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# “Social Innovation and Technology for Area Development to Sustainable Community Development”

KSU SINtech 2023 for ADSCD

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December 17th – 19th, 2023

at Office of the President and Asset Management Building,  
Kalasin University, Kalasin City, Kalasin Province



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## Proceedings of Kalasin University Conference

<http://conference.ksu.ac.th>

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**Purposes :** The purposes of the conference are to publicize the valuable research articles and academic articles presented at Kalasin University International Conference and to be the medium for sharing the academic perspectives of researchers, academics, undergraduates and graduated students, and lecturers in the fields of health sciences, engineering, agriculture, science and technology, education, business administration, services and tourism, laws, politics, administrations, social sciences, and humanities.

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## Message from The President of Kalasin University Council

Stepping into the 8th year of Kalasin University, the institution is proud to host "The 2nd National and International Academic Conference 2023" with the theme "Social Innovation and Technology for Area-based Development to Sustainable Community Development." The event is scheduled to take place from December 17th to 19th, 2023, at the Office of the President and Asset Management Building, Kalasin University, Kalasin City, Kalasin Province.

This conference serves as a public platform for the exchange of research and academic endeavors among students, faculty staff, academics, researchers, and educational personnel. It aims to foster a network of academic cooperation, facilitating the advancement of research and creative innovation on both national and international fronts, effectively addressing the country's needs. Co-hosted by 30 organizations from both domestic and international spheres, the event featured 175 articles in oral presentations and poster sessions at both national and international levels.

On behalf of the Kalasin University Council, I extend a warm welcome to all co-hosts and presenters. I express my sincere wishes for the successful attainment of the conference objectives. It is my hope that Kalasin University will emerge as a pillar in academics and the local development of Kalasin Province and neighboring areas, guided by the university's philosophy: "Knowledge Cultivates Values, Wisdom Strengthens Society."

I am highly confident that the personnel of Kalasin University will harness harmony, knowledge, and their diverse abilities to pioneer and enhance the university for further progress. We look forward to the continued organization of national and international conferences in the coming years.



Emeritus Professor. Soottiporn Chittmittrapap, M.D., Royal Academician  
President of Kalasin University Council



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## Message from The President of Kalasin University

Kalasin University is committed to driving the university strongly, continuously, and sustainably towards becoming a "University for Local Development." This strategic vision is founded on disciplines such as science, social sciences, technology, and innovation, complemented by the incorporation of the King's Philosophy of Sufficiency Economy, local wisdom, and recent knowledge. These guiding principles serve as the foundation for the creation of academic works, driving Kalasin University to the forefront as the leading local institution. In 2023, Kalasin University is hosting "The 2nd National and International Academic Conference", with the theme "Social Innovation and Technology for Area-Based Development to Sustainable Community Development" on December 17th to 19th, 2023, at the Office of the President and Asset Management Building, Kalasin University, Kalasin City, Kalasin Province. This conference represents the cooperation of 42 national and international academic and educational institutes from six countries, presenting a total of 175 papers.

I would like to extend my sincere congratulations and appreciation to all of us for successfully organizing this academic conference, particularly on a topic crucial for the development of the country and Thai society today: "Social Innovation and Technology for Area-Based Development to Sustainable Community Development."

Social Innovation and Technology for Area Development serves as an important tool in solving problems and creating opportunities for sustainable community development. Through the integration of local knowledge and wisdom with modern technology, it enables the creation of innovations and development strategies that truly align with the needs of the community.

Kalasin University, as a higher education institution in the northeastern region, recognizes the importance of sustainable community development. As a result, the university has formulated a development strategy that emphasizes active involvement in community and social development. This includes a special focus on advancing innovation and technology to improve the quality of life of the people and create a strong grassroots economy.

This academic conference presents a significant opportunity for academics, faculty staff, researchers, students, and individuals from various sectors to share knowledge through research presentations. Moreover, it offers a valuable chance to establish a cooperative

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network aimed at advancing social innovation and technology for area-based development, contributing to sustainable community development.

On behalf of Kalasin University, I extend a warm welcome to all participants and express my sincere wishes for this event to be successful according to the set objectives. Lastly, I extend heartfelt gratitude to the committees, experts, presenters, participants, and sponsors who have contributed to the success of the 2nd Kalasin University National and International Academic Conference.



Assoc.Prof.Jirapun Huaisan  
President of Kalasin University



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**Tel.: +86-771-3260218 Fax: +86-771-3262052 Email: [dice@gxmzu.edu.cn](mailto:dice@gxmzu.edu.cn)**

14 Nov., 2023  
Nanning, Guangxi, PRC

**Assoc. Prof. Jirapun Huaisan**  
**President**  
**Kalasin University(KSU)**

**Prof. Dr. Xie Shangguo**  
**President**  
**Guangxi Minzu University(GXMZU)**

**Subject: Reply to the Agreement on Co-hosting the 2<sup>nd</sup> International Conference t “Social Innovation and Technology for Area Based Development for Sustainable Community Development: KSU- SINtech 2023 for ADSCD”**

Dear Assoc. Prof. Jirapun Huaisan,

Warm greetings from Guangxi Minzu University, the People's Republic of China!

The official letter dated September 11, 2023 from KSU has been well received, and the leadership team of GXMZU has decided and reply to the kind invitation for our university to co-host the 2<sup>nd</sup> International Conference “Social Innovation and Technology for Area Based Development for Sustainable Community Development: KSU- SINtech 2023 for ADSCD” as follows:

We agree to co-host the 2<sup>nd</sup> International Conference “Social Innovation and Technology for Area Based Development for Sustainable Community Development: KSU- SINtech 2023 for ADSCD” with Kalasin University of the Kingdom of Thailand, and authorize Kalasin University to use the name and logo of GXMZU in this conference.

We will inform you as soon as possible once the GXMZU participants confirmed.

Warm regards,



**Prof. Dr. Xie Shangguo**  
**President**  
**Guangxi Minzu University**

谢尚果

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## UNIVERSITAS PEKALONGAN ( U N I K A L )

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**Kampus Terpadu:**

Jl. Sriwijaya No. 3 Pekalongan  
Telp. (0285) 426800, 421464

November 9<sup>th</sup>, 2023

Subject : Co-host Requirements

Dear President of Kalasin University,

Referring to our letter of acceptance to co-host the Kalasin University Second International Conference, here we send the co-host requirements:

1. We authorize the use of Unikal logo for the conference purposes. The logo file is attached with this letter.
2. We plan to delegate five people to attend the conference consisting of three vice-rectors, Head of the research and community service and Postgraduate and Cooperation Program representative. We will inform you of these names again before departure.
3. We send articles of Pekalongan University lecturers for publication in the conference proceeding.
4. We appoint three reviewers for the conference:
  - a. Associate Professor Dr. Chalimah, M.M.
  - b. Dwi Agustina, M.Pd.BI., Ph.D.
  - c. Siwi Sri Widhowati., S.Kep., Ns., M., Sc., Ph.D

We are waiting for good news about the conference. If there are additional requirements needed, please contact us. We will respond to it as soon as possible.

Thank you very much for your kind of cooperation.

Sincerely yours,  
Rector of Pekalongan University



Andi Kushermanto, S.E., M.M.



Khangkhay Teacher Training College  
Address: Khangkhay Village, Road Number 07,  
Pek District, Xiengkhouang Province, Laos.  
Tel: +856 61215004 Fax: +856 61215003

**Re: letter of Invitation**

December 11, 2023  
Assoc. Prof. Jirapun Huaisan  
President of Kalasin University

Dear the President of Kalasin University,

Thank you very much for your Invitation to the second international conference titled “Social Innovation and Technology for Area Based Development for Sustainable Community Development: KSUSIN tech 2023 for ADSD” from December 17 to 19, 2023 at Kalasin University. We are delighted and honored to be invited to the conference. Following is the name list of our delegates who are going to attend the conference.

1. Mr. Soutchanthong CHANTHAVONG, the Director
2. Mr. Sommay SHINGPHACHANH, Head of Science and Research Center
3. Mr. Keovongkot INSIXIENGMAI, Technical Staff

For more information, please contact Ms. Saysouly SORPHOUPHIENG

Email: [saysouly2011@hotmail.com](mailto:saysouly2011@hotmail.com) Mobile: +85620 54309897

We value the conference will be a valuable opportunity for us to gain new insight regarding the Social Innovation and Technology for Area Based Development for Sustainable Community Development and strengthen our collaboration between our both institutes.

Sincerely,

Mr. Soutchanthong CHANTHAVONG  
Director of Khangkhay Teacher Training Colleg





**Northern Agriculture and Forestry College**

P.O. Box.154 LuangPrabang Province Lao. PDR

Tel: +856 71 219 036. Mobile: +856 20 5570 0538, Fax: +856 71 219 034

www.nafclao.org

11 December 2023

**Official letter of informing**

To: Assoc. Prof. Jirapun Huaisan  
President of Kalasin University  
62/1 Kasetsomboon Road, Kalasin Sub-District, Mueang District, Kalasin  
Province 46000

Tel: +6643-811128, Mobile: +6686-4584360, Fax: +6643-813070

From: Northern Agriculture and Forestry College, NAFC

Re: To submit committees list from NAFC for the co-host of the 2<sup>nd</sup> KSU international  
conference titled: "Social Innovation and Technology for Area Based Development  
for Sustainable Committee Development during 17 to 19 December 2023 at Kalasin  
University, Kalasin Thailand

- Referring to MoU between Northern Agriculture and Forestry College (NAFC) and  
Kalasin University (KSU)
- According to an official invitation of KSU on the date September, 11<sup>th</sup> 2023 for  
inviting professors from NAFC to be the co-host at the KSU international conference

We are honored to inform that, the Director of NAFC assigned 2 teachers for participating to  
be the co-host committees of the 2<sup>nd</sup> KSU international conference titled: "Social Innovation  
and Technology for Area Based Development for Sustainable Committee Development"  
during 17 to 19 December 2023 at Kalasin University, Kalasin Thailand as named:

- 1) Mr. Somsy Khammanivong, Deputy Director of NAFC
- 2) Mr. Bounchan Lengsavath, Head of Administrative Office NAFC

*For more information please do not hesitate to contact:* Mr. Amphaivanh Souksanty

Tel: +856 20 5570 0538 email: [souksanty@yahoo.com](mailto:souksanty@yahoo.com)

Your sincerely,

Director of NAFC







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**National Pingtung University of Science and Technology**  
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October 18<sup>th</sup>, 2023

**Assoc. Prof. Jirapun Huaisan**  
**President**  
**Kalasin University**

Dear President Jirapun Huaisan,

I hope this letter finds you well. On behalf of National Pingtung University of Science and Technology (NPUST), I would like to extend our heartfelt gratitude for extending an invitation to us to co-host the upcoming international conference at Kalasin University in December.

However, due to a significant milestone fast approaching, we regret to inform you that we will not be able to fully participate as co-hosts for the conference this year. Our university is on the cusp of celebrating its 99th school anniversary in November, a momentous occasion that requires the full dedication of our faculty and staff. Given these circumstances, it is with a heavy heart that we find ourselves unable to organize our faculty members for the paper reviewing task.

To this end, we would like to propose an alternative approach to our involvement in the conference. I will send the Dean of the Office of International Affairs and College of Humanities and Social Sciences, Prof. Dr. Vincent Ru-Chu Shih to attend the event. Furthermore, if there is a need for additional paper reviewers, we are prepared to invite two of our professors to assist with the paper review process.

We hope this solution is acceptable to you, and we look forward to discussing the details of our participation further. Please let us know if you have any suggestions or additional requirements for our involvement in the conference. Thank you for your understanding and flexibility in accommodating our current commitments.

Sincerely,

A handwritten signature in blue ink that reads 'C. L. Chang'.

Prof. Dr.-Ing Chin-Lung Chang  
President  
National Pingtung University of Science and Technology, Taiwan

## Tentative Schedule

The 2<sup>nd</sup> National and International Academic Conference Kalasin University 2023

Theme: “Social Innovation and Technology for Area Based Development for  
 Sustainable Community Development”

KSU SINTech 2023 for ADSCD Hybrid Conference (Onsite & Online)

December 17<sup>th</sup> – 19<sup>th</sup>, 2023 at Office of the President and Asset Management Building,  
 Kalasin University, Kalasin City, Kalasin Province

Time	Activities
<b>December 17<sup>th</sup>, 2023 at Kalasin University Hall</b>	
09.00 – 16.00 PM.	Attend the exhibitions and poster installation for the presenters at the conference venue (2 <sup>nd</sup> floor of the at Office of the President and Asset Management Building)
16.00 – 17.00 PM.	Registration for the welcome party
17.00 – 17.15 PM.	Welcome speech by <b>Assoc. Prof. Jirapun Huaisan, the President of Kalasin University</b>
17.15 – 17.45 PM.	Group Photos Session
17.45 – 18.00 PM.	Traditional Performances by <b>Kalasin University Ponglang Band</b>
18.00 – 21.00 PM.	Dinner
21.00 PM.	Relaxation

Time	Activities
<b>December 18<sup>th</sup>, 2023 at Office of the President and Asset Management Building</b>	
08.30 – 08.30 AM.	Registration and attend an exhibition on research outcomes and innovation for area development.
08.30 – 09.00 AM.	Welcome VIP/VIP (group) list to create a seating arrangement and invite VIPs to their assigned seats.
09.00 – 09.15 AM.	Kalasin University's introductory VDO presentation
09.15 – 09.30 AM.	Opening ceremony performance

Time	Activities
<b>December 18<sup>th</sup>, 2023 at Office of the President and Asset Management Building</b>	
09.30 – 09.45 AM.	- <b>Opening Ceremony-</b> - Addressing the report of the KSU Conference by <b>Asst. Prof. Dr. Phimlikid Kaewhanam</b> , the Director of Research and Development Institute
09.45-10.00 AM.	- Delivering the opening remark by <b>Mr. Sanan Phongaksorn, the Governor of Kalasin Province</b> and President of Ceremony - All partners and representatives of co-host institutes join the opening ceremony on stage: Governor of Kalasin Province, President of Kalasin University, the Director of Program Management Unit on Area Based Development (PMU A), and Members of Kalasin University Council - The President of Kalasin University, along with representatives from co-host and organizations, activates the laser to project the letter “KSU”, marking the opening of the conference
10.00 – 10.20 AM.	- Giving souvenir to representatives of co-host institutes and organizations by <b>Assoc. Prof. Jirapun Huaisan, the President of Kalasin University</b>
10.20 – 10.40 AM.	-Special talk by <b>Mr. Sanan Phongaksorn, the Governor of Kalasin Province and President of Ceremony</b> entitled “ <b>Area-Based Development and the Improvement of People's Quality of Life</b> ”
10.40 – 11.10 AM.	-Special talk on “ <b>Urban Development Guidelines for Grassroots Economic Development</b> ” by <b>Assoc. Prof. Dr. Poon Thiengburanathum</b> , the Deputy-Director for Planning and Organizational Strategy of the Program Management Unit for Human Resources & Institutional Development, Research and Innovation (PMU)
11.00 – 11.30 AM.	-Special talk on “ <b>Roles of Higher Education for Sustainable Area-Based Development</b> ” by <b>Prof. Qin Yinghong</b> (Dean of School of Civil Engineering and Architecture) Guangxi Minzu University (GXMZU), China
11.30 – 11.45 AM.	- Group photos
11.45 – 12.00 AM.	- Attend an exhibition on research outcomes and innovations for area-based development
12.00 A.M. – 01.00 PM.	Lunch break
01.00 PM. - 05.00 PM.	<b>National and international poster presentation session at the 2sd floor of the Office of the President and Asset Management Building</b>  1. Engineering and Innovation 2. Health Science and Technology

Time	Activities
<b>December 18<sup>th</sup>, 2023 at Office of the President and Asset Management Building</b>	
	3. Agricultural Technology and Innovation 4. Business Administration, Economics, Hospitality and Tourism 5. Educational Sciences, Education, and Learning Management Innovations 6. Humanities, Social Sciences and Innovation for Local Development 7. Innovation Solving Area Poverty Problems for Sustainability
01.00 PM. - 05.00 PM.	<b>National research presentation session at the Office of the President and Asset Management Building, Building 14, and Building 15</b> 1. Engineering and Innovation 2. Health Science and Technology 3. Agricultural Technology and Innovation 4. Business Administration, Economics, Hospitality and Tourism 5. Educational Sciences, Education, and Learning Management Innovations 6. Humanities, Social Sciences and Innovation for Local Development 7. Innovation Solving Area Poverty Problems for Sustainability
01.00 PM. - 05.00 PM.	<b>International research presentation session at the Office of the President and Asset Management Building, Building 14, and Building 15</b> 1. Engineering and Innovation 2. Health Science and Technology 3. Agricultural Technology and Innovation 4. Business Administration, Economics, Hospitality and Tourism 5. Educational Sciences, Education, and Learning Management Innovations 6. Humanities, Social Sciences and Innovation for Local Development 7. Innovation Solving Area Poverty Problems for Sustainability
<b>December 19<sup>th</sup>, 2023</b>	
08.00 AM. - 09.00 AM..	<b>Registration for study tour</b>
09.00 AM. - 04.00 PM.	<b>Study tour</b> (details to be provided later)

- Remark:**
1. Other committees are responsible for related duties
  2. The schedule is subject to change as necessary
  3. Participants include a total of 150 people (seating plan arrangement)

## Program Speaker International Conference

**Sessions 1**                      Engineering and Innovation

**Chairman**                      Dr.Methawee Sriwattanapong Photisan     : Nakhon Ratchasima Rajabhat University

**Co-Chairman**                 Dr.Arjaree Saengsathien                         : Kalasin University

**Moderator**                     Mr.Teetipon Vimuktananda                       : Kalasin University

**Assistant Moderator**       Mr.Tawan Thongsuk                               : Kalasin University

   Mr.Teerachati Noisombut                       : Kalasin University

**DATE**                              December 18, 2023

**Presentation**                 Oral (International)

**Room:** Cog meeting room

**Venue:** Faculty of Engineering and Industrial Technology, Kalasin University

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-OI-001	01.00-01.15 PM	The analysis of current operation problems and application of tracking audit in engineering cost of express delivery company in Kunming, China <i>Yue Huang</i>	Online
2	KSUC-OI-002	01.15-01.30 PM	The advantages of bim technology on the construction efficiency of a sample green residential project <i>Jieru Yang</i>	Online
3	KSUC-OI-003	01.30-01.45 PM	Enhancing sme construction project success: a tqm approach in Kunming, the people's republic of China <i>Kaixiang Shi</i>	Online
4	KSUC-OI-004	01.45-02.00 PM	Impacts of supply chain collaboration and firm performance: the mediating role of supply chain capabilities of express delivery companies in Kunming, the people's republic of China. <i>Chun Mei Li</i>	Online
5	KSUC-OI-005	02.00-02.15 PM	Sustainable construction supply chain for green building: a case of the siem reap airport terminal <i>Zheng Guan</i>	Online

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
6	KSUC-OI-006	02.15–02.30 PM	Factors affecting supply chain management strategies and financial performance towards the competitive advantage of small and medium-sized enterprises in Kunming, the people's republic of China  <i>Ni Chang</i>	Online



## International Conference

**Session 2** Health Science Technology

**Chairman** Assoc.Prof.Dr.Watcharapong Ruankham : Chiang Rai Rajabhat University

**Co-Chairman** Asst.Prof.Dr.Punika Chaisemsaeng : Kalasin University

**Moderator** Miss Podjaman Inudom : Kalasin University

**Assistant Moderator** Asst.Prof.Dr.Tipubon Tippalert : Kalasin University  
 Miss Sasitorn Sanpundorn : Kalasin University

**DATE** December 18, 2023

**Presentation** Oral (National and International)

**Room:** 1541 Fourth floor

**Venue:** Faculty of Administrative Science, Kalasin University

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-OI-007	01.15-01.30 PM	Improving the quality of life for the elderly through the use of an online elderly system, with family and community involvement in Maha Sarakham province <i>Nitaya Buntao</i>	Online
2	KSUC-OI-008	01.30-01.45 PM	Fabrication of erythromycin-loaded poly (vinyl alcohol)/chitosan/collagen nanofiber mats via electrospinning as potential wound dressings <i>Narakorn Paengyotha</i>	Online
3	KSUC-OI-009	02.00-02.15 PM	Physical activity, play exercise and early stimulation treatment for stunting ages 25 – 59 month in the Karanganyar health center area Pekalongan district <i>Andung Maheswara Rakasiwi</i>	Online



## International Conference

<b>Sessions 4</b>	Business Administration, Economics, Hospitality, Tourism	
<b>Chairman</b>	Dr.Daranee Ketchompu	: Nakhon Phanom University
<b>Co-Chairman</b>	Asst.Prof.Dr.Chairung Chaikambang	: Kalasin University
<b>Moderator</b>	Mr.Jonathan Wary	: Kalasin University
<b>Assistant Moderator</b>	Mrs. Wilawan Tongsuksaeng	: Kalasin University
<b>DATE</b>	December 18, 2023	
<b>Presentation</b>	Oral (International)	

**Room:** 1534, Third floor

**Venue:** Faculty of Administrative Science, Kalasin University

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-OI-012	01.00-01.15 PM	An investigation into the development of preschool education teachers in An Giang province, Viet Nam <i>Nguyen Bach Thang, PhD</i>	Onsite
2	KSUC-OI-013	01.15-01.30 PM	Income smoothing through loan loss provisions in Vietnamese banks <i>HOANG, Hanh Nguyen</i>	Onsite
3	KSUC-OI-014	01.30-01.45 PM	Changing behavior in climate change: exploring factors influencing environmentally friendly products adoption among urban consumers in Hue, Vietnam <i>Ngô Minh Tam</i>	Onsite
4	KSUC-OI-015	01.45-02.00 PM	Assessing the impact of government responses to the covid-19 pandemic on stock market performance: insights from Asian countries <i>Thi Bich Ngoc TRAN</i>	Onsite
5	KSUC-OI-016	02.00-02.15 PM	The volatility spillovers between the cryptocurrency market and traditional markets <i>Phan Nhat Quang</i>	Onsite
6	KSUC-OI-017	02.15-02.30 PM	Determinants of energy poverty in the central coastal area, Vietnam <i>Yen Hai Nguyen</i>	Onsite

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
7	KSUC-OI-018	02.30-02.45 PM	A study of customer behavior and satisfaction towards online technology product distributors who receive products through transport service providers in Samut Sakhon province <i>Adul Nongpa</i>	Online
8	KSUC-OI-019	02.45-03.00 PM	Risk evaluation and mitigation strategies for Chinese investments in overseas public-private partnerships <i>Min Yang</i>	Online
9	KSUC-OI-020	03.00-03.45 PM	Improvement strategies of quality in textile and garment production in shanghai <i>Zhou Zhijun</i>	Online
10	KSUC-OI-021	03.45-04.00 PM	The effect of financial performance and firm size on bond rating <i>Siti Pujiwati</i>	Online

## International Conference

<b>Sessions 5</b>	Education, Pedagogy and Learning Management Innovation	
<b>Chairman</b>	Dr.Duangporn Sriboonruang	: Rajabhat Maha Sarakham University
<b>Co-Chairman</b>	Asst.Prof.Dr.Chulida Hemtasin	: Kalasin University
<b>Moderator</b>	Mr.Nanthanut Wiangin	: Kalasin University
<b>Assistant Moderator</b>	Mr.Niwat Chinserm	: Kalasin University
<b>DATE</b>	December 18, 2023	
<b>Presentation</b>	Oral (International)	

**Room:** Dino Theater, Eighth floor

**Venue:** Faculty of Administrative Science, Kalasin University

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-OI-022	01.00-01.15 PM	Interlinking the cooperative and work-Integrated Education Programs of COLA KKU vis-à-vis english language teaching and learning  <i>Xenia R. Emperador-Garnace, Ph.D.</i>	Onsite
2	KSUC-OI-023	01.15-01.30 PM	Factors affecting year 2 students' poor english reading ability at department of foreign languages faculty of languages, Souphanouvong University. academic year 2020-2021  <i>Sisoury Phommaseng</i>	Onsite
3	KSUC-OI-024	01.30-01.45 PM	Students' reluctant in english speaking. A cased study of english teacher students at the faculty of education, Souphanouvong University, Lao PDR  <i>Toulakone Souliya</i>	Onsite
4	KSUC-OI-025	01.45-02.00 PM	Error analysis of Lao undergraduate students' in english speaking and writing skills 4th year students faculty of languages, Souphanouvong University 2023-2024.  <i>Somsack PHETSAMAI</i>	Onsite

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
5	KSUC-OI-026	02.00-02.15 PM	Training and recruitment of male teachers at the preschool level with a gender equal approach <i>Nguyen Minh Diem Quynh</i>	Online
6	KSUC-OI-027	02.15-02.30 PM	The optimization of the may fourth commune online learning platform: improvement and efficiency <i>Xiaochong Li</i>	Online
7	KSUC-OI-028	02.45-0.300 PM	User experience of intelligent center of vocational education platform based on blended teaching: the perspective of higher vocational teachers <i>Fanghui Quan</i>	Online
8	KSUC-OI-029	03.00-03.15 PM	A conceptual framework of instructional model enhancing cognitive skills based on Thai qualifications framework for higher education for undergraduate students of Rajabhat Universities <i>Kantida Boonma</i>	Online
9	KSUC-OI-030	03.30-03.45 PM	The importance of bamboo flute in the primary school curriculum <i>Chen Sai</i>	Online



## International Conference

**Sessions 6** Humanities, Social Science, and Innovation for Local Development

**Chairman** Asst.Prof.Dr.Patawee Chotanan : Ubon Ratchathani University

**Co-Chairman** Dr.Suwitchan Un-udom : Rajabhat Maha Sarakham University

**Moderator** Miss Narueta Hongsa : Kalasin University

**Assistant Moderator** Miss Prapaporn Nongharnpituk : Kalasin University

**DATE** December 18, 2023

**Presentation** Oral (International)

**Room:** Meeting Room the 6<sup>th</sup> floor

**Venue:** Office of the President and Asset Management, Kalasin University

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-OI-031	01.00-01.15 PM	The Indonesian netizens' response to tiktok as English learning media <i>Dwi Ario Fajar</i>	Online
2	KSUC-OI-032	01.30-01.45 PM	Populism sentiments in Indonesian higher education curriculum <i>Susanto</i>	Online
3	KSUC-OI-033	01.45-02.00 PM	Digital skills development policy for a better quality of life for the elderly in Bangkok. <i>Atthapon Chaianun</i>	Onsite
4	KSUC-OI-034	02.00-02.15 PM	Guidelines for Developing the International Effectiveness of Academic Administration in Higher Education Institutions <i>Sivaphong Orpong</i>	Onsite
5	KSUC-OI-035	02.15-02.30 PM	Study and find patterns to prevent problems from expanding the NEET group in the northeast of Thailand <i>Surangrat Jintanasathirakul</i>	Onsite

## International Conference

**Sessions 6** Humanities, Social Science, and Innovation for Local Development

**Chairman** Asst.Prof.Dr. Waraporn Chedchoo : Naresuan University

**Co-Chairman** Dr.Worachat Kitrenu : Kalasin University

**Moderator** Miss Pattharaporn Wathawatthana : Kalasin University

**Assistant Moderator** Miss Jamlonglak Siangsanana : Kalasin University

**DATE** December 18, 2023

**Presentation** Oral (International)

**Room:** Computer 3, 2nd floor (ห้องคอมพิวเตอร์ 3 ชั้น 2)

**Venue:** Office of the President and Asset Management, Kalasin University

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-OI-036	01.15-01.30 PM	Analysis of village owned enterprises (bumdes) development: efforts to create a developed and independent tourism village <i>Chalimah</i>	Online
2	KSUC-OI-037	01.30-01.45 PM	Purchase decision of green product "batik with natural dyes" <i>Danang Satrio</i>	Online
3	KSUC-OI-038	01.45-02.00 PM	Program music on "the expression" song for big band jazz: eventful <i>Thitinun Charoensloong</i>	Online
4	KSUC-OI-039	02.00-02.15 PM	Creation of rongngen "gunung selatan" <i>Ketkaew Bunrattanang</i>	Online
5	KSUC-OI-040	02.15-02.30 PM	Chao Phraya's Lightning Suite <i>Nayos Sartjinpong</i>	Online
6	KSUC-OI-041	02.30-02.45 PM	Didgeridoo: creating traditional aboriginal musical instruments from alternative materials <i>Pariphon Dinlansagoon</i>	Online

	KSUC-OI-042	02.45-03.00 PM.	A creative work prasad wai for trumpet quartet <i>Kueakool Jaisom</i>	Online
7	KSUC-OI-043	03.00-03.15 PM	Neo-hanuman for flute, violin, cello and piano: the burning of Longka <i>Thanyawat Sondhiratna</i>	Online
8	KSUC-OI-044	03.15-03.30 PM	A creative work: Sor Pamar song for wind quartet <i>Saksit Smithitam</i>	Online

## International Conference

**Sessions 6** Humanities, Social Science, and Innovation for Local Development

**Chairman** Asst.Prof.Dr.Piyanat Soikham : Ubon Ratchathani University

**Co-Chairman** Assoc.Prof.Dr.Parisha Marie Cain : Kalasin University

**Moderator** Miss Kamollapat Chaisongkram : Kalasin University

**Assistant Moderator** Asst.Prof.Dr.Nataya Hokpanna : Kalasin University

**DATE** December 18, 2023

**Presentation** Oral (International)

**Room:** Computer 1, 2nd floor

**Venue:** Office of the President and Asset Management, Kalasin University

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-OI-045	01.00-01.15 PM	A confirmatory factor analysis of factors influencing the job performance of royal Thai army personnel <i>Colonel Tammasarit Junjuajarn</i>	Online
2	KSUC-OI-046	01.15-01.30 PM	The effect of local governance on subjective well-being evidence from household survey <i>Pham Thi Bich Ngoc</i>	Online
3	KSUC-OI-047	01.45-02.00 PM	The role of employee performance on organizational cohesiveness mediated by employee trust <i>Isti Windari Suryaningsih dan Chalimah</i>	Online
4	KSUC-OI-048	02.00-02.15 PM	The influence of job satisfaction, quality of work life and organizational commitment on intention to stay <i>Akhmad Zaeni dan Chalimah</i>	Online
5	KSUC-OI-049	02.15-02.30 PM	Analysis of factors influencing organizational citizenship behaviors :a case study of members of the Pekalongan city resort police office <i>Meidiyanto Ibnu Putra, Zahro</i>	Online

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
6	KSUC-OI-050	02.30-02.45 PM	The impact of female chairs on firm risk: evidence from Vietnam <i>Nguyen Ho Phuong Thao</i>	Onsite
7	KSUC-OI-051	02.45-03.00 PM	Welfare impact of microcredit on rural households in Vietnam <i>Phan Nguyen Khanh Long</i>	Onsite
8	KSUC-OI-052	03.00-03.15 PM	Market analysis and willingness-to-pay for implementing water quality management devices - iots in white leg shrimp farming facilities in the Mekong delta region <i>Dao Duy Minh</i>	Onsite

## Program Poster

<b>Sessions 6</b>	Humanities, Social Science, and Innovation for Local Development	
<b>Chairman</b>	Assist.Prof.Dr.Satit pakmaluk	: Sakonnakhon Rajabhat University
<b>Co-Chairman</b>	Assist.Prof.Dr.Kittanut Yanpisit	: Kalasin University
<b>Moderator</b>	Mr.Apichet Samerjai	: Kalasin University
<b>DATE</b>	December 18, 2023	
<b>Presentation</b>	Potser (International)	

**Link:**

**Room:** Hall **Venue:** Office of the President and Asset Management, Kalasin University, Mueang District, Kalasin Province

NO.	Article ID	Time	Name of Manuscript/ Author's Name	Scientific Programme
1	KSUC-PI-001	01.00-01.15 PM	A sustainable learning model for conservation and utilization of natural resources, tailored to the community and forest practices in areas susceptible to frequent forest fires, has been developed in the Phu Long forest of Phu Khiao district, Chaiyaphum province <i>Tawan Chumpapho</i>	Onsite (Poster)
2	KSUC-PI-002	01.15-01.30 PM	Model of conservation and prevention for the biodiversity loss according to live of the community people with forest by participation of network associates in the area at risk of repeated forest fires in Phu Long forest, Phu Khiao district, Chaiyaphum province <i>Warawut Mahamit</i>	Onsite (Poster)

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# Oral Presentation

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KSUC-OI-001

## The analysis of current operation problems and application of tracking audit in engineering cost of express delivery company in Kunming, China

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### Abstract

The purposes of this research were (1) To analyze the problems existing in the current operation and the application of tracking audit in engineering cost, (2) To compare the similarities and differences of engineering activities that take place within the express delivery company, and (3) To propose ways to reduce the engineering costs of the express delivery company in Kunming, China. The key information is 16 people owners of businesses or assigned managers, experienced team members, and employees, with two groups selected from each company. All informants had at least 3 years of experience in managing or operating the express delivery company. The research tool is the semi-structured interview and content analysis, The results of problems of the express delivery company from 2 groups of key informants, have 12 factors as follows: (1) competition situation, (2) last-mile delivery, (3) business owners lack sufficient funds, (4) regulatory challenges, (5) operational efficiency (6) measures to protect against COVID-19, (7) air and water transportation, (8) environmental concerns, (9) disruptions and external factors, (10) data security and privacy, (11) security and fraud, and (12) the monopoly of shipping. Results of the application of tracking audit in engineering cost can be summarized in eight factors as follows: (1) logistics communication, (2) customer service, (3) procurement, (4) managing the transportation, (5) warehouse management and storage, (6) feedback, (7) material handling, and (8) packaging and packages. The model of reducing engineering costs is an ongoing process that involves several steps. First, analyze the situation and identify the problem. Next, program direction, followed by building objectives. To establish a cost-cutting strategy, operations, including prevention and appraisal costs, should involve the participation of all parties involved. Accurate measurement and stakeholder satisfaction are crucial for providing quality services and achieving continual improvement. By following these steps, can adopt new technologies and adjust as needed to achieve long-term success.

**Keywords:** Problem of express delivery company, Application of tracking audit, Engineering cost.

## Introduction

China's rapid economic growth also caused some problems at the same time, to avoid major investment projects, the engineering construction projects "high low yield" and "jerry-built projects", the audit institution reform in the previous post audit way, advocates the advance, the whole process of tracking audit approaches, the resulting tracking audit (Hao, 2022). The research on the whole process of tracking audits has not stopped. Tracking audits are mostly used in real estate development and construction projects. Under the rapid development of the economy and the acceleration of the country's urbanization process, more large-scale construction projects have emerged, and the ensuing increase in project quotations. In the actual construction process, due to various reasons, the project volume is large, and uncontrollable factors affect the overall cost level, so there will be many problems, such as the lack of scientific quality management, the inability to find existing defects, and safety hazards in time. At the same time, it will also be the main factor that restricts the quality, safety, and cost of project construction (Wenlong, 2017).

The traditional audit work is to collect and sort out the list of materials and equipment consumed in the construction of the project, and the settlement of personnel wages, after the completion of the project. During this process, it is also necessary to audit the cost, mainly to analyze whether the use of these funds in place, it is in line with the actual needs, and the placement of the remaining funds after the completion of the project. Audit the construction drawings of the project and conduct corresponding audits and supervision on the project cost. The completion of an audit is a crucial stage in any construction project. It is important to discover any problems that may exist in the project as soon as possible. If the audit of the construction project's cost is not sufficient, it can lead to unnecessary losses, affect the quality of the project, and even delay the construction project's progress. Such an audit is a post-project work that takes place after the project's operation period. Due to the long operation period, illegal activities such as cutting corners and exploiting loopholes in the project process may go unnoticed. This can prevent the project from realizing its maximum economic benefits (Ting et al. 2013). Therefore, the follow-up audit in the project implementation came into being. Tracking and auditing can run through the entire process of the entire project, based on the project. Budget and cost management, by determining the project cost, in the project design stage, carrying out cost determination, estimation, calculation, control, and evaluation, and using various methods to Items controlled (Olanipekun, 2018). Therefore, construction projects should establish an independent project cost-tracking audit mode, establish a sound cost supervision system, and comprehensively analyze the project budget implementation in combination with the implementation effect of the procurement budget, to ensure the smooth progress of the project.

This research analyzes the composition of the project quality control system, as well as the basic theories and methods of cost audit and supervision, The role of project cost tracking audit is used to evaluate the importance and influence of audit in the whole process of engineering projects. To ensure that the project construction work can be carried out smoothly, and the same time, control the false situation of the project cost, we will focus on the design links that have a large impact on the project cost

to ensure that all links in the construction project can be effectively implemented. The audit estimates the project quantity, determines the project cost and construction cost, and then carries out the project settlement and settlement. It also aims to predict problems related to the application of tracking audit in engineering cost and compare tracking and inspection. The research suggests that using tracking audit can be a backup plan for work mode planning and can increase operational efficiency. Currently, the project cost is being monitored through tracking.

## 1. Research Objectives

1.1 To analyze the problems existing in the current operation and the application of tracking audit in engineering cost of the express delivery company in Kunming, the People's Republic of China.

1.2 To analyze and compare the similarities and differences of engineering activities that take place within the express delivery company in Kunming, the People's Republic of China.

1.3 To propose ways to reduce the engineering costs of the express delivery company in Kunming, the People's Republic of China.

## 2. Review of Related Literatures

### 2.1 Express Delivery Company Context In Kunming

China is known as the commercial center of Asia, one of which is Kunming, located in Yunnan province. It is a promising market for imported goods and services worldwide. Especially products produced by foreign investment entrepreneurs. Which quickly invested in Kunming until it became the number one important retail market in China. Kunming is the capital city of Yunnan province. It is China's fourth-largest port after Shanghai, Beijing, and Guangzhou, where the Chinese authorities intend to serve as a gateway to Western trade. After developing the R3A route, the Silk Road connecting China-Laos and Thailand was established in 1995 under the project "Economic Square," and was officially launched in 2008, with a distance of approximately 1,240 kilometers from Chiang Rai province to Kunming. It is also a path to develop trade, investment, and logistics for quality, increasing the competitiveness of entrepreneurs, and seeking new markets to increase as well as developing supply chains to support the linkage of countries in the Mekong sub-region. Promote the diverse Lanna culture and social capital. Both are culturally linked with neighboring countries in the Mekong sub-region at the same time.

This area is targeting logistics hubs to trade with allies who want to enter the Chinese market. About 4 million citizens have taken up trading careers in Kunming. While the population of Yunnan is 45 million people, they see trade opportunities and foreign businessmen, who want to penetrate this market, in addition to general roadside stalls Images of cyclists peddling goods can still be seen, it is a traditional selling culture that the Kunming people have done since the past.

Nowadays, this is a world of free trade. The Yunnan authorities saw the potential for trade in the city. Kunming has been renovated into a "new city" along with the installation of important infrastructure such as the airport. A large electric train project that is expected in the next 2 years, all construction plans will be completed. For the "port city" of this support for trade that will flow continuously. The business in



Kunming that has grown exponentially over the past 10 years is mining hydropower plants, pharmaceuticals, real estate, and retail (Yiqun, 2016). The Kunming municipal government has formulated the 2011-2015 Logistics Modernization Development Plan for Kunming and has prepared a budget of 1.12 trillion yuan to develop Kunming into an inter-China distribution center. Inland and ASEAN or the government in Kunming are called "Network 1234", with the number 1 referring to the logistics connection between the central cities of Yunnan Province to reach each other within 1 hour. Number 2 means the link of 2 oceans, namely the Pacific Ocean and the Indian Ocean Number 3 means the connection of 3 regions, namely East Asia Southeast Asia, and South Asia, and number 4 means connecting and expanding logistics management around the 4 directions.

## **2.2 Tracking audits in the engineering cost**

Production cost is an important factor that determines whether a product is cheap or expensive. Because the cost of production has many components that are the main factors in production, including materials, labor costs, and various utilities, reducing production costs. Therefore, it is very important to make the product cost lower or increase profits which has a positive effect on competitive efficiency in the industrial market (Zupan, 2020). In particular, value engineering is the application of engineering principles to help analyze various processes in operation.

Cost of transportation can be classified into 4 types (Hao, 2022) as follows: (1) Fixed cost is the cost or expense that does not change according to the volume of transport. Whether to produce or not to produce. This cost will occur in a fixed amount and will have to be paid at the same rate, such as rent, land, building, insurance, vehicle registration, depreciation salary venue rental license fees. (2) Variable costs are those that change with the level of production or output. In the case of transportation services, the cost of variable expenses such as fuel, repairs, and lubricants, increases with the volume of transportation services provided. When fewer transportation services are produced, the variable costs decrease as well. (3) Total cost is the cost or expense that combines fixed costs and variable costs together. The cost of transporting goods or services cannot be separated from each service. The cost or expense incurred when transporting goods or services to their destination on the return trip, without carrying anything back. This is considered an opportunity cost, and the cost of non-economical transportation due to waste must be taken into account when calculating the cost of the return trip.

## **2.3 Strategies to reduce transportation costs**

The cost of transportation is one of the important costs because transportation is nowadays important to almost all types of businesses, causing in many businesses, the cost of production affects the total cost of products and services. The cost of the transport operator will be more or less depending on the factors involved in pricing the freight. Therefore, entrepreneurs need to plan various strategies to increase efficiency (Olanipekun, 2018) and reduce transportation costs as follows:

2.3.1) Changing transportation energy from diesel or gasoline to biodiesel or CNG can save 60-70% compared to oil consumption.

2.3.2) Here is a clearer version of the text you provided. Transportation systems can be structured in various ways. One such way is a combination of two or more modes of transportation, that are either under a single contract or overseen by a single person. Such systems can be categorized based on physical characteristics into five types: road, rail, water, air, and pipeline transport. Alternatively, they can be multimodal, integrating different modes of transport. To keep up with customer demands and vary transportation costs to be more economical, it's essential to choose the appropriate model.

2.3.3) Distribution center strategy. When constructing a collection and distribution center, it is crucial to consider different strategies that can be implemented to reduce transportation costs and ensure efficient delivery of goods. By having a distribution center, the need for direct transportation to customers in other areas is reduced, which in turn results in trucks being empty or not fully loaded. However, with an efficient distribution center, products can be collected and loaded onto trucks that correspond to the delivery location and quantity. This helps to minimize transportation costs, making it imperative to have a well-planned distribution network. By collecting goods and filling trucks, the entire transportation process becomes more efficient and cost-effective.

2.3.4) Strategies for transporting goods both round trips and back. Improving transport efficiency by reducing idle runs. Because in general transportation, when the goods are delivered, they will hit the car running empty back, resulting in a useless increase in the cost of assembly. The costs incurred are non-value-added costs, and these costs must be borne by the operator. Which is an important part of increasing the operating costs.

2.3.5) Strategies for using information technology systems. In order to reduce logistics costs and improve the efficiency of the transportation management system (TMS), it is important to focus on two main components: transportation planning and transportation efficiency. The planning component is responsible for organizing transportation operations, while the efficiency component helps make decisions about cargo in order to achieve the goals of the transportation business, such as achieving the fastest and most cost-effective transportation possible.

## **Research Methodology**

### **1. This research methodology is divided into 3 parts as follows:**

Part 1. The study reviews related works on engineering cost operations in an Express Delivery Company and analyzes current operational problems.

Part 2. We will suggest a different method for tracking audit in engineering costs and delve into its components. This method involves interviewing the business owner or manager and team members or employees to operate and understand their perspective on the application of tracking audits in engineering costs. The research data is primary data obtained from the semi-structured interview form for the owner or manager of the express delivery company in Kunming, the People's Republic, and secondary data obtained from literature reviews.

Part 3 the data through content analysis to compare the similarities and differences with 8 related elements: (1) Logistics communication, (2) Customer service, (3) Procurement, (4) Transport management, (5) Warehouse management and storage, (6) Feedback (7) material handling and, and (8) Packaging and package, after which summarizing the cost of application of tracking audit in engineering cost of express delivery company and perform unit cost analysis for some activities. Finally, the results are summarized.

## **2. Research Instrument**

2.1 The questionnaire will be created for literature review. It will be a semi-structured interview about the application of tracking audit in engineering cost, including of express delivery company, related 8 elements. The semi-structured interview will have audit tools from experts in accounting, tracking audits in engineering costs.

2.2 The researcher utilized a questionnaire they had created and presented it to three academic experts for their review. The experts assessed and checked for consistency with the research purpose, a process known as item-objective congruency (IOC). To ensure reliability, the researcher analyzed the internal consistency model, using (6) criteria. The questions with IOC values between 0.50-1.00 were chosen, while those with values below 0.50 were reviewed or removed entirely (Rovinelli, 1976). IOC score of 0.78-0.94. For the consistency of the questions in this research.

## **3. Target Group**

Technique for an in-depth interview with owner or manager and team members or employees. Who will be the key informants for one company, and has experience in operations for more than 3 years, willing to volunteer to join and participate in research. The research purposive key information was used to select 16 individuals from 8 companies, two groups all informants had at least 3 years of experience in managing or operating an express delivery company. The researcher utilized two methods to collect data: personal interviews and focus groups. The researcher organized representatives to facilitate group discussions or handle telephone inquiries. After scheduling appointments for interviews, the content was summarized into categories based on the research question and objectives of the study.

## **4. Statistics for Data Analysis**

The researcher conducted a content analysis and categorized data collected from interviews and focus groups with 16 individuals from 8 companies.

## **Results/Research**

### **1. Demography of Key Information**

The key informants who were surveyed for this study were divided into two groups: business owners/assigned managers, experienced team members, and employees. Out of the 16 respondents, 11 (69%) were female and 5 (31%) were male. Age was classified into four categories, 40-47 years (44%; 7), 50-59 years (31%; 5), 60 years or older (13%; 2), and 30-39 years (12%; 2). Education was divided into three

categories, Bachelor's degrees (44%; 7), Master's degrees (37%; 6), and below Bachelor's degrees (19%; 3). Business experience was classified into four categories: 7-9 years (31%; 5), 4-6 years (25%), 3 years (25%), and 9 years or more (19%; 3).

**2. To the analysis of the results of the application of engineering cost monitoring of Express Delivery Companies in terms of similarities and differences.**

**Table 1:** shows an analysis of the results of the application of engineering cost, similarities, and differences.

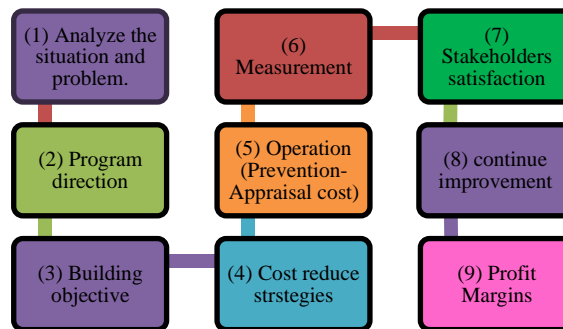
The application of engineering cost monitoring	Business Owner /Manager (8 people)	Experience team members and employees (8 people)	Similarities	Differences
1. Logistic communication	Good communication also enables us to operate smoothly and efficiently, creating a seamless network of information flow. Overall, it gives our express delivery company a competitive advantage.	The communication became evident that effective communication with business stakeholders is crucial in ensuring that everyone shares the same understanding.	Effective communication is crucial for business owners and managers, including experienced team members and employees who need to coordinate transportation activities to achieve their goals.	The role of communication applications is different. Business owners and managers focus on communication to drive policy up the operational hierarchy, while experienced team members and employees use communication to discuss and coordinate work effectively.
2. Customer service	As a service-based business, the quality of service is key, and it should cover all aspects of the customer experience, including inbound logistics. The company has to prioritize service quality above all else. The goal is to deliver products correctly, accurately, and quickly, while meeting the expectations and needs of our customers.	Continuous operational improvement, proactive communication, feedback collection, knowledgeable staff, and personalized interactions are crucial for exceptional customer service.	Similarities	-
3. Handle procurement	The quantity and quality of purchased products and materials impact the satisfaction of the organization and customer needs in various departments. To optimize costs, purchasing equipment, tools, or technology at a lower price can lead to increased efficiency and lower engineering costs, ultimately resulting in a more profitable business.	Experience team members and employees must have manual procurement, access to information, and planning aspects of procurement.	Similarities	it's important for experienced team members and employees to have accurate procurement handling from operators. This ensures safe operations and prevents any problems from arising in the workplace. Ultimately, the goal is to achieve the

The application of engineering cost monitoring	Business Owner /Manager (8 people)	Experience team members and employees (8 people)	Similarities	Differences
				objectives that have been set for the business.
4. Transport management process	The process encompasses moving raw materials or products from their starting point to their final destination or returning abnormal products to the warehouse.	It's focused on managing information, tracking and monitoring operations, confirming deliveries, and processing payments. We ensure continuous monitoring of the entire process.	Similarities	-
5. Process for managing and storing items in a warehouse.	A well-managed warehouse ensures efficient processes from setting up the warehouse structure to product design and placement, managing space, inventory leveling, and maintaining equipment.	Managing and storing items in a warehouse is a critical aspect of supply chain and inventory management. Efficient warehouse operations can help reduce costs, improve order fulfillment, and enhance customer satisfaction.	Similarities	-
6. Feedback	It was revealed that there are instances where returned items cannot be given to customers due to damage or expiration and that businesses should have policies in place to efficiently handle and potentially process or reuse these products to minimize costs.	There are quality control measures in place to ensure safe and efficient handling of packages. All those involved in operations must trace every process of the transport business.	Similarities	-
7. Material handling process	Engaging in the transportation of raw materials, goods in process, and finished goods is crucial within factories and warehouses.	Efficient material handling is crucial for optimizing storage capacity, and equipment usage, and minimizing distribution and transportation costs.	Similarities	-
8. Packaging and Package	It's important, because the packaging is designed to showcase product details and create awareness among customers while also protecting the product from damage during transportation and storage.	To achieve ease of movement and storage, the optimal shape for packaging is a cube. The objective of packaging and unitization is to pack products of diverse sizes and shapes as tightly as possible to resemble a cuboid shape.	Similarities	-

### 3. The ways to reduce the engineering costs of the express delivery company.

The self-interview involved telephone interviews and group discussions with 8 business owners/assigned managers and 8 experienced team members and employees, totaling 16 individuals from 8 companies in Kunming. Information was collected from the company's operational experiences. After

analyzing the issues and engineering costs of an express delivery company, methods to reduce costs were identified, See Figure 1.



**Figure 1:** The ways to reduce the engineering costs of the express delivery company in Kunming

Figure 1. shows the model of reducing engineering costs is an ongoing process that involves several steps. First, it's important to analyze the situation and identify the problem. Next, program direction should be established, followed by building objectives. From there, cost reduction strategies should be determined to make the transportation business more competitive. Including, prevention and appraisal costs, should involve the participation of all parties involved. Measurement should also be emphasized, including quantitative measurements such as delivery time, raw material costs, quantity of products sent, and quality of resource use. Providing accurate services is crucial, as is ensuring stakeholder satisfaction. Continual improvement is also necessary to maintain profit margins and stay competitive in the Express Delivery Company. By following these steps, the Express Delivery Company can adopt new technologies and adjust as needed to achieve long-term success.

## Conclusion

The research into reducing engineering costs involves nine steps and is an ongoing process. It is necessary to continuously adjust the model in the future by either adding or removing relevant factors. The changing environment and increased competition have forced businesses to adjust their operating strategies. To ensure sustainable business operations, it is important to find ways to overcome obstacles and challenges in engineering costs for express delivery companies.

## Suggestions

1. Suggest areas for future research, the research into strategic planning and improve the engineering cost operation plan of the express delivery company in Kunming, the People's Republic of China
2. The current guidelines or operational strategies to reduce the company's engineering costs, to have long-term competitiveness.

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## The advantages of bim technology on the construction efficiency of a sample green residential project

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### Abstract

The purposes of the research were to compare the efficiency of traditional construction methodologies with BIM (Building Information Modeling) technology in green residential project construction, to explore the implications of BIM technology on energy consumption and emissions reduction in such projects, and to establish a theoretical, practical foundation for applying BIM technology in green residential initiatives, striving to offer more efficient, intelligent, and sustainable solutions for green home construction. The methodology used to accomplish this involves three principal research methods: literature research, information research, and regression analysis. The literature research method forms the foundation of the study, it is a comparison and summary of all the collected literature, distilling the research findings and conclusions into key factors influencing BIM technology's influence on green housing project construction efficiency. The information research method aids in comprehending the application of BIM technology in green housing project construction. regression analysis further investigates the influence of BIM technology on the construction efficiency of green housing projects. The research findings showed that the advantages of BIM over traditional construction methods, bridging existing knowledge gaps. Indicate the factors such as construction time, quality, collaborative capabilities, costs, carbon emissions, noise and particulate pollution, energy efficiency, and aspects of technology, economy, and environment significantly influence construction efficiency. From a technological, economic, and environmental perspective, advanced technologies like BIM design, construction, and management efficiency, leading to decreased carbon emissions, increased energy and water savings, and lessened indoor air pollution. These outcomes form a robust theoretical and practical foundation for employing BIM in green residential projects.

**Keywords:** Building Information Modeling (BIM), Green Housing Projects, Construction Efficiency, Sustainable Construction, Technology Impact

### Introduction

Building Information Modeling (BIM) is a digital tool suite that revolutionizes architecture and construction by allowing comprehensive modeling of project elements. Originating in Europe and America,



BIM's widespread global use, as in public building projects in the US, UK, and Germany, enhances sustainability, efficiency, and cost-effectiveness. It's seen successful implementation in notable projects like London City Island and Chicago's Willis Tower. Green residential projects are on the rise, targeting sustainable development, environmental protection, health enhancement, and energy conservation. By 2021, over 70,000 residences adhered to green standards, primarily in the US, Canada, Australia, and UAE, with growing demand in Asia-Pacific and Africa. Predictions for 2030 suggest green housing will comprise 25% of the global market. Green housing brings environmental, economic, and social benefits through reduced carbon emissions and pollutants, lower living costs, improved urban living quality, and promotion of sustainable lifestyles. It's crucial for societal transformation and low-carbon development. Enhancing construction efficiency stimulates industry investment, promotes affordable housing, conserves energy, reduces emissions, addresses housing shortages, and spurs technological innovation. This study explores the integration of BIM technology with green housing projects, contributing to academic research and practical sustainable housing advancements.

## 1. Research Objectives

1.1 To compare the efficiency differences between traditional construction methods and BIM technology in green residential project construction.

1.2 To investigate the influence of the application of BIM technology on building energy utilization and emissions reduction in green residential project construction.

1.3 To provide a theoretical and practical basis for the application of BIM technology in green residential projects, and to provide more efficient, intelligent, and sustainable solutions for green home construction.

1.4 To study the application effect of BIM technology in green residential projects can quantitatively evaluate the performance of BIM technology in accuracy, model precision, efficiency, etc., providing effective application examples and scientific references for the construction industry.

## 2. Review of Related Literatures

Building Information Modeling (BIM) is a pivotal tool in construction, fostering cooperation and error reduction by digitizing building attributes. It enhances communication and precision in design processes, optimizes designs, simulates systems, and promotes sustainable development. [1] Despite challenges like high costs and complexity, with proper planning, BIM's benefits are fully harnessed, improving efficiency, resource utilization, and cost control. Future research could focus on BIM's implementation strategies and its role in enhancing sustainability and safety. Significantly, BIM contributes to green building practices, aiding energy saving, indoor environmental quality enhancement, Life Cycle Assessment integration, sustainable urban planning, and retrofitting of existing buildings.

Green residential projects, aimed at mitigating environmental influence and promoting human health, incorporate sustainable design, construction, and operation.[2] They focus on energy efficiency, water

conservation, improved indoor environment, waste reduction, and biophilic designs. Unlike traditional projects, these initiatives stress sustainability and interdisciplinary collaboration, resulting in long-term savings despite larger initial investments.[3] They offer potential for improved health, ecosystem impacts, materials sourcing, and urban development implications [4]. Technologies like Building Information Modelling (BIM), Internet of Things (IoT), bamboo construction, 3D printing, geothermal heat pumps, and phase change materials enhance performance, reduce environmental influence, and improve occupant comfort in green buildings.[5]

Construction efficiency is crucial for project success, integrating sustainability and optimizing cost, time, resources, and quality.[6] It addresses challenges like budget constraints, safety, environmental impact, and labor shortages. Strategies include Building Information Modelling (BIM) for error reduction, prefabrication for time-saving, and lean construction to minimize waste.[7] Improving efficiency impacts operational costs, environmental footprint, and project management. Green building construction efficiency encompasses multiple dimensions, including cost, energy, environment, social aspects, and time. Key indicators are carbon footprint, water consumption, and waste generation.[8] Approaches to enhance efficiency involve clear communication, proactive policies, lean principles, BIM, and life cycle cost analysis.

## Research Methodology

### 1. The Research Procedure Includes 6 which are:

The primary objective of this research is to assess the influence of Building Information Modeling (BIM) technology on the efficiency of green residential construction projects. The methodology adopted involves a tripartite approach encompassing a literature review, information research, and regression analysis.

1.1 To identify key themes and critical findings in existing scholarship related to BIM technology and green residential construction. By comparing and summarizing the literature review, focusing on extracting valuable insights including data, outcomes, viewpoints, and best practices. The resulting compilation of insights offers a robust literature review that aids in understanding the influencing factors of BIM technology on the construction.

1.2 By gleaning information about green residential project design, construction, and acceptance processes from various sources such as online platforms, public reports, industry forums, and consulting services. After collating this information, it is compared and analyzed to discern the practical implications and effectiveness of BIM technology in the context of green residential construction projects, which is conducive to analyzing the influence of BIM technology on the construction efficiency.

1.3 The results of the previous literature review and information collection, can be determined the influencing factors of BIM technology on the construction efficiency of green housing projects, such as time, cost, quality, etc.

1.4 Build mathematical models and process data. The collected data are sorted out and imported into regression analysis software to establish a mathematical model between influencing factors and construction efficiency, and carry out data processing.

1.5 The regression analysis method was used to calculate the coefficient and significance level of the model to determine the influence degree of influencing factors on the construction efficiency.

1.6 Explain the model results and detailed examination of how each factor, influenced by BIM technology, contributes to the overall efficiency of green residential..

## 2. Research Instrument (s)

2.1 Questionnaire Survey. By means of the main vice project manager, obtained the data needed for the Green project survey, which then allowed for further empirical analysis based on this data. Combined with the use purchased databases and reports, the 5-point scoring method is used to transform the data.

2.2 Expert scoring method. In this paper, the different indexes of dependent variables are transformed into a specific comprehensive value through the expert scoring method. Based on these dimensions, the paper sent a questionnaire to 20 experts in the construction industry and asked them to rate each dimension. The weights of each index are determined through the scores of experts, and then the formula to convert the index into comprehensive value is established.

2.3 SPSS24.0 software. This paper takes construction efficiency as dependent variable and technical dimension, economic dimension and environmental dimension as independent variables to build a multiple linear regression model. In order to examine the fitting effect between regression equation and sample observations, the goodness of fit test method was used. Define  $R^2 = SSR/SST$ , which is a complex coefficient of determination and is used as a test index for goodness of fit tests. Finally, SPSS24.0 software was used for regression analysis.

## 3. Target Group

3.1 The population is 30 different green residential construction projects worldwide. The main methods involved database research and the purchase of paid research reports. The main purchased data covers the independent variable BIM building technology and the dependent variable green building construction efficiency.

3.2 Samples were includes a total of 30 green residential building projects located in China, Thailand, and other Southeast Asian countries in Europe. Specifically to the main vice project manager to gather data from their hands. Then, the 5-point scoring method is used to transform the data. The collected data included the variables mentioned earlier, with the independent variable being the application of BIM technology in construction. The key measurement indicators consisted of Construction time, Construction quality, Collaborative work ability, Investment cost, Project cost, Maintenance cost, Carbon emissions, Reduction of noise and particle pollution, and Energy efficiency. As for the dependent variables related to

the construction efficiency of green residential projects, the main measured indicators were reducing the proportion of environmentally harmful materials, reducing construction time and cost, improving the utilization rate and efficiency of human resources, enhancing the humanization and functionality of buildings, and improving the safety performance of buildings.

#### 4. Statistics for Data Analysis

BIM (Building Information Modeling) enhances construction quality and efficiency in green residential projects, requiring evaluation across technical, economic, and environmental dimensions. Technically, BIM supports all stages of construction, reduces time, improves quality, and fosters collaboration. Economically, BIM affects investment, project, and maintenance costs but optimizes resources to prevent wastage. Environmentally, it lowers carbon emissions, manages pollution, and enhances energy efficiency. These three dimensions must be considered when assessing BIM's impact on construction efficiency. [9]

**Table 1:** Argument Dimension Partition

Variable type	Partition dimension	Measurement Dimension	Dimensional Code
BIM building information modeling technology	technical dimension	Construction time	TD1
		Construction quality	TD2
		Collaborative work ability	TD3
	economic dimension	Investment cost	ED1
		Project cost	ED2
		Maintenance cost	ED3
	environmental dimension	Carbon emissions	ET1
		Reduction of noise and particle pollution	ET2
		Energy efficiency	ET3

This paper develops six metrics across environmental protection, economy, and comfort to evaluate the influence of Building Information Modeling (BIM) on green residential projects' efficiency. BIM improves material usage and energy management, reducing waste and carbon emissions. It also enhances construction time, cost efficiency, and human resources utilization through digital modeling. In terms of comfort, BIM optimizes building functionality, user needs, and safety through comprehensive digital simulation and management, thus minimizing potential hazards. [10]

**Table 2:** Dependent Variable Dimension Partition

Variable type	Partition dimension	Measurement Dimension	Dimensional Code
BIM building information modeling technology	technical dimension	Construction time	TD1
		Construction quality	TD2
		Collaborative work ability	TD3
	economic dimension	Investment cost	ED1
		Project cost	ED2
		Maintenance cost	ED3
	environmental dimension	Carbon emissions	ET1
		Reduction of noise and particle pollution	ET2
		Energy efficiency	ET3

Then gathered data from 30 global green residential projects using BIM technology. Metrics like construction time, quality, costs, and environmental influence were obtained from purchased reports and commissioned surveys. The data, mainly from China, Thailand, Southeast Asia, and Europe, was classified and integrated for analysis. Ensuring data reliability and considering real-world constraints is crucial in drawing conclusions.

Next uses purchased databases and reports, focusing on BIM technology and green building efficiency. Data from 30 green building projects were collected and transformed using a 5-point scoring method.

Mainly purchasing databases and reports to gather data on BIM technology and green building efficiency. The data, including application of BIM and efficiency indicators of green buildings, is transformed using a 5-point scoring method, facilitating the analysis of their relationship and promoting sustainable building development.

Then transforms dependent variable indexes into a comprehensive value via expert scoring. The construction efficiency of green buildings is divided into dimensions, rated by 20 industry experts. Their scores determine each index's weight, which is then used to establish a conversion formula for the comprehensive value. This value represents the overall performance of green buildings under different indicators.

**Table 3:** Descriptive Statistics for Independent Variables

Variable type	Dimensionality	Index	Min	Max	Mean value	Standard deviation
		Construction time	1	5	3.33	2.94

Variable type	Dimensionality	Index	Min	Max	Mean value	Standard deviation
Independent variable: BIM building information modeling technology	technical dimension	Construction quality	1	5	3.93	2.16
		Collaborative work ability	1	5	3.73	2.50
	economic dimension	Investment cost	1	5	3.17	4.69
		Project cost	1	5	2.67	2.63
		Maintenance cost	1	5	3.43	2.99
	environmental dimension	Carbon emissions	1	5	3.13	2.16
		Reduction of noise and particle pollution	1	5	2.30	3.30
		Energy efficiency	1	5	2.33	0.50
	dependent variable: construction efficiency	environmental protection	Reduce the proportion of materials harmful to the environment	1	5	2.93
Reduce the energy consumption of buildings			1	5	3.27	3.65
cost saving		Reduce construction time and cost	1	5	3.13	4.03
		Improve the utilization rate and efficiency of human resources	1	5	3.57	4.65
comfort		Improve the humanization and functionality of buildings	1	5	2.13	4.08
		Improve the safety performance of buildings	1	5	2.37	3.56

**Table 4:** Descriptive Statistics for Dependent Variables

Variable type	Dimensionality	Index	Mean value	Standard deviation
construction efficiency	environmental protection	Limit harmful materials	2.93	1.89
		Decrease energy use	3.27	3.65
	cost saving	Speed up construction	3.13	4.03

Variable type	Dimensionality	Index	Mean value	Standard deviation
		Optimize workforce	3.57	4.65
	comfort	Increase building comfort	2.13	4.08
		Ensure safety	2.37	3.56

And uses Pearson correlation coefficient analysis to study relationships between variables, particularly the correlation between BIM technology and green building efficiency, using SPSS24 statistical software.

**Table 5:** Pearson Correlation Analysis

	1	2	3	4
technical dimension	1			
economic dimension	0.673**	1		
environmental dimension	0.536***	0.166	1	
construction efficiency	0.739*	0.618**	0.721**	1

As can be seen, The Pearson correlation coefficient between technical dimension and construction efficiency is 0.739, which is significantly correlated at 0.05 level. It shows that technical dimension has significant correlation with construction efficiency. The Pearson correlation coefficient between economic dimension and construction efficiency is 0.618, which is significantly correlated at the level of 0.01, indicating that the understanding degree of we media has a significant correlation with construction efficiency. The Pearson correlation coefficient between environmental dimension and construction efficiency was 0.721, which was significantly correlated at the 0.1 level. It shows that environmental dimension has significant correlation with construction efficiency. In addition, in order to clarify the direction and degree of relationship between variables, further regression analysis is needed.

Then takes building efficiency as dependent variable and technical dimension, economic dimension and environmental dimension as independent variables to build a multiple linear regression model as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \omega$$

In this formula, Y is building efficiency,  $\beta_0$  is a constant term;  $\beta_i$  is the coefficient value of the i th factor;  $x_1$  is the acceptance degree of we-media;  $x_2$  is the understanding degree of we media;  $x_3$  is we-media trust.

Then SPSS24.0 software was used for regression analysis, and the analysis results were as follows.

**Table 6:** Regression Analysis of Index

Dimension	Index	B	Std	T	Sig.
Technical Dimension	Construction time	0.109	0.034	3.185	0.000
	Construction quality	0.249	0.050	4.945	0.000
	Collaborative work ability	0.218	0.049	4.375	0.000
Economic Dimension	Investment cost	0.211	0.048	3.295	0.000
	Project cost	0.255	0.035	4.585	0.000
	Maintenance cost	0.135	0.037	4.867	0.000
Environmental Dimension	Carbon emissions	0.185	0.041	4.613	0.000
	Reduction of noise and particle pollution	0.116	0.027	4.231	0.000
	Energy efficiency	0.132	0.038	3.897	0.000

So, influence values show construction time (0.109), quality (0.249), collaboration ability (0.218), investment cost (0.211), project cost (0.255), maintenance cost (0.135), carbon emissions (0.185), pollution reduction (0.116), and energy efficiency (0.132) all influence building efficiency. Crucially, construction quality, project cost, collaboration, and investment costs most influence efficiency. To enhance the process and results, it's necessary to focus on reducing carbon emissions, noise, pollution, maintenance costs, and improving energy efficiency for sustainable development.

**Table 7:** Regression Analysis of Dimension

Index	B	Std	T	Sig.
Technical Dimension	0.227	0.041	3.285	0.000
Economic Dimension	0.264	0.048	4.456	0.000
Environmental Dimension	0.194	0.043	4.105	0.000

And influence values indicate technical (0.227), economic (0.264), and environmental (0.194) dimensions significantly influence building efficiency. Technological applications, cost control, and environmental measures can improve construction efficiency. In the regression equation, a unit increase in these dimensions raises construction efficiency by 0.109, 0.249, and 0.218 units respectively. Therefore, focusing on technological innovation, economic management, and environmental sustainability can enhance overall construction efficiency and project quality.



**Table 8:** Significance Test

	Sum of squares	df	Mean variance	F	significance
Regression	8.048	5	1.61	6.479	0
Residual error	179.636	165	0.248		
total	187.684	170			

As can be seen from the above table,  $F=6.479$ ,  $sig=0.00$ , it can be seen that the significance is less than the critical value,  $H_0$  is rejected, and the regression equation is considered significant.

**Table 9:** Coefficient of Determination Analysis

R	R Square	Adjusted R Square	Std. Error of the Estimate
.677a	0.458	0.454	1.043

By testing the regression equation, it can be seen from the table that the adjusted  $R^2$  value is 0.454. Since the revised  $R^2$  value can better reflect the fitting effect, the revised determination coefficient is used. It can be seen that the regression effect of this model is significant, so it can indicate that the marketing efficiency equation has a good goodness of fit.

## Results

In index level, through the empirical research method of regression analysis, this paper finds:

The influence value of Construction time weight is 0.109. Construction time has a certain influence on building efficiency, and longer construction times may lead to project delays and cost increases. Therefore, shortening the construction time can improve the construction efficiency.

The influence value of Construction quality weight is 0.249. The influence of construction quality on building efficiency is very important, high-quality construction can reduce later maintenance and restoration costs, and improve the overall building performance and life. Therefore, ensuring construction quality is the key to improve building efficiency.

The influence value of the Collaborative work ability weight is 0.218. Collaborative working ability refers to the degree of coordination and cooperation among the participants. Good collaborative working ability can improve communication efficiency, reduce misunderstandings and conflicts, and thus improve the efficiency of construction. Therefore, strengthening the ability to work together can improve building efficiency.

The influence value of Investment cost weight is 0.211. Investment costs have an influence on building efficiency, and lower investment costs may drive projects to the construction phase faster, but it

is necessary to ensure that costs are reduced without sacrificing quality and sustainability. Therefore, reasonable control of investment costs can improve building efficiency.

The influence value of Project cost weight is 0.255. Engineering costs have a great influence on construction efficiency, and high engineering costs could lead to construction projects exceeding the budget, affecting the overall efficiency and feasibility. Therefore, controlling project cost is the key to improve construction efficiency.

The influence value of the Maintenance cost weight is 0.135. Maintenance cost refers to the repair and maintenance cost of the building during use, and lower maintenance cost can improve the economic efficiency and sustainability of the building. Therefore, reducing maintenance costs can improve building efficiency.

The Carbon emissions weight influence value is 0.185. Reducing carbon emissions is one of the important goals of modern architecture, and lower carbon emissions can reduce the environmental load and improve the sustainability of the building. Therefore, reducing carbon emissions can improve building efficiency.

The weight influence value of Reduction of noise and particle pollution was 0.116. This refers to the ability of building design and material selection to reduce noise and particulate pollution and provide better indoor environmental quality and comfort. Therefore, reducing noise and particle pollution can improve building efficiency.

The Energy efficiency weight has an influence value of 0.132. Energy efficiency is an important indicator to measure the energy saving performance of buildings, and higher energy efficiency can reduce energy consumption and operating costs. Therefore, improving energy efficiency can improve the efficiency of buildings.

And in demension level he influences value of technical dimension weight is 0.227. The technical dimension has a certain influence on the efficiency of green buildings, and advanced technology applications can improve the efficiency of design, construction, and management, such as the use of BIM technology for accurate modeling and collaborative design, and the application of intelligent control systems for energy management and optimization. These technologies can effectively reduce the waste of resources, reduce energy consumption, and improve the overall performance of the building.

The Economic dimension weight has an influence value of 0.264. The economic dimension has a great influence on the efficiency of green buildings. Reasonable consideration of cost-effectiveness and economic feasibility can promote the popularization and sustainable development of green buildings. The initial investment in green buildings may be relatively high, but long-term economic benefits can be realized by reducing operating and maintenance costs, improving resource efficiency, and being supported by environmental protection and energy conservation policies.

The influence value of Environmental dimension weight is 0.194. The environmental dimension plays an important role in the efficiency of green buildings. Measures such as reducing carbon emissions, saving energy and water resources, and reducing indoor air pollution can improve the quality of the environment

and enhance the comfort and health of occupants. At the same time, green buildings also focus on recycling and waste management to minimize the influence on the natural environment.

To sum up, the technical dimension, economic dimension and environmental dimension are the factors that have a greater influence on the efficiency of green buildings. Through technological innovation and application, reasonable control of economic costs, and focus on environmental protection measures, can effectively improve the overall efficiency and sustainability of green building projects.

## Discussion

The results showed that reveal significant influences from various factors like construction time, quality, collaborative capabilities, investment cost, project cost, maintenance cost, carbon emissions, noise and particulate pollution, energy efficiency, and aspects of technology, economy, and environment on construction efficiency. Each of these elements supports the second research objective by highlighting the influence of BIM technology on building energy utilization and emissions reduction in green residential project construction. For instance, improved construction time and quality brought about by BIM usage can indirectly enhance energy efficiency and reduce emissions by avoiding costly rework and delays.

In terms of technology, economy, and environment, the application of advanced technologies like BIM can improve design, construction, and management efficiency, which in turn can lead to reduced carbon emissions, enhanced energy and water savings, and diminished indoor air pollution. These outcomes provide a robust theoretical and practical basis for applying BIM technology in green residential projects (third research objective). They also underline how this approach can result in more efficient, intelligent, and sustainable solutions for green home construction.

This research demonstrates the potential of BIM technology in enhancing the efficiency of green residential project construction, impacting building energy use and emission reduction, and offering valuable insights for further application of BIM technology in this field. It provides a comprehensive understanding of how these objectives align with the aims of sustainable construction and environmental preservation, substantiating the broader goals of this study.

## Suggestions

This study for constructing efficiency improvement in green residential progames, rasing 10 suggestions arised from this paper as follow. Firstly, BIM allows for precise construction planning and real-time tracking, which enables efficient schedule management. Secondly, it improves construction quality by identifying potential design conflicts through 3D modeling and collision detection functions. Thirdly, BIM facilitates collaboration among various professionals, reducing information transmission conflicts. Fourthly, it aids in controlling investment and project costs by accurately estimating material quantities. Fifthly, it lowers maintenance costs by enabling intelligent equipment management. Sixthly, BIM's ability to perform energy simulations can help reduce carbon emissions, thus augmenting a building's sustainability. Seventhly, BIM helps mitigate noise and particulate pollution by simulating indoor environments, improving indoor air

quality. Eighthly, BIM optimizes energy consumption by identifying energy-saving potential. Ninthly, as an advanced technical tool, BIM enhances the overall efficiency of design, construction, and management processes. Lastly, from economic and environmental perspectives, the use of BIM in conjunction with sustainable practices can result in long-term economic benefits, reduced resource usage, and improved environmental quality, thereby enhancing occupant comfort and health.

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## Enhancing sme construction project success: a tqm approach in Kunming, the people's republic of China

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### Abstract

The purposes of this research were (1) to study the importance level of implementing total quality management and success, (2) to study the effect influencing total quality management implementation success, and (3) to study a model of the success in construction projects of SMEs. The sample group is 384 people, business owners, and managers with experience doing construction projects for more than three years. The research tool was an online questionnaire. Data were analyzed using descriptive and inferential statistics with MRA. The results found that all factors were considered high level important except for two factors that were deemed as very high level important. are continual improvement ( $\bar{x}=4.54$ ), and measuring performance ( $\bar{x}=4.51$ ), and leadership commitment had the very low important ( $\bar{x}=4.13$ ). Research findings, employee empowerment and satisfaction have the highest impact on success in construction projects. Followed by cooperation and teamwork, customer/supplier relationship, effective communication, process involvement, performance measurement, management and leadership commitment, and continual improvement significant at 0.10. However, continuous learning and training and improved customer satisfaction were insignificant. In a successful model for construction projects, eight key factors should be given priority. By concentrating efforts on these elements, project teams can enhance their chances of achieving success and delivering satisfactory outcomes in construction projects. Significant findings suggest that employee empowerment and satisfaction, as well as cooperation and teamwork, are crucial factors for achieving success. Therefore, it is important not to overlook these elements when implementing performance measurement and continuous improvement in small and medium-sized construction projects.

**Keywords:** TQM, Implementation, Construction Project, SMEs, China.

### Introduction

The construction industry plays an essential role in the development of the country. Expectations of construction stakeholders are proliferating due to the clients' rich nature, understanding, and quality consciousness, and construction companies actively seek internationally accepted quality adoption levels

to ensure their sustainability (Oyedele et al. 2015). Both in the economy and society of many countries, it is an industry that creates the necessary infrastructure for the country's development, especially in public services, in addition to improving the quality of life and people's lives, facilitating, and supporting the development of other industries. It is the primary growth engine of other economic sectors in the country's development (Khlaifat, 2019). The basis of every country's development lies in its construction projects, especially in terms of each country's transportation infrastructure and public utilities. In addition to improving the quality of life of the people, it also facilitates and supports the development of other industries, such as express transportation business, tourism business, and other service sector businesses that result in resource mobility of raw materials and equipment to support operations and livelihoods for better living (Hajiani et al. 2018). Construction management and engineering play an important role in global economic growth the results in the cost-effective use of resources and the use of knowledge or innovation to support efficient work. There is a job gap for many professionals to foster a competitive business (Musarat et al. 2020).

China's actual property zone is presently developing between 18% and 30% of GDP. A more significant correct measure is around 23%, except for infrastructure, in which money owed for 7% of GDP is no longer covered with actual property offerings, leading to about 18% of GDP (CaixaBank, 2023). The relationship between the construction industry and the economy is determined by three industry characteristics: government customers, the larger market size, and expanded investment potential, and products are the primary source of both direct and indirect employment, generating income and stimulating the Chinese economy. The construction industry has a high growth rate and is essential to the country's development. However, there still needs to be more development and finding ways to increase the potential of the construction industry seriously. Therefore, entrepreneurs must find ways to adapt to the significant construction industry. The investment will focus on increasing investment in machinery with technology to replace labor to reduce the risk of labor shortage, including the impact of social distancing measures, which is expected to continue for a while for small and medium enterprises.

The importance of total quality management (TQM) implemented successfully in construction project's introduction of the theory of quality management and the quality chain was proposed by Porter (1980). TQM is a technique that organizations use to streamline their supply chain management, improve their customer service, and ensure that their employees are adequately trained. The primary focus of TQM is to enhance the quality of an organization's outputs, including goods and services, by continually improving its internal practices. Although there is no single agreed-upon approach, TQM follows eight guiding principles that concentrate on improving quality. TQM can have a positive impact on both employee and organizational development. By making all employees focus on quality management and continuous improvement, companies can establish and maintain cultural values that lead to long-term success for both customers and the organization. The success of the construction project plays an essential role in the country's economic development, by the successful completion of the project. It can be measured in three key metrics (time, cost, and quality). Many researchers consider performance-oriented to be operational

costs. Project implementation on time duration and the quality of the construction work are variables to measure the project's success (Meredith et al. 2017). These parameters are called the "Iron Triangle" that the project manager and the teamwork have used as a principle for continuous construction management. Although often criticized, it is still the gold standard for measuring project success (Papke-Shields et al. (2010). Construction projects in Kunming have utilized TQM in their business operations in the past, but it has not been executed in a systematic manner. Some companies have failed to consider key aspects such as customer/supplier relationships, continual learning and training, and measurement of performance results. As a result, their businesses are not operating as efficiently as they could be (Kamal et al. 2014). Therefore, this research firstly clarifies total quality, makes assumptions and surveys according to the definition and literature to discover the methods and expected goals of total quality management in construction projects, and discusses the importance of the successful implementation of total quality management in construction projects.

## 1. Research Objectives

- 1.1 To assess the importance of TQM in SMEs construction projects in Kunming.
- 1.2 To identify the factors influencing the successful implementation of TQM in construction projects in Kunming.
- 1.3 To study a model of the success in SMEs construction projects in Kunming.

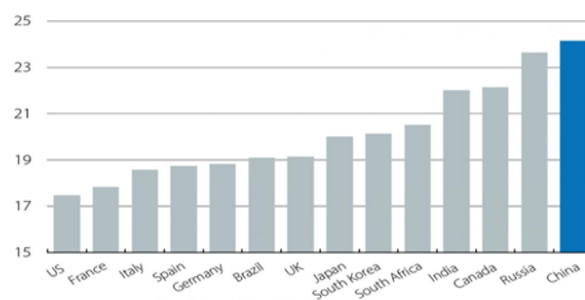
## 2. Review of Related Literature

### 2.1 SME's Context

SMEs are a shaped of enterprise that operates in the manufacturing and distribution of things to do of small size. It is an impartial commercial enterprise privately owned, no longer affecting different human beings or businesses. It is low operating, and there are now a few people. An SME helps in financial and social development. Small businesses are crucial because they let business owners diversify their revenue streams. The regulations divide SMEs into three categories: medium, small, and mini. The higher restrictions were fashionable for medium-sized organizations, while the decreased restrictions were well-known for large-sized enterprises. Individual companies and industries that were different from these certain in the regulations are additionally classified by using a reference to the Regulations (Shira, 2011).

Statistics show that in 2022 there will be more than 40 million SMEs, accounting for more than 99.6% of the total number of enterprises in China. According to the data from China's Department of Business Development, there are approximately 79,648 registered construction entrepreneurs nationwide, of which more than 99.9 percent are SMEs. (Quazi, & Padibjo, 1998). In terms of contribution to China's overall economic growth, SMEs make a considerable contribution to the industry, contributing 59% of GDP and accounting for more than 65% of China's import and export turnover. Tax revenue paid by SMEs in the same year still accounted for more than 48% of total government tax revenue (Musarat et al. 2020). As for the development state of affairs in China, in 2022, there was a gradual growth. Most of the development

things that come up, whether public or private construction, are ongoing projects. In addition to the growth of governing bodies and the non-profit sector. Alongside the expansion of both governmental and non-governmental organizations. There are approximately 126.9 million households, which represents a significant market. These customers spend around 185 billion Yuan annually on housing renovations and improvements, which can greatly affect the success of entrepreneurs in this industry. This makes it a crucial aspect of certain businesses as follows. (1) Commercial activities will be financially supported, particularly in procuring raw materials from the industrial network. (2) Financial and insurance activity in financial risk and life insurance will be supported. (3) Transportation & storage focuses on assisting cargo transportation management in order to achieve the lowest total cost of product distribution, from the point of raw material procurement until the point of consumption. (4) Manufactured metal items for the additive manufacturing industry and basic metal fabrication. (5) Machinery and equipment production is nearly solely focused on selling capital goods or their components to other sectors of the economy. As a result, demand for machinery and equipment tends to follow economic investment cycles. In addition, other industries must be supported in descending order. See Figure. 1.



**Figure 1:** GDP percentage of the construction sector.

**Source:** Statista (2022)

## 2.2 TQM context

TQM is an intertwined operation thinking and set of practices that address an organizational-wide stimulant of quality, commencing from the top operation but with the involvement of all the situations of workers in the organization. The main benefits of using TQM in construction projects can be explained as follows: production of higher quality products, increased efficiency, and effectiveness through the integrated work of all employees, reduced labor hours and overall construction costs, and focus on communication systems at all levels of the organization. There should be a focus on coordination with stakeholders. Quazi and Padibjo (1998) support that there is increasing pressure on SMEs; the TQM system has led large organizations to enhance their overall quality management practices, as SMEs are the leading suppliers of goods and services to large organizations. The author further emphasizes that applying TQM has become a critical survival factor and a competitive advantage for construction SMEs. As reviewed by Kazemi (2011), the effectiveness of applying the TQM system in the construction activities of SMEs still needs to improve.



### 3. Critical success factors

Albtoush et al., (2022) found that the most essential and vital factors for a construction project's success are quality-related, cost-related, time-related, time-related factors, contract-related, and externally related factors. Results help stakeholders improve construction project performance by identifying the factors affecting the project's success. It allows them to take appropriate action for each worker to ensure the success of their projects. In addition, this study contributes to the current state of knowledge by being one of the few studies analyzing project data to identify critical success factors of construction projects in developed countries. In addition to working with the customer's needs, the supply chain is also essential if the shipper cannot deliver on time, or the product is not delivered according to the requirements. The product will affect the organization and can affect customers using both public and private services. The TQM process consists of 10 elements which are (1) Commitment of leadership and management, (2) Improve customer satisfaction, (3) Continuous improvement, (4) Collaboration and teamwork, (5) Continuous learning and training, (6) Customer/supplier relationship (7) Employee empowerment and satisfaction (8) Involvement in processes (9) Performance Measurement, and (10) Effective communication. The project's success at the macro was external-related factors, and the micro was quality-related, cost-related, and contract-related factors because of the coverage of the variables studied in this study.

## Research Methodology

### 1. This research methodology is divided into three parts as follows:

First, the study reviews the related success in construction projects of SMEs, TQM implementation, TQM theory, and successful enterprise measurement. The population in this study were owners of businesses in Kunming. Kunming is a tourist city located in Yunnan province. In order to boost the economic system, there has been a significant increase in investment, particularly in SMEs, as there was previously a lack of investment in the area. This investment has created employment opportunities and utilized local resources for the benefit of the region. The survey focuses only on business owners registered with the Kunming's Government (2022) and does not cover sole proprietorships.

The questionnaire was distributed by sharing an online link to the Kunming Construction Contractors Association platform and sending a link to WeChat and a QR Code. For this study, data was collected from June to December 2023 over a period of seven months. A total of 400 units were sampled, Using Yamane's criteria. (Yamane, 1970). The questions are a 5-level rating scale from Likert method (Likert, 1970), which determines five importance levels: A very high significant level Score of 5 and a very low-level score of 1. (Best and Khan, 2006)

### 2. Research Instrument (s)

2.1 A questionnaire is a tool for collecting information as follows: Data collected from the population entrepreneurs or managers or committees of construction projects of SMEs. The result of the concept review, theory, and related research. The authors concluded that total quality management

implementation has ten components developed from the scales (Kazemi, 2011). The project's prospects for success can be divided into two types: macro and external-related factors and micro, quality-related, cost-related, and contract-related factors. The project's success is considered to satisfy predefined project goals, which often include criteria such as time, cost, and performance (Albtoush et al. 2022). According to some studies, cost, scope, and time are the three criteria for the success of a business.

2.2 The analysis results were used to determine the reliability of the questionnaire. The average index of compliance IOC is between 0.77-1.00. The alpha coefficient (**α**-coefficient), using Cronbach's method. The overall confidence value should be 0.7 or higher, as Nunnally (1978) recommended, indicating a reliable measure of 0.70 or greater. The Cronbach's alpha coefficient of the between score=0.798 to 0.814. The questionnaire has a total value of 0.876, exceeding the acceptable threshold of 0.70.

### 3. Populations and Samples

In the population were 46,147 companies. The researcher plans to select willing business owners and managers to provide information from a population of 46,147 companies. The unit of analysis will be a business owner or manager representing a construction company registered with the Kunming's Government (2022). The researcher used the criteria of Best and Khan (2006) and calculated 384 companies to be the sample size. Data collection will take one month to complete. There were 384 individuals who volunteered to provide information for the research and were returned through online social networking channels, with 384 cases representing 100 percent of the sample size.

**4. Statistics for Data Analysis** We analyzed data such as mean, percentage, standard deviation, and inferential statistics with Multiple Regression Analysis (MRA.) by the Enter Selection technique.

## Results/Research

### 1. Respondents' demographic analysis

According to the research, most individuals undertaking construction projects are male, accounting for 75.26% of the respondents. The age group with the highest representation is between 41 and 50 years old, accounting for 50.78%, followed by the 31-40 age group with 21.09%, and the 51-60 age group with 19.79%. Most respondents are married, accounting for 74.48%, followed by single individuals with 17.45%. Most respondents have a bachelor's degree (50.78%), followed by those with a master's degree (37.24%). The majority of respondents are individuals who own construction projects (69.53%), followed by managers (30.47%).

Individual investors and financial institutions make up the majority of investments in this industry at 33.85%, followed by a combination of individual investors, corporate investors, and financial institutions at 30.47%, and individual investors and family offices at 17.71%. Most companies in this industry have less than 1,000 employees, comprising 79.69% of the sector. The next most common employee count is between 1,001 and 2,000, at 20.31%. In terms of company age, 51.04% have been operating for 5-10 years,

with 24.22% in the 11-15 year range and 20.05% less than five years. Commercial operations are the most significant percentage of construction projects at 39.58%, followed by civil works for public utilities at 27.86% and residential or housing at 24.22%. Large-sized projects are the most common, comprising 42.45%, followed by small-sized at 36.19% and mini-sized at 21.36%. Most construction projects involve less than 30 million yuan investments, accounting for 78.64% of the total. The next most common income bracket is 30-70 million yuan at 18.23%, followed by 71-110 million yuan at 3.13%.)

## 2. To assess the importance of TQM in SMEs construction projects in Kunming

Out of the 10 components of TQM in SMEs construction projects, all factors were considered high level important except for two factors that were deemed as very high level important. These two factors are continual improvement ( $\bar{x}=4.54$ ,  $SD.= 0.508$ ) and measuring performance ( $\bar{x}=4.51$ ,  $SD.= 0.538$ ). The other factors that were considered as high important are management and leadership commitment ( $\bar{x}=4.13$ ,  $SD.=0.730$ ), customer satisfaction improvement ( $\bar{x}=4.14$ ,  $SD.=0.661$ ), co-operation and teamwork ( $\bar{x}=4.18$ ,  $SD.= 0.667$ ), continual learning and training ( $\bar{x}=4.16$ ,  $SD.= 0.698$ ), the customer/supplier relationship ( $\bar{x}=4.30$ ,  $SD.=0.708$ ), employee empowerment and satisfaction ( $\bar{x}=4.32$ ,  $SD.= 0.675$ ), the process involvement ( $\bar{x}=4.28$ ,  $SD.=0.693$ ), and lastly, effective communication ( $\bar{x}=4.19$ ,  $SD.=0.685$ ).

## 3. To identify the factors influencing the successful implementation of TQM in construction projects.

Table 1 illustrates that the significance of the 10 predicting the success of SMEs was identified based on their significance. The effect of a predicting variable is significant if its sig. Value is less than 0.10. These findings suggest that employee empowerment and satisfaction had a coefficient ( $B= 0.220$ ), (Beta) .229, with the highest impact on success. It was found that cooperation and teamwork had a coefficient ( $B= 0.213$ ), (Beta) .201, Customer/supplier relationship had a coefficient ( $B= 0.163$ ), (Beta) .178, Effective communication had a coefficient ( $B= 0.170$ ), (Beta).169, Process involvement had a coefficient ( $B= 0.111$ ), (Beta).108, Measurement of performance had a coefficient ( $B= 0.098$ ), (Beta) .097, Management and leadership commitment had a coefficient ( $B= 0.065$ ), (Beta) .061, and continual improvement had a coefficient ( $B= -0.116$ ), (Beta) -.107.

Moreover, the adjusted  $R^2$  was (0.879), which indicated that the model's predictors explained 76.7% variation in the booming construction projects of SMEs in Kunming. Total quality management implementation has ten elements explained factors as predictors of success. ( $R^2 = .767$ ). This model is highly significant, as indicated by the F-value of  $F=126.753$  ( $p=0.000 < 0.05$ ). Figure.1 draws the model of multiple regression analysis.

**Table 1:** Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
	B	SE <sub>B</sub>				Tol.	VIF
(Constant)	.351	.153	-	2.291	.02	-	-
1. Management, leadership commitment	.065	.034	.061	1.926	.05*	.607	1.649
2. Improved customer satisfaction	.033	.039	.035	.853	.394	.367	2.721
3. Continual improvement	-.166	.045	-.107	-2.574	.01*	.354	2.824
4. Co-operation and teamwork	.213	.055	.201	3.853	.00**	.224	4.472
5. Continual learning and training	-.057	.052	-.058	-1.084	.279	.216	4.622
6. Customer/supplier relationship	.163	.057	.178	2.875	.00**	.160	6.267
7. Employee empowerment and satisfaction	.220	.062	.229	3.543	.00**	.145	6.878
8. Process improvement	.111	.062	.108	1.799	.073	.168	5.936
9. Measurement of performance	.098	.059	.097	1.654	.099	.177	5.650
10. Effective communication	.170	.057	.169	2.980	.00**	.186	5.370

Remark: a. Dependent Variable: success in the construction projects

Adjust R<sup>2</sup> = 0.879; R<sup>2</sup> = 0.767, F = 126.753, Sig = 0.10

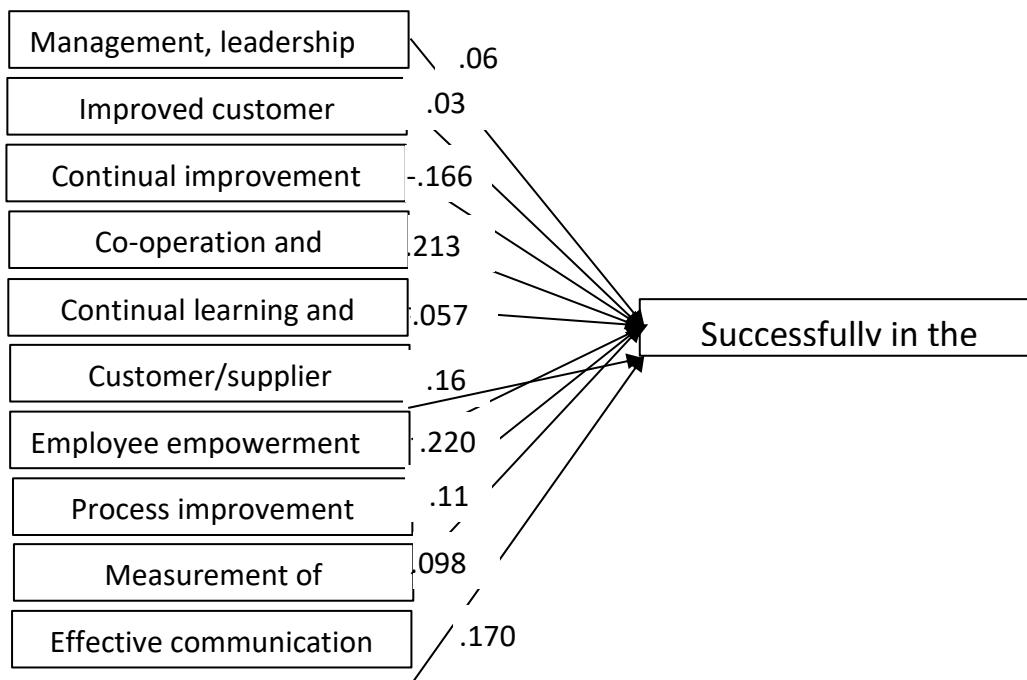


Figure 2: Multiple regression analysis

#### 4. Success model for SMEs' construction projects in Kunming

Based on the regression coefficient for raw scores, the following factors should be prioritized: (1) Employee empowerment and satisfaction (B=0.220) has the highest impact on success, followed by (2) co-operation and teamwork (B=0.213), (3) effective communication (B=0.170), (4) customer/supplier

relationship ( $B= 0.63$ ) (5) process involvement ( $B=0.163$ ), (6) measurement of performance ( $B=0.111$ ), (7) management and leadership commitment ( $B=0.065$ ), and (8) improved customer satisfaction ( $B= -0.033$ ). These factors significantly affect the SMEs' construction project success. See Figure 3



Figure 3: SMEs' Construction Projects Success Model.

## Discussion

According to the results, all factors were deemed highly important. First, continual improvements had the highest mean at 4.54, followed closely by performance measurement at 4.51. Employee empowerment and satisfaction mean 4.32, while customer /supplier relationships and process involvement mean 4.30 and 4.28. Cooperation and teamwork mean 4.18, while continual learning and training and effective communication both received a mean 4.16. Improved customer satisfaction means 4.14, and management and leadership commitment had the lowest mean 4.13.

Results of multiple regression analysis findings that employee empowerment and satisfaction had a regression coefficient ( $B= 0.220$ ), which has the very high impact on success in construction projects. Cooperation and teamwork had a coefficient ( $B= 0.213$ ), customer/ supplier relationship had a coefficient ( $B = 0.163$ ), effective communication had a coefficient ( $B= 0.170$ ), process involvement had a coefficient ( $B = 0.111$ ), measurement of performance had a coefficient ( $B= 0.098$ ) management and leadership commitment had a coefficient ( $B= 0.065$ ) and continual improvement had a coefficient ( $B= -0.116$ ) significant level at 0.10. Continuous learning and training, along with improved customer satisfaction, did not have a significant impact. This research is related to, which concluded that establishing a continuous improvement process for daily task management is critical for personnel working toward organizational success.

In a SMEs' construction projects success, the eight key factors should be given priority. Management is of great importance to owners, or managers of SMEs construction projects. These include employee empowerment and satisfaction, cooperation and teamwork, effective communication, customer/supplier relationships, process involvement, measurement of performance, management and leadership commitment, and improved customer satisfaction. Except for the factors of improved customer satisfaction and continual learning and training, SMEs construction project operations should be the basis for agencies

to learn from one another continuously. The SMEs' construction projects success depends on various elements. The other contributing factors also significantly impact the project's overall success.

According to Albtoush et al. (2022), the success of a construction project is determined by several factors. These factors include quality, cost, and time. The measurement of performance variables in this research identifies time-related factors as essential indicators of the project's success. This is because the project's progress must be measured in both quantity and quality each month or quarter. Additionally, the issue of contract-related factors is closely tied to cooperation and teamwork. All parties involved must work together to achieve the project's goals.

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## Impacts of supply chain collaboration and firm performance: the mediating role of supply chain capabilities of express delivery companies in Kunming, the people's republic of China.

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### Abstract

The purposes of this research were (1) To study the importance of supply chain collaboration, supply chain capabilities, and firm performance, (2) To study the impact of supply chain collaboration, and supply chain capabilities on firm performance, and (3) To test the mediating role of supply chain capabilities linking from supply chain collaboration to the firm performance. The sample group is 235 people, owners of businesses, and managers who have experience doing 9 express delivery companies. The research tool was an online questionnaire. Data were analyzed using descriptive, inferential statistics were used to analyze data with a structural equation model (SEM) by ADANCO and PROCESS program. The results found that all factors were at a high important level. First, firm performance, followed closely by supply chain collaboration, and supply chain capabilities. Based on the findings of the SEM analysis, it was discovered that supply chain collaboration has the highest impact on supply chain capabilities, with a path coefficient of 0.647. Following this is the impact of supply chain capabilities on performance, which has a path coefficient of 0.481. Lastly, the path coefficient of supply chain collaboration on firm performance was found to be 0.435. Therefore, it can be concluded that supply chain capabilities play a crucial role in transferring the influence of supply chain collaboration through firm performance.

**Keywords:** Supply chain collaboration, Firm performance, Mediating role of supply chain capabilities, Express Delivery Companies.

### Introduction

At present, competition in the economy and trade has intensified. Technological situations and unexpected changes, including the external environment, affect company management in terms of both new product launches and timely responses to customer needs. This has become a driving force for businesses to focus on trying to find ways to meet customer satisfaction. As a result, the business has to continuously adapt and develop its capabilities. Create a competitive advantage over your competitors and ensure your company's long-term viability. A way for companies to focus on supply chain management is



to control the entire organization and reduce costs and expenses. It improves the operational efficiency of the organization and leads to the improvement of competitiveness (Langley et al., 2009). Supply chain management is management that focuses on building cooperation with members of the supply chain, and process management within the organization. The goal is to make production and service efficient (Ahmad & Dhafr, 2002). The supply chain management applied by an organization can be divided into two categories: internal coordination and operational performance. In general, the purpose of creating internal links is to improve information sharing, as well as external links and operational performance. There have been two different approaches to consider the impact of information exchange via external links on supply chain performance. Companies are facing an era of globalization and intensifying competition. Entrepreneurs are beginning to realize that in order to gain and maintain a competitive advantage, businesses have to deliver the best value and service to their customers at the lowest possible cost. Due to modifications in client behavior, there is likewise better demand. In phrases of time, a quicker reaction is required. Product lifecycles are getting shorter and competition is increasing worldwide, so businesses must create shorter cycle instances and customized products and services. Certain skills, excellence, innovation, and knowledge of the service business are becoming increasingly important when developing new products. Companies have been seeking ways to collaborate with their supply chain partners over the last decade. To ensure supply chain efficiency and responsiveness, managers of organizations have to utilize resources; especially, the company's suppliers and customers, including network and expertise in business that is available both within and externally. (Cao & Zhang, 2011)

The collaboration with stakeholders, therefore, enables companies to achieve a faster product development process. Reducing development costs can lead to better technology and innovation in dynamic market conditions, as well as better product quality. Achieving business goals can seem daunting for individual organizations. However, it can easily be achieved through supply chain collaboration. Cooperative action of working groups and activities in supply chain management is of great importance. (Koçoğlu et al., 2011) A lot of attention has been paid to this in the past. This is because all participants have different common competencies to work in the supply chain. This will enable the company to compete at lower prices and reduce operating and labor costs, including improved service efficiency. Therefore, requires strong integration between suppliers and customers. (Vereecke & Muylle, 2006). Firms form partnerships with supply chain partners to achieve both quantitative and qualitative goals, resulting in workforce flexibility and a sustainable competitive advantage. (Nyaga et al., 2010) When it comes to supply chain relationships, it turned out to be at a cooperative level. It can happen between suppliers and suppliers. It is a relationship that shares common goals, increases efficiency, and strives collaboratively for purposeful, collaborative quality. (Vereecke & Muylle, 2006) The supply chain has become a strategy for building competitive advantage and developing the core competencies of companies as a quality-oriented collaborative approach, defined on the basis of synergistic factors. Awareness of collaborative efforts affecting perceived delivery supply chain effectiveness.

Kunming is the capital of Yunnan province. Yunnan, China is the most ethnically populous province in China, with a total of 26 different nationalities. The history of various countries has created special arts and cultures over a long period of time. As a result, many service companies were born. The transportation industry is one of the service industries that supports Kunming's tourism economy, Well-known and popular courier companies among consumers who use this service are his nine companies. In order to maintain high service quality in line with established standards, the key is to develop a system and employees who are prepared for change, such as securing human resources and managing employee qualifications. Service transportation companies are therefore challenged to manage supply chain collaboration at an efficient level in order to maximize efficiency and improve customer satisfaction. However, due to the development of the transportation business in the past big festivals, it is found that the daily parcel transportation capacity is very limited, slightly below plan, including on-time package delivery. Many customers are using express delivery services as consumer demand surges due to measures to encourage working from home and due to the COVID-19 pandemic. However, poor service leads to delays, ultimately leading to customer dissatisfaction and impacting the courier's performance.

## 1. Research Objectives

1.1 To study the importance of supply chain collaboration, supply chain capabilities, and firm performance of Express Delivery Company in Kunming, the People's Republic of China.

1.2 To study the impact of supply chain collaboration, and supply chain capabilities on firm performance of Express Delivery Company in Kunming, the People's Republic of China.

1.3 To test the mediating role of supply chain capabilities linking from supply chain collaboration to the firm performance of Express Delivery Company in Kunming, the People's Republic of China.

## 2. Review of Related Literatures

### 2.1 Express delivery company context In Kunming

China is a vast area consisting of counties and many cities that are known as the commercial center of Asia. One of them is Kunming which is located in Yunnan Province. It is a promising market for imported goods and services from around the world; especially, products produced by foreign investment entrepreneurs who quickly invested in Kunming, where now has become the number one major retail market in China. Therefore, Kunming has been renovated into a "new city" along with the installation of important infrastructure such as the airport. A large electric train project is expected in the next 2 years, all construction plans will be completed for the "port city". The support for trade will flow continuously. One business in Kunming that has grown exponentially over the past decade is mining, hydropower plants, pharmaceuticals, real estate, and retail. (Waitayasewi, 2022). There are many companies that offer delivery services in the Chinese mainland, but in Kunming, most of the delivery companies use Mandarin to communicate with their clerks. All these 9 Express Delivery Companies have many branches because there are a large number of transportation service users. In addition, operators of transport companies have

developed modern transportation systems by bringing innovation to apply in order to have long-term competitiveness.

### **1) Supply chain collaboration**

Supply chain collaboration is about coordinating with internal departments and external partners to sustain an optimized flow through the supply chain in order to efficiently meet demand and

Supply chain collaboration is about coordinating with internal departments and external partners to sustain an optimized flow through the supply chain in order to efficiently meet demand and ensure on-time, in-full delivery. It means establishing real-time shared visibility and processes with supply chain partners to facilitate the identification and resolution of issues. Supply chain collaboration encompasses the full scope of supply chain functions, including purchase order processes, forecasting, capacity planning, and quality management. Cao and Zhang (2011) conducted supply chain collaboration as a partnership process where two or more autonomous firms work closely to plan and execute supply chain operations toward common goals and mutual benefits. Many researchers are studying supply chain collaboration. For example, (Min et al., 2005; Kumar & Banerjee, 2012). researchers investigated elements of supply chain collaboration. Supply chain collaboration turned out to be the joint activities of information sharing, joint planning, joint decision-making, knowledge sharing, resource resolution, joint problem solving, appropriate revenue sharing, and joint performance measurement. The study analyzed to examine the role of these variables in the information-sharing work strategy that contributes to long-term effectiveness.

### **2) Supply chain capabilities**

Supply chain capabilities are the ability of an organization to provide goods or services to customers. The term often refers to a company's manufacturing capabilities, but it can also include other areas, such as customer service, order fulfilment, and logistics. Supply chain management has been grouped into 5 elements of supply chain capability as follows: Supply sense, Supply response, Decide and commit, Demand sense, and demand response. The perception of supplier risk helps motivate the supply chain manager to enhance the integration capabilities of the supply chain and thus achieve higher resilience. Furthermore, the perception of external risks to a supply chain actually reduces the effort of deploying external capabilities to obtain resilience. Overall, the findings strongly support the view that resources, routines, and capabilities provide different results in terms of resilience depending on supply chain risk factors (Brusset & Teller, 2017).

### **3) Firm performance**

Firm performance measures are indicators that determine how well an organization achieves its goals. This may include the direction of the request, client satisfaction, fiscal performance, profitability of the business, or other factors related. In the performance is measured in numerous ways, similar to company performance, functional effectiveness, and fiscal effectiveness. Still, it has been accepted that there's no further competition between associations. But it's in the process of force chain capability. Therefore, for global competition, it is very important to integrate all network members to integrate together. And should measure performance at the supply chain level. One organization with a

better supply chain can keep business running smoothly, and efficiently (Singham et al., 2017). Managers must create a complete supply chain system having a clear approach with a positive effect on performance. The most effective is supply chain collaboration (Seo et al. 2015).

## Research Methodology

### 1. This research methodology is divided into 3 parts as follows:

1.1 The tool used a questionnaire, which reviewed the literature to find variables. The variables Supply chain collaboration, developed from a measure of Seo et al. (2015). Supply chain capabilities, developed from a measure of Brusset & Teller (2017), and firm performance, developed from a measure of Singham et al. (2017).

1.2 The questionnaire is divided into 2 parts: Part 1: General information of the respondents; Part 2: There were 3 variables: (1) Supply chain collaboration; SupCl has 10 observed variables; (2) Supply chain capabilities; SupCp has variables. Observe 10 questions and (3) Firm performance; FirmP has 10 questions on observed variables, totaling 3 latent variables, 30 questions.

1.3 The questionnaire was distributed by sharing an online link to the Kunming Express Delivery Association platform and sending a link to WeChat and a QR Code. The questions are a 5-level rating scale applied according to the Likert method, which determines 5 levels of importance as follows: A very high important level Score of 5, and a very low important level score of 1.

### 2. Research Instrument (s)

2.1 We utilized research tools and online questionnaires that were sent to entrepreneurs, owners, or branch managers of nine Express Delivery Companies. The sample size was determined according to the criteria of (Hair et al., 2010), which specified a sample size of 15-20 times per 1 parameter. The criterion of 10 times the measurement variable, as there are a total of 3 latent variables and 30 observed variables ( $3 \times 10 = 300$  people) in our research. Thus, our sample group comprised 300 individuals.

2.2 Let's measure the validity of the content by analyzing the consistency between the question items and the objectives (IOC) and the consistency between the questions (Brusset & Teller (2017). The average index of compliance IOC is between 0.66-1.00.

2.3 Questionnaire considering Cronbach's Alpha coefficient, the whole is equal to 0.829, the reliability coefficient alpha of supply chain collaboration is equal to 0.886, supply chain capabilities are equal to 0.796., and firm performance is equal to 0.807 and the acceptable value is greater than 0.7 (Cronbach, 1970).

### 3. Populations and Samples

3.1 A total of 300 units were sampled during the month of September 2023 and responses were collected through the questionnaire.

3.2 The completed questionnaires were returned through online social networking channels, with a total of 235 people, who respond to inquiries on behalf of the company and have direct management knowledge and experience. representing 78.33 percent of the sample size. (please specify the sampling)

#### **4. Statistics for Data Analysis**

The statistics used for analyzing data were mean, percentage, standard deviation and 2) Inferential statistics with SEM, Software ADANCO (Hair et al., 2010), and PROCESS technique (Hayes & Flannery, 2000).

### **Results/Research**

#### **1. Demography of Owners and Branch Managers**

The research reveals that the majority of individuals who were entrepreneurs and managers, including branch managers, consisted of 82% males and 18% females. Among them, 48% fell in the age bracket of 41-50 years, 26% were 31-40 years old, 21% were between 51-60 years old, and only 5% were 30 years or under, and owned a business or were branch managers. In terms of education, 72% held a Bachelor's degree, 18% had a Master's degree, 7% had education below a Bachelor's degree, and only 5% held a Doctoral degree.

The positions held by these individuals were as follows: 62% were owners, 38% were branch managers, 38% were individual investors and financial institutions, 26% were individual investors, corporate investors, and financial institutions, 17% were individual investors and corporate investors, 15% were individual investors and family offices, and 4% were individual investors. Regarding past performance, 77% showed better results, 15% were fixed, and 8% were reduced. The Express Delivery Company was classified into nine types, with Jd.com Express at 15%, followed by Yto Express at 14%, Deppon Express and Sf Express at 13%, Zto Express at 12%, Yunda Express at 11%, Rabbit Express at 10%, Deppon Logistics at 7%, and lastly Sto Express at 5%.

#### **2. To study the importance of supply chain collaboration, supply chain capabilities, and firm performance.**

According to the findings, the firm's performance is of high importance. The average score was 4.42 with a standard deviation of 0.573. Supply chain collaboration is also crucial, with an average score of 4.36 and a standard deviation of 0.698. Lastly, supply chain capabilities are highly important, with an average score of 4.24 and a standard deviation of 0.793.

#### **3. To study the impact of supply chain collaboration, and supply chain capabilities on the firm performance**

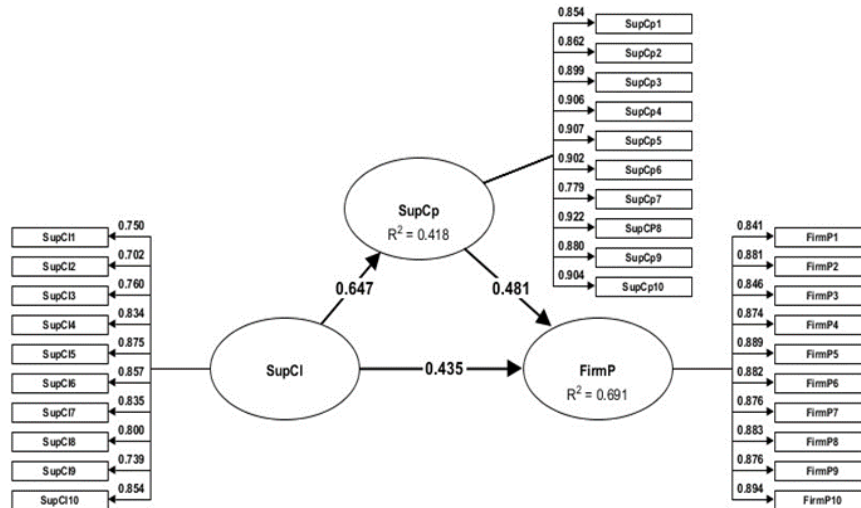


Figure 1: Result of structure equation model analysis

Figure 1. It was discovered that the correlation between all variables impacts the operational outcomes. In particular, the supply chain collaboration variables have the most significant impact on the supply chain capabilities, with a path coefficient of 0.647, and R2 of 0.418. This is followed by the impact of supply chain capabilities on performance, with a path coefficient of 0.481, and R2 of 0.691. Lastly, the influence of supply chain collaboration on firm performance with a path coefficient of 0.435.

The first variable is supply chain collaboration (SupCl) There are observe 10 indicators: (1.1) It is important to prioritize working together (1.2) Collaborating with others leads to the formation of long-term and environmentally friendly business alliances (1.3) The organization's goals align with those of its joint partners (1.4) It is important to prioritize investments based on the agreement in order to achieve mutual benefits (1.5) Electronic systems can support sending information within and between organizations (1.6) Organizations exchange knowledge to establish collaborative partnerships (1.7) Let's work together to reduce risk by establishing joint cooperation (1.8) It is important to prioritize working together to effectively manage resources for optimal operational benefits (1.9) Let's focus on supporting each other by sharing resources to decrease expenses in supply chain management and (1.10) To enhance operational efficiency, prioritize the development of joint personnel. Factor loading between 0.702 to 0.875.

The second supply chain collaboration (SupCp). There are observe 10 indicators: (2.1) It is important to prioritize flexibility when it comes to sourcing raw materials (2.2) There is a focus on being flexible when it comes to adjusting work based on orders (2.3) It's important to focus on one's ability to adapt to change (2.4) Businesses can utilize forecasting to predict various factors that may have an impact (2.5) It is important to focus on spreading out risks across the entire supply chain of the business (2.6) Organizations have the ability to learn and consistently stay updated on what the customers desire (2.7) The company can assess its capacity to acquire raw materials and equipment as per customer needs (2.8) The company is capable of accurately recording information and managing the placement of raw materials in the warehouse (2.9) The company offers various transportation options to meet customer delivery requirements, and (2.10) The

company efficiently improves operations by actively listening to customer feedback across all channels. Factor loading between 0.779 to 0.922.

The third, dependent variable is the firm performance (FirmP) There are observe 10 indicators: (3.1) The Company emphasizes the importance of understanding information flow in order to improve supply chain management effectiveness (3.2) It is important to prioritize the flexibility of cash flow (3.3) The focus is on enhancing the capacity to generate higher returns on investments (3.4) Focus should be on developing innovative strategies that lead to a competitive advantage for the organization (3.5) The focus of the company's operations is to improve customer satisfaction (3.6) Businesses can boost productivity to fulfill the demands of their customers (3.7) Focus on the capability to efficiently manage the delivery of products and services within designated time frames (3.8) It is important to focus on inventory costs and product turnover rates that are suitable (3.9) Efficient time management reduces waste resources and solves problems, and (3.10) The business emphasizes long-term profitability. Factor loading between 0.841 to 0.894. Based on criteria of Fornell's & Larcker (1981) support that all the indicators have a positive volume greater than 0.5.

**Table 1:** Shows the direct effect, indirect effect, and total effect analysis.

Dependent Variable	R <sup>2</sup>	Effects	Supply chain collaboration	Supply chain capabilities
Supply Chain Collaboration	-	DE	N/A	N/A
		IE	N/A	N/A
		TE	N/A	N/A
Supply Chain Capabilities	0.418	DE	0.647	N/A
		IE	0.000	N/A
		TE	0.647	N/A
Firm Performance	0.691	DE	0.435	0.481
		IE	0.311	0.000
		TE	0.746	0.481

**Remark;** TE=Total Effect, DE=Direct Effect, IE=Indirect Effect, Supply Chain Collaboration=SupCl, Supply Chain Capabilities =SupCp, Firm Performance=FirmP.

The structural equation hypothesis was tested using the ADANCO program in Table 1.

The findings revealed that supply chain collaboration has a direct effect on supply chain capabilities, with a high value of 0.647 and an R2 value of 0.418. The total influence was also found to be 0.647. Moreover, the study found that supply chain collaboration has a direct effect on firm performance, with a value of 0.435, an R2 value of 0.691, an indirect effect of 0.311, and a total influence of 0.746. Lastly, supply chain capabilities were found to have a direct effect on firm performance, with a value of 0.482 and an R2 value of 0.691. The total influence was equal to 0.481. It's important to keep in mind that there are correlations between these variables.

**Table 2:** Hypothesis test.

Hypothesis	Coefficient path	T-stat	Summary
Supply chain collaboration ► Supply chain capabilities	0.647	15.530	Support
Supply chain collaboration ► Firm performance	0.435	7.777	Support
Supply chain capability ► Firm performance	0.481	8.426	Support

**Remark;** Accept  $p \leq 0.10$ , T-stat  $t \geq 1.96$ .

Hypothesis 1. Supply chain collaboration influences Supply chain capabilities with a coefficient path value of 0.647, support.

Hypothesis 2. Supply chain collaboration influences firm performance with a coefficient path value of 0.435, support.

Hypothesis 3. Supply chain capabilities influence firm performance with a coefficient path value of 0.481, support.

### 3. To test the mediating role of supply chain capabilities linking supply chain collaboration to the firm performance.

The results of testing the mediating role of supply chain capabilities linking supply chain collaboration to the firm performance with PROCESS Program (Hayes & Flannery, 2000) are summarized in Table 3.

**Table 3:** Tests the mediating.

The total effect of Supply chain collaboration ► Firm performance					
Effect	SE	t	p	LLCI	ULCI
.6259	.0511	12.2508	.0000	.5253	.7266
The direct effect of Supply chain collaboration ► Firm performance					
Effect	SE	t	p	LLCI	ULCI
.435	.0609	5.1724	.0000	.1950	.4349
The indirect effect of Supply chain collaboration ► Firm performance					
	Effect	Boot SE	BootLLCI	BootULCI	
Supply chain capabilities	.3110	.0517	.2158	.4094	

**Remark:** Total Effect = .625 (t=12.25), R<sup>2</sup>=392, Direct Effect= 0.435 (t= 5.172), Indirect Effect = 0.311

(BootCL=0.215, BootCU=0.0.409) Significant at 0.01

#### Summarize

1. The influence of supply chain collaboration on supply chain capabilities is significant at 0.01 (beta=0.647, t= 13.46)

2. The influence of supply chain capabilities on the firm performance is significant at 0.01 (beta= 0.481, t= 7.722).



3. The direct influence of supply chain collaboration on the firm performance was significant ( $\beta=0.435$ ,  $t=5.172$ ), decreasing from the total influence ( $0.625$ ,  $t= 12.251$ ). 49.7 percent shows that supply chain capabilities is a hidden factor with a very high influence. Can influence along the path supply chain collaboration on the firm performance greatly decreased.

4. Indirect influence along the route supply chain collaboration on supply chain capabilities to the firm performance is significant ( $\beta=0.311$ , 99% confidence interval covers 0). It shows that supply chain capabilities is an interstitial variable that transfers the influence of supply chain collaboration to the firm performance, which is a very important variable. Because it can reduce the total influence that supply chain collaboration has on the firm performance by up to 49.7 %.

5. The influence of supply chain collaboration on the firm performance is still significant and remains high. ( $\beta=0.435^{**}$ ) is higher than 0.20, indicating, that there are still other factors that influence the influence of supply chain collaboration on the firm performance.

## Discussion

According to the results, all factors were high-level important. First, the firm's performance is of high importance. Follow by supply chain collaboration is also crucial, Lastly, supply chain capabilities are highly important, with an average score of 4.24 and a standard deviation of 0.793.

Results of the structure equation modeling found that the supply chain collaboration has the most significant impact on the supply chain capabilities, with a path coefficient of 0.647, and  $R^2$  of 0.418. This is followed by the impact of supply chain capabilities on performance, with a path coefficient of 0.481, and  $R^2$  of 0.691. Lastly, the influence of supply chain collaboration on firm performance with a path coefficient of 0.435.

The study tested the role of supply chain capabilities in connecting supply chain collaboration to firm performance. The results showed that supply chain capabilities act as a mediator, transferring the impact of supply chain collaboration to firm performance and remains high. Most express delivery companies, especially the larger ones such as Zto Express, Deppon Express, and Jd.com Express, prioritize efficient operations by collaborating with all parties involved in the supply chain. These companies rely on cooperation with networks in both public and private sectors to work and support each other. For instance, Zto Express is known for its fast pick-up and good experience, Deppon Express has a network that covers 98% of counties in the country, and Jd.com Express is known for its fast speed and good experience. Therefore, supply chain collaboration is crucial for these companies to operate effectively.

This study was conducted to understand how supply chain collaboration approaches contribute to firm performance. The current study finds out the approaches to enhance the firm performance literature through supply chain collaboration, supply chain capability, and firm performance. It has been proved that supply chain collaboration and supply chain capability have a direct and significant role in the firm performance of supply chain members of the Express Delivery Company. This is in line with Singham et al. (2017) conclusion that performance depends on proper supply chain collaboration and supply chain

capabilities. The study by Brusset & Teller (2017) found that supply chain capabilities support operational performance and long-term competitiveness. Thus, this study shows the impact of the mediating role of supply chain capabilities through supply chain collaboration approaches on firm performance.

## Suggestions

1. Suggest areas for future research, such as investigating the impact of technology, cultural variables, and environmental sustainability on express delivery company's supply chain collaboration and capabilities.

2. To identify control variables such as industry type and firm size that can impact the relationship between supply chain collaboration and firm performance for express delivery companies.

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KSUC-OI-005

## Sustainable construction supply chain for green building: a case of siem reap airport terminal

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### Abstract

The purposes of this research were to assess the extent to which Siem Reap new Airport Project has implemented green building practices in the field to study the possibility and obstacles of China and Southeast Asian countries to share and build green building supply chain. This study mainly uses questionnaires to major participants in the project implementation process which included 304 participants, mainly Cambodian state departments, officials, project designers, general contract managers, engineers, technicians, subcontractors, suppliers, etc., who completed 287 questionnaires through online social network channels, accounting for 94.41% of the sample size. The data analysis are mainly based on the assessment of the implementation practice of Siem Reap International New Airport and the survey feedback of the main direct participants, It can count and calculate the weight score of its green building implementation, and study the co-construction and development of green building sustainable supply chain between China and Southeast Asian countries by comparing the similarities and differences in the development of green building technology and materials. The possibility and direction of establishing a more sustainable green building supply chain across countries and regions through the implementation case study of the Siem Reap Airport Terminal project.

**Keywords:** Green building, Sustainable construction, Information support systems, Green technology information.

### Introduction

Green buildings are buildings that are harmless to the environment, capable of making full use of the natural resources of the environment, and built under conditions that do not destroy the basic ecological balance <sup>[6]</sup> (Kats, 2003). It can also be called sustainable development building, ecological building, return to nature building, energy saving and environmental protection building. The basics of green building :(1) saving energy, reducing the burden of building on the environment; (2) providing a safe, healthy and human living space; (3) achieving the harmonious coexistence of people, buildings and the

environment. Green buildings have a broad application market in Southeast Asia and other developing countries, affected by the tropical monsoon climate, Southeast Asian countries have a high proportion of the demand for refrigeration. At the same time, the renewable energy utilization potential of Southeast Asian countries is huge, but at present, the utilization rate of renewable energy in Southeast Asian countries is only about 15% (Southeast Asia Energy Outlook, 2022). ASEAN member nations are targeting 23% of all primary energy from renewable sources by 2025<sup>[7]</sup> (ASEAN Centre for Energy, 2015), and green building technologies are widely used and developed in Southeast Asia in order to adapt to the special needs of local buildings<sup>[8]</sup> (Li et al., 2022).

The new Siem Reap International Airport in Cambodia is one of the largest public buildings under construction in Cambodia, and the vision of practicing green architecture as a model for both China and Cambodia has been determined from the planning of the project, which is the best choice for this case study, Siem Reap International Airport is the first class 4E international civil aviation airport that invested, designed, built and operated by a Chinese company. The project adheres to the Chinese government's concept of sustainable development. The implementation and development process of the project prioritized sustainable development practices from the planning stage to the construction stage. In order to maintain the vision of sustainability, the building process must be conducted according to sustainable practices.

## 1. Research Objectives

1.1 To analyse the existing gap between the actual implementation of the new Siem Reap International Airport terminal project and the relevant regional green building standards and real needs of Southeast Asian countries.

1.2 Identify the common convergence between China and Southeast Asian countries such as Cambodia in terms of green building technology application, material use, and supply chain.

## 2. Review of Related Literatures

### 2.1 Sustainable Development and Green Buildings

In engineering, sustainable design is a conceptual design idea that embraces the sustainable development of human beings and society. Sustainable development can be defined in many ways. Different factors lead to different approaches to sustainability issues, such as sustainability objectives, context, awareness and economic conditions. In terms of resources, sustainable development is about providing opportunities for the next generation. Sustainable construction is a key aspect of sustainable development. Sustainable building practices are based on ecological principles, do not affect the environment, have a closed material cycle, and are fully integrated into the landscape at the end of the structure's useful life (Sinha et al., 2013).

### 2.2 Sustainability with Respect to Building Materials.

The goal of sustainable development is to protect and restore ecosystems. The main goals of sustainability are to minimize material consumption and environmental impact, improve human satisfaction, and increase the reuse of materials. One important aspect is to minimize consumption, and another is to either reuse the same materials or recycle them into different or similar building products.

**2.3 Financial Benefits and Life Cycle Assessment.**

Compared with traditional buildings, the economic benefits of green buildings are also increasingly prominent, such as saving water, electricity, gas and other energy, improving indoor environmental quality, reducing employee health costs, and reducing operating costs.

Green buildings save operating and maintenance costs mainly by reducing energy consumption, Improved occupant comfort and productivity. As shown in Table 2.1,

For green buildings, the life cycle usually begins with the extraction of original resources from nature or the recycling materials. These original resources are then manufactured into usable products, such as cement, rebar, etc. The product is then transported to the construction site, in site, the products then are assembled into a building. it consumes energy over the life of the building, Finally, the building is demolished, and its materials are disassembled as construction waste or recycling reuse.

**Table 1:** Economic benefits of green buildings.

Category	20-year Net Present Value
Energy savings	\$5.80
Emissions savings	\$1.20
Water savings	\$0.50
Operations and maintenance savings	\$8.50
Productivity and health value	\$36.90 to \$55.30
Subtotal	\$52.90 to %71.30
Average extra cost of building green	(-\$3.00 to \$5.00)
Total 20-year net benefit	\$49.90 to \$66.30

**2.4 Green Building Development in Southeast Asia**

Clear definition of green building is conducive to the promotion and implementation of green building. However, there has been no uniform standard on what green buildings are or what green buildings should include (Zuo,2014). According to About Green Building n.d Singapore, Green building is resource efficient and environmentally responsible in the life cycle of a building. Due to its rapid urbanization in Southeast Asia most countries have developed its own green building assessment tools.

**Table 2:** Southeast Asia countries green building assessment tools.

Countries	Release time	Name of assessment tools	Organization
Singapore	2005	Green Mark	BCA
Malaysia	2009	GBI	malaysiaGBC
Indonesia	2008	Greenship	GBCIndonesia
Thailand	2012	TREES	TGBCI
Cambodia	2020	CAMEEL	CamGBC
Vietnam	2010	LOTUS	VGBC
Myanmar	2020	JADE	MGBS
Philippines	2009	BERDE	PGBC
Brunei	2016	BAGUS	The Ministry of Development

### 2.5. Green Building Energy-saving Technologies in Southeast Asia

The geographical and climatic characteristics of Southeast Asia challenge the moisture resistance and thermal insulation performance of building materials, The energy saving technology of Southeast Asian countries is fully studied from the aspects of wall, Roof Windows, Envelope shading, Air conditioning, Ventilation, Solar energy.

### Research Methodology

#### 1. This research methodology is divided into three parts as follows:

Step1, Systematically summarizes the collected literature, compares the main scope and standards of green building evaluation in Southeast Asian countries, and makes a questionnaire form based on the actual situation of Siem Reap International Airport to collect data.

Step 2, Through statistics and analysis of existing green building assessment standards in Southeast Asian countries, Make Siem Reap Airport Green Building assessment form based on the summary and research of relevant data.

Step3, The data collected in the questionnaire survey were screened and classified, and the data that had nothing to do with the research topic and repeated studies were initially excluded. Only data consistent with the objectives of the study is retained.

Step4, Through the comparative study of the data of roof, curtain wall, air conditioning system and other projects, the conformity analysis is obtained. The values of the parameters performed by the various specialized systems engineering are compared and added to the total value and final data as a reference for prioritizing the sustainable supply chain of green buildings in Southeast Asia.

## 2. Research Instrument (s)

Qualitative methods are used in this study by conducting a green building assessment of Siem Reap Airport Terminal project. In the discussion, the approaches used in this study are case studies and comparative. There is no standard method for using comparative research, but comparability analysis investigates two or more items, products, data sets, or other forms of collection. This study compares the results of target plans and actual site performance by investigation in order to evaluate performance achievements in the form of a desired value that provides information on the gap between actual field performance and the maximum target value.

## 3. Populations and Samples

3.1 In Populations, there are about 90 companies or groups from investors, designers, builders, operators, subcontractors, suppliers, etc. These respondents are direct or indirect participants in the Siem Reap Airport project. They are familiar with the project situation and can participate in the questionnaire survey in a targeted way.

3.2 The study included 198 participants, mainly Cambodian state departments, officials, project designers, general contract managers, engineers, technicians, subcontractors, suppliers, etc., who completed 191 questionnaires returned via online social network channels, accounting for 96.40% of the sample size.

4. **Statistics for Data Analysis** We use comparison, classification, screening, statistics, percentage, standard deviation, etc. to analyze the data.

## Results/Research

### 1. Data screening analysis result

Through the collection and analysis of questionnaire survey data, the actual feedback data of respondents were compared by majors and compared with the green building assessment form of Siem Reap Airport, and the score data of various green building evaluation in the actual implementation of Siem Reap Airport was obtained.

**Table 3:** Green building assessment score for the actual implementation.

Category	Trade project			
	Roof	Curtain Wall	Air conditioning	Water and electricity engineering
Green designed	4.73	4.23	4.12	3.89
Material & Resources	4.32	4.17	3.97	3.97
Energy-saving	4.67	4.81	4.33	4.09



Sustainable Site Planning & Management (SM)	4.07	3.97	4.01	3.77
Indoor Environmental Quality	4.77	4.73	4.36	3.89
<b>Total score</b>	<b>4.51</b>	<b>4.38</b>	<b>4.16</b>	<b>3.92</b>

## 2. Conclusion

Overall, the Siem Reap Airport Terminal project received a high score of 77.2 out of 100 in the green building assessment, which shows the new Siem Reap Airport has highly satisfied the relevant regional green building standards and real needs of the project in the actual implementation process.

**Table 4:** Results of the green building performance assessment.

No.	Condition	Claim	Percentage
1	Conformity of the performance of the green building assessment table	79.11	28%
2	Green construction process	86.92	16%
3	Green supply chain	69.66	34%
4	Practice green behavior	79.39	22%
<b>Total All Parameter Rating</b>		<b>77.2</b>	<b>100%</b>

Through the evaluation of all questionnaires and data classification and analysis, the results show that Siem Reap Airport has achieved success in the application of green buildings, comprehensively implemented the concept of green buildings in design, procurement, construction and other aspects, and invented a new technology of energy-saving maintenance system adapted to the local climate according to the local climate. A good combination of China's existing green building technology and Cambodia's demand for green energy conservation, a large number of China's green technology in similar climate areas can be applied to Southeast Asian countries like Cambodia, but it also needs to be moderately improved and innovated according to the actual local conditions.

## Discussion

During the important implementation period of the project, the supply chain of important analytical engineering materials such as metal roofing, curtain wall, air conditioning system and other control engineering materials was ensured to be sustainable. All materials were tested and implemented in strict accordance with relevant green building quality standards. In the process of green building development, Cambodia and other Southeast Asian countries have the same development trend as China, and have great development potential in the application of technologies and materials such as energy saving and environmental protection and the joint development and establishment of sustainable supply chains.

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## Factors affecting supply chain management strategies and financial performance towards the competitive advantage of small and medium-sized enterprises in Kunming, the people's republic of China

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### Abstract

Description of the Problem: This study looks at the complex linkages between financial performance, competitive advantage, and Supply Chain Management (SCM) practices in Kunming, China's small and medium-sized firms (SMEs). Notably, it seeks to comprehend how these aspects interact and influence the performance of SMEs in a changing business environment. Method: 222 individuals from Kunming's SME sector responded to the survey using an online questionnaire. The survey was designed to evaluate the influence of SCM-related factors on competitive advantage and financial performance. To examine the gathered data, quantitative analysis such as Multiple Linear Regression and Principal Component Analysis were used. Results: SCM-related factors accounted for 9.38 percent of the variability in competitive advantage, according to the data. Notably, cost efficiency and employee skill training are highlighted as significant competitive advantage drivers. Furthermore, these SCM-related factors explained approximately 24.99 percent of the difference in financial performance. Key components in both SCM and financial performance were discovered, with cost efficiency and debt control playing critical roles. Conclusion: Based on the outcomes of the study, practical recommendations were developed. For Kunming's SMEs, strategies concentrating on improving cost efficiency, investing in staff training, optimizing debt management, and implementing technology and sustainability practices were advised. The study closes by underlining the significant influence of SCM techniques on financial performance and competitive advantage in Kunming's SMEs. It emphasizes the necessity of cost efficiency and personnel skill training for long-term competitiveness in a volatile business environment.

**Keywords:** Supply chain management, Factor analysis, Financial performance, Competitive advantage

### Introduction

Small and medium-sized enterprises play an integral function within an economic ecology, where their interdependencies foster mutual reinforcement and growth, whether they function as product manufacturers for large enterprise groups or establish connections with the local manufacturing sector or community, SMEs exercise unique influence. Small and Medium enterprises must face problems such as the reputation of business owners, and lack of recognition. The liquidity of the business is relatively low,

with a limited business plan. The potential to negotiate with trading partners is relatively low, and personnel lacks specialized skills. Therefore, to enhance the role of the small-medium size enterprise sector, some business operators are inferior in financial management. Therefore, the performance of SMEs, especially in terms of the financial management of entrepreneurs, will continue to improve and be sustainable. Requires public and private support from stakeholders, whether it is financial strategy training, innovation support to add value, and study visits to successful SMEs. (Pono et al., 2018 and Munizu et al., 2019).

The supply chain concept is a group of internal and external stakeholders. It has interacted and engaged in business activities to add value, by sharing and providing accurate information, and by exchanging that information into applications to provide the final product or service, that consumers want some product (Jain et al., 2010). The approach to supply chain management is the most effective means of enhancing the fiscal health and competitiveness potential of SMEs. Due to the risks associated with carrying out business today, including demand fluctuation, material volatility in prices, delivery delays, or seasonal demand. (Kumaret al., 2013). Thus, gaining an edge over rivals through efficient supply chain administration is a great operating strategic potential (Heizer & Render, 2010). Strengthen the management and competitiveness of members in the supply chain, members can align operations across all departments, focus on sharing the information needed to streamline operations and focus on utilizing limited resources (Kenneth et al., 2008).

This is because various factors in the business will affect the supply chain management of SMEs in the service industry, for example, the decision-making process of members of various departments in the supply chain may have inconsistent opinions in the supply chain, the raw material procurement process, rising inflation has increased a raw material's price, climate change is a long-term problem in the supply chain, and the supply chain will be affected (Malik et al., 2014). Supply chain management strategy focuses on building partnerships with supply chain members to achieve differentiation and process management within the organization. The goal is to make production and service efficient (Frohlich and Westbrook, 2001; Ahmad and Dhafr, 2002). Maat et al., (2020) found that supply chain strategy variables significantly affect competitive edge and firm productivity. Furthermore, an organization's success is significantly impacted by its edge in the market.

The topic "Factors Affecting Supply Chain Management Strategies and Financial Performance Towards the Competitive Advantage of Small and Medium-sized Enterprises in Kunming, People's Republic of China" was chosen due to its critical relevance to the contemporary business landscape and Kunming's specific socioeconomic context. The significance of supply chain management (SCM) in encouraging global competitiveness cannot be emphasized (Sodhi & Tang, 2021). Given the importance of small and medium-sized firms (SMEs) in the Kunming economy, understanding the relationship between SCM strategies, financial performance, and competitive advantage is critical (Li & Huo, 2019). Kunming, being a significant economic hub, faces distinct challenges and opportunities that warrant an investigation into how SMEs navigate these complexities through effective SCM practices (Huang et al., 2020). Therefore, examining the

factors influencing SCM strategies and financial performance in this specific region holds promise for unveiling insights crucial to the sustainable growth and success of SMEs in Kunming.

## 1. Research Objectives

1.1 To explore the significance of Supply Chain Management (SCM) strategies in shaping the competitive advantage of Small and Medium-sized Enterprises (SMEs) in Kunming, China.

1.2 To investigate the factors affecting SCM strategies and their impact on the financial performance of SMEs in Kunming, China.

## 2. Review of Related Literature

### 2.1 Supply Chain Management Context

Enhancing the effectiveness of the supply chain to lower costs is the aim of SCM, which is a means of supervising and managing the movement of commodities from manufacturing and services to consumers. Supply Chain Management's primary focus is procurement or raw materials, size and location of warehouse and production sites, partnership agreement, transportation, occurrence of an event that does not go according to the schedule, inventory management, and customer order processing. Purchase order delivery process, and customer order tracking. Therefore, the work process of each responsible person is important for the smooth operation of the above nine supply chains. However, many factors can cause problems or create bad attitudes, which can adversely affect a company's business. Carriers should focus on supply chain management processes to increase customer satisfaction (Nugroho et al., 2017).

The SCM strategy is intricately linked to performance improvements and organizational capabilities, such as research and development. By applying technology to enhance enterprise capacity and marketability, organizations can further strengthen their supply chain operations (Tajbakhsh et al., 2015). The application of strategies must take into account the specificity for the continuation and expansion of SMEs is the most important thing. Prioritization is required. During these rapidly spreading changes, it is difficult to get an edge over others by improving factors alone.

Within the organization with changes in the external environment and increasing global competition, companies must figure out how to create new capabilities in order to adapt to rapidly changing circumstances and remain competitive (Moon, 2013), implying that corporate supply chain strategy is key. It is important and a mechanism that promotes creativity, innovation, and efficiency. It suggests that these mechanisms can help companies have outstanding potential, make a difference and adapt to changing situations, and help businesses grow. Therefore, SCM strategies can help companies to meet these difficulties. The SCM method for coordinating demand alongside supply has become an essential aspect of organizational relationships in the supply chain (Kwak et al. 2018).

### 2.2 Express Delivery Business in China

One service provider that is crucial to the distribution of goods to both domestic and foreign markets is goods forwarding. All phases of the supply chain, from raw materials and manufactured products to finished and intermediate goods, are handled by goods forwarders. China, in particular, is one of the fastest growing countries in the cyber world. The development of modern technology and the adoption of single-chip computers have revolutionized the transportation industry, bringing convenience and modernization to land, sea and air transportation. In the past, Kunming City had a Kunming Metropolitan Railway Container Centre. This centre was established on November 4, 2006, by China United International Rail Containers Co., Ltd. (CUIRC or Intermodal).

### **2.3 Financial Performance**

Financial performance is an indicator of operational success and relates to the degree to which quantitative performance has been achieved or achieved. It is an important part of financial risk management. It is the process of valuing company policies and operations in monetary terms. It measures the overall financial performance of a company over a given period of time. Financial statements are the official record of the activities and financial condition of a business. Financial information is presented on the board of directors and has a clear financial structure (Verma, 2022). The return on equity model, Cole's, (1972) study applied this framework to business, measuring the return on equity in equity of ordinary shareholders (Return on Equity; ROE) as a measure of profitability from the perspective of ordinary shareholders.

### **2.4 Competitive Advantage Theory**

It requires business strategies to be consistent with changing situations and external environments, taking into account low costs and differentiation of products or services that are superior to competitors and quick response (Porter, 1980). The development of a theory that explains competitive advantage has attracted interest from stakeholders for the better part of the last half-century (Wang, 2014).

According to an investigation by Jitrong and Niruttikul (2021), supply chain administration techniques at this level positively impacted competitive edge at a significance level of 0.001, and organizational performance positively impacted competitive advantage at a significance level of 0.001. A direct influence of 0.857 and 0.685, respectively, is indicated by the path factor. Entrepreneurs can utilise these findings as a guide to improve organisational tactics in order to get a competitive edge, and supply chain management practises can benefit from good performance management. (Hua, Chatterjee, and Jingliang 2011), discovered that the impact of these tactics on the competitiveness of various processing firm types varies. Strategic cooperation and source capability are critical components for large businesses, while demand control and source ability are critical components of supplier competition for SMEs. (Lu et al., 2021) observed that gaps have a larger influence on the financial performance of SMEs than those of tight bonds. The capacity for information sharing and innovation acts as a mediator amid the powerless and the powerful relationships, and the financial performance of SMEs.

Moreover, the capacity to share information and inventiveness support one another and have an impact on the financial performance of SMEs. A weak relationship has a more significant impact on SME financing than a strong relationship.

## Research Methodology

### 1. The research methodology divided into three parts as follows:

Firstly, the study reviews the related works of SCM, supply chain management strategy, financial performance, and the competitive advantage theory. Supply chain management strategy component: Vendor managed inventory (VMI), Enterprise replenishment Planning (ERP), Collaborative Planning, Forecasting and replenishment (CPFR), Warehouse management systems (WMS), outsourcing, R&D and technology commercialization (Bendoly et al., 2005). In addition, the variables of financial performance are profitability, return on equity, return on assets, return on investment and earnings per share, which are also components of financial performance, and the dependent variable is a competitive advantage.

Secondly, research tools, online questionnaires were sent to entrepreneurs or managers, or committees of 9 express delivery businesses, including branch managers. A population is a group of analytical units. Therefore, they are entrepreneurs or managers, or committees of nine express delivery companies, including branch managers of One hundred and Eight small and medium-sized enterprises in Kunming, People's Republic of China. A total of 108 companies are included. Therefore, this study included 222 employees or individuals.

In addition, the variables of financial performance are profitability, return on equity, return on assets, return on investment and earnings per share, which are also components of financial performance, and the dependent variable is a competitive advantage. AMOS program was used to establish a structural equation model to analyse these variables.

### 2. Research Instrument (s)

2.1 This study was based on a questionnaire survey. A questionnaire is an online tool for collecting information. the questionnaire about the SCM strategy, and competitive advantage will be used as a data collection tool.

2.2 The analysis and findings are used to determine the reliability of the questionnaire.

### 3. Population Sampling

Data collected from the population entrepreneurs or managers, or committees of 9 express delivery businesses, including branch managers of small and medium-sized enterprises in Kunming, People's Republic of China.

#### 3.1 Data Analysis

Descriptive and Inferential analysis is used to analyse the data. Inferential statistics in multiple regression analysis with enter selection technique. Statistical tests of Linear Multiple Regression, ANOVA, Principal Component Analysis and Eigenanalysis of the Correlation Matrix are conducted to run the data.

The statistical tests utilized serve different purposes in analyzing the data. Descriptive analysis focuses on summarizing and describing the characteristics of the dataset, providing insights into its central tendencies and variability. Inferential statistics, specifically multiple regression analysis with the enter selection technique, are employed to understand the relationships between multiple variables and to make predictions or inferences based on observed data. The statistical tests of Linear Multiple Regression, ANOVA (Analysis of Variance), one-principal component analysis, and Eigenanalysis of the Correlation Matrix are conducted to assess the strength and significance of relationships, variance among groups, reducing dimensions of data, and understanding the underlying structure of correlations within the dataset. These tests collectively enable researchers to describe the data comprehensively and infer conclusions or relationships that extend beyond the observed sample to the broader population.

## Results/Research

The study's findings highlight the critical impact of numerous aspects in supply chain management (SCM) and financial success for Kunming's SMEs. SCM-related issues, specifically cost efficiency, personnel skill training, and inventory management, emerged as key drivers to competitive advantage and financial success. Cost-cutting and staff skill development were identified as statistically significant drivers of competitive advantage, notably in revenue growth. Furthermore, financial performance metrics including profitability, cash flow management, and debt management showed significant relationships, explaining a significant amount of diversity in financial outcomes.

### 1. Research Question 1:

The Multiple Linear Regression analysis examined the impact of supply chain management (SCM) strategies on competitive advantage (Revenue Growth) in SMEs in Kunming, China. The model had an R-squared value of 9.38%, indicating that 9.38% of the variability in competitive advantage could be explained by SCM-related factors. The overall regression model was highly significant (F-value 7.52, p-value 0.000). Cost Efficiency and Employee Skill Training were statistically significant predictors, with p-values below 0.05, suggesting their significant influence on competitive advantage. However, Inventory Management did not show statistical significance in this model, and unexplained variability in competitive advantage suggests a need for further investigation or model refinement.

**Table 1:** Result of multiple linear regression between revenue growth and sme's supply chain management.

Analysis of Variance					Model Summary
Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	3	24.455	8.1516	7.52	0.000
Q5_Cost_Efficiency	1	5.150	5.1500	4.75	0.030
Q5_Inventory_Managemen t	1	2.468	2.4676	2.28	0.133



Q5_Employee_Skill_Trainin g	1	9.467	9.4668	8.74	0.003				
Error	218	236.216	1.0836						
Lack-of-Fit	17	166.014	9.7655	27.96	0.000				
Pure Error	201	70.202	0.3493			S	R-sq	R-sq(adj)	R-sq(pred)
Total	221	260.671				1.04094	9.38%	8.13%	5.25%

The regression analysis for research objective one focused on the impact of supply chain management (SCM) strategies on financial performance in SMEs in Kunming, China. The ANOVA confirmed the overall statistical significance of the regression model (F-value 24.21, p-value 0.000), demonstrating its predictive power in explaining financial performance. Specifically, "Profitability," "Cash Flow Management," and "Debt Management" were all found to be highly statistically significant factors, collectively explaining about 24.99% of the variability in financial performance. The adjusted R-squared value was 23.96%, indicating the model's robustness.

**Table 2:** Result of multiple linear regression between revenue growth and financial performance.

Analysis of Variance						Model Summary			
Source	DF	Adj SS	Adj MS	F-Value	P-Value				
Regression	3	65.14	21.7129	24.21	0.000				
Q6_Profitability	1	22.57	22.5659	25.16	0.000				
Q6_Cash_Flow_Manageme nt	1	24.00	23.9971	26.75	0.000				
Q6_Debt_Management	1	12.36	12.3599	13.78	0.000				
Error	218	195.53	0.8969						
Lack-of-Fit	2	10.73	5.3629	6.27	0.002				
Pure Error	216	184.81	0.8556			S	R-sq	R-sq(adj)	R-sq(pred)
Total	221	260.67				0.947068	24.99%	23.96%	23.35%

## 2. Research Question 2:

The principal factor analysis assessed the contributions of variables (Q5\_Cost\_Efficiency, Q5\_Inventory\_Management, and Q5\_Employee\_Skill\_Training) to underlying factors (Principal Components, PC1, PC2, and PC3) in supply chain management (SCM). PC1 explained 52.6% of the variance, primarily influenced by cost efficiency and inventory management. PC2, driven by employee skill training, explained 33% of the variance. PC3 had low loadings and lacked a dominant variable. This analysis organized these variables into three principal components, offering a structured understanding of their roles in SCM.

**Table 3:** Principal component analysis of factors affecting supply chain management.

Eigenanalysis of the Correlation Matrix				Eigenvectors			
Eigenvalue	1.5792	0.9906	0.4302	Variable	PC1	PC2	PC3
Proportion	0.526	0.330	0.143	Q5_Cost_Efficiency	0.677	0.279	-0.681
Cumulative	0.526	0.857	1.000	Q5_Inventory_Management	0.704	0.026	0.710
				Q5_Employee_Skill_Training	-0.215	0.960	0.179

The principal factor analysis on financial performance-related variables identified four principal components. PC1 emphasizes overall financial performance, particularly revenue growth, while PC2 is primarily associated with profitability. PC3 represents a component with an inverse relationship between cash flow management and debt management, and PC4 provides a balanced view of financial performance.

The analysis focuses on the relationship between supply chain management (SCM) cost efficiency and financial performance in Kunming's SMEs. The regression model indicates that "Q5\_Cost\_Efficiency" is statistically significant, explaining 7.29% of financial performance variability with an F-value of 5.71 ( $p=0.001$ ). While the adjusted R-squared is relatively low (6.01%), it suggests a modest explanatory power for cost efficiency. The findings imply that improving cost efficiency in SCM can have a meaningful impact on financial performance, but other unanalyzed factors may also play a role.

**Table 4:** Principal component analysis of factors affecting financial performance.

Eigenanalysis of the Correlation Matrix					Eigenvectors				
Eigenvalue	1.5732	1.2649	0.6721	0.4898	Variable	PC1	PC2	PC3	PC4
Proportion	0.393	0.316	0.168	0.122	Q6_Revenue_Growth	0.635	0.271	0.299	-0.659
Cumulative	0.393	0.710	0.878	1.000	Q6_Profitability	0.110	0.791	0.252	0.546
					Q6_Cash_Flow_Management	0.613	-0.014	-0.751	0.244
					Q6_Debt_Management	0.457	-0.548	0.531	0.457

**Table 5:** Analysis of variance of revenue growth and cost efficiency.

Analysis of Variance						Model Summary			
Source	DF	Adj SS	Adj MS	F-Value	P-Value	S	R-sq	R-sq(adj)	R-sq(pred)
Q5_Cost_Efficiency	3	19.00	6.333	5.71	0.001	1.05289	7.29%	6.01%	4.87%
Error	218	241.67	1.109						
<b>Total</b>	<b>221</b>	<b>260.67</b>							

The analysis examines the relationship between "Q6\_Debt\_Management" in supply chain management and financial performance in Kunming's SMEs. ANOVA results show a significant relationship with an F-value of 12.11 ( $p=0.001$ ). The R-squared value of 5.22% suggests limited explanatory power, but debt management remains statistically significant (adjusted R-squared 4.79%). The model's predicted R-squared value for new data is 4.32%, indicating limited predictive capability. Unmeasured factors may also impact financial performance, necessitating further research.

**Table 6:** Analysis of variance of revenue growth and cost efficiency.

Analysis of Variance						Model Summary			
Source	DF	Adj SS	Adj MS	F-Value	P-Value	S	R-sq	R-sq(adj)	R-sq(pred)
Q6_Debt_Management	1	13.60	13.600	12.11	0.001	1.05974	5.22%	4.79%	4.32%
Error	220	247.07	1.123						
<b>Total</b>	<b>221</b>	<b>260.67</b>							

## Discussion

The study's findings shed light on the complex linkages between supply chain management (SCM) methods, financial performance, and competitive advantage among Kunming's small and medium-sized firms (SMEs) (Minwir, Mallouh, & Al-Shammari, 2023). The fundamental goal of this research was to decipher the complex network of interactions between these important parameters, which are critical for the success and sustainability of SMEs in a dynamic business landscape. Examining the unique context of Kunming, this study adds to our knowledge by underlining that SCM techniques are inextricably linked to financial results and the competitive posture of SMEs (Nilesh & Mate, 2022).

In order to achieve the first research objective, the study investigated the role of SCM techniques in developing SMEs' competitive advantage in Kunming. The study found that SCM-related factors, particularly cost efficiency and staff skill training, had a significant impact on boosting SMEs' competitive advantage, as evaluated by revenue growth. These findings corroborate Minwir, Mallouh, and Al-(2023) Shammari's comments on strategic planning's critical role in generating long-term competitive advantages in SCM. Effective SCM methods, as demonstrated by our research, provide SMEs with a competitive advantage, emphasizing their importance.

The second research objective was to better understand the elements influencing SCM strategies and their influence on the financial performance of SMEs. The Principal Component Analysis revealed that cost efficiency and debt control were critical factors impacting financial outcomes in the context of SCM. These findings are consistent with Commander, Natarajan, and Rajiv's (2022) empirical work, however, our research did not focus exclusively on green SCM. Nonetheless, it emphasizes the broader significance of SCM practices, particularly the role of cost efficiency and debt management in defining the financial performance of SMEs. By combining these findings, our research provides helpful guidance for SMEs seeking to strategically manage their SCM techniques and financial strategies toward long-term success in Kunming's competitive marketplace.

## Limitations

The study concentrated on a specific geographic area (Kunming, China) and SMEs, perhaps restricting the data's generalizability to other regions or bigger firms. The study's cross-sectional design may limit the capacity to demonstrate causation across factors. Furthermore, while the study investigated

various aspects impacting SCM and financial performance, there may be unaccounted-for or uninvestigated elements influencing SMEs' competitive advantage and financial results.

## Recommendations

The study recommends that SMEs in Kunming prioritize cost efficiency, invest in employee skill training, optimize debt management, embrace technology, explore collaborative networks, and adopt sustainable practices. These strategies can aid in enhancing competitive advantage, improving financial performance, and navigating the dynamic business landscape for long-term success.

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## Improving the quality of life for the elderly through the use of an online elderly system, with family and community involvement in Maha Sarakham province

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### Abstract

The aim of this research is to develop the online elderly system with assessing the health and risky behaviors of the elderly, as well as promoting healthy behaviors and providing care. The research population includes 1,505 elderly individuals from Maha Sarakham Province. The research sample, consisting of 216 individuals, is determined using Taro Yamane's formula. The research tools used encompass computer software, R programming (2008), and questionnaires for the elderly. The statistical methods applied in this research encompass frequency, percentage, mean, standard deviation, t-test, F-test, and confidence interval estimation for health behavior using Nakakami distribution. The research investigates critical aspects of the health and well-being of the elderly population using an inclusive logic model. Four main variables, namely healthy behavior, disease occurrence, environmental quality, and relationships with family and community, are examined in alignment with the research of Lopasradha Walailakmlas (2013: 85). Findings reveal that a substantial proportion of the elderly exhibits low levels of healthy behaviors (38.41%), while a considerable number experience a high occurrence of diseases (37.34%). The environmental quality of living conditions is primarily assessed at a moderate level (31.10%). Additionally, the study likely explores the quality of relationships with family and community, underscoring the importance of social support networks for the elderly. By referencing previous research and adopting an age-grouped analysis, the research contributes to the broader understanding of the quality of life among the elderly, emphasizing the need for tailored interventions and improvements in various aspects of their well-being. The quality of life for male and female elderly individuals differs statistically insignificantly at the 0.05 significance level. The comparison of health care knowledge categorized by chronic illnesses demonstrates statistically significant differences at the 0.01 significance level. The analysis of the logistic regression model indicates that the overall health status of the majority of elderly individuals is average. Health behaviors should be promoted by providing suitable health care knowledge to the elderly to enhance their overall health. Regarding the confidence interval estimation for health behavior, the

maximum probability method yields the highest likelihood, and the method of moments provides values closely approximating the coefficient of confidence as the sample size increases.

**Keywords:** Quality of life, Elderly, Online elderly system

## Introduction

Currently, the world's population is trending towards a changing demographic structure. Over the past 50 years, there has been an increase in the global population with a growing elderly population (Christensen et al., 2009). Thailand is transitioning towards an aging society, projected to become a fully aged society by the year 2025. It is estimated that there will be around 20 million elderly individuals in Thailand from the estimated population data spanning from the year 2010 to 2041 (HelpAge International., 2012). This demographic shift has led to an increase in the number of dependent elderly individuals, and due to the lack of comprehensive caregiving and health promotion systems for the elderly; the existing care systems are unable to fully meet the needs of the elderly (Abdi et al., 2019). Therefore, Thailand is compelled to rapidly address this aging population situation by enhancing the capacity and roles of the elderly in becoming a high-quality aged society. This is crucial to alleviate the overall burden on the country. Developing systems and mechanisms that address the diverse needs and requirements of the elderly becomes essential (Jensantikul, 2022). Providing quality of life for the elderly is paramount, enabling them to lead a fulfilling life that encompasses physical, mental, social, and spiritual well-being (van Leeuwen et al., 2019). This development process requires the active involvement of families, communities, and society as a whole, enabling the elderly to be self-reliant to the best of their abilities and utilizing their personal capacities for creative contributions to themselves, their families, others, and society. The integration of innovations and technology to benefit the elderly in their daily lives is important. Employing various technological advancements in different fields can enhance the quality of life for the elderly (Perkins, 2007). There are numerous reasons for elderly individuals to learn and engage with technology, such as improving memory, healthcare management, communication, social interaction, and business endeavors. Learning formats for the elderly vary, including self-learning, workplace learning, and learning from peers and relatives. Utilizing technology can offer several benefits for the elderly, such as broadening their horizons and accessing instant information, enabling them to stay informed about societal developments and sharing knowledge.

However, there are multiple challenges faced by the elderly in adopting and benefiting from technology. These include attitudes towards technology, resistance to change, feelings of being too old to learn, and apprehension about their abilities to learn due to the pre-digital era of their upbringing. Physical impairments like impaired vision, hearing loss, limited dexterity, slower response times, illnesses, and chronic conditions also pose limitations. Furthermore, the challenges are compounded by their limited exposure to and understanding of the significance of information technology, stemming from their experiences predating the emergence of computers and the internet. Considering these factors, researchers

acknowledge the necessity of developing innovations and systems for the elderly that are user-friendly and foster collaborative participation from families and communities.

The objective of this study was to develop the online elderly system with assessing the health and risky behaviors of the elderly, as well as promoting healthy behaviors and providing care. This online system served as a platform for the public to access information and services quickly and comprehensively, reducing time and spatial limitations for service delivery, relieving the burden on staff, and optimizing the allocation of resources for disease prevention campaigns and elderly services. This initiative was piloted in Maha Sarakham Province and was intended to serve as a model for expansion to other provinces in Thailand, ultimately contributing to the improvement of the nation's development in alignment with the evolving aged society.

## Research Methodology

### 1. Methods

#### 1.1 Population and Sample Groups

The population used for this research consists of elderly individuals in the Kang Leung Chan sub-district, Mueang District, Maha Sarakham Province, totaling 1505 individuals. The sample group for this research was selected using a multi-stage sampling technique. The first stage involved cluster random sampling, and the second stage employs simple random sampling. The sample used in this research aims to study data from the elderly collected through an in-depth survey of health behaviors in the Kang Leung Chan sub-district, Mueang District, Maha Sarakham Province, totaling 216 individuals.

#### 1.2 Data Collection

This research was an exploratory survey aimed at studying the usage behaviors of electronic wallets (E-Wallets) for consumer purchases in Maha Sarakham Province. Secondary Data was obtained through the study and exploration of data compiled by various sources, including books, journals, printed materials, internet sources, academic books, articles, theses, dissertations, and relevant research reports, as well as data related to the elderly collected and stored by government agencies.

For the collection of Primary Data, information was gathered through fieldwork activities. This involved coordinating research team meetings to plan and foster mutual understanding. Meetings with local leaders and collaborating organizations in the area were organized, followed by on-site research activities to survey and verify community data. Community assemblies were conducted to clarify the research objectives to the target group within the community. This research aimed to study the community context, the elderly individuals, the prevailing issues, the needs of the elderly, and the community-driven factors influencing elderly care. This process had undergone tests for accuracy and reliability, enabling its application to the designated sample group for questionnaire responses, totaling 216 individuals.



### 1.3 Research Tools

In this study, the researchers employed the following research tools.

1. Computer Software: R Program (2008) was utilized for data simulation using the Monte Carlo technique, with 10,000 iterations.

2. Questionnaire, the questionnaire was developed based on the study's theoretical framework and related literature. The objectives were to investigate the development of the quality of life for the elderly through the collaborative online elderly system involving families and community participation in Maha Sarakham Province. The research instrument was a questionnaire. The content validity was carried out by the three experts examining item-objective congruence or IOC (Identified as 0.83, IOC = 0.69 – 1.00). After a tryout for reliability by 30 undergraduates, who are not samples, alpha's Coefficient was 0.899.

3. Online Elderly System, tools for Creating a Model were used to support decision-making and the process of creating an online elderly system after identifying the problems. The study explored the feasibility of the system to be developed. The system would take the form of a mobile application and a web application. The mobile application would be interconnected with the web application. The mobile application would operate on users' mobile devices that they carry with them at all times. This mobile application would be linked to the data mining system supporting decision-making, transferring data from the users' mobile application to the web application. The web application's role would be to gather various user data and present it in the form of tables, graphs, etc. As for hardware, a computer with an Intel Core™ i3 CPU, 4 GB RAM, and a 500 GB hard disk was used for development. Additionally, a mobile phone with Android version 4.00 and above was used. The tools chosen for system development were based on the analysis and design of the system.

### 1.4 Development of elderly health indicators using fuzzy logic model

Fuzzy logic is a set of multiple-valued logics, which means there are more than two true values. It has variables which approximates the value between 0 and 1 based on reasoning. The term "fuzzy logic" was introduced by Lotfi A. Zadeh in 1965. Many difficulties realized frequently like uncertainty and vagueness during image analysis. These can be simplified by using fuzzy mathematical morphology. The researchers were aware of the necessity to develop health indicators for the elderly using a probabilistic model, as the health assessment system for the elderly can be effectively implemented across all regions. This enables the determination of their health status levels and risk-prone behaviors, offering guidance for proper health management. This is crucial for promoting and sustaining the well-being of the elderly in the future. This process leads to strategies for enhancing health and fostering a comprehensive reform of the healthcare system. To ensure the well-being of the elderly, it is crucial to be aware of their health status and risk-prone behaviors, taking into account the overall dimensions of physical, mental, social, and spiritual health. Creating these measurement parameters involves defining indicators, but assessing health status levels and risk behaviors is intricate due to the uncertain and non-specific nature of data. There are no clear-cut criteria to precisely measure whether a level is low or high. Therefore, the researchers turned

to the principles of Fuzzy Logic, introduced by Lotfi A. Zadeh in 1965, which originated from Fuzzy Sets, encompassing sets with vague or overlapping boundaries. Fuzzy Logic serves as a tool to make decisions under data uncertainty, providing criteria and reliability. Several studies have applied Fuzzy Logic in the medical and health fields, such as Pytel et al.'s (2016) development of a neural network to assess the risk of high blood pressure, and Pancardo et al.'s (2018) presentation of the Rating of Perceived Exertion (RPE) method for exercise assessment, utilizing heart rate using Fuzzy Logic. These findings are significant in helping individuals control their exertion levels during physical activities. Creating a comprehensive conceptual framework for the development of indicators for the health of the elderly, the variables used in the study include four main variables, namely: Healthy behavior; Disease; Environmental quality; Relationships with family and community. The process of developing this model consists of four steps as follows.

The first step is to transform crisp inputs into fuzzy variables through a process called fuzzification using membership functions. The number and types of membership functions are created based on statistical data. In this study, triangular membership functions are used to describe input and output variables.

The second step is the creation of a fuzzy rule base using historical data for all parameters and fuzzy operators. The historical data is collected from each meteorological station, and fuzzy operators AND and OR are used to combine input variables.

The third step involves using membership functions and rule bases for inference. This step is performed by taking a fuzzy set of outputs when each input data is received. Then, the output membership functions of each rule are combined to produce one fuzzy set, known as the aggregation process.

In the fourth step, the defuzzification process converts the fuzzy set of the output into a single value. The most commonly encountered defuzzification method is the 'centroid' method, which returns the area under the curve. The following diagram illustrates the logical steps of the prediction envelopment process.

In this research, letters will be used to represent the levels of each variable. All fuzzy sets will cover the range of changes necessary for the variable of interest. The study of membership levels (0-1) for inputting actual data values (e.g., environmental quality) is particularly crucial. Fuzzy sets (e.g., high) will be obtained from the operation of members. The conversion of input data values into membership levels of fuzzy sets is called fuzzification of the variables. The language is a categorization of parameters into each level. Functions are defined for each variable's members. All parameters used in this system are divided into levels as follows.

**Table 1:** levels of variables used in the study

Order	Parameters	Letters to represent the levels of variables
1	Healthy behavior	Very high R, High R, Medium R, Low R, Very low R
2	Disease	Very high E, High E, Medium E, Low E, Very low E
3	Environmental quality	Very high C, High C, Medium C, Low C, Very low C
4	Relationship with family and community	Very high S, High S, Medium S, Low S, Very low S

$$Var(x) = \text{var}(x) = \begin{cases} \text{"VL"} & \text{if } 0.0 \leq \text{var}(x) < 0.3 \\ \text{"L"} & \text{if } 0.3 \leq \text{var}(x) < 0.4 \\ \text{"M"} & \text{if } 0.4 \leq \text{var}(x) < 0.7 \\ \text{"H"} & \text{if } 0.7 \leq \text{var}(x) < 0.8 \\ \text{"VH"} & \text{if } 0.8 \leq \text{var}(x) < 1.0 \end{cases}$$

Let us consider a group of  $n$  students,  $n \geq 2$ , while modeling a process in a classroom. Denote by  $A_i, i = 1, 2, 3$ , the stages of understanding the problem, devising a plan, solution and validation of the model respectively, and by  $a, b, c, d$ , and  $e$  the linguistic labels of negligible, low, intermediate, high and complete success respectively of a student in each of the  $A_i$ 's. Set  $U = \{a, b, c, d, e\}$  and  $n_{ia}, n_{ib}, n_{ic}, n_{id}, n_{ie}$  denote the number of students that respectively achieved negligible, low, intermediate, high and complete success at state  $A_i, (i = 1, 2, 3, 4)$ . We shall represent the  $A_i$ 's as fuzzy sets in  $U$ . The membership functions  $\mu_{A_i}$  for each  $x$  in  $U$  can be defined as follows (Zadeh, 1965; Voskoglou, 2011).

$$\mu_{A_i}(z) = \begin{cases} 0, & \text{if } 0 < n_{ia} \leq \frac{n}{5} \\ 0.25, & \text{if } \frac{n}{5} < n_{ib} \leq \frac{2n}{5} \\ 0.50, & \text{if } \frac{2n}{5} < n_{ic} \leq \frac{3n}{5} \\ 0.75, & \text{if } \frac{3n}{5} < n_{id} \leq \frac{4n}{5} \\ 1, & \text{if } \frac{4n}{5} < n_{ie} \leq n \end{cases} \quad (1)$$

Then we can write  $A_i = \{(z, \mu_{A_i}(z)) : z \in U\}, i = 1, 2, 3$ . The stages of analysis and implementation as fuzzy sets in  $U$  can be represented of our fuzzy model technically much more complicated. A general technique was applied frequently during the modeling process of a real-world problem by eliminating the variables of the real system. This assumed real system helps towards the formulation of the problem in a form ready for mathematical treatment (Voskoglou, 2007).

### 1.5 Evaluation of Health Behaviors in the Elderly Using the Nakagami Distribution

The objective of this part was to assess the confidence interval of health behaviors in the elderly using the Nakagami distribution. The estimation methods employed are the Maximum Likelihood (ML) method, the Method of Moment Estimator (ME), and the Bayesian method. The criteria for consideration are the joint probability coverage and the average length of confidence intervals. Sample sizes of 10, 25, 50, 100, 500, and 1000 are used, with confidence levels of 0.95 and 0.99. The study is conducted through Monte Carlo simulation with 10,000 iterations. When the shape parameter varies at 0.5, 1, 1.5, 2, 2.5, 5, 10, and 30, and the scale parameter is fixed at 1, the maximum joint probability coverage and the narrowest average interval width are determined. Additionally, the health behavior data of 216 elderly individuals from Tambon Kaeng Leung Chan, Mueang District, Maha Sarakham Province, are applied to the Nakagami distribution. The performance of each method is assessed by simulation in terms of the coverage probabilities and average widths by the Monte Carlo simulation.

### Results

The researchers became aware of the necessity to develop an elderly care system and health-promoting behaviors for the elderly. This involved fostering inclusive participation from families and communities. Integrating younger individuals and family members into the elderly care system promoted learning and participation in health care practices. When these individuals returned home, they could then take care of the elderly within their families. This approach increased knowledge about elderly care, which, in turn, prepared individuals for their own aging process. They could then take care of themselves and pass on their knowledge to others in the family. This knowledge-sharing was aimed at comprehensive care for both the general population and the elderly, preventing chronic illnesses and extending the period of good health. It also reduced the burden on healthcare providers and allocated resources more efficiently. Elderly individuals, feeling a sense of self-worth, contributed to an improved quality of life, thus reducing the strain on caregivers and the need for budget allocation for health promotion and disease prevention. The elderly care and health-promoting behavior system included components such as gathering information on the elderly, identifying their needs, providing health advice in various aspects, and recognizing different health levels. The emphasis was on holistic care to maintain the balance of physical, mental, emotional, social, and spiritual well-being. This approach enabled individuals to perform their roles efficiently, leading to a comprehensive state of well-being. Consequently, it was crucial to promote good health, as everyone desired it. However, illnesses often resulted from elderly individuals' behaviors that impacted their health. Therefore, it was essential to encourage health-promoting behaviors, which were actions individuals took to maintain good health, achieve personal success, and experience fulfillment in life. Through research, analysts could analyze data on elderly care and health-promoting behaviors among the elderly.

To illustrate the computation of the elderly's health status using a model proposed in this article, we use the data of observations for precipitation in Maha Sarakham, Thailand. The 1,505 elderlies were

selected. The data showed appropriateness for the Lomax distribution. Based on the basic data of 1,505 elderlies people in Maha Sarakham Province, general information can be summarized as Table 2.

**Table 2:** Numbers and percentages of the elderly by gender and the presence of underlying diseases

Details		frequency	Percentages
Sex	Male	620	41.20
	<b>Total</b>	<b>1,505</b>	<b>100.00</b>
Medical condition	Yes	642	42.70
	<b>Total</b>	<b>1,505</b>	<b>100.00</b>

Based on the study of the health status for the elderly using a proposed model, the input variables used in the study consisted of 4 variables, namely, healthy behavior, disease, environmental quality, and relationship with family and community. The results of the analysis of the elderly quality level in each aspect were shown in Table 3.

**Table 3:** Percentage of the health status for the elderly using an proposed model

Variables	Very High	High	Medium	Low	Very low
Healthy behavior	3.79	5.05	29.57	38.41	23.19
Disease	15.35	37.34	32.49	12.16	2.66
Environmental quality	6.51	23.99	31.10	20.73	17.67
Relationship with family and community	9.04	14.02	29.77	23.72	23.46
<b>Gross health</b>	<b>8.67</b>	<b>20.10</b>	<b>30.73</b>	<b>23.76</b>	<b>16.75</b>

From Table 3, when considering the level of health status of the elderly considering the input variables, the variables must be considered in two parts: positive variables which consist of healthy behavior environmental quality and family and community relations and the negative variable was disease incidence. When analyzing the level of health status of the elderly, the aggregates must be adjusted to be in the same standard. The results of the analysis of each input variable revealed that most of the elderly's health behaviors were at a low level which accounted for 38.41 percent. The disease incidence of the elderly was at a high level which accounted for 37.34%. The quality of the environment in which the elderly lived was at a moderate level which accounted for 31.10 percent, and the relationship with family and community of the elderly was at a high level which accounting for 29.77%. The overall health of most elderly people was at a moderate level which accounted for 30.73 percent.

The researchers tested hypotheses regarding the differences to compare the quality of life among the elderly, classified according to independent personal factors. They examined the differences between the means of two independent populations using the t-test and tested the differences in mean scores

among more than two groups in comparing multiple group means using the One Way Analysis of Variance (ANOVA). The t-test was employed to examine differences between the means of two independent populations, while the F-test was used in the One Way ANOVA to assess the overall difference in means. When significant differences were observed in some pairs or, in other words, when the null hypothesis was rejected, the researchers conducted pairwise comparisons using Scheffe's Method and the Least Significant Difference's Method (LSD) to further analyze the specific group differences. In summary, the research involved statistical testing to investigate differences in the quality of life among the elderly based on various independent personal factors. The t-test and One Way ANOVA were employed for comparisons, and additional pairwise comparisons were conducted using Scheffe's Method and LSD when significant differences were detected.

**Table 4:** Comparing the quality of life of the elderly, categorized by gender

Variable		$\bar{X}$	<i>S.D.</i>	<i>t</i>	P-Value
Sex	Male	4.193	0.455	0.831	0.407
	Female	4.138	0.487		

\* There was a statistically significant level at the 0.05.

From Table 4, it was found that the hypothesis test regarding the quality of life of the elderly, categorized by gender, revealed that there was no significant difference in the quality of life between males and females, or the difference was statistically insignificant at the 0.05 level.

**Table 5:** Comparing the quality of life of the elderly, categorized by living arrangement

Variable		$\bar{X}$	<i>S.D.</i>	<i>t</i>	P-Value
Having a caregiver	Living alone	3.971	0.344	-2.259	0.034*
	Living with others	4.174	0.482		

\* There was a statistically significant level at the 0.05.

From Table 5, it was found that the hypothesis test regarding the quality of life of the elderly, categorized by living arrangement, revealed that there was a statistically significant difference in the quality of life between those living alone and those living with others at the 0.05 level.

**Table 6:** Comparing the quality of life of the elderly, categorized by health level

Variable	Source of Variance	Sum of Squares	df	Mean Square	<i>F</i>	P-Value
Health level	Between groups	9.046	4	2.261	12.096	0.000**
	Within group	39.448	211	0.187		
	Total	48.493	215			

\*\* \* There was a statistically significant level at the 0.01.

Table 6, comparing the quality of life of the elderly based on health levels, showed that there was a statistically significant difference in the quality of life among different health levels at the 0.01 level. Pairwise comparisons indicated that the quality of life for those with excellent health was significantly different from those with good health, fair health, and poor health, with statistical significance at the 0.01 level. Therefore, the health of the elderly significantly affected their quality of life.

The simulation studies are carried out to evaluate coverage probabilities and average lengths of each confidence interval. The nominal values of 0.90 and 0.95 are calculated based on 10,000 replications and for the proposed method. All computer simulations, in variety of parameters, are studied by using written functions in R statistical programming environment (R Development Core Team, 2021). In this part, the simulations of confidence intervals of the elderly's health status based on statistical models under the discrete alpha power inverse Lomax distribution using a model proposed can be shown as Table 7-8.

**Table 7:** Interval estimations (Lower bound, Upper bound) of health status at the 0.95 nominal level

Variables	Parameters			Health status
	$\alpha$	$\vartheta$	$\rho$	
Healthy behavior	(0.138, 0.203)	(1.118, 1.314)	(7.812, 8.856)	2.841
Disease	(0.139, 0.205)	(1.145, 1.331)	(7.726, 8.246)	4.374
Environmental quality	(0.140, 0.205)	(1.316, 1.532)	(4.362, 4.757)	3.799
Relationship with family and community	(0.159, 0.185)	(1.319, 1.391)	(7.661, 8.235)	3.237
<b>Gross health</b>	(0.139, 0.205)	(1.661, 1.831)	(7.566, 8.331)	3.543

**Table 8:** Interval estimations (Lower bound, Upper bound) of health status at the 0.99 nominal level

Variables	Parameters			Health status
	$\alpha$	$\vartheta$	$\rho$	
Healthy behavior	(0.113, 0.256)	(1.0238, 1.354)	(7.984, 8.954)	2.957
Disease	(0.101, 0.245)	(1.245, 1.345)	(7.659, 8.945)	4.462
Environmental quality	(0.127, 0.276)	(1.267, 1.637)	(4.147, 4.875)	3.892

Relationship with family and	(0.123, 0.193)	(1.265, 1.410)	(7.443, 8.654)	3.476
<b>Gross health</b>	(0.116, 0.273)	(1.534, 1.879)	(7.371, 8.712)	3.725

These results are presented in Table 7-8 clearly show that the 99% confidence interval for parameters are wider width with 95% confidence interval. Moreover, Health statuses of all variables of the 0.99 nominal level is higher than those the 0.95 nominal level. The result of the analysis of health status for the 0.95 nominal level is equal to 3.543. It means that that the overall health of the elderly was at quite high level. At the 0.99 nominal level, elderly's health status is equal to 3.725. It means that that the overall health of the elderly was at a high level.

The development of data mining systems and online systems for supporting decision-making for the elderly has been carried out through the process of analysis, design, and system development. The system's functionality has been tested, and at this stage, the research results are presented to achieve the research objectives. The research results are divided into three parts as follows: the development of data mining and online systems for the elderly, the evaluation of the quality of data mining and online systems for the elderly, and the evaluation of satisfaction with data mining and online systems for the elderly.

In the development of data mining and online systems for the elderly, a part of the application on mobile devices has been developed. When evaluating the quality of the data mining and online systems, it was found that the overall assessment of the application by experts was at a high level ( $\bar{X} = 4.04$ , S.D. = 0.70). Considering the aspects with the highest quality assessment, it was found that meeting user requirements was the highest ( $\bar{X} = 4.16$ , S.D. = 0.79). Recommendations from experts suggest that in system development, the application should be developed to support other operating systems, such as iOS and Windows Phone, to cater to users of all groups.

Regarding the evaluation of satisfaction with the online systems for the elderly on mobile devices, the sample group consisted of elderly individuals participating in the project. Practical training activities were organized to transfer technology to the local community under the project mechanism to drive the development of the quality of life for the elderly. The evaluation was conducted with 55 participants in the Nong Uam village, Natsinon sub-district, Kantarawichai district, Maha Sarakham province. The results of the satisfaction evaluation of the health promotion system on mobile devices showed an overall satisfaction at a high level ( $\bar{X} = 4.31$ , S.D. = 0.68). Considering specific findings, the highest-rated item was the appropriateness of the guidebook in using the online system. It was found that the system serves as an aid for maintaining personal health, promoting health, preventing illnesses among the elderly, and providing guidance on health care. Social support from close individuals and assistance in promoting the health of the elderly in terms of personal relationships were received. Additionally, there was an exchange of various ideas that helped promote the use of self-care abilities in line with the concept of the Pender model (United Nations, 2007), stating that social support contributes to enhancing



## Discussion

The researcher presented several key points in the findings as follows. The majority of the elderly exhibited low levels of healthy behaviors. This suggests that there may be challenges or factors influencing the adoption of health-promoting behaviors among the elderly population. A significant portion of the elderly experienced a high occurrence of diseases. This finding implies that there might be a need for targeted health interventions or preventive measures to address the prevalent health issues in this demographic. The environmental quality of the living conditions for the elderly was predominantly at a moderate level. This indicates a middle-ground assessment of the living conditions, suggesting potential areas for improvement or modification to enhance the overall quality of life for the elderly. The study likely explored the quality of relationships with family and community, but the specific details are not provided. Understanding the dynamics and satisfaction levels in these relationships is crucial for comprehending the social support network available to the elderly. The researcher referenced the work of Thomopoulou, I., Thomopoulou, D., and Koutsouki, D. (2010), indicating an alignment with previous research on the quality of life among the elderly. This suggests a contextualization of the current findings within a broader academic and research landscape. The study's objective to examine variations in the quality of life among the elderly, classified by age groups, highlights the importance of considering different age cohorts. This approach recognizes that the needs and challenges of the elderly may vary across different stages of aging. Overall, these key points provide insights into the health behaviors, disease prevalence, living conditions, and social relationships of the elderly population, contributing valuable information for further research and potential interventions to enhance the well-being of this demographic. When the online system for the elderly was used, it functioned as a supportive tool for individuals to maintain their health, promote well-being, and prevent illnesses among the elderly. The system played a role in health assessments and provided guidance on health care. Social support from close individuals and assistance in promoting the health of the elderly were received. There was a promotion of interpersonal relationships, and there were exchanges of diverse ideas, all contributing to the enhancement of self-care abilities. This aligns with the concept of the Pender model (United Nations, 2019), which emphasizes that social support aids in the promotion of the use of personal abilities in self-care.

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## Fabrication of erythromycin-loaded poly (vinyl alcohol)/chitosan/collagen nanofiber mats via electrospinning as potential wound dressings

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### Abstract

In this research work, erythromycin (EM)-loaded poly (vinyl alcohol)/chitosan/collagen (PVA/CS/CG) nanofibers were fabricated by electrospinning technique. The mixtures of PVA/CS/CG solutions were prepared at various weight ratios of 6/3/1, 6/2/2, 6/1/3, 7/2/1, 7/1.5/1.5, and 7/1/2. EM, an antibiotic drug, was added to the polymer solutions at 0.1% w/w. The viscosity and electrical conductivity of the as-prepared solutions were measured. The electrospun PVA/CS/CG-EM fibers were crosslinked using a glutaraldehyde vapor treatment at either 12 or 24 hours. The average fiber diameters of the PVA/CS/CG-EM fibers before and after crosslinking, as measured from the images of a scanning electron microscope (SEM), were in the range of 157-228 nm. With increasing CG contents, the viscosity of the solution decreased, and the electrical conductivity increased, resulting in a decrease in fiber diameters. In order to investigate the potential for use in wound healing applications, the antibacterial activity of the electrospun PVA/CS/CG-EM fibers were evaluated by an agar disc method against *Staphylococcus aureus* (*S. aureus*) and *Escherichia coli* (*E. coli*). All types of fiber mats (PVA/CS/CG-EM 6/3/1, 6/1/3, 7/2/1, and 7/1/2) exhibited large inhibition zones for both bacteria, especially *S. aureus*, determining their potential for use as wound dressings.

**Keywords:** Poly (vinyl alcohol), Chitosan, Collagen, Electrospinning

### Introduction

Electrospinning technique is a simple and efficient technique which is used to fabricate polymer solutions with fiber diameters ranging from nanometers to micrometers. The fibers have unique properties such as high surface area to volume ratio, high porosity with various pore sizes. However, the diameter and morphology of the fiber depends on a number of parameters, for example, the concentration of the polymer solution, viscosity of solutions, electrical conductivity of solution, the type of solvent, the humidity, and the applied potential. Currently, there are various applications of fibers that are widely utilized in filtration, protective clothing, tissue engineering scaffolds, drug delivery systems, and wound dressings (Huang et al., 2003). Numerous studies investigated the factors influencing the use of electrospun nanofiber

mats as wound dressings. There are many kinds of wound dressings, including hydrogels, films, gauze, foams, and electrospun nanofiber mats.

In this work, erythromycin (EM)-loaded poly (vinyl alcohol)/chitosan/collagen (PVA/CS/CG) nanofibers were fabricated by electrospinning technique. Poly (vinyl alcohol) (PVA) is one of the suitable synthetic polymers for the biomedical field being water-soluble, non-toxic, biocompatible, and biodegradable polymer (Jia et al., 2007). The quality of chitosan (CS) includes antibacterial activity, nontoxicity, biocompatibility, and biodegradability (Cui et al., 2018). Moreover, collagen (CG) has been shown to be biocompatible and has a variety of uses in tissue engineering and drug delivery (Ottania V et al., 2001). The combination of PVA, CS, and CG is an interesting material to fabricate into electrospun fibers for use as wound dressings due to their biocompatibility, non-toxicity, and availability. Furthermore, the antibacterial activity of wound dressings can be enhanced by encapsulating antibiotic drug. Erythromycin (EM) exhibits antibacterial properties against both gram-positive and gram-negative bacteria which was chosen to use in this work. The purpose of this study is to fabricate the electrospun EM-loaded PVA/CS/CG fibers and to determine the effect of the ratio of polymer solution on the diameter and morphology of fibers and study the potential for use as wound dressings.

## 1. Research Objectives

- 1.1 To fabricate nanofiber mats of poly (vinyl alcohol) (PVA), chitosan (CS), collagen (CG), and erythromycin (EM) via the electrospinning technique.
- 1.2 To study the effects of PVA/CS/CG ratio and EM loading on the diameter and morphology of PVA/CS/CG and PVA/CS/CG-EM fibers.
- 1.3 To investigate the potential of the electrospun nanofiber mats of PVA/CS/CG-EM for use as wound dressings.

## 2. Literature review

Hassan et al., (2019) fabricated poly (vinyl alcohol), chitosan and starch by electrospinning and crosslinked with glutaraldehyde to enhance water resistance and to achieve an appropriate biodegradation rate. The morphology of fibers which characterized by SEM and AFM, revealed that the fibers exhibited a uniform and non-bead structure. The structural properties which were characterized using FT-IR technique revealed that the wound dressing exhibited suitable properties as it possessed a porous structure, allowing for water vapor permeability, efficient absorption, and retention of exudate. The research demonstrated the ability to protect wounds from external force and found that the wound dressing exhibited antibacterial properties against both gram-positive and gram-negative bacteria.

Zhang et al., (2016) focused on the formulation of electrospun nanofiber mats of collagen and poly (vinyl alcohol) loaded with salicylic acid (COL/PVA-SA) for use as a drug delivery system. The electrospun fibers were crosslinked using UV radiation at different times and glutaraldehyde vapor to reduce excessive drug (salicylic acid) release and decrease damage of morphology when the nanofibers were in

water environment. In the cross-linking process, the morphological characteristics of the electrospun COL/PVA-SA nanofibers were retained and drug release from the COL/PVA-SA nanofibers can be effectively controlled by the crosslinking time using UV radiation for a duration of 4-8 hours.

In addition, Behzad et al., (2019) produced the electrospun nanofibers of poly (vinyl alcohol), carboxymethyl cellulose, and zinc oxide nanoparticles. The research revealed that the addition of zinc oxide nanoparticles and erythromycin into the fiber affected the average diameter of fibers. Moreover, the nanofiber exhibited antibacterial efficacy which was observed to inhibit both gram-positive and gram-negative bacteria. The release of the erythromycin from the nanofibers increased slowly in which the sustained release was achieved.

In this work, erythromycin (EM)-loaded poly (vinyl alcohol)/chitosan/collagen (PVA/CS/CG) nanofibers were fabricated by electrospinning technique. The effect of blending ratio on the morphology and fiber diameters was investigated. The antibacterial property of the obtained electrospun fibers was also studied to evaluate the potential for use as wound dressings.

## Research Methodology

### 1. Materials

Poly (vinyl alcohol) (PVA, degree of hydrolysis: 95.5-96.5%, MW: 85,000-124,000 g/mol), chitosan (CS, MW: 600,000-800,000 g/mol), erythromycin (EM, 98%) and glutaraldehyde (GTA, 25% solution in H<sub>2</sub>O) were purchased from Acros Organics (USA). Collagen (CG, liquid) was obtained from Chemipan Corporation (THA). All chemicals were analytical grade.

### 2. Preparation of solutions

A 10% (w/v) PVA solution was prepared by dissolving PVA powder in distilled water at 80°C under constant stirring for 4 hours. CS solution of 1% (w/v) was dissolved in 0.1 M acetic acid at 45°C and stirring for 30 minutes. The mixtures of PVA, CS, and CG at different ratios were prepared as shown in Table 1. For the drug-loaded polymer solutions, EM was added into each of the abovementioned solutions at 0.1% (w/w). The solutions were stirred until homogeneous solutions were obtained.

**Table 1:** The amounts of each composition to prepare 100 g of polymer blends

Sample	Sample code	Weight ratio (wt%)			
		Poly (vinyl alcohol)	Collagen	Chitosan	Erythromycin
PVA/CS/CG 6/3/1	A	60	30	10	-
PVA/CS/CG 6/2/2	B	60	20	20	-
PVA/CS/CG 6/1/3	C	60	10	30	-
PVA/CS/CG 7/2/1	D	70	20	10	-
PVA/CS/CG 7/1.5/1.5	E	70	15	15	-
PVA/CS/CG 7/1/2	F	70	10	20	-
PVA/CS/CG - EM 6/3/1	G	60	30	10	0.1

PVA/CS/CG - EM 6/2/2	H	60	20	20	0.1
PVA/CS/CG - EM 6/1/3	I	60	10	30	0.1
PVA/CS/CG - EM 7/2/1	J	70	20	10	0.1
PVA/CS/CG - EM 7/1.5/1.5	K	70	15	15	0.1
PVA/CS/CG - EM 7/1/2	L	70	10	20	0.1

### 3. Characterization of solutions

The viscosities of polymer solutions were measured by using a Cannon-Fenske Routine viscometer (size number: 450 with a constant kinetic viscosity of 2.351 cSt/s at 40°C). The conductivities of solutions were determined by a Lutron CD-4318SD conductivity meter at 25°C. Triplicate measurements of viscosity and conductivity were performed, and the average and standard deviation values were calculated.

### 4. Electrospinning process

The polymer solution was poured into a plastic syringe connected to a stainless-steel needle with a diameter of 0.91 mm. used as a nozzle. A rotating collector with a width and diameter of 25 and 7.6 cm, respectively, was covered with aluminum foil. The distance between the nozzle and collector was 15 cm. Electrospinning was carried out using an applied voltage of 20 kV at a room temperature. The feed rate of solution was controlled at approximately 0.5 mL/h via a syringe pump. The electrospun nanofiber mats were collected for 10 hours.

### 5. Cross-linking of the electrospun fiber mats

Cross-linking of the electrospun nanofibers mats were carried out using glutaraldehyde (GTA) vapor treatment. The fresh electrospun fiber mats were placed in a closed container saturated with GTA vapor by placing a cup of 25% GTA in water in a container, at 40°C for either 12 or 24 hours. The cross-linked fibers were left in a hood for 1 hour to allow complete evaporation of the remaining GTA from the fiber mats.

### 6. Morphological characterization

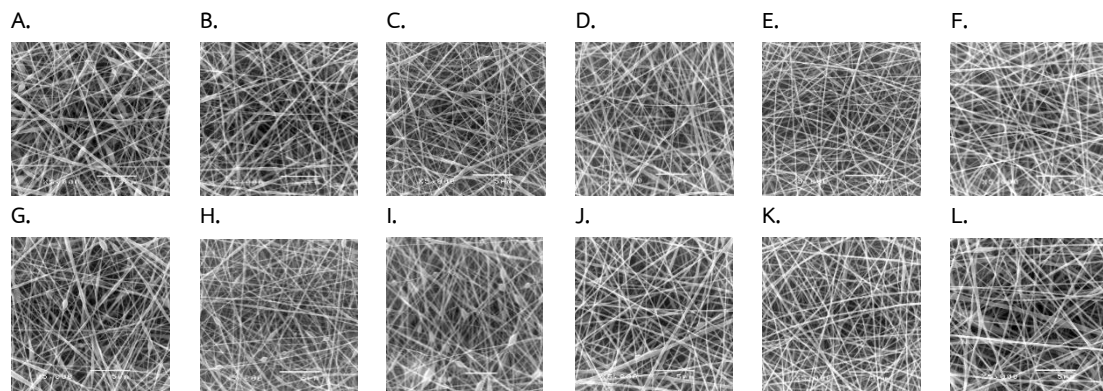
The morphology of the nanofiber mats before and after crosslinking was observed using a JSM-5410LV JEOL scanning electron microscope (SEM). The samples were coated with a thin layer of gold using a Polaron SC7640 coater. The diameters of nanofiber segments were measured using ImageJ software. The average diameter of the sample and the standard deviation were calculated from at least 100 measurements.

### 7. Antibacterial activity testing

Antibacterial activities of electrospun nanofiber mats against *Staphylococcus aureus* (ATCC 25,923) and *Escherichia coli* (ATCC 25,922) were evaluated by the agar disc diffusion method. The fiber mat, with a size of 50 x 50 mm<sup>2</sup>, was placed in an agar containing bacteria. The filter papers saturated with either distilled water or ethanol were used as a negative and a positive control, respectively. The agar disc was incubated at 37°C for 18 hours. The length of the inhibition zone was measured from the edge of the sample to the end of the clear zone using the ImageJ software.

## Results

The polymer solutions composing of PVA, CS, and CG either without or with EM loading were prepared at various weight ratios as shown in Table 1. The viscosity and electrical conductivity of the as-prepared solutions were measured and presented in Table 2. The morphology of the obtained electrospun PVA/CS/CG and PVA/CS/CG-EM fibers at different ratios of compositions before crosslinking was observed by SEM. The SEM images of these electrospun fibers are presented in Figure 1. All types of the electrospun PVA/CS/CG fibers (i.e., 6/3/1, 6/2/2, 6/1/3, 7/2/1, 7/1.5/1.5, and 7/1/2), PVA/CS/CG-EM 7/2/1, 7/1.5/1.5, and 7/1/2 had smooth surface without presence of bead. However, beaded fibers were obtained for the PVA/CS/CG and PVA/CS/CG – EM of 6/3/1, 6/2/2, and 6/1/3.



**Figure 1:** SEM images of the electrospun nanofibers of PVA/CS/CG at different ratios of (A) 6/3/1, (B) 6/2/2, (C) 6/1/3, (D) 7/2/1, (E) 7/1.5/1.5, (F) 7/1/2, and PVA/CS/CG-EM at (G) 6/3/1, (H) 6/2/2, (I) 6/1/3, (J) 7/2/1, (K) 7/1.5/1.5 and (L) 7/1/2 before crosslinking (a scale bar of 5  $\mu\text{m}$ )

### 1. Effect of electrical conductivity of solution

For the electrospun PVA/CS/CG fibers, the electrical conductivities of each solution were comparable and were in the range of 0.700 - 0.783 mS/cm. For the electrospun PVA/CS/CG - EM fibers, the electrical conductivities of each solution were also comparable and were in the range of 0.753 - 0.820 mS/cm. It was found that the electrical conductivities of the solutions with EM loading were greater than those without EM loading. Wang et al., (2007) revealed the same observation with these findings that the inclusion of EM in the solution of hydroxypropyl methylcellulose phthalate resulted in an increase in the conductivity of the solution and therefore improved the electrospinning process. The higher electrical conductivity leads to a higher electrostatic force during the electrospinning process and could increase the mass flow of polymer jets, resulting in larger fiber diameters (164 - 218 nm) compared to those without EM (157 - 169 nm).

### 2. Effect of the viscosity of solution

Not only the electrical conductivity, but the viscosity of the solution was also one of the important parameters affecting the size of the fibers. Comparing PVA/CS/CG 6/3/1, PVA/CS/CG 6/2/2 and PVA/CS/CG 6/1/3, the viscosity of the solution decreased from 71.4 to 45.3 cSt with increasing CG content, resulting in



a decrease in fiber diameters from 164 to 157 nm (see Table 2). In a similar manner, for PVA/CS/CG 7/2/1, PVA/CS/CG 7/1.5/1.5 and PVA/CS/CG 7/1/2, the increasing CG content resulted in a decrease in the viscosity of the solution from 93.0 to 84.0 cSt and fiber diameters from 169 to 166 nm. The smaller viscoelastic force due to the smaller solution's viscosity leads to less capacity for the charged jet to tolerate the stretching from the electrostatic and Coulombic repulsion forces, resulting in a decreased fiber diameter (Okutan et al., 2014). In the case of the electrospun PVA/CS/CG – EM fibers, the effect of the solution's viscosity on the size of the fibers was also observed to follow the same trend. On the other hand, the increasing of CS content led to increasing of the solution's viscosity and therefore increasing of fiber diameters. The ratio of PVA also affected the viscosity of solution. The viscosities of PVA/CS/CG 7/2/1, 7/1.5/1.5, and 7/1/2 were in a range of 84.0 – 93.0 cSt which were higher than those of the PVA/CS/CG 6/3/1, 6/2/2, and 6/1/3 (45.3 – 71.4 cSt). For the EM-loaded solution, the same trend was observed. The viscosities of PVA/CS/CG - EM 7/2/1, 7/1.5/1.5, and 7/1/2 were in a range of 84.9 - 102 cSt which were higher than the PVA/CS/CG - EM 6/3/1, 6/2/2, and 6/1/3 (48.3 – 73.6 cSt). As a result of higher viscosity, the average fiber diameters increased according to the higher viscoelastic force as mentioned above.

**Table 2:** Viscosity and electrical conductivity of the polymer solutions and the average fiber diameters of the electrospun fibers

Sample	Sample code	Viscosity (cSt)	Conductivity (mS/cm)	Average fiber diameter (nm)
PVA/CS/CG 6/3/1	A	71.4 ± 1.1	0.747 ± 0.006	164 ± 53
PVA/CS/CG 6/2/2	B	59.1 ± 1.4	0.757 ± 0.025	160 ± 49
PVA/CS/CG 6/1/3	C	45.3 ± 0.9	0.783 ± 0.015	157 ± 57
PVA/CS/CG 7/2/1	D	93.0 ± 0.7	0.730 ± 0.010	169 ± 50
PVA/CS/CG 7/1.5/1.5	E	89.3 ± 0.3	0.703 ± 0.021	167 ± 105

**Table 3:** Viscosity and electrical conductivity of the polymer solutions and the average fiber diameters of the electrospun fibers

PVA/CS/CG 7/1/2	F	84.0 ± 2.0	0.700 ± 0.010	166 ± 32
PVA/CS/CG - EM 6/3/1	G	73.6 ± 0.2	0.790 ± 0.010	176 ± 86
PVA/CS/CG - EM 6/2/2	H	61.0 ± 1.7	0.813 ± 0.006	171 ± 57
PVA/CS/CG - EM 6/1/3	I	48.3 ± 0.4	0.820 ± 0.020	164 ± 55
PVA/CS/CG - EM 7/2/1	J	102 ± 0.2	0.753 ± 0.015	218 ± 80
PVA/CS/CG - EM 7/1.5/1.5	K	94.6 ± 0.9	0.757 ± 0.021	204 ± 51
PVA/CS/CG - EM 7/1/2	L	84.9 ± 0.6	0.760 ± 0.010	196 ± 51

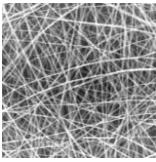
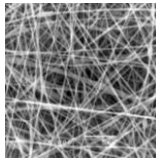
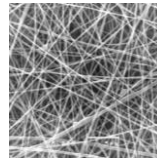
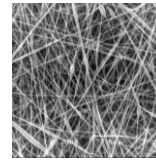
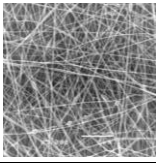
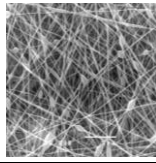
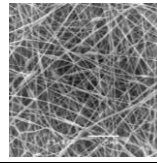
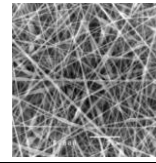
### 3. Cross-linking of the electrospun fibers

The mechanical characteristics of the materials are also significant for applications such as wound dressing. Crosslinking of polymer matrix molecules is usually carried out to enhance a material's mechanical qualities and improve wet resistance. Among various methods and types of crosslinking agents, GTA is widely



used to crosslink PVA due to its inexpensiveness and availability. Numbers of successful crosslinking of PVA using GTA were revealed. Instead of a direct immersion of samples in GTA, a vapor treatment method was chosen in order to minimize the remaining amounts of GTA that might cause toxicity. For further study, only the electrospun PVA/CS/CG – EM 6/3/1, 6/1/3, 7/2/1, and 7/1/2 were chosen according to the significant difference in the ratio of CS and CG and difference in the fiber diameters. The electrospun PVA/CS/CG – EM fibers were crosslinked using GTA vapor at 40°C at 12 or 24 hours. Table 3 displays the SEM images of the crosslinked PVA/CS/CG – EM fibers and average fiber diameters of the crosslinked PVA/CS/CG – EM 6/3/1, 6/1/3, 7/2/1, and 7/1/2 at 12 and 24 hours. The electrospun fibers fused together with junction spots, resulting in a slight increase in fiber diameters. The average fiber diameters of the PVA/CS/CG – EM fibers before crosslinking, as measured from the scanning electron microscope (SEM), were in a range of 164-218 nm, whereas those after crosslinking were slightly larger (179-228 nm). The electrospun fibers that had been crosslinked with GTA for 24 hours retained mechanical qualities and were more water resistant than the fibers that had been crosslinked with GTA for 12 hours.

**Table 4:** SEM images and average diameter of the electrospun fiber crosslinked with GTA

Cross-linking time	PVA/CS/CG-EM 6/3/1	PVA/CS/CG-EM 6/1/3	PVA/CS/CG-EM 7/2/1	PVA/CS/CG-EM 7/1/2
Crosslinked with GTA for 12 hours				
Average fiber diameter	179 ± 31 nm	192 ± 51 nm	211 ± 71 nm	203 ± 82 nm
Crosslinked with GTA for 24 hours				
Average fiber diameter	182 ± 40 nm	185 ± 67 nm	217 ± 64 nm	228 ± 74 nm

#### 4. Antibacterial activity

The antibacterial activities of the electrospun PVA/CS/CG-EM fibers 6/3/1, 6/1/3, 7/2/1, and 7/1/2 were evaluated by an agar disc method. Table 4 shows the lengths of inhibition zones observed for each type of fiber mat. It was found that all types of electrospun PVA/CS/CG-EM fibers (i.e., 6/3/1, 6/1/3, 7/2/1, and 7/1/2) exhibited the inhibition zone in both *S. aureus* and *E. coli* testing. Especially for *S. aureus*, all types of electrospun PVA/CS/CG-EM fibers provided much larger inhibition zones compared to the positive control. According to the excellent antibacterial properties of these electrospun fibers, they can be good candidates for use as wound dressings.

**Table 5:** Inhibition zone of the electrospun PVA/CS/CG - EM fibers, a negative control, and a positive control against *S. aureus* and *E. coli* as determined by an agar disc method

Sample	Length of inhibition zone (mm)	
	<i>S. aureus</i>	<i>E. coli</i>
PVA/CS/CG - EM 6/3/1	11.57 ± 0.67	4.74 ± 0.68
PVA/CS/CG - EM 6/1/3	13.33 ± 0.28	1.97 ± 0.55
PVA/CS/CG - EM 7/2/1	13.70 ± 0.53	3.75 ± 0.36
PVA/CS/CG - EM 7/1/2	12.40 ± 0.53	5.55 ± 0.36
Negative control (distilled water)	0.00 ± 0.00	0.00 ± 0.00
Positive control (ethanol)	2.17 ± 0.12	2.33 ± 0.17

The results of the abovementioned studies indicate the effects of several parameters, including the PVA/CS/CG ratio, viscosity of solution, and electrical conductivity on the morphology and size of the electrospun fibers. Furthermore, it is also found that electrospun fiber is suitable for the making of an effective antimicrobial wound dressings, as it has an excellent antibacterial property against both gram-positive and gram-negative bacteria.

## Discussion

In this study, erythromycin (EM)-loaded poly (vinyl alcohol)/chitosan/collagen (PVA/CS/CG) nanofibers were fabricated by electrospinning technique. The average fiber diameters of the PVA/CS/CG-EM fibers before and after crosslinking, were in the range of 157-228 nm. The increasing CG contents, the viscosity of the solution decreased, and the electrical conductivity increased, resulting in a decrease in fiber diameters. For the purpose of use in wound healing application, the antibacterial property is one of the important characteristics. The use of PVA and CS as a matrix of hydrogels in wound dressings application was revealed by several research. The electrospun CS/serecin/PVA fibers with addition of nano-silver particles showed antibacterial activity against *E. coli* (Goudarzi et al., 2014). Wang et.al (2020) reported that the electrospun CS/PVA fibers incorporated with Cu metal-organic framework exhibited excellent antibacterial activity (99%) against *S. aureus* and *E. coli*. In this work, the antibacterial activity of the PVA/CS/CG-EM electrospun fibers were evaluated by an agar disc method against *S. aureus* and *E. coli*. All types of the fiber mats exhibited inhibition zones for both bacteria, especially *S. aureus*, determining their potential for use as wound dressings.

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KSUC-OI-009

## Physical activity, play exercise and early stimulation treatment for stunting ages 25 – 59 month in the Karanganyar health center area Pekalongan district

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### Abstract

Stunting in Indonesia has become a focus on current health issues. Impact Stunting will disrupt children's growth and development. It is very dangerous for future generations. Stunting in the region Pekalongan district is one of the areas where stunting is still occurring attention of local government. Stunting can be prevented and also treated with the right health steps, several steps can be taken carried out is physical activity and play exercise stimulation, early stimulation in handling stunted children. This research aims to determine growth and development disorders in children stunting, assessing motor and sensory activities in stunted children can cause a decrease in physical activity. Design of this research in the form of qualitative and experimental. Samples used in This study included children aged 25 – 59 months in the community health center area Karanganyar, Pekalongan Regency. The samples taken in this study were 30 children according to categories included in the criteria for stunting, where body weight is measured, height and age between 6 – 59 months. Interventions are provided in the form of physical activity, play exercise and stimulation then measured again changes in body weight, height and motor development with GMFCS before intervention and after intervention. The intervention provided is in the form of physical activity in the form of simple physical activities such as jumping, clapping, running and walk. The stimulation provided is in the form of an expression massage for stimulates sensory and relaxation in children. The results of the research after the physiotherapy intervention were carried out, there were results significant with a P value <0.05, this is indicated by an increase in The child's body weight is an indicator that there is an increase in intake The food provided can reduce the criteria for stunting children.

**KeyWords:** Stunting, Physical activity, Play exercise, Stimulation

## Introduction

The incidence of stunting or what is often called short children is one of the nutritional problems experienced in the world today. The data recorded by Joint Child Malnutrition Estimates, in 2017 it was 22.2% or around 150.8 million children in the world experience stunting. Prevalence The incidence of stunting in Indonesia in 2018 was 30.8% (RISKESDAS, 2013). From the data obtained, it was concluded that stunting is still high in Indonesia compared to the prevalence of stunting in the world, where the condition of stunting in children it can only be identified when the child is 2 years old and over. Stunting caused by various factors including biological, psychological and social.

According to the results of the Indonesian Nutritional Status Study (SSGI), in 2021 there will be as many as 20.9% of children under five years old (toddlers) in Java Currently experiencing stunting (Yulianti Kristen Banhae et al., 2023). This means stunting or growth disorders approximately 1 in 5 toddlers in Central Java experience it. From 34 districts/cities in Central Java, there are 14 districts/cities with the proportion of stunted toddlers above provincial figures. Meanwhile, 21 other districts/cities have a prevalence in below provincial figures. Wonosobo Regency is listed as a region with The highest prevalence of stunted toddlers is in Central Java, reaching 28.1%. Followed by Tegal Regency with 28%, and Brebes Regency with 26.3%. Temporary Grobogan Regency has the lowest prevalence of stunted toddlers in this province, namely only 9.6%. After that there is Magelang City with a prevalence of 13.3%, as well Wonogiri Regency 14%. Nationally, the prevalence of stunted toddlers has reached 24.4% in 2021. This figure is down compared to the 2019 position 27.69%. The government is also targeting the number of stunted toddlers to fall to 14% until the end of 2024. Until June 2021, the district's stunting cases Pekalongan is at 13.48 percent.

Stunting experienced childhood can have an impact on growth and development. Growth is not optimal and development obstacles occur in early in life resulting in lower educational attainment in the future (Black et al., 2017). Impact of stunting can be categorized into short-term and long-term impacts. Impact Short-term stunting can cause failure to thrive, stunting cognitive and motor development, and not optimal physical body size and metabolic disorders. Long-term impacts, stunting causes decreased intellectual capacity. If there are obstacles to cognitive development and motor skills can have an impact on reducing the ability to absorb lessons at school age which will affect their productivity at that time adults (Giyaningtyas et al., 2019; Yadika et al., 2019). Types of development that fall into categories suspicious in children with stunting, including development personal social, language, gross motor and fine motor skills. Incidents of malnutrition or Malnutrition in early childhood can cause long-term effects such as impaired gross and fine motor skills, fatigue, loss flexibility, rapid sequence movement disorders, behavioral problems, and disorders cognitive disorders such as lower attention span, language disorders, learning disability, low IQ score (Waber et al., 2015).

It is vital that doctors in developing countries immediately realize this that early detection of motor disorders in malnourished children, followed by Early physical rehabilitation will help prevent, minimize and effectively treating physical disorders and motor delays. By looking at the conditions above, the author

took the title "Physical Activity, Play Exercise and Early Stimulation in Handling Stunting Ages 25 – 59 Months IN the Region Karanganyar Community Health Center, Pekalongan Regency"

## Research problem

Problems that can be concluded from the explanation above in the research this is as follows:

1. Is physical activity, play exercise and early stimulation possible detect motor delays in stunted children?
2. Is physical activity, play exercise and early stimulation possible improve motor development in children with the condition stunting

## 1. Research Objectives

The aims of this research are as follows:

1. Reduce or reduce neuromusculoskeletal disorders in children with stunting conditions using physical activity and play interventions exercise and early stimulation.
2. Improve growth and development in children with stunting conditions using physical activity interventions, play exercise and early stimulation.

## 2. Review of Related Literatures

Some of the data used to see the general condition of stunted children was obtained through several data stored by midwife health workers Among other things is data Nutritional Status Assessment, an physiotherapy collect data about Assessment of Children's Functional Abilities, Motor and Sensory Assessment and Physiotherapy Intervention in Stunted Children

### 1) Physical Activity

Physical activity is a basic function of human life. Since long ago Physical activity is required to collect food by walking around forests and rivers, running from pursuing enemies or wild animals that want to pounce. In further developments after humans get to know the system cultivation means humans use a lot of physical activity to farm planting rice and gardening growing vegetables to meet needs food. In order to survive, ancient humans needed space who provide food, so they need a lot of it energy to travel looking for food, moving from one place to another there are still many sources of food. As it develops Human civilization began to recognize means of transportation in the form of animals such as Horses are used as a means of transportation. At that time there were already known tools transportation, human physical activity to walk somewhere has started reduce. According to WHO, physical activity is movement the body is produced by skeletal muscle which requires energy expenditure. Activity physical involves biochemical and biomechanical processes. Physical activity can grouped based on type and intensity. Often people exchange The term physical activity refers to sports or exercise. By definition exercise 2 Sport (exercise) is part of physical activity or can be said 11 Sports training (exercise) is physical activity that is

planned, structured, repetitive, and aims to maintain physical fitness (Haskell & Kiernan 2000). The term physical fitness is often discussed when discuss physical activity

## 2) Play Exercise

According to Minister of Education Regulation No. 137 of 2014 concernin The National Early Childhood Education Standards are in attached attachment STTPA in the 2-3 year age group with the scope of physical development One of the motor skills is gross motor skills. At that age the child has able to walk on tiptoes, jump backwards and forwards 2 feet, throwing and catching a ball, dancing to the beat, going up and down stairs by holding on and climbing from high to low places with holding on (Permendikbud, 2014). According to (Malak et al., 2013) stimulation Children's motor skills can be done by parents, educators, caregivers and other people other adults. Research carried out by (Biering-Sørensen et al., 2017) stated that training uses the play exercise method can improve walking development. Play exercise is a type a play therapy method that has goals such as: play puzzles, piggy banks and other toys to repair or stimulate children to achieve certain targets (Ibrahim et al., 2015). Play Exercise can be done in various ways such as squatting to standing, sit ups, cobra position, plank, which is done while playing. Play exercise can significantly improve cognitive and fine motor skills for children with mild motor delays (Harbourne et al., 2021). Apart from that, research was carried out by (Gunawan et al., 2016) stated that after undergoing exercise therapy with Using the play exercise method there is an increase in muscle tone in the region ankle, increasing the ability of functional activities in the standing dimension, development of the level of compliance and understanding towards a better direction. Play Exercise is considered an opportunity to increase physical activity 12 children through gross motor movements on interesting standing skills, funny and not boring (Westergren et al., 2016). The play exercise method for stunted children is very necessary because Stunting has an impact on children's growth and development so treatment is needed appropriate. The child's high desire to play is also an encouragement to improve children's motor development

## 3) Early Stimulation

Parents need to stimulate children's abilities and growth and development Children can grow and develop optimally and according to their age. Stimulation is stimulation (sight, speech, hearing, touch) that comes from child's environment (Chamidah, 2009). Children who receive targeted stimulation will be faster develop compared to children who receive little or no stimulation. Stimulation can also serve as a beneficial reinforcer for child development. Various kinds of stimulation such as visual stimulation (vision), verbal (speech), auditive (hearing), tactile (touch) etc. can be optimize child development. Providing stimulation will be more effective when paying attention to the needs of children according to the stages its development. In the early stages of development, children are in the sensory stage motor. Providing visual stimulation in the baby's bed will increase the child's attention to his environment, the baby will be happy by laughing and moving his whole body. But if the stimulation is too many, the reaction can be the opposite, namely the child's attention will decrease and the child will cry. In the first years children learn to listen.

Stimulus Verbal language in this period is very important for children's language development in 2018 first of his life. The quality and quantity of a child's vocals can increase with verbal stimulation and children will learn to imitate the words he heard (Briawan & Herawati, 2008). But if there are too many auditive simulations (noisy environment) for children will experience difficulty in distinguishing between various sounds. Stimulation visual and verbal at the beginning of a child's development is the initial stimulation which is important, because it can give rise to expressive qualities such as lifting eyebrows, opening the mouth and eyes in an expression of astonishment, etc. Apart from that, children too requires tactile stimulation, lack of tactile stimulation can result deviations in social, emotional and motor behavior (Yusuf et al., 2022).

## Research Methodology

### 1. Method

This research aims to test physical activity and exercise against neuromusculoskeletal disorders and growth and development stunting. Type This research is a type of experimental research that uses design pre experimental design research with one-group pretest-posttest form design, namely comparing treatment before and after receiving treatment. The aim of this research is to determine the decline neuromusculoskeletal disorders and stunting growth and development disorders.

### 2. Population and Sample

The population in this study were children with stunting conditions as many as 30 children.

Researchers determine inclusion criteria and exclusions in this study are as follows:

Inclusion Criteria:

- Stunted children
- There are neuromusculoskeletal disorders
- There are growth and development disorders
- Willing to be a research subject

Exclusion Criteria:

- Illness during the research process
- Not willing to be a research subject

## Results

### 1. Description Sample characteristics

Sample characteristics in this study include gender, age, Height, weight that describe the sample.



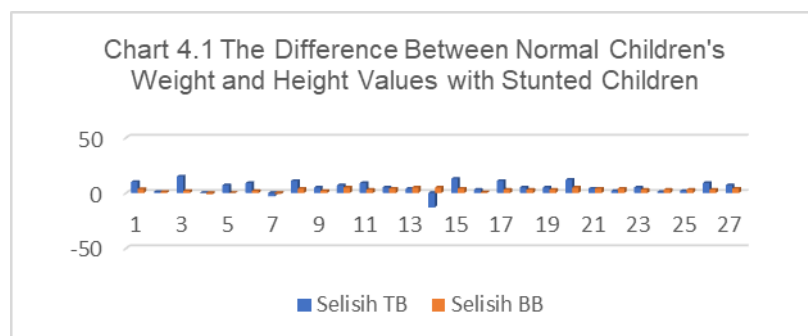
**Table 1:** Subject characteristics of frequency

Characteristic		N	(%)
Gender	Man	15	50
	Women	15	50
<b>Total</b>		<b>30</b>	<b>100</b>
Age	6 – 10 months	3	9,9
	11 – 15 months	5	16,6
	16 – 20 months	3	9,9
	21 – 25 months	3	9,9
	26 – 30 months	4	13,3
	30 – 35 months	1	3,3
	36 – 40 months	6	20
	41 – 45 months	1	3,3
	46 – 50 months	3	10
	51 – 55 months	1	3,3
	56 – 60 months	1	3,3
	<b>Total</b>		<b>30</b>

The results of the research sample description analysis are based on table 4.1 shows that the number of samples is 30 with 15 samples being male and 15 samples being female. Based on table 4.1, it shows The age range for the sample was between 6 and 60 months, where the sample was the largest were aged 36 - 40 months, totaling 6 samples or children. This matter shows that the age of the sample in this study varies.

## 2. Description of sample characteristics

This description explains the difference between body weight and height stunt child with Normal Value. Non-stunt child.



Sample characteristics which can describe the sample frequency, maximum, minimum, average and standard Deviations can be seen in the following table:

**Table 2:** sample characteristics

Characteristics	N	Min	Max	Mean	SD
Age	30	6	58	28,23	14,47
HW Pre	30	63	114	82,2	11,27
					5
HW Post	30	63,6	114,75	82,918	11,28
		5			9
BW Pre	30	6	14	9,7	1,98
BW Post	30	6,80	15.20	10,59	2,08

From table 4.2 it shows that the age of the measurement data sample changes in height and weight in stunted children. The data shows it is heavy body before receiving physical activity intervention, early stimulation and play exercise and after receiving physical activity intervention, early stimulation and play exercise

### 3. Test Of Normality

Data normality test using Shapiro Wilk because there were 30 samples, the data tested for normality were height and weight well before after the intervention. This normality test is carried out to find out the next difference test.

**Table 3:** normality test results

Kriteria	<i>p</i>
TB pre	0,574
TB Post	0,583
BB Pre	0,281
BB Post	0,272

From table 4.3 shows that the normality test results using Shapiro Wilk  $p > 0.005$  value which berate shows normal distributed data. Therefore, the difference test is continued using parametric tests.

### 4) Hypothesis

Hypothesis testing is carried out to determine the pre-test and post-test scores physical activity intervention, early stimulation and play exercise and after receive physical activity intervention, early stimulation and play exercise. For To find out these differences, a paired sample t-test was carried out.

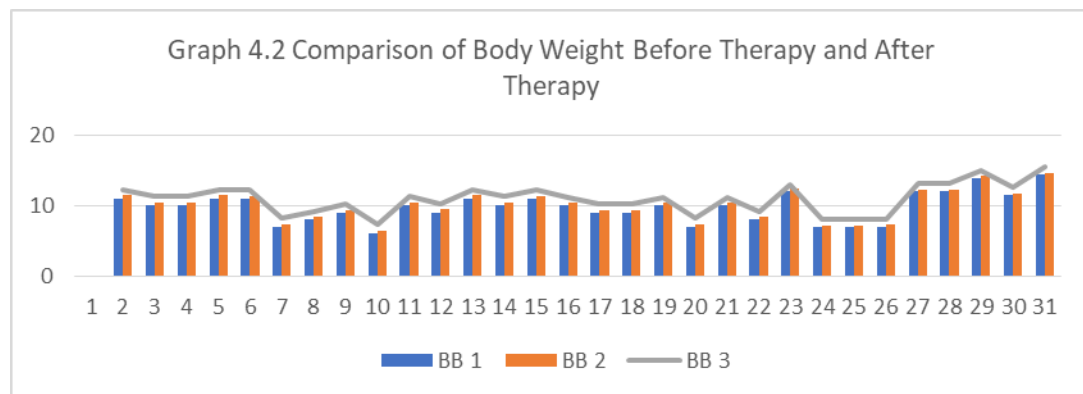
**Table 4:** Difference test results using paired sample t-test

Kriteria	<i>SD</i>	<i>p</i>
HW Pre – HW Post	0,933	0,000
BW Pre – BW Post	0,195	0,000

Based on Table 4.4, it shows a probability value of 0.000, p value <0.05, This shows that there are significant results between the pre test and post test physical activity intervention, early stimulation and play exercise and after receiving physical activity intervention, early stimulation and play exercise

## Discussion

### 1. Physiotherapy effect to weight stunted children



The importance of early detection in children aims to determine development whether the child is appropriate for his age or not, both developmentally and growth. Many people still don't know about early detection of good children use of instruments or others. Early detection of motor development for children with stunting conditions using the DDST form. This form is screening form to determine the development of children from the ages of 0 – 6 years. Refer In the table above, before intervention was given, there were 30 children who experienced severe problems Lack of body weight can affect motor development in children. Heavy A lack of body weight can affect development, this is due to lack of nutritional intake that will be absorbed. In the period of absorption development Nutrition or metabolic processes in children are very important and much needed in the best possible condition. Increased metabolism in children can improved by increasing physical activity so that nutrient absorption can be achieved maximum. One of the causes of stunting is impaired absorption of nutrients Children can experience growth disorders. The golden age for children is up to 7 years, at this time children need to be given stimulation to maximize their activities growth and development (Welasih & Wirjatmadi, 2012). Cell growth in Children will be faster if their metabolic processes are well supported by nutrition and appropriate stimulation.

During the growing period, children are very dependent on stimulation both internal and external. External stimulation is the most influences the growth and development of children. the Golden Age is a

very effective and urgent period for optimizing various potentials intelligence possessed by human children to lead to Human Resources quality. Success or failure in developing intellectual intelligence, a child's emotional and spiritual abilities often lie at the level of their abilities and awareness of parents in taking advantage of opportunities in this golden age (Gratzer, 2008). The results of this study show that by providing early stimulation and play Exercise can increase body weight and height in children. This matter It is shown from the results of the analysis that there are differences before and after the intervention. Body weight and height are signs of increased growth in This also shows that children are absorbing nutrients and increasing their appetite in children to prevent stunting in children. Stunting disorders in children can cause serious problems (Satriawibawa & Saraswati, 2014). Where Children who are underweight can easily get infectious diseases such as bronchitis, pneumonia and others.

## 2. Physiotherapy effect to height of stunted children

Intervention in the form of stimulation and physical activity training using a physiotherapy approach showed an increase in body weight and height. This shows an increase in metabolism in nutrient absorption. Good absorption in children can help children's height before and after have a good development, so that children's development can increase. Increasing physical activity can help stimulate motor skills or motor learning so that children's motor development can increase. An increase in body weight and height after the intervention shows that there is awareness and development in children's thinking that children feel they need adequate nutrition (Santri et al., 2017). This research by providing play exercise also shows the development of children in interacting with their parents, this is shown by an increase in appetite. Early stimulation in children also has an influence on children's cognitive development, this is shown by their willingness to do more physical activity than passively watching cellphones or TV as well as parents' awareness in accompanying children in doing exercises using the play exercise method (Chamidah, 2009; Yusuf et al., 2022).

## Conclusion

1. Physical activity, play exercise and early stimulation can stimulate motor delays in stunted children
2. Physical activity, play exercise and early stimulation can increase growth motor development in children with stunting conditions

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## Efficiency of lime, cow manure associated with nitrogen fixing bacterial inoculation on yield and quality of groundnut

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### Abstract

The field study was carried out in Tri Ton town, An Giang province, Vietnam during Winter-Spring and Summer-Autumn crop of 2022-2023. The field experiment was carried out by four treatments and four replications. Four treatments of Winter-Spring crop: The control treatment applied NPK (100 kg Urea + 556kg P<sub>2</sub>O<sub>5</sub> + 100 kg KCl); (NT2): application of NPK, lime with *Rhizobium* inoculation; (NT3): NPK, cow manure (CM) and *Rhizobium* inoculation; (NT4): NPK, CM and lime with *Rhizobium*. Four treatments of Summer-Autumn crop were carried on the prior experiment (Winter-Spring crop). However, treatments did not apply to CM, lime and *Rhizobium* (only NPK). The highest plant biomass (168 g), number of nodule (92.1), fresh and dry weight of filled pods (61.4 and 37.6 g, respectively), fresh and dry weight of empty pods (2.07 and 1.19 g), weight of dry nodules (0.83 g) per plant, yield (6.12 ton ha<sup>-1</sup>), protein and oil in seeds (26.1 and 50.1%, respectively) were observed in CF and lime applied with *Rhizobium* inoculated treatments. All the parameters of growth and yield showed best result for application of lime and CM with synthetic *Rhizobium* inoculation of seeds. CM manure has significantly increased the yield of peanut in the next crops. The results from our two crops of study showed that co-application of NPK, CM, lime and *Rhizobium* inoculation always increased field capacity in both crops.

**Keywords:** Groundnut, Yield, Cow Manure, Lime, Rhizobium

### Introduction

Groundnut (*Arachis hypogaea* L.), which is one of the world's most popular crops cultivated in tropical and sub-tropical regions, has the high economic value. It contains high protein, oil, fatty acid, carbohydrates, vitamins and mineral (Gulluoglu, 2011). Groundnut contains 45-55% oil, 20-25% protein, 16-18% carbohydrates and 5% minerals (Gulluoglu et al., 2016). The urbanization has narrowed the agricultural soil, reducing food production. The government developed an intensive system to overcome the food shortage that has resulted in the deterioration of the quality of agricultural soil. Therefore, the agricultural production may be faced with environmental changes that make the soil increasingly apparent depression (Barrow, 2012). The grey degraded soils have good drainage and aeration due to the high rate of sand in the

soil structure, but low organic matter content due to easy leaching (Yunilasari et al., 2020). Increasing crop yields, farmers use more and more chemical fertilizers and pesticides. This is the cause of environmental pollution due to the accumulation of nutrients derived from fertilizers and pesticides. Land will be damaged slowly and the productivity of crops will continue to decrease. The application of organic fertilizers (bio-char and CF) that replaces for inorganic fertilizers can improve the soil fertility (Yunilasari et al., 2020).

Peanuts, which like many other plants, the same peanut family, are the symbiosis of *Rhizobium* roots and *Rhizobium*. *Rhizobium* is a type of bacteria, the ability to fix nitrogen. *Rhizobium* are responsible for fixing free nitrogen from the air for plants. The amount of nitrogen that was fixed by *Rhizobium* was achieved an average of 94 kg N/ ha / crop (about 200 kg ure/ha/crop). In the good condition, it can reach 168 kg N/ ha / crop (Krishnan, et al., 2018). The amount of nitrogen that fixed by *Rhizobium*, can support to 74% of N the peanut trees. Environmental conditions have a great influence on the activity and ability of nitrogen fixation of *Rhizobium*. If application of N is too high, it can inhibit the nitrogen fixation of bacteria. Phosphorus has a positive effect on the formation and nitrogen fixation of nodules. Especially, the soil is sufficiently applied the calcium or lime (Krishnan, et al., 2018; Mbah, & Dakora, 2018). Nitrogen is an important element for effective production of peanut, adequate supply of nitrogen fertilizer is essential for growth and yield due to the intensive farming. Therefore, farmers have used a large amount of chemical fertilizer, which has been the cause of soil degradation. The application of bio-fertilizer is frequently recommended to get high and clean agricultural product (Awadalla & Mohammed, 2017). The recent challenge faced by advanced farming is to achieve higher yields in an environment-friendly manner. Thus, there is an immediate need to find eco-friendly solutions. Among various types of species being used as biocontrol agents. Inoculation of rhizobia helps to add nitrogen to peanuts because native rhizobia species cannot provide enough nitrogen for it (Doloum et al., 2017). The nitrogen of *Rhizobium*-legume symbiosis is one of the nutrients that increase the soil fertility. This nutrition makes it help the farmers reduce application of NF. Farmers can increase their productivity and income by maximizing bio-nitrogen fixation through the *Rhizobium* strain. Helping peanuts grow and raise the population of *Rhizobium* strain to improve nitrogen supply, so yield of peanuts will be increased, (Korir et al., 2017). The aim of this study to find out effects of *Rhizobium* and cow manure on yield and quality of the Peanut in the grey degraded soil of Tri Ton town.

## Materials and Methods

### Field location

Two field experiments were carried out in the grey degraded soil of Tri Ton district, An Giang province, Vietnam during the Winter-Spring and Summer-Autumn crop of 2019 and 2020 under drip irrigation system. The study soil is the grey degraded soil zones (Table 2), which obtain 400–600 mm of total area. The rainy season occurs 50-60%, between April and October. Temperature varies from 25-35°C in summer and from 20- 30°C in winter.



## Microorganisms

*Rhizobium* sp. Was isolated from nodules of peanuts on fields of farmers in Tri Ton district, An Giang province, Vietnam. *Rhizobium* sp. Was mixed well with seeds of peanut. Seeds of peanut were soaked in liquid inoculated after diluted 1:1 with well water for 30 min. before sowing.

## Experimental design and treatment

The field experiment was design in Randomized Complete Block Design (RCBD) with four treatments. Each treatment has an area of 80 m<sup>2</sup> (1.0 m x 20 m x 4 replications). Treatments of crop 1 (Winter-Spring): The control treatment only applied N, P, K per ha (100 kgUrea + 556 kgP<sub>2</sub>O<sub>5</sub> + 100 kg KCl); (NT2): Co-application of N, P, K (100 kg Urea + 556 kgP<sub>2</sub>O<sub>5</sub> + 100 kg KCl)+ 500 kg CaCO<sub>3</sub>/ha and *Rhizobium* inoculation (10<sup>8</sup>CFU/g); (NT3): N, P, K(100 kg Urea + 556 kgP<sub>2</sub>O<sub>5</sub> + 100kg KCl) + cow manure (10 tons/ha) and *Rhizobium* inoculation; (NT4): Incorporation of N, P, K (100 kg Urea + 556 kgP<sub>2</sub>O<sub>5</sub> + 100 kg KCl)+ cow manure (10 tons/ha) + 500 kg CaCO<sub>3</sub>/ha and *Rhizobium* inoculation. Treatments of crop 2 (Summer-Autumn) were carried on the prior experiment (crop 1). However, the treatments did not apply to cow manure, lime and *Rhizobium* inoculation (only applied NPK), which evaluate the effects of cow manure, lime and *Rhizobium* inoculation on the next crop. Seeds of peanut were obtained from Vietnam Agricultural Research Center, An Giang, Vietnam. The field experiment was laid out in Randomized Complete Block Design (RCBD) in Tri ton, An Giang province, Vietnam during two crops, which consisted of four treatments of Winter-Spring crop and four treatments of Summer-Autumn crop.

## Data recorded

Four samples, which were taken at 20, 40 and 60 and 80 days after sowing and ten plants were taken from each plot randomly, estimated the average height and number of shoots per plant. At harvest season, on December 30, 2019, and May 15, 2020, the random samples of ten plants were taken from each plot to determine number of biomass, number of nodule per plant, dry weight of nodule, fresh and dry weight of filled and unfilled pods per plant (g). Plants on the middle two rows in each plot were harvested separately and dried in order to estimate weight of pods yield per hectare (ha), seed protein and oil percentage.

## Methods of analysis

At harvest season, on December 30, 2019 and May 15, 2020. Plants on the middle two rows in each plot were harvested separately and dried in order to estimate weight of pods yield per ha and weight of seeds per ha. Seed samples were grinded into fine powder and stored in brown glass bottles for chemical analysis. All data were analyzed by the generalized linear model analysis of variance using Genstat v10 (VSN International Ltd, UK, 2007). Oil percentage and NPK in seeds were determined according to methods described by AOAC.

**Table 1:** The chemical properties of cow manure (n=10) (Results were determined before experiment)

Character (dry weight of cow manure)						
Cow manure	dry weight	%N	%P <sub>2</sub> O <sub>5</sub>	%C	%K <sub>2</sub> O	C/N
	49.29+3.13	0.95+0.33	0.24+0.10	0.35+0.03	0.89+0.11	25.30+0.27

**Table 2:** The physic-chemical properties of the soils (0–20 cm) performed before sowing [12]

Characters	Value	
	Winter-Spring	Summer-Autumn
Soil deep (0-20 cm)		
CEC Cmol <sup>+</sup> /kg	2.52	2.54
pH	5.02	4.82
Soil moisture (%)	10.3	11.1
Organic matter (%)	0.91	0.82
Ca <sup>2+</sup> (µg.g <sup>-1</sup> )	504	496
Mg <sup>2+</sup> (µg.g <sup>-1</sup> )	386	369
Available K (mg.kg <sup>-1</sup> )	120	160
Total N (%)	0.25	0.80
Available Phosphorus (mg/100g)	11.1	12.0
silt (%)	15.33	15.4
clay (%)	1.89	2.19
sand (%)	82.78	82.41
Texture	Sandy loam	Sandy loam

**Statistical analysis:**

For statistical analysis, F-test was use by using LSD test (Steel & Torrie, 1980). All data recorded were subjected to analysis of variance (ANOVA) for RCBD The means were tested using the least significant difference (LSD) at P≤0.05 levels. For statistical analysis was analyzed by using STATISTIX version, which was separated by LSD test at P= 0.05 probability level. Soil, plant analysis and *Rhizobium* spp. Was isolated in laboratory of An Giang University. This study was carried out for six months and materials used were cow manure, lime, peanut seeds and *Rhizobium* and also urea, KCl and P<sub>2</sub>O<sub>5</sub> fertilizers. For crop culture, soil and cow manure samples were taken for first and analysis before application. Lime and cow manure were applied on soil several days before planting. Soil samples were taken before and after planting of peanut. Observed parameters were soil chemical properties such as soil pH, CEC, Soil moisture (%), Organic matter (%), Ca (µg g<sup>-1</sup>), Mg (µg g<sup>-1</sup>), Total N (%), available P (mg 100 g<sup>-1</sup>) and available K (mg kg<sup>-1</sup>) and silt (%), clay (%), sand (%). Plant growth parameters were also observed as yield components, yield, seed protein and oil of peanut.

## Results and Discussion

### Plant height

Results in Table 3 showed that plant height between treatments in the Winter-Spring crop had a significant difference ( $P < 0.05$  and  $0.01$ ) during the growth time of peanuts. Maximum plant height of the co-application treatments was always higher than control treatment (Table 3). The highest height of peanut plant was founded in NT4 (10 tons cow manure  $\text{ha}^{-1}$  + 0.5 ton  $\text{CaCO}_3$   $\text{ha}^{-1}$  + NPK and *Rhizobium* inoculation  $10^8$  CFU  $\text{g}^{-1}$ ), while the lowest plant height was recorded in the control treatment (NT1: Without application of cow manure, lime and non-*Rhizobium* inoculation). The Summer-Autumn crop, the highest plant height was observed a statistically significant value in the  $F_{\text{test}}$  ( $p=0.05$  and  $p=0.01$ ) significant difference at 1% and 5% (except 80 DAS). According to Hillary et al. the co-application of NPK (100 kg Urea + 556 kg  $\text{P}_2\text{O}_5$  + 100 kg KCl) + lime and cow manure helped soybeans had higher plant height and higher ground biomass than the treatments using only NPK. Prior studies further showed that *Rhizobium* inoculation treatments also gave different results to the un-inoculated ones in plant height; stem dry weight, number of nodules per plant and nodule dry weight (Carterand & Gregorich, 2007; Sajid et al., 2011).

**Table 3:** The height of peanut as affected by combined application of cow manure, lime, NPK and *Rhizobium* inoculation in Winter-Spring and Summer-Autumn crop of 2022- 2023

Treatments	Plant height (cm)			
	20 DAS	40 DAS	60 DAS	80 DAS
Winter-Spring (A)				
NPK	19.5 <sup>a</sup>	37.8 <sup>a</sup>	50.3 <sup>a</sup>	62.1 <sup>a</sup>
NT2	21.3 <sup>b</sup>	38.4 <sup>a</sup>	51.6 <sup>ab</sup>	66.7 <sup>b</sup>
NT3	21.8 <sup>bc</sup>	41.4 <sup>b</sup>	54.2 <sup>bc</sup>	65.5 <sup>ab</sup>
NT4	22.7 <sup>c</sup>	44.4 <sup>c</sup>	56.7 <sup>c</sup>	68.2 <sup>b</sup>
Summer-Autumn (B)				
NT1	21.4a	41.7a	58.8a	70.8
NT2	22.0 <sup>ab</sup>	42.5 <sup>a</sup>	59.7 <sup>ab</sup>	72.0
NT3	22.5 <sup>b</sup>	42.6 <sup>a</sup>	60.1 <sup>b</sup>	70.9
NT4	22.9 <sup>b</sup>	44.4 <sup>b</sup>	61.8 <sup>c</sup>	71.5
$F_{\text{test}}$ (A)	**	**	**	*
$F_{\text{test}}$ (B)	*	**	**	ns
$\text{CV}_A$ (%)	15.5	11.7	14.1	14.8
$\text{CV}_B$ (%)	10.5	6.90	4.47	5.41

DAS: Days after seeding; Means with different letters, in the same column differ significantly \*, \*\* = significant at 0.05 and 0.01 level, respectively; ns = non-significant. Mean in the same column with different letters are significantly different at  $p \leq 0.05$ , as determined by LSD

### Number of shoots per plant

The number of shoots per plant was insignificantly affected by various treatments in the growing stages from 20 to 80 DAS between Winter-Spring and Summer-Autumn crop (Except 20 DAS in the Winter-Spring crop) (Table 4). The average number of shoots recorded at the low leaf stage ( $5 < \text{shoots / plant}$ ) during the growth of peanut plants. The number of shoots per a peanut plant is less likely to be changed by the fertilizer, because this characteristic is determined by genetics (Ahmad et al., 2009).

**Table 4:** Shoots of peanut as affected by combined application of cow manure, lime, NPK and *Rhizobium* inoculation in Winter-Spring and Summer-Autumn crop of 2022- 2023

Treatments	Number of Shoots per plant			
	20 DAS	40 DAS	60 DAS	80 DAS
Winter-Spring (A)				
NT1	2.13 <sup>a</sup>	3.93	4.48	4.80
NT2	2.25 <sup>ab</sup>	3.88	4.38	4.80
NT3	2.55 <sup>b</sup>	3.83	4.45	4.80
NT4	2.05 <sup>a</sup>	3.88	4.55	4.95
Summer-Autumn (B)				
NT1	2.85	4.50	4.75	4.75
NT2	3.08	4.48	4.65	4.65
NT3	3.10	4.53	4.68	4.68
NT4	3.15	4.55	4.73	4.73
$F_{test} (A)$	**	ns	ns	ns
$F_{test} (B)$	ns	ns	ns	ns
$CV_A(\%)$	31.9	15.8	11.8	11.8
$CV_B(\%)$	25.6	15.3	12.8	12.8

DAS: Days after seeding; Means with different letters, in the same column differ significantly \*, \*\* = significant at 0.05 and 0.01 level, respectively; ns = non-significant. Mean in the same column with different letters are significantly different at  $p \leq 0.05$ , as determined by LSD

### Biomass per plant

Cow manure and lime treatments were significantly affected by the biomass of peanut in Summer-Autumn crop (Table 5). The biomass of peanut of all studied treatments in the Summer-Autumn crop was higher than that in Winter-Spring crop. The biomass value ranged from 125 to 168 g plant<sup>-1</sup> in both crops. The NT3 and NT4 treatment gave the highest values of biomass (168 g. plant<sup>-1</sup>), which was not co-application of cow manure, lime and *Rhizobium* inoculation but based on the cow manure and lime treatments of Winter-Spring crop. While lowest value of biomass (125 g. plant<sup>-1</sup>) was given by application of NPK, lime and *Rhizobium* inoculation (the NT2 treatment of Winter-Spring crop). The result may be the cause of the

relationship of cow manure, lime and *Rhizobium* inoculation with roots of prior peanut crop (Awadalla & Mohammed, 2017). When applying organic fertilizers, which improved Biomass yield, growth and highest weight, were in the following crops (Sajid et al., 2011).

### Number of nodules per plant

The nodulation of peanut had significantly affected by lime, CM and inorganic fertilizer (NPK) integrated with *Rhizobium* inoculation (Tables 5). Maximum nodules per plant (92.1) were produced in the inoculated plants, while fewer nodules per plant (58.0) had at the control treatment (Without *Rhizobium* and cow manure). Table 5 shows that interaction between cow manure, lime and *Rhizobium* co-application on maximum nodules per the plant in the Winter-Spring crop. On the contrary, Number of Nodules per plant were insignificant effected by all treatments in the Summer-Autumn crop (without lime, cow manure and non-*Rhizobium* inoculation). At the Summer-Autumn crop, results, which ranged from 26.8 to 31.3, was found to be decreased by 53.8, 67.8, 66.2 and 64.8% due to the inorganic fertilize in all treatments, respectively, compared to the in Winter-Spring crop (Table 5). Number of nodules of peanut in the Winter-Spring crop were higher than that in Summer-Autumn crop in all treatments (Table 5). The reason might be explained the synthetic inoculation of *Rhizobia*, which increased number of maximum nodules per the plant in the Winter-Spring crop (co-application of cow manure, lime and *Rhizobium* inoculation) and decreased number of nodules in the Summer-Autumn crop (without cow manure, lime and non-*Rhizobium* inoculation). The nodulation of peanut showed a significant response to organic (compost and manure) integrated with *Brady rhizobium* inoculation (Shiyam, 2010). Five *Rhizobium* strains increased nodule number of peanut plant<sup>-1</sup>, and was a significant effect of synthetic inoculation of *Rhizobium* on nodules per the plant of groundnut (Anteneh, 2017). The co-application of lime, organic manure increased the population of *Rhizobium* in soil by 23% compared to application of inorganic fertilizer only (Basu et al., 2007). Furthermore, result showed that positive influence increased the root growth and the uptake of nutrients and improved the nodulation (Kimiti & Odee, 2010; Ibrahim et al., 2011).

### Dry nodules weight per plant

*Rhizobium* inoculated with cow manure produced dry nodules with a greater weight than those produced with NPK fertilizers applied without inoculation during the summer-autumn harvest. The nodule dried weight values varied between 0.178 and 0.830 g. plant<sup>-1</sup>. The treatment containing cow manure, lime, and *Rhizobium* yielded the highest value (NT4:0.83g plant<sup>-1</sup>), while the treatment containing only NPK resulted in the lightest weight of 0.178 g plant<sup>-1</sup> (NT1). Comparable in weight to the nodules of peanuts, the dry nodule content of both cultivars ranged from 0.178 to 0.830 g. plant<sup>-1</sup> compared to the Winter-Spring crop, all Summer-Autumn crop interventions (100 kg Urea + 556 kg P2O5 + 100 kg KCl) resulted in respective decreases of 58.6%, 75.3%, 73.2, and 75.2% (Table 5). The nodule dried weights of the Winter-Spring crop treatments were greater than those of the Summer-Autumn crop treatments (Table 5). The present investigation aligns with the findings reported in (Asante et al., 2020), which linked 30 kg of

inoculated peanuts with Rhizobium. The mean nodule dry weight per plant was greater at  $P \text{ ha}^{-1}$  in comparison to the non-inoculated treatment. The nodules dry weight of soybean increased by approximately 145% when Rhizobium strains and inorganic fertilizer were applied in conjunction, as compared to the treatment without  $\text{CaCO}_3$  inoculation (Tarekegn & Kibret, 2017).

### Fill pods fresh and dry weight per plant

Only the simultaneous treatment of lime and cow manure with Rhizobium inoculation had an impact on the weight of fresh and dried fill pods plant<sup>-1</sup> (Table 5). The weight of fill pods per plant on peanuts was considerably and statistically significant ( $P \leq 0.01$ ) affected by the application of lime and cow manure (Table 5). The weight of peanut fill pods both fresh and dry was unaffected by the inoculation with Rhizobium and lime. Cow manure, however, had a substantial ( $P \leq 0.01$ ) impact on the fresh and dry weight of peanut fill pods. Table 5's findings demonstrated that, in comparison to the other treatments, the dry and fresh weight of peanut fill pods under the cow manure treatments (NT3 and NT4) was significantly higher. The summer-autumn crop's experimental sites were set up on the winter spring crop's experimental basis (NPK alone), yet NT3 and NT4 treatment's fresh and dry weight of peanut fill pods was still greater than NT1 and NT2. According to earlier studies, *Brady Rhizobium* combined with compost and manure produced the maximum total biomass and total pod weight for both crops (Shiyam, 2010). After four months, applying both organic and inorganic fertilizer might greatly boost peanut growth and yield (Chuong & Chinh, 2018).

### Empty pods fresh and dry weight

In contrast to fill pods, all treatments had significant effects on the dry and fresh weight of peanut empty pods per plant (Table 5). The NT3 and NT4 treatments, which did not apply cow manure, lime, or non-inoculation with Rhizobia, produced the lowest dry and fresh weight of empty peanut pods (1.69 and 1.01 g plant<sup>-1</sup>, respectively) during the Summer-Autumn crop (crop 2). In contrast, the control treatment, which consisted of Winter-Spring crops, produced the greatest amount of empty pods (2.07 and 1.19 g plant<sup>-1</sup>). The weight of filled peanut pods increased considerably with the application of 10 t ha<sup>-1</sup> of chicken manure, while the weight of empty peanut pods decreased significantly (Hardjoloekito, 2020).

**Table 5:** Yield traits of peanut as affected by CM, lime and *Rhizobium* between Winter-Spring and Summer-Autumn crop of 2022-2023

Treatment	Parameters per plant						
	Biomass (g)	No. of Nodule	Wt. of dry nodule (g)	Wt. of fill pods (g)		Wt. of empty Pods (g)	
				fresh	dry	fresh	dry
<b>Winter-Spring (A)</b>							
NT1	145 <sup>bc</sup>	58.0 <sup>b</sup>	0.430 <sup>b</sup>	54.8 <sup>a</sup>	31.5 <sup>a</sup>	2.07 <sup>e</sup>	1.19 <sup>d</sup>

NT2	125 <sup>a</sup>	85.8 <sup>c</sup>	0.748 <sup>c</sup>	56.7 <sup>abc</sup>	31.6 <sup>a</sup>	1.92 <sup>cd</sup>	1.09 <sup>abc</sup>
NT3	133 <sup>ab</sup>	92.1 <sup>c</sup>	0.765 <sup>c</sup>	58.9 <sup>abc</sup>	35.5 <sup>b</sup>	1.88 <sup>bc</sup>	1.14 <sup>bcd</sup>
NT4	138 <sup>ab</sup>	88.9 <sup>c</sup>	0.830 <sup>c</sup>	60.8 <sup>bc</sup>	36.9 <sup>b</sup>	1.78 <sup>ab</sup>	1.08 <sup>ab</sup>
<b>Summer-Autumn (B)</b>							
NT1	160 <sup>cd</sup>	26.8 <sup>a</sup>	0.178 <sup>a</sup>	55.3 <sup>ab</sup>	31.7 <sup>a</sup>	2.04 <sup>de</sup>	1.17 <sup>cd</sup>
NT2	165 <sup>d</sup>	27.6 <sup>a</sup>	0.185 <sup>a</sup>	56.5 <sup>abc</sup>	31.6 <sup>a</sup>	1.85 <sup>bc</sup>	1.05 <sup>ab</sup>
NT3	168 <sup>d</sup>	31.1 <sup>a</sup>	0.205 <sup>a</sup>	60.2 <sup>abc</sup>	36.3 <sup>b</sup>	1.83 <sup>bc</sup>	1.10 <sup>abc</sup>
NT4	168 <sup>d</sup>	31.3 <sup>a</sup>	0.210 <sup>a</sup>	61.4 <sup>c</sup>	37.6 <sup>b</sup>	1.69 <sup>a</sup>	1.01 <sup>a</sup>
$F_{test} (A)$	ns	**	**	ns	*	**	*
$F_{test} (B)$	ns	ns	ns	*	**	**	*
CV <sub>A</sub> (%)	10.8	22.4	28.1	7.29	9.80	6.53	6.08
CV <sub>B</sub> (%)	4.43	22.5	22.6	7.49	9.89	8.64	7.92

Means with different letters, in the same column differ significantly \*, \*\* = significant at 0.05 and 0.01 level, respectively; ns = non-significant. Mean in the same column with different letters are significantly different at  $p \leq 0.05$ , as determined by LSD

### Peanut yield

According to the data presented in Table 6, the seed yield of peanuts was significantly increased by the combined application of lime, cow manure, and Rhizobium inoculation, as opposed to the control procedures (which involved the sole application of NPK) for both crops. Yield per hectare varied between 5.44 and 6.12 metric tons during the Winter-Spring and Summer-Autumn seasons. The treatment NT4 for the Summer-Autumn crop, which involved the concurrent application of lime, cattle manure, and *Rhizobium inoculation* from the previous season (Winter-Spring), produced the highest yield (6.12 t ha<sup>-1</sup>). The control treatment resulted in lower yields of Winter-Spring and Summer-Autumn crops (5.44 and 5.49 tha<sup>-1</sup>, respectively). Rhizobium inoculation of groundnut substantially increased plant height, yield, and yielding components, as demonstrated in (Sajid et al., 2011; Si et al., 2016). Seasonally, the co-application of inorganic and organic fertilizers increased peanut yield (Ghazanfar et al., 2018; Si et al., 2016). The implementation of Rhizobia inoculation in conjunction with inorganic and organic fertilizers (compost and manure) substantially enhanced the peanut yield at both experimental locations (Desta et al., 2015).

**Table 6:** Effects of CM, lime and *Rhizobium* on the quality and yield of peanut in Winter-Spring and Summer-Autumn crop of 2022-2023

Treatments	Parameters		
	Seed protein (%)	Seed Oil (%)	Yield (ton ha <sup>-1</sup> )
Winter-Spring (A)			
NT1	23.9 <sup>b</sup>	48.8 <sup>b</sup>	5.44 <sup>a</sup>
NT2	23.0 <sup>b</sup>	50.1 <sup>c</sup>	5.62 <sup>b</sup>

NT3	23.9 <sup>b</sup>	48.8 <sup>b</sup>	5.83 <sup>c</sup>
NT4	26.1 <sup>c</sup>	47.6 <sup>a</sup>	6.00 <sup>d</sup>
Summer-Autumn (B)			
NT1	21.0 <sup>a</sup>	48.9 <sup>b</sup>	5.49 <sup>a</sup>
NT2	21.5 <sup>a</sup>	48.8 <sup>b</sup>	5.60 <sup>b</sup>
NT3	21.5 <sup>a</sup>	48.3 <sup>ab</sup>	5.96 <sup>d</sup>
NT4	21.9 <sup>a</sup>	49.0 <sup>b</sup>	6.12 <sup>e</sup>
$F_{\text{test}}$ (A)	**	**	**
$F_{\text{test}}$ (B)	ns	ns	**
CV <sub>A</sub> (%)	5.45	1.89	3.85
CV <sub>B</sub> (%)	3.00	1.15	4.64

Means with different letters, in the same column differ significantly \*, \*\* = significant at 0.05 and 0.01 level, respectively; ns = non-significant. Mean in the same column with different letters are significantly different at  $p \leq 0.05$ , as determined by LSD

### Lipid and protein content

Table 6 presents the significant effects ( $P \leq 0.01$ ) of lime and CM levels in conjunction with Rhizobium inoculation on the percentage of oil and protein content in seeds of winter-spring crops. The peanut seeds' oil and protein content during the Summer-Autumn harvest were not significantly affected by any of the treatments. The lime, cow manure with Rhizobium inoculation treatment yielded the highest values of oil and protein (50.1 and 23.9%, respectively) for the Summer-Autumn crop. Conversely, the lime, cow manure with *Rhizobium* inoculation treatment provided the lowest oil content (47.6%) and protein content (21.0%) among all treatments (Table 6). The oil and protein contents were found to increase significantly in response to the investigated treatments (Table 6) that included cow manure and lime application combined with Rhizobium inoculation. The oil, protein, and peanut yield were enhanced when organic, lime, and inorganic substances were applied to sandy soil concurrently with Rhizobium inoculation (Emam, 2018; Anas, et al., 2019; Febri et al., 2017).

### Conclusion

The addition of nitrogen (N), phosphorus (P), and potassium (K) in the form of 100 kg of Urea, 556 kg of P<sub>2</sub>O<sub>5</sub>, and 100 kg of KCl, together with cow manure at a rate of 10 tons per hectare, and 500 kg of CaCO<sub>3</sub> per hectare, as well as the inoculation of *Rhizobium* bacteria, resulted in an increase in the yield component, overall yield, and quality of peanuts in Tri Ton town. This study discovered that Rhizobium had beneficial effects on the nodulation process and overall output of peanut crops. The study determined that the utilization of cow dung on groundnut cultivation resulted in a substantial enhancement in both crop yield and its various components in the subsequent harvest. The simultaneous application of lime,



cow dung, and Rhizobium inoculation resulted in a considerable improvement in the growth and yield of peanuts compared to the control treatments.

### Disclaimer

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of us.

### Competing interests

Authors have declared that no competing interests exist.

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## Analysis of honey in the comal district involves testing for moisture content, acidity levels, reduction of sugar levels, and sucrose sugar levels

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### Abstract

Honey, a natural sweetening liquid produced from the nectar of plants by bees, is known for its diverse colors and medicinal properties for humans (Q.S, An-Nahl ayat 69). In Indonesia, the quality standard for honey is outlined in SNI 8664-2018. The 2020 case of counterfeit honey from Banten raised public concern, highlighting the need for consumer protection against fake honey consumption. A survey conducted by researchers in the Comal area revealed the prevalence of low-priced honey brands, prompting concerns about authenticity and safety. Consequently, an analysis of the quality of pure honey circulating in the Comal District is imperative, encompassing organoleptic, water content, acidity, and sucrose sugar content tests. This research is included in descriptive observational research. Honey samples were obtained through random sampling, with selections made from various honey types and brands. The assessment of honey quality involved both qualitative and quantitative analyses. Organoleptic tests were conducted to evaluate shape, color, smell, and taste, while quantitative analysis included water content, acidity, and sucrose sugar tests. The results of these tests were then compared against the standards outlined in SNI 8664-2018. The set requirements include a maximum allowable water content of 22%, a maximum acidity level of 50 mL NaOH/kg, a maximum sucrose sugar content of 5%, and a minimum reducing sugar content of 65%. The study focused on 20 brands of pure honey, encompassing four distinct types, all free from additional ingredients such as ginger, turmeric, ginseng, cumin, etc. These samples were sourced from Apotek, supermarkets, and herbal medicine sellers. Each honey sample exhibited unique organoleptic characteristics attributable to variations in bee type, flower source, and production location, yet all adhered to the specified requirements. However, the results of the honey quality tests, including assessments of water content, acidity levels, sucrose sugar levels, and reducing sugar levels, revealed that 5 out of the 20 samples failed to meet the stipulated standards. These non-compliant samples are identified by the codes B, D, F, J, and S. The acidity test results show that sample B does not meet the requirements. The test results for, sucrose sugar content were not satisfactory. The reducing sugar test results showed that all samples were less than 65% w/w.

**Keywords:** comal subdistrict honey quality, moisture content, multiflora honey; reducing sugar levels

## Introduction

Honey is a natural liquid sugar produced by honey bees sourced from several flowers containing nectar, in which there are healing medicines for humans. Honey is classified as a food source and has medicinal properties, so it is necessary to test the quality of pure honey to maintain the authenticity and safety of public consumption from irresponsible traders. The contents of honey are carbohydrates, water, minerals, vitamins, amino acids, enzymes, proteins, aromatic substances and phenolic compounds (SNI, 2013). The quality of honey is the main factor that people review before consumption. The tests carried out to determine the quality of honey are tests for acidity levels and total sugar levels which play a role in determining the taste of honey, which consumers use as indicators for choosing honey (Batista De Sousa et al., 2015). The qualities of honey depending on the flower source taken, resulting in different colors, acidity, sugar content, ash and proline content (Wulandari, 2017).

Based on research conducted by Wulandari, (2017). There are several factors that influence the sugar content in honey, including water content, humidity, harvest time and storage temperature which influence the levels of reducing sugar and sucrose sugar. Sucrose levels in honey are influenced by the invertase enzyme, where the enzyme converts sucrose into glucose and fructose. Another thing is thought to be the cause of the sugar content in room temperature honey being lower than cold temperature honey because room temperature honey has a higher water content than cold temperature honey. The yeast in honey will degrade sugar, especially dextrose and levulose, into alcohol and CO<sub>2</sub>, thus affecting the dextrose (glucose) and levulose (fructose) content of honey (Wulandari, 2017). For this reason, determining the quality of honey is very important before marketing.

Research by Sulis Setio et al (2015), "Honey derived from rubber honey has a water content of 21.59% and rambutan honey 19.94%," (Harjo et al., 2015), "Randu honey from Nglorog Village has a water content that is not much different from honey randu from Kentengsari Village, namely 30.5%. Randu honey from Kentengsari Village has the highest water content and exceeds the standards set in the 2013 SNI with a value of 32.8%. Meanwhile, rubber honey from Medari Village has the lowest water content and its value meets the standards set in the 2013 SNI, namely 20.9%. Randu honey from Nglorog Village has the highest acidity level and exceeds the 2013 SNI, namely 67.96 mL NaOH/kg, meanwhile, kapok honey from Kentengsari Village has an acidity level of 64.2 mL NaOH/kg. "Rubber honey from Medari Village has the lowest acidity level compared to the acidity level in all honey samples studied, namely 34.59 mL NaOH/kg" (Savitri et al., 2017).

Martin and Bagdanov (2002) stated that honey counterfeiting occurs because real honey is relatively expensive compared to granulated sugar which comes from sugar cane plants, so honey counterfeiting is done by adding liquid sucrose or granulated sugar solution, thereby changing the composition of the honey. According to Sukmawati Noor, & Firdaus (2015) other causes of differences in reducing sugar content in honey are the addition of other substances such as sucrose and water as well as harvesting honey that is not yet ripe because the bee invertase enzyme is not yet perfect, so the sucrose sugar content of honey

has a limit. maximum 5% to maintain the authenticity of the honey and the content of the honey (Sukmawati et al., 2015).

Several cases of honey counterfeiting in Indonesia, for example in the Banten area in 2020, have disturbed the public, so protection for consumers is needed to avoid consuming fake honey. The occurrence of honey counterfeiting is categorized into 3, namely, truly fake honey is made from ingredients that do not come from plant nectar and do not come from bees, second is that honey is processed by mixing a sugar solution, and third is stimulating bee food with sugar and harvesting (Debora & Gatra, 2020). The results "are the most difficult to analyze because honey really comes from bees, but the honey produced comes from sugar given to bees by breeders," said Kuntadi, Head of Education and Training at the Indonesian Beekeeping Association. The side effects of consuming fake honey are that it can cause diabetes and can cause diarrhea (Aditomo, 2021). Pure packaged honey produced under various brands is widely circulated in the Comal District area. The results of the research survey showed that there were 4 types of honey without a mixture of other ingredients, with a total of 26 honey from 22 brands found in pharmacies, supermarkets and brewed herbal medicine sellers. The large number of pure honey brands appearing and their low prices have raised consumer suspicions regarding its purity and safety.

SNI 8664 (2018), regulates the quality of honey which can be viewed from the organoleptic test, water content test, water content test, acidity test, reducing sugar content test and sucrose sugar content test (SNI, 2018). Determination of water content can be done using the moisture content method using a moisture analyzer. Determination of acidity levels can be done using the acid-base titration method. Determination of sucrose sugar content which aims to determine the percentage of sucrose sugar content of honey can use the luff schrool method. This analysis method is an accurate, sensitive and easy to carry out method.

The description explained shows that it is necessary to analyze of honey in the Comal area with a water content test, water content test, acidity test, reducing sugar content test and sucrose sugar content test.

### **1. Research Objectives**

This research aims to determine the quality of honey in the Comal District involves testing for moisture content, acidity levels, reduction of sugar levels, and sucrose sugar levels.

### **2. Review of Related Literatures**

Research conducted by Sulis Setio et al 2015 stated that "Honey is derived from rubber honey which has a water content of 21.59% and rambutan honey 19,94%" (Harjo et al., 2015), " Randu honey from Nglorog Village has a water content, not much different from kapok honey from Kentengsari Village, namely 30,5%. Randu honey from Kentengsari Village has the highest water content and exceeds it standard set in SNI 2013 with a value of 32.8%. Meanwhile, rubber honey from Medari Village has the lowest water content and the value meets the standards set in SNI 2013, namely 20,9%. Randu honey from Nglorog

Village has the highest acidity levels and exceeds SNI in 2013, namely 67,96 ml NaOH/kg, meanwhile, kapok honey from Kentengsari Village had an acidity level of 64,2 ml NaOH/kg. Rubber honey from Medari Village has the lowest acidity level compared with the acidity level in all honey samples studied, namely 34,59 ml NaOH/kg” (Savitri et al., 2017). Honey quality is carried out to ensure authenticity and safety consumers because when the water content in honey is more than 20% it will accelerate the process of bacterial growth "Results of analysis of the water content of rubber honey amounting to  $24,25 \pm 1.49\%$ . The water content value of this honey does not comply with the requirements honey quality SNI 3545:2013, namely a maximum of 22%.

Based on the description above, it is important to carry out quality tests quality of honey to determine the levels that have been determined so that it is safe consumers and honey sellers' honesty was guaranteed.

## Research Methodology

### 1. The Research Procedure Includes which are:

#### 1.1 Organoleptic Test (SNI, 2018; Triwanto et al., 2021)

Test using the five senses, to determine color, smell and taste. A number of samples were smelled, felt, observed for color and shape. The organoleptic test results are compared with the organoleptic requirements for honey in table 1.

#### 1.2 Water Content Test (Wulandari, 2017)

Oven the petri dish for 15 minutes then place it in a desiccator for 20 minutes. Weigh a sample of 2 grams, put it in a petri dish of known weight, put the sample in an oven at a temperature of 105-110°C for 2 hours, then cool it in a desiccator for 10 minutes, weigh it and put it in the oven for 1 hour. This treatment was repeated until the weight was constant with a difference in successive weighings of less than equal 0,2 mg, then calculated using the formula in equation 1. Determination of water content was replicated 3 times for each sample.

$$\text{Water Content} = \frac{\text{Initial weight of Sample} - \text{Weight constan after drying (g)}}{\text{Initial weight of Sample (g)}} \times 100\% \quad (\text{SNI, 2013})$$

#### 1.3 Acidity Test (SNI, 2013)

##### a. Standardization of 0.1 N Oxalic Acid with 0.1 N NaOH (SNI, 2013)

10 mL of 0.1 N oxalic acid solution was pipetted into an Erlenmayer, 20 mL of distilled water was added and 1% pp indicator was added in 4 to 5 drops. Titrate with 0,1 N NaOH solution until the color changes o pink. Repeat the titration up to 3 times with the same amount of oxalic acid. Calculate the concentration of the NaOH solution from the titration results.

##### b. Determination of Acidity Levels in Honey (SNI, 2013)

Carefully weigh 10 grams of honey, put it in a 250 mL Erlenmayer then dissolve it in 75 mL of distilled water and add 4 to 5 drops of pp indicator, titrate using 0,1 N NaOH solution until the end point

of the titration is marked with a constant pink color. for ten seconds, record the volume of 0,1 N NaOH used, calculate the acidity in the sample using equation 2, replicate three times.

$$\text{Acidity Levels} \left( \text{mL} \frac{\text{NaOH}}{\text{Kg}} \right) = \frac{a \times b}{c} \times 1000 \quad (\text{Batista De Sousa et al., 2015})$$

note:

a = Volume of 0,1 N NaOH used in the titration, expressed in mL;

b = Normality of 0,1 N NaOH.

c = Sample weight, expressed in grams

#### 1.4 Determination of Sugar Levels (SNI, 1992)

##### a. Sample preparation

Prepare honey samples and label each honey container. Weigh 2 g of honey sample, put it in a 250 mL measuring flask, add distilled water to the mark and homogenize (Solution 1).

##### b. Standarisasi $\text{KIO}_3$ dengan Na Thiosulfate (Wihardika, 2015)

Take 10 mL of  $\text{KIO}_3$  primary standard solution and put it into a 250 mL Erlenmeyer flask. Add 10 mL of 20% KI Indicator, add 25 mL of 25%  $\text{H}_2\text{SO}_4$  solution (be careful that  $\text{CO}_2$  gas is formed). The solution was then titrated with 0.1 N Sodium Thiosulfate solution until a light yellow color was formed, then 0.5% starch solution indicator was added until the blue color in the solution disappeared. Replication was carried out 3 times.

##### c. Blank titration (Wulandari, 2017)

The blank was determined with a sample containing 25 mL of water and 25 mL of Luff Schoorl solution (V2). Pipette 25 mL of distilled water and 25 mL of Luff Schoorl solution (with a volume pipette), Erlenmeyer connected to an upright cooler, heated over an electric heater, and tried within 3 minutes it should start to boil. The sample solution is heated continuously for 10 minutes (using a stopwatch) then removed and cooled in a tub filled with ice (do not shake). After cooling, add 10 mL of 20% KI solution and 25 mL of 25%  $\text{H}_2\text{SO}_4$  solution (be careful to form  $\text{CO}_2$  gas). The solution was then titrated with 0,1 N sodium thiosulfate solution until a light yellow color was formed, then 0,5% starch solution indicator was added until the color was blue and again titrated with 0,1 N sodium thiosulfate until the blue color of the solution disappeared.

#### 1.5 Determination of Sugar Levels

##### a. Reducing Sugar Test (before inversion) (Wulandari, 2017)

The sample solution that has been prepared is pipetted in a quantity of 10 ml and 15 mL of distilled water and 25 mL of Luff Schoorl solution (with a volume pipette) are added, the Erlenmeyer is connected to an upright cooler, heated on an electric heater, and within 3 minutes it should start to boil. The sample solution is heated continuously for 10 minutes (using a stopwatch) then removed and cooled in a tub filled with ice (do not shake). After cooling, add 10 mL of 20% KI solution and 25 mL of 25%  $\text{H}_2\text{SO}_4$  solution (be careful to form  $\text{CO}_2$  gas). The solution was then titrated with 0.1 N Sodium Thiosulfate solution until a light yellow color was formed, then 0,5% starch solution indicator was added until a blue color (V1)



was formed, and titrated with 0,1 N Sodium Thiosulfate until the blue color in the solution disappeared. Replication was carried out 3 times, the rough reducing sugar was calculated using equation 3.

$$\% \text{ Reducing Sugar} = \frac{v1 \times FP}{W} \times 100 \% \quad (\text{Wulandari, 2017})$$

b. Sucrose sugar test (after inversion) (Wulandari, 2017)

The prepared sample solution was pipetted into 50 mL and placed in a 100 mL Erlenmeyer flask. Add 25 mL of 25% HCl solution and hydrolyze using a water bath, if the temperature has reached 68-70°C then maintain for 10 minutes and cool. The solution was added with 30% NaOH until a pink color was formed with PP indicator, then distilled water was added until the 100 mL mark. 0 mL of the sample solution was pipetted and 15 mL of distilled water and 25 mL of Luff School solution were added (with a volume pipette), the Erlenmeyer was connected to an upright cooler, heated on an electric heater, and tried within 3 minutes it should start to boil. The sample solution is heated continuously for 10 minutes (using a stopwatch) then removed and cooled in a tub filled with ice (do not shake). After cooling, add 10 mL of 20% KI solution and 25 mL of 25% H<sub>2</sub>SO<sub>4</sub> solution (be careful to form CO<sub>2</sub> (gas)). The solution was then titrated with 0,1 N Sodium Thiosulfate solution until a light yellow color was formed, then 0.5% starch solution indicator was added until a blue color (V1) was formed, and titrated with 0,1 N Sodium Thiosulfate until the blue color in the solution disappeared. Replication was carried out 3 times, rough calculation of sucrose sugar using the equation 4.

$$\% \text{ Sucrose Sugar} = \frac{V2 \times FP}{W} \times 100 \% \quad (\text{Harjo et al., 2015})$$

Explanation of equations 3 and 4:

- V1V2 = glucose, mg (in glucose list)
- Fp = dilution factor
- W = sample weight (mg)
- % Gula total = 0.95 x % sugar after inversion (as saccharose)
- % Sakarosa = 0.95 x % sugar (after- before inversion)

## 2. Research Instrument (s)

### 2.1 Tools and Materials

Tools : Oven, Petri Dish, Analytical Balance (Acs. Ad- 600 t), Burette (50 ML) (Pyrex), Hotplate, Dropper pipette (One med), Stirring rod, Tweezers, Gloves (Sensi) Tissue, Label paper, Statives and clamps, Measuring cup (Herma), Measuring flask (Herma), Erlenmayer (Herma), Funnel (Pyrex), Filler (Worner lab), Bath water (Healt), measuring cup (Pyrex), filter paper (Whatman), beaker glass (Pyrex), evaporating cup (Herma), volume pipette (Pyrex).

Ingredients: Kapok Honey, Multiflora Honey, Pure Honey, Kelengkeng Honey, NaOH 0,1 N (Merck), Oxalic Acid 0,1 N (Merck), PP Indicator 1% (Brataco), Ethanol (One Med), KI solution 20 % (Merck), H<sub>2</sub>SO<sub>4</sub> solution

25% (Merck),  $\text{Na}_2\text{S}_2\text{O}_3$  solution 0,1 N (Merck), HCl solution 25% (Merck), Indikator Kanji 0,5% (Merck), Asam Sitat (Merck),  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  (Merck),  $\text{Na}_2\text{CO}_3$  (Merck), Akuades (One med), kristal ice (-)

### 3. Populations and Samples

#### 3.1 Populations were

The population was taken for research comes from honey without a mixture of other ingredients such as ginger, cumin, ginger etc. circulating in Comal District, Pemalang Regency. The population distribution in the study was grouped into 4 based on type with a total population of 26. The 4 types of honey are pure, klengkeng, multifora, and kapuk. The population numbers for each type are 14, 3, 5, and 4.

#### 3.2 Samples

The sampling method uses a random sampling technique, where the honey to be sampled was grouped by type and selected using a proportional random sampling technique by drawing the brand name of each type of honey so that each sampling unit has the opportunity to be selected as a sample. Samples were taken from sellers of packaged honey without a mixture of other herbal ingredients such as ginger, turmeric, ginseng, cumin, etc. circulating in Comal District, Pemalang Regency by observing the number of brands and types of honey.

### 4. Data Analysis

The results of honey quality testing based on organoleptic tests, water content, acidity test, reducing sugar test and sucrose sugar test, are compared with the honey quality requirements listed in table 1.

**Tabel 1:** Honey Quality Requirements (SNI, 2018)

Test	Persyaratan Mutu		
Organoleptic Test	Smell	Flavor	Color
	Rotten	Not sweet	Blackish brown
	Less Rotten	Not sweet enough	Light brown
	Neutral	Quite sweet	White
	Slightly fragrant	Sweet	Bright yellowish
	fragrant	Very sweet	Yellow
Acidity Test	Max 50 mL NaOH/kg		
Water Content Test	Max 22% b/b		
Gula sukrosa	Max 5% b/b		
Reducing Sugar	Min 65 %b/b		

Tabel 1. Honey Quality Requirements (SNI, 2018) Test Persyaratan Mutu Organoleptic Test Smell Flavor Color Rotten Not sweet Blackish brown Less Rotten Not sweet (enough) Light brown Neutral Quite

sweet White Slightly fragrant Sweet Bright yellowish fragrant Very sweet Yellow Acidity Test Max 50 mL NaOH/kg Water Content Test Max 22% b/b Gula sukrosa Max 5% b/b Reducing Sugar Min 65 %b/b

## Results/Research

### 1. Organoleptic Test

Tests to determine the color, aroma and taste of physical honey samples were carried out using organoleptic tests. The results of the organoleptic test showed in table 2

**Table 2:** Organoleptic Test Results

No	Sampel Code	Types of honey	Color	Smell	Flavor
1.	A	Murni	Light brown	Pungent sweet fragrance	Very sweet
2.	B	Murni	Blackish brown	Pungent sweet fragrance	Very sweet
3.	C	Murni	Blackish brown	Pungent sweet fragrance	Sweet
4.	D	Murni	Light brown	Sweet fragrant	Sweet
5.	E	Murni	Bright yellowish	Sweet fragrant	Very sweet
6.	F	Murni	Light brown	Sweet fragrant	Sweet
7.	G	Murni	Blackish brown	Pungent sweet fragrance	Very sweet
8.	H	Murni	Light brown	Pungent sweet fragrance	Very sweet
9.	I	Murni	Light brown	Sweet fragrant	Sweet
10.	J	Murni	Light brown	Sweet fragrant	Sweet
11.	K	Murni	Light brown	Pungent sweet fragrance	Very sweet
12.	L	Multiflora	Light brown	Sweet fragrant	Sweet
13.	M	Multiflora	Light brown	Pungent sweet fragrance	Sweet
14.	N	Multiflora	Light brown	Sweet fragrant	Sweet
15.	O	Klengkeng	Bright yellowish	Sweet fragrant	Sweet
16.	P	Klengkeng	Light brown	Sweet fragrant	Sweet
17.	Q	Kapuk	Light brown	Sweet fragrant	Very sweet
18.	R	Kapuk	Light brown	Sweet fragrant	Quite sweet
19.	S	Kapuk	Bright yellowish	Sweet fragrant	Sweet
20.	T	Kapuk	Light brown	Sweet fragrant	Very sweet

### 2. The distribution permit tests, water content, acidity, sucrose sugar levels, and reducing sugar levels

Results of distribution permit tests, water content, acidity, sucrose sugar levels, and reducing sugar levels, showed in table 3

**Table 3:** Results of distribution permit tests, water content, acidity, sucrose sugar levels, and reducing sugar levels

No	Sample Code	Types of Honey	distribution permit	Water Content (%)±SD	Acidity Levels (mL NaOH/kg±SD)	Sucrose sugar levels (%)±SD	reducing sugar levels (%)± SD
1	A	Murni	Not Registered	18,33±0,288	18,63±0	8,79±0,02*	36,11±0,32*
2	B	Murni	Not Registered	23,6±0,288*	56,53±0,057*	5,61±0,0068*	25,73±0,29*
3	C	Murni	Not Registered	16,83±0,288	20,50±0	2,11±0	18,38±0*
4	D	Murni	Not Registered	25,5±0,5*	17,70±0	1,32±0	22,86±0*
5	E	Murni	Not Registered	19,6±0,288	10,25±0	1,74±0,034	37,71±0,31*
6	F	Murni	Not Registered	22,83±0,288*	29,6±0	4,28±0,02	25,21±0,31*
7	G	Murni	Registered	18,83±0,288	27,64±0,057	1,50±0,0068	22,25±0,29*
8	H	Murni	Registered	16,66±0,288	9,31±0	3,34±0,013	29,59±0,30*
9	I	Murni	Registered	17,83±0,288	18,63±0	3,56±0,013	24,58±0,30*
1	J	Murni	Not Registered	23,33±0,288*	18,63±0	3,90±0,02	40,57±0,31*
1	K	Murni	Registered	16,66±0,288	26,71±0,057	1,05±0,01	21,73±0,30*
1	L	Multiflora	Not Registered	18,83±0,288	16,77±0	1,45±0,013	50,65±0,30*
1	M	Multiflora	Terdaftar	21,83±0,288	15,84±0	4,28±0,02	34,82±0,30*
1	N	Multiflora	Not Registered	19,66±0,288	11,18±0	4,20±0,01	40,59±0,30*
1	O	Klengkeng	Not Registered	21,33±0,288	11,18±0	1,32±0	43,06±0,31*
1	P	Klengkeng	Not Registered	21,83±0,288	13,97±0	3,51±0,0068	24,17±,29*
1	Q	Kapuk	Not Registered	19,16±0,288	18,63±0	2,54±0	45,87±0*
1	R	Kapuk	Not Registered	19,33±0,288	44,10±0,057	2,66±0,0068	9,80±0,28*
1	S	Kapuk	Not Registered	22,66±0,288*	12,11±0	4,60±0,02	43,68±0*
2	T	Kapuk	Registered	16,16±0,288	9,31±0	3,53±0,027	48,78±0,25*

Note: if there is a mark (\*) it does not meet the requiremen

The Research of honey in Comal District, Pemalang Regency showed that the results of organoleptic color tests were grouped into 3 color levels, namely bright yellow, light brown and blackish brown; aromas are grouped into pungent odors, sweet odors, and pungent odors; and tastes are grouped into moderately sweet, sweet, and very sweet. Overall organoleptic test results of honey samples meet the requirements. The results of the water content test showed that 5 samples, namely codes B, D, F, J and S were more than 22% w/w, so they did not meet the requirements. The acidity test results show that sample B does not meet the requirements, because the value is more than 50 mL NaOH/kg. The test results for sucrose

sugar content 2 were not satisfactory, namely A and B levels were more than 5%w/w. The reducing sugar test results showed that all samples were less than 65% w/w, so they did not meet the requirements

### Discussion

Honey samples were taken by survey on 11-14 May 2022, in 17 villages in Comal District. Samples obtained were 20 honey samples with inclusion criteria, namely packaged or branded honey that does not contain a mixture of other ingredients. Samples were taken using a random sampling method, first the samples were grouped based on the type of honey, and selected using a proportional random sampling technique by drawing lots on the brand name of each type of packaged honey. The number of samples taken was determined using the Slovin formula.

The distribution permit for each honey sample is checked to determine the distribution permit number registered with the BPOM, the permit number is not registered, or the permit number listed is a distribution permit for another honey product. The BPOM testing process is carried out using the BPOM application which can be downloaded on Android or PC by looking at the permit number on the packaging, open the BPOM RI page (<https://cekbpom.pom.go.id/>). The web page contains several information such as registration number, product name and registrant. The test results registered with the BPOM Agency are seen in Figure 1, and Figure 2 presents results that are not registered with the BPOM RI.

Based on table 3, the results of BPOM RI distribution permit testing show that there are 13 unregistered samples that only include P-IRT permits. Based on a quote from (dev yandip prov jateng, n.d.), if the P-IRT permit has been registered with BPOM, it will appear on the web page, but if it has not been registered, it will not appear in the application or web, The results for 13 sample, the quality of the honey were not guaranteed, because samples were not registered at the BPOM RI .



Figure 1: test results registered at The BPOM RI

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Data Tidak Ditemukan		

10 Data Per-Halaman. Menampilkan 0 - 0 Dari 0 Data.

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**Figure 2:** test results that are Not registered at The BPOM RI

Tests to determine the color, aroma and taste of physical honey samples are carried out using organoleptic tests. The parameters for organoleptic test results according to SNI 8664 2018 are only aroma and taste test results which have unspecific parameters, and there is no color test to determine the type and factors of each honey, so in this research honey color parameters were tested. The difference in honey color results is caused by the product coming from a different type of honey. The color of the honey distributed in the comal area of the 20 samples can be seen in image 3, namely A is bright yellow, image B is brown, and image C is blackish brown.



**Figure 3:** Differences in Honey Color

Based on the organoleptic test results in table 2, honey has many compound components, especially gluconic acid, flying acid, minerals and phenolics which play a role in the formation of color, aroma and taste in honey (Pattamayutanon et al., 2017). The mineral content in honey also affects the color. Honey that contains high minerals will be dark in color, and the lower the mineral content, the brighter the color will be (Priadi & Wiratmoko, 2019). According to L.G. Berry and B. Mason Minerals are homogeneous solid compounds that are formed inorganically, which have a chemical composition within certain limits, and are composed of ordered atoms. The mineral content in honey is based on color, so it can be concluded that honey that has a blackish brown color has a higher mineral content than honey that is light brown and bright yellowish.

The aroma test results on honey have an average sweet smell like sugar, but there is a scent that is not overpowering. The fragrance level of honey is influenced by the presence of volatile acid compounds such as acetaldehyde, formaldehyde, acetone, isobutiraldehyde and diacetyl. Honey that has a non-pungent aroma indicates a lower content of volatile acid compounds. Research conducted by (Pattamayutanon et al., 2017) states that the aroma of honey is closely related to the volatile terpene

content. There are several other factors that influence the pungent aroma of honey, namely damaged honey with the characteristics of gas content which is indicated by damage to the honey lid seal and brownish foam, honey with codes A and B have these characteristics and the taste test results are very sweet, indicating a mixture of solutions sugar, this is proven by the results of the sucrose sugar content, namely that it does not meet the requirements.

The results of the taste test in the research showed differences, namely very sweet, sweet and quite sweet. There were several factors that influenced the taste of honey, namely water content, harvest time, gluconic acid compound content and sucrose sugar content. Honey contains gluconic acid compounds which give a sweet taste which then changes to a slightly sour taste, so that the higher the gluconic acid compound content, the sweeter the resulting honey tastes. The results of the research stated that the honey samples with codes A and B which had different very sweet tastes, namely like a sugar solution, were not the same as the results for the honey samples coded E, Q and T with a very sweet taste which ended with a slightly sour taste, so the honey taste factor Very sweet in codes A and B are influenced by high levels of sucrose because the results obtained in codes A and B have high levels of sucrose (Saepudin et al., 2014)

The water content test is related to the shelf life of honey which can influence the growth of putrefactive bacteria and yeast, according to SNI 8664 2018 the maximum water content contained in honey is 22% because honey that has a water content of more than 22% will easily ferment because the yeast that causes fermentation grows so that The shelf life of honey does not last long and of course this affects the content of the honey which changes the benefits of the honey. Based on table 3, the results obtained in this study are that of the 20 samples there were 5 honeys that had a water content of more than 22%, including 4 types of pure honey, namely sample names with code B, D, F, and J were 23,6%, 25,5%, 22,83%, 23,33%, and the type of kapok honey was 1, with code S was 22,66%.

Based on the data obtained, honey with codes B, D, F, J and S has requirements that do not meet the water content, and there was a possibility that honey with a high category was took from kapok flowers, because in Savitri's research (2017) that kapok honey has a high water content compared to other types of honey (Savitri et al., 2017). Factors that influence high water content according to Wulandari, 2017 were environmental conditions such as high humidity, harvest time such as morning, afternoon or evening, honey harvested in the morning has higher humidity conditions, so the honey will have a smooth texture more dilute, besides the storage temperature also affects the water content (Wulandari, 2017).

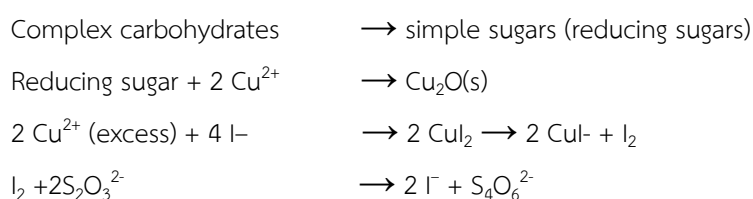
The acidity level test is used in honey testing parameters, especially during the shelf life of honey, the higher the acidity level will indicate sugar fermentation which is related to the water content, honey fermentation occurs because glucose and fructose become carbon dioxide and alcohol, in the presence of oxygen the alcohol will be oxidized and converted into acetic acid and water thereby increasing the acidity of honey (Pujiarti et al., 2021). The data in table 3 shows the results of the acidity water content test in honey circulating in the Comal sub-district, there is 1 honey sample, namely with sample code B pure type honey with plastic bottle packaging, with dark honey color and very sweet taste with a result of 56,53 mL

N NaOH /kg, so that honey with code B does not meet the requirements based on SNI 8664 2018. According to Pujiarti et al., 2021, the factor that influences high acidity levels is the ongoing fermentation process which is characterized by increased gas content, damage to the packaging lid seal, and the presence of foam chocolate on honey (Pujiarti et al., 2021).

The sucrose sugar test is a test to determine the level of sucrose in honey. Sucrose is a disaccharide sugar that cannot be reduced and is often found in everyday life, namely granulated or cane sugar. The presence of high levels of sucrose sugar in honey can indicate the presence of a mixture of sugar solutions in the honey. High levels of sucrose can affect health, especially triggering diabetes and changing the benefits of honey. Based on table 3, it shows that the results of this research contained 2 samples that had high sucrose levels, namely code A honey had a sucrose content of 8.79% and code B had a sucrose content of 5.61% so that both honeys had quality that did not meet the requirements. This can be seen from honey, namely that there is brown foam and lots of ants approaching it and there is gas which is indicated by damage to the packaging seal. These results are the same as research by Pujiarti et al 2021 namely damaged honey which is indicated by high levels of sucrose sugar, there is brownish foam and contains gas (Fatma et al., 2017).

The high sucrose levels in this study could be caused by damage to the honey or honey feed, beekeepers provide additional intake which is placed in the bee stimulant box in the form of sugar syrup, there are several factors that make beekeepers add sugar syrup, namely to maintain the bee colony due to the weather. making flower nectar difficult to obtain, such as not during the flowering season (Fatma et al., 2017). The process of forming honey is that flower nectar contains sucrose which is used as food for bees and is digested by the invertase enzyme in the bee's stomach. The function of this enzyme is to convert sucrose sugar into glucose and fructose. Sucrose is a non-reducing sugar because it cannot reduce like fructose and glucose (Sukmawati et al., 2015). Sucrose is a disaccharide sugar which consists of two types, namely glucose and fructose which have glycosidic bonds. Sucrose can be found every day, namely granulated sugar, so it is necessary to test the sucrose content to determine the sucrose sugar content in honey.

The carbohydrate test officially determined by BSN in SNI 01-2891-1992 is total carbohydrate analysis using the Luff-Schoorl method. In 1936, the International Commission for Uniform Methods of Sugar Analysis considered the Luff-Schoorl method as one of the methods used to standardize the analysis of sucrose sugar. The principle of analysis using the Luff-Schoorl Method is the reduction of  $\text{Cu}^{2+}$  to  $\text{Cu}^{1+}$  by monosaccharides. Free monosaccharides will reduce the basic solution of the metal salt to its oxide or free form. The excess of unreduced  $\text{Cu}^{2+}$  is then quantified by iodometric titration (SNI 01-2891-1992). The reactions that occur in determining levels using the Luff-Schoorl method are:





### Reducing Sugar Content Test

The process of forming honey is that flower nectar contains sucrose which is used as food for bees and is digested by the invertase enzyme in the bee's stomach. The function of this enzyme is to convert sucrose sugar into glucose and fructose. Sucrose is a non-reducing sugar because it cannot reduce like fructose and glucose (Sukmawati et al., 2015). Honey has a minimum requirement of 65% because the component of honey is reducing sugar. Based on table 3, none of the 20 samples met the requirements for reducing sugar content.

Reducing sugar is sugar that can reduce other compounds produced by bees. Factors that influence the low level of reducing sugar are the presence of a mixture of sugar solutions such as cane sugar or other sugars that do not come from the bee's stomach, unripe honey, water content, humidity, storage temperature and harvest time. Honey that is harvested early or in an immature state (honey cells are not completely closed) so that the inversion process by the amylase enzyme which breaks down complex sugars into simple sugars (reduction) in imperfect honey will reduce the levels of the diastase enzyme which plays a role in converting sucrose sugar into sugar simple. The diastase enzyme comes from the bee's stomach during the process of expelling honey into the hive.

### Suggestions

Based on the research findings on honey in Comal District, Pemalang Regency involves testing for moisture content, acidity levels, reduction of sugar levels, and sucrose sugar levels, here are some suggestions:

1. Verify the results of reducing sugar tests using other methods such as Fehling and Dinitrosalicylic Acid (DSA)
2. Honey farmers or honey producers regularly check reducing sugars and honey quality parameters to ensure honey quality standards are achieved.
3. Honey farmers are given training in selecting and processing pollen substitute food sources, to produce honey with reducing sugar content that meets standards.

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## An investigation into the development of preschool education teachers in An Giang province, Viet Nam

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### Abstract

Vietnam has a long history of education, and traditionally the Vietnamese people highly respect learning. However, preschool education in Vietnam started to be concerned in the early 1945 and it has made remarkable progress since the early 2000s. The Vietnamese Ministry of Education and Training (MOET) commits to improving access to preschool education across the country. The MOET has also attempted to enhance the quality of preschool education by revising the curriculum and upskilling its teaching workforce. According to Vietnam Education Law 2019, preschool education teachers are required to obtain a university degree. This paper aims to investigate the development of preschool education teachers in An Giang province located in the Mekong Delta region, Vietnam. The paper utilized a mixed- research method to collect quantitative and qualitative data from the tools of questionnaires, interviews of teachers and educational managers, and provincial document analysis. The research findings showed that the province is in the greater shortage of preschool education teachers in the rural areas than in towns. Its school and class network as well as quantity of preschool units that meet the national standards is below 50%. Also, the province has a lower teacher-pupil ratio in the classroom in comparison with that of the national ratio. The province has not had a clear roadmap to plan for developing the teaching workforce at this educational level. The paper ended with some conclusions and suggested some recommendations for this provincial educational leaders to take into consideration for its future preschool education teacher development in the context of the Vietnamese education being into the broadly and profoundly global integration progress.

**Keywords:** document analysis, educational managers, mixed-research method, shortage of preschool education teachers, teaching workforce development.

## Introduction

A nation's human resource and particularly its human resources in the educational sector, including its national policy for human resource development in the sector of education. There are various issues of education and training such as goals, program contents, teaching methods, management mechanisms, policy systems, and development of the teaching staff and educational managers that should be addressed. Among of such issues, the development of teaching workforce and educational management team is considered as a crucial element primarily influencing on the quality of education and training.

### Preschool education in Vietnam

Preschool is a type of early childhood education for children from about age 3 to 5, aiming to prepare children for kindergarten and lifelong learning. Preschool education is important and beneficial for any child attending nursery school because it gives the child a head start through social interactions. Through cognitive, psychosocial and physical development-based learning a child in preschool will learn about their environment and how to verbally communicate with others. Children who attend Preschool learn how the world around them works through play and communication (Dustmann, C.; Fitzenberger, B.; Machin, S., 2008). Chapter II - Article 23 in Vietnam Education 2019 documents that Preschool education is the first educational level in the Vietnam national educational system that sets the foundation for the comprehensive development of the Vietnamese people and carries out nurturing, caring and educating children from 03 months to 06 years of age (Vietnam National Assembly (VNA), 2019).

Since 1986 there have been two periods of preschool education reform in Vietnam. First, the Education Law 1998 marked a new move on curriculum and pedagogy of preschool education, which a new preschool - called the Innovative Program 1998, was introduced in 1998 (Phan, 2012). This program was piloted in some kindergartens and then it was implemented throughout the country. The second reform was piloted in 2006 (Vietnam Ministry of Education and Training, Decision about promulgation a pilot project that uses new early childhood education curriculum, 2006) and was carried out nationwide in 2009, namely the Program 2009 (Vietnam Ministry of Education and Training Vietnam, 2009). Recently, the Program 2009 was amended in 2016 and then its updated version 2017 has been implemented since February 15<sup>th</sup>, 2017 (Vietnam Ministry of Education and Training, Circular 01/VBBH-BGDĐT dated on 24/01/2017 Issuance on Preschool Education Curriculum, 2017).

According to a report from MOET, the development scale of the preschool education was uneven in the regions in Vietnam; the quality of the preschool education was not stable; its policy system was not synchronized, and the resources to invest into the preschool education was considered to be the lowest in the education sector (Vietnam MOET, Decision 1215/MOET dated 4/4/2013 Promulgating the Action Program to implement the Vietnam Education Development Strategy 2011-2020, 2013). The MOET's statistic report 2020 documented that there are 5,095,037 children and 336,783 preschool teachers (approximately

ratio 15:1) (Vietnam MOET, General Number of Preschool Education in the school year 2019-2020, 2020); however, Joint Circular 06/2015/TTLT-BGDĐT-BNV on the date March 16<sup>th</sup> 2015 stipulates that each standardized preschool class should arrange 2.2 teachers maximally [approximately 2 teachers per class] (Vietnam MOET&MHA, 2015). Consequently, there happens to be a serious shortage of preschool teachers. In fact, according to the MOET’s statistic report 2022, there is a shortage of 48,700 preschool teachers, and in the school year 2023 Vietnam’s education sector needs to recruit 27,850 new preschool teachers (Vinh Hà, 2022). Currently, the MOET’s statistic report 2023, the whole country lacks 51,300 preschool teachers for public kindergartens. The lack of preschool education teaching staff leads to pressure on teachers, potential safety risks, and limitations in improving the quality of child care and education. Salaries, wages, and policies of preschool teachers are very low (Đỗ Như, 2023).

### Types of preschools in Vietnam

Preschools in Vietnam consist of state-run and private nurseries and kindergartens. Nurseries, or crèches, cater to infants aged three months old to toddlers aged three years old. In Vietnam, children aged between three and six enter preschool. Approximately half the preschool system in Vietnam is made up of state-run kindergartens. There are also private kindergartens which use Vietnamese as the medium of instruction and international kindergartens, which can be found in big cities and use English as the medium of instruction.

**Table 1:** Vietnam General Data on Preschool Education from 2018-2020

		Year 2018-2019			Year 2019-2020		
		Total No.	Division		Total No.	Division	
			Public	Private		Public	Private
Types of schools		15,463	12,441	3,022	15,033	12,098	2,935
	Kindergarten	2,124	1,980	144	1,978	1,843	135
	Nursery	13,339	10,461	2,878	13,055	10,255	2,800
Classes		151,017	121,945	29,072	151,984	120,523	31,461
Pupils		4,415,233	3,709,236	705,997	4,314,744	3,573,610	741,134
<i>Of whom</i>	<i>Female</i>	2,110,684	1,777,614	333,070	2,067,134	1,716,859	350,275
	<i>Ethnic minorities</i>	806,967	791,659	15,308	798,348	781,270	17,078
	<i>5-aged pupils</i>	1,211,651	1,064,700	146,951	1,171,627	1,019,240	152,387
	<i>disabled</i>	5,757	5,228	529	5,414	4,914	500
		262,101	205,081	57,020	268,290	<b>214,372</b>	<b>53,918</b>

		Year 2018-2019			Year 2019-2020		
		Total No.	Division		Total No.	Division	
			Public	Private		Public	Private
<i>Of wh o m</i>	female	261,651	213,207	48,444	267,786	213,925	53,861
	Ethnic minorities	40,369	38,419	1,950	38,669	37,113	1,556
	Staff	194,108	194,108		200,577	200,577	
	Achieved qualification standards and above	261,457	204,365	57,092	267,430	213,624	53,806
<hr/>							
<i>Av er ag e No</i>	Pupils/class	29.24	30.42	24.28	28.39	29.65	23.56
	Pupils/teacher	16.85	18.09	12.38	16.08	16.67	13.75
	Teacher/class	1.74	1.68	1.96	1.77	1.78	1.71

(Vietnam Ministry of Education and Training, General Statistic Data on Preschool Education, 2021)

### An Giang province's plan for preschool education development

An Giang provincial People Committee issued Decision No. 219/QĐ-UBND, dated February 11, 2022 to promulgate the Project "Developing the teaching workforce and educational managers to meet the requirements of implementing the General Education Program in 2018, period 2021-2025, orientating toward 2030 in An Giang province". Then, An Giang People Committee issued Plan No. 206/KH-UBND, dated April 13, 2022 to perform the Project "the Development of Preschool Education in Phase II 2021-2025, orientating toward 2030" according to Decision No. 1677/QĐ-TTg of the Prime Minister of the Government in An Giang province". Following are some achievements in period 2018-2020:

- **Scale of school and class network**

- The whole province currently has 197 public and private preschools, childcare/daycare centers, kindergartens (179 public schools; 18 private schools); there are 157 children groups; private independent kindergarten classes.
- Total number of groups and classes: 1,886, of which (children groups: 167, kindergarten classes: 1,719).

- Rate of mobilizing preschool children to go to class: infants and toddlers are 6.8% of the age population; kindergarten children 72.7% of the age population (of which 5-year-old kindergarten children 99.7%).
- Preschool children at public preschool units: 49,631/56,450 children (87.9% of the number of children completing their classes).
- Preschool children at private preschool units: 6,819/56,450 children (12.8% of the number of children competing classes).
- The percentage of preschool children attending 2 sessions/day and boarding is 79.09% (of which 41.84% are boarding children).

● **Development of preschool education teaching workforce**

○ Total number of management staff, preschool owners, preschool teachers and staff are 4,637 people (including 460 managers; 153 facility owners; 2,970 teachers; 1,054 employees. Qualifications of preschool teachers reaching the degree standardization is 99.0%, of which above the standard is 72.6%. Table 1 below illustrates the figure of An Giang province’s preschool teaching workforce in 2022.

**Table 2:** An Giang Province’s preschool education teaching workforce in 2022

	Professional Title			
	Management staff	Preschool units’ owners	Preschool Edu. teachers	Preschool Edu. staff
Number	460	153	<b>2,970</b>	1,054
Total	4,637			
Qualified Qualifications: 99% of which are above the standard (qualified qualification) is 72.6% (over college degrees)				
Notice: According to Vietnam Education Law 2019, preschool teachers who are 3-year college degree holders are considered to be qualified or reach standardization.				

- The ratio of preschool teacher over a group or class is 2,962 teachers/1,886 groups and classes - ratio of 1.57 teachers/group and class (arranged according to the quota of day-boarding classes 2.0; 2 sessions/day 1.5 and 1 session 1.0 teachers /class), the average teacher rate increases by 10-15% each year.
- The professional standard assessment rate of preschool teachers is evaluated with 4 levels (*Good – Rather Good – Acceptable – Unaccepted*). The level of ‘Good’ and ‘Rather Good’ is 97.67% (2,893/2,962), ‘Acceptable’ is 5.98% (177/2,962), and ‘Unacceptable’ is 0.51% (15/2,962).
- 100% of preschool teachers are fully and promptly supported with legally required policies such as salaries, position allowances, preferential policies for teachers working in extremely difficult



socioeconomic areas and ethnic minority areas; social insurance, health insurance and working conditions. There are no teachers violating teachers' ethics.

- *Facilities and equipment*

Classrooms: The province has 1,915 classrooms/1,886 groups and classes (of which, 1,578/1,915 [82.40%] durable classrooms; 247/1,915 [12.9%] semi-durable classrooms, and 111/1,915 [5.8%] temporary rooms). Most classrooms are considered to ensure one room per class for 5-year-old kindergarteners to study 2 sessions per day. 100% of schools and classrooms have toilets and clean water to meet the needs of caring for, nurturing and educating preschoolers.

- *Results of building preschools meeting national standards and universal preschool education for 5-year-old kindergarten pupils*

- Develop the quantity and improve the quality of preschools meeting national standards. The whole province currently has 84/179 preschools meeting national standards, accounting for 46.9%.
- Maintain and improve the quality of universal preschool education for 5-year-old children. Presently, the province has 11/11 district units (including 2 towns and 2 cities) to gain 100% of meeting the universal standards for this aged children group. There are 100% of 5-year-old kindergarten classes attending 2 sessions per day and boarding classes. On average, the rate of mobilizing this age group to school to account for nearly 99% of this age population.

This province's Department of Education and Training (DOET) stated a general comment that its preschool network is reasonably planned, which basically meets the needs of preschool children. The province's educational sector has successfully implemented the goal of universal preschool education for 5-year-old children and improved the quality of care, nurturing and education of children. The team of preschool education managers and teachers meets standards and exceeds standards in terms of professional qualifications, meeting the requirements of nurturing, caring for and educating children.

However, the province has also recognized several limitations and causes. The rate to mobilize children under 3 and 4 aged and boarding children is still low due to the limited conditions of facilities and classrooms. The provincial DOET estimated that the province needs a budget of 7,200 billion VND to construct facilities and teaching equipment (4,430 billion VND for basic construction; 2,740 billion VND for teaching equipment); however, this budget is huge for this poor province; the Central government has not supported yet, and it is hard for the province to mobilize such a huge socialized capital.

The ratio of preschool teachers per group and class has not met the maximum level according to Joint Circular No. 06/2015/TTLT-BGDDT-BNV dated March 16, 2015 of the MOET and the MHA on regulating the list employment position framework and norms for the number of employees working in public preschools. An Giang Province's DOET stated that the number of payroll assigned to the education sector is a total number for the general education at all 3 educational levels (preschool education- primary

education – lower and upper-secondary education); another reason is that the recruitment source of preschool teachers is not guaranteed. On the other hand, when recruiting, many students register to enroll in the same unit (with favorable conditions or close to home), but many other units in need do not have students applying

Children groups and private preschool units are rapidly growing in number and mainly centered in favorable areas and residential areas. Most of the units take advantage of available housing premises to turn them into places to raise and care for children, so they have still limited playgrounds and also difficulties in staffing. Most of their teachers are working with temporary sign-contracts and work. Additionally, their teaching and supporting teams are not stable and their salaries are low, too. Therefore, it is hard for them to create favorable conditions to attract new, good teachers (An Giang Province People Committee, 2022).

## Literature Review

Preschool education provides a bridge between the caring and nurturing and learning experience children receives in a preschool and their continuing learning journey when they enter into a school setting later (All About Children, 2023). Pre-primary education quality is the foundation of a child's journey. Every stage of education that follows relies on its success. However, there have been proven and lifelong benefits of the preschool education stage, more than 175 million children – nearly half of all preschool-age children globally – are not enrolled in the preschool education stage (UNICEF, 2023). So far, there have been several research trends in preschool education that have been reported. They include (1) Mindfulness, (2) Nature-based preschool education, (3) Social emotional learning, (4) Technology-based learning, (5) STEM/STEM education in preschool education, (6) Early language and literacy development, (7) Culturally responsive teaching, practices, and approaches, (8) Child-centered instruction, (9) Developmentally appropriate practice, and (10) Family engagement (Mc Callops, K; Karpyn, A.; Klein, J.; Jelenewicz, S., 2021). However, in the section of the literature review of this research, the research team just focuses on reviewing studies related to the shortage of preschool education teachers and policies and teacher professional development for the teaching force at this educational level.

### *1. The global shortage of preschool education teachers*

Preschool education provides the highest return on investment of all education sub-sectors; however, it receives the smallest share of government expenditure compared to primary, secondary and post-secondary education. According to a report from the UNICEF (2023), less than 1% international aid to education currently support preschool education and less than 2% of education budgets are allocated to preschool education in low-income countries. UNICEF (2023) mentioned that efforts to scale up access to preschool education should not come at the expense of quality. Quality is the sum of many parts, including teachers, families, communities, resources, and curricula. Without adequate safeguards for quality,

expansion efforts can intensify education inequities. It is only by investing in quality as education systems grow – not after – that governments can expand access and maintain quality. 9.3 million new teachers are needed to achieve universal pre-primary education. Only 50% of pre-primary teachers in low-income countries are trained. Only 5% of pre-primary teachers globally work in low-income countries (UNICEF, 2023).

Preschool education teachers and staff are significant contributors to the quality of preschool education care, development and education. The daily experiences of children in their early years, in particular the quality of care, depends on appropriate qualifications, training, knowledge and skills. Properly trained professional preschool education teachers and staff provide children with experiences that are nurturing, developmentally appropriate and responsive. Yet, while knowledge and skills are important, professionalism, attitudes towards children and the values they hold also affect the quality in their services. Therefore, both educational qualifications and professional commitments are essential to effectively provide warm, positive interactions and high quality learning environments to optimally promote children's learning and development. The continual upgrade of knowledge and skills for preschool education teachers and staff reflects their professional commitments to improve their capabilities and responsibilities as professional preschool education practitioners. Based on these vital contributions to the preschool education quality from the teachers and staff, in 2017 all ASEAN member States ratified the Convention on the Rights of the Child (CRC) which has 54 articles covering four major categories of child rights, namely, the right to life, the right to protection, the right to development and the right to participation. Specifically, teachers and staff at this educational level are required to meet the following criteria:

- *G1: Qualifications*: Staff meet the qualifications in compliance with regulatory requirements of the ASEAN Member State.
  
- *G2: Knowledge, skills and attitudes*
  - (G2.1) Respect children's rights, demonstrate knowledge of child development in their planning and implementation of activities, communicate respectfully and effectively with the children, use positive, non-violent approaches to guide children's behavior.
  - (G2.2) Staff are flexible and innovative in modifying the planned lessons, routines and schedules on encountering unexpected situations and events.
  - (G2.3) Staff encourage and support children's learning and development through: asking open-ended questions, active listening, responding to their questions, providing opportunities for children to express their feelings and ideas, providing opportunities for active exploration and experimentation.
  
- *G3: Professionalism*

- (G3.1) Staff display professionalism in performing their duties and routines: respect all children and adults irrespective of gender, ethnicity, religion, position and socio-economic status, respect cultural and religious sensitivities
- (G3.2) Staff maintain strict confidentiality on all matters relating to children (except with parents' consent), families and colleagues
- (G3.3) All staff adhere to the guidelines of ethical conduct as staff members of the center
- (G3.4) Staff regularly upgrade their knowledge and skills.

## *2. Teacher professional development*

Teacher professional development involves a continuing process of reflection, learning and action to further develop teachers' knowledge and skills, leading to enhanced teaching practices positively impacting on students' learning (Angus-Cole, 2021). Teacher professional development (PD) aims to improve teachers and their practice by adopting a holistic approach to developing the teacher as a professional practitioner. It is an ongoing process that supports continuous development of practice throughout the whole of a teacher's career. Teaching practice comprises a range of areas, each of which can be targeted by PD activities. For example, in the TPACK model (Mishra, P., and Koehler, M. J., 2006), there are three overlapping areas that exist – Technological, Pedagogical and Content Knowledge. PD activities could therefore specifically target subject content knowledge or instead focus on subject-specific pedagogical knowledge (the overlapping areas of Pedagogical and Content Knowledge) (Angus-Cole, 2021). Any activity that supports teachers to reflect, learn and then act to improve their practice can be classified as teacher PD. Such PD activities can occur in a face-to-face or online environment and some of their examples can be seen in Figure 1 below.



**Figure 1:** Micro to macro scale engagement with PD activities [adapted from Angus-Cole (2021, p. 1)]

Some common terms associated with PD activities include:

- *Continuing professional development (CPD)* reinforces the notion that professionals should always develop their expertise and teaching practice.
- *Teacher (or professional) education* emphasizes how engagement in educational experiences leads to learning, advancing a teacher’s knowledge, skills and characteristics and enhancing their practice.
- *Training* often develops operational features of a role, focusing on accomplishing one specific skill, such as understanding how to teach a syllabus or how to write learning objectives.
- *Mentoring and coaching* are slightly different from one another. Mentoring focuses on establishing a supportive relationship where a less experienced teacher benefits from the guidance of a more experienced colleague (a ‘critical friend’). Coaching is a technique that provides structured support to encourage a practitioner to review and develop their practice in relation to a specific skill or change in circumstance.
- *A professional learning community/network* brings practitioners together, enabling the sharing of ideas and experiences, as well as providing mutual support, either online or face to face.
- In *action research* teachers conduct research into their own practice with the aim of finding out how they might overcome a specific issue or problem associated with their practice.

### *3. Preschool education teacher professional development*

It is likely to state that the preschool teacher professional development is a subordinate concept of teacher professional development and different researchers have different views on its the connotation (Qiu, Y. and Fu. T., 2019). Li (2010) stated that the professional development of preschool teachers is an activity procedure of continuous learning of professional knowledge, acquisition of professional skills and formation of good professional attitude by preschool teachers in order to achieve their professional development goals (Li, 2010) whereas Gu (2013) said that the professional growth of preschool teachers principally referred to the development process of preschool teachers from non-professionals to professionals and continuously improving their own professional quality (Zhang, S.Y. and Gu, R.F., 2013).

#### *Teaching development*

Professional development for teachers consists of self-directed or directed programs and activities designed to enhance their knowledge, skills, and expertise in their teaching practice. It has many forms, including ongoing classes, periodic seminars or workshops, in-class observations, collaborative learning sessions or support groups.

According to the Learning Policy Institute (2017), effective teacher professional development consists of the following elements (Darling-Hammond,L.; Hyler, M. E.; Garner, M.; Espinoza, D., 2017):

- *Focuses on content:* Successful teacher professional development concentrates on teaching strategies associated with specific curriculum content that supports teacher learning within their classroom contexts;
- *Incorporates active learning utilizing adult learning theory:* Teacher learning that offers hands-on experience designing and practicing new teaching strategies and skills, helps teachers overcome challenges in their day-to-day practice;
- *Supports collaboration, typically in job-embedded contexts:* Active learning — that creates space for teachers to share ideas and collaborate — often takes place in job-embedded contexts that relate new instructional strategies to teachers' students and classrooms.
- *Uses models and modelling of effective practice:* Good teacher learning gives access to lesson plans, unit plans, sample student work, observations of peer teachers, and video or written cases of accomplished teaching;
- *Provides coaching and expert support:* School leaders should provide access to master teachers and experts who share their specialized knowledge, either as one-on-one coaches in the classroom, as facilitators of group workshops, or as remote mentors using technology to communicate with educators;

- *Offers opportunities for feedback and reflection:* To develop professionally, teachers must have time to think about, receive input on, and make changes to their practice by incorporating feedback; and finally,
- *Maintains a sustained duration:* an effective teacher development program provides adequate time (over weeks, months, and/or years) to learn, practice, implement, and reflect upon new strategies that facilitate changes in their practice.

#### 4. Research gaps

So far there are numerous studies of early childhood education or preschool education. These studies can be classified into themes on mindfulness, nature-based preschool education, social emotional learning, technology-based learning, STEM/STEM education in preschool education, early language and literacy development, culturally responsive teaching, practices, and approaches, child-centered instruction, developmentally appropriate practice, and family engagement that are summarized by Mc Callops, et al. (2021). In Vietnam, there have been an increasing number of studies on preschool education since 2017 when Vietnam MOET issued Circular 01/VBBH-BGDĐT dated on 24/01/2017 on Vietnamese Preschool Education Curriculum (Vietnam Ministry of Education and Training, Circular 01/VBBH-BGDĐT dated on 24/01/2017 Issuance on Preschool Education Curriculum, 2017). Most studies on preschool education sector conducted in Vietnam have been focused on renovating early childhood education pedagogy (Dang, T. P., & Boyd, W. A., 2014), the history of Vietnam early childhood education (Boyd W., Dang T., 2017), the matter of quality in Vietnamese early childhood education studied by Hang (Hang D. T. T., 2019), and a review of the trends of early childhood education in Vietnam (Nguyen, H. T. T., Boyd. W., 2022). However, there have been still a limited number of studies on exploring the development of teaching workforce at preschool education sector and its sustainable development orientation toward 2030. Up to now, it is likely to say that our research team can be one of the first research teams to conduct this type of research in An Giang province, Mekong Delta region – a ‘low-lying area on education’ in Vietnam, and it is our hope to provide an insight on this investigatory research to those who are interested into this research theme. Based on that, this research set out the following research questions:

(1). *What is the current reality of the development of preschool education teaching workforce in An Giang Province?*

(2). *What will be An Giang province’s sustainable development orientation on the preschool education sector in the period of 2021-2030?*

(3). *What recommendations can be suggested for this province’s educational leaders to consider planning its preschool education development?*

## Research Methodology

The researchers of this study invited 502 preschool education teachers and 50 educational administrators in An Giang province to participate in the study with the permission from their management agencies (e.g. An Giang Department of Education and Training, District Offices of Education and Training). The participants were provided a detailed explanation of the objectives and content of the study while voluntarily joining the questionnaire survey. As a sensitive issue to work with human participants about sharing personal views on their professional development careers, the research team guaranteed to keep confidentiality about all information as a matter of professional ethics in study. The research team went to each location to work with all participating preschool teachers. Each participant completed the questionnaire within 30 minutes and the research team received the completed questionnaires from each kindergarten in the study. The quantitative data obtained from the sound and valid questionnaires were input and analyzed with the SPSS software 20.

The descriptive data of the preschool teachers' teaching quality evaluated by their own, their managers and children's parents were analyzed to find out their relationships, interactions between independent and dependent variables. All analysis and tests were established at a significance level of  $p < 0.05$ . Methods of synthesis, analysis and comparison are used to present the main research results.

Additionally, the study also conducted in-depth interviews with 36 principals, 36 teachers and 36 children's parents from the studied kindergartens. The research group invited these interviewees who did not join the questionnaire survey. The qualitative data from in-depth interviews were categorized into thematic contents related to the research topic, and interpreted according to each criterion and content.

## Findings and Discussions

### *4.1. An Giang province's teaching workforce at preschool education level from 2021 to 2025 and orientation toward 2030*

Table 2 and Table 3 below show the number of preschool education teaching workforce in 2022 and the projection number of preschool education teaching workforce in the period of 2021-2025 and its orientation toward 2030. The ratio of preschool education teachers that is qualified (college degree) and over qualified (university and postgraduate degree) in term of qualification standards is very high (99%), in which 72.6% of the teachers are university and postgraduate degree holders. However, the situation of shortage of teachers for this education level is warning. Every year, the province need to recruit hundreds of new teachers for this level but they do not have enough resources to recruit.

**Table 2:** An Giang Province's preschool teaching workforce in 2022

Professional Title				
	Management staff	Preschool owners	Preschool teachers	Preschool staff



Number	460	153	<b>2,970</b>	1,054
Total No.	<b>4,637</b>			
Qualified Qualifications: 99% of which above the standard (qualified qualification) is 72.6% (over college degrees)				
Notice: According to Vietnam Education Law 2019, preschool teachers who are 3-year college degree holders are considered to be qualified or reach standardization.				

(An Giang Provincial People Committee, 2022)

**Table 3: The projecting number of preschool teaching force in An Giang Province from 2021 to 2025**

Academic years	2021-2022	2022-2023	2023-2024	2024-2025	Toward 2030
No. of preschool Edu. teachers	<b>2,526</b>	<b>3,007 (*)</b>	3,151 (*)	3,274 (*)	N/A
Need of additional recruitment	<b>393</b>	<b>239</b>	211	198	N/A
(*) : If the previous year has an enough recruitment number					

However, the research team of this study had an interview with the Head of Personnel Office – An Giang Province’ DOET (Department of Education and Training) to understand more about the current teaching workforce of the whole province. The research team got the collected data that the total number of the provincial preschool education teachers and staff in the academic year of 2022-2023 is 2,433 teachers (nursery teachers: 152; kindergarten teachers: 2,281). In figure, the whole province is in need of 159 nursery teachers and 3,200 kindergarten teachers. This means that the province is in the shortage of 926 teachers (7 nursery teachers and 919 kindergarten teachers. Let’s see the figure in Table 4 below.

**Table 4: An Giang Province’s preschool teaching workforce in 2022-2023**

No. of current preschool Edu. teachers		No. of preschool Edu. teachers in need according to payroll quota		No. of preschool Edu. teachers in shortage	
2433		<b>3359</b>		<b>926</b>	
Nursery teachers	Kindergarten teachers	Nursery teachers	Kindergarten teachers	Nursery teachers	Kindergarten teachers
152	<b>2,281</b>	<b>159</b>	<b>3,200</b>	<b>7</b>	<b>919</b>

(source from the research team’s interview data May 2023)

- Orientation towards 2030

An Giang province’s educational sector needs to continue to review and arrange the network of schools and classes and by the year 2030, it will strive to reduce 4 additional small schools. 100% of the management and teaching staff at this education level will reach at least the college degree. Also, the province will continue to recruit new teachers to ensure the maximum number of teachers according to Joint Circular No. 06/20215/TTLT-BGDĐT-BNV dated March 16, 2015 regulating the list of job positions framework in public preschools in the annual development plan (An Giang Provincial People Committee, 2022).

In fact, while examining the data in Table 1 and Table 2, we can identify that only in the academic year of 2021-2022, the educational sector of An Giang province is need of over 444 preschool teachers (393 + [2970 – 2526 = 51]). Table 2 indicates that in the period of 2021-2025, the province also will need to recruit around 200 preschool teachers annually. In practice, the number of graduated high school students that is applying to study to become preschool teachers is reducing due to the fact that they know their future salaries are very low. For instance, a new preschool teacher is paid 3.129 mil VND per month (1.49 mil VND x 2.10) [approximately 128 USD] before 30 June 2023, and she will be paid 3.618 mil VND per month (approximately 150 USD) since 1 July 2023 because the basic salary for Vietnamese officials increases from 1.49 mil VND to 1.8 mil VND (Thuvienphapluat [Law Library], 2023). And in real life, it is very difficult a new teacher to live on such a small amount of money.

**Table 5:** The Scale of schools, classes, kindergarteners in period 2021-2025 and its orientation toward 2030 in An Giang province.

	Year 2020-2021		Projected Year 2024-2025		Projected Year 2029-2030	
	<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>
No. of preschools	197		210		197	
	179	18	174	36	175	22
No. of classes	1,754		1,977		2,104	
	1,551	203	1,696	281	1,811	293
% class meeting the national standards	46.93%		N/A		N/A	
No. kindergarteners	53,159		57,173		61,094	
Ratio of kindergarteners per class	<b>30.3</b>		<b>28.9</b>		<b>29</b>	
<i>Notes:</i>	<i>National ratio of kindergarteners per class (16.08: 1) in 2020 (Vietnam Ministry of Education and Training, General Statistic Data on Preschool Education, 2021)</i>					

It is projected that by the academic year of 2024-2025, the province will have 210 preschool units (174 public units, 36 private units) with a total of 1,977 classes (1,696 public classes, 281 private classes) and there will be 57,173 kindergarteners (approximately 28.90 kindergarteners per class). In the academic year of 2029-2030, it is projected that the figure of preschool units in the province will be 197 units (175 public units, 22 private units) with a total of 2,104 classes (1,811 public classes, 293 private classes) and the province will have 61,094 kindergarteners (approximately 29 kindergarteners per class) (An Giang Provincial People Committee, 2022).


UNICEF in 2019 recommended that countries progressively aimed for a pupil-teacher ratio of no more than 20 pupils per teacher at the preschool education level. More specifically, UNICEF suggested a reasonable ratio of preschool education teacher over pupils for various ranks of countries in terms of their income levels in 2017. For example, a ratio of teacher per pupils for high income countries is 1: 14; for upper-middle income countries is 1: 17; for lower-middle income countries is 1:20; and low-income countries is 1:34. (United Nations Children’s Fund (UNICEF), 2019). In contrasting with this recommended ratio, by the year of 2029-2030, the ratio of teacher per pupils at preschool education level in An Giang province will be for the standard of low-income countries while Vietnam will expect to become a middle-income country. Therefore, in order to enhance the teaching quality of preschool education level, the educational sector of this province should reduce the ratio of teacher per pupils (1:20) in following years. By such doing, the province will more highly strive for developing its preschool education teaching force and network of schools and classes. The province, additionally, will need to mobilize various socializing sources to increase the number of private preschools to reduce the investment burden of the local government.

In addition to a low teacher-pupil ratio, the province’s educational leaders admit that although their local size and network of schools and classes have been carefully arranged, the current number of pupils attending 2 sessions per day has been still low and not yet widespread because of the facility conditions and the number of classrooms have not been enough to be used for 2 sessions per day.

4.2. Satisfaction on remuneration policies for preschool education teachers in An Giang province

Table 6 shows the data on the satisfactory levels on remuneration policies for preschool education teachers in An Giang province. The teachers in the study felt quite satisfied with the remuneration policies that can be from items (d, e, f, g, h) with quite high percentages (32.5%, 38.4%, 51%, 49.2%, and 38.4% respectively). Meanwhile, they expressed their high dissatisfaction [*very dissatisfied and dissatisfied*] with ‘salary policy’, ‘professional allowances’, and ‘policies attracting teachers to work in difficult areas’ with the percentages of 51.2%, 45.6%, and 39% respectively. As a result, the responsibly educational leaders of this province should consider the three mentioned remuneration policies in this study so that they can keep ‘feet’ teachers to continue to work in difficult socio-economic and ethnic minority areas.

**Table 6:** Remuneration Policies for preschool education teaching in An Giang province


Remuneration Policies	1 Very dissatisfied	2 Dissatisfied	3 Neither dissatisfied or satisfied	4 Satisfied	5 Very satisfied
No. respondents (508)	Likert scale on the satisfactory level calculated by % of respondents 				
a. Salary policy	22.1	29.1	29.1	19.7	0

b. Professional allowances	16.5	29.1	37.5	16.7	0.2
c. Policies attracting preschool education teachers working in areas with extremely difficult socio-economic conditions or in ethnic minority areas	14.5	24.5	41.0	19.7	0.2
d. Local authorities creating favorable conditions for preschool education teachers to work	5.0	16.3	46.2	32.5	0
e. Preschool education teachers with eligibility are supported to change workplace according to their expectations	4.2	12.0	45.0	38.4	0.4
f. Competition and reward regimes for preschool education teachers are objectively and scientifically cared according to professional standards	4.4	12.2	32.1	51.0	0.4
g. Fully equipped facilities to meet the requirements of working conditions in preschool education units	1.2	10.2	39.2	49.2	0.2
h. Policies and conditions are ensured to create motivation for teachers to participate in fostering and training activities	2.8	9.8	47.8	39.4	0.2

#### 4.3. Solutions to improve the quality of preschool education teaching workforce

The data in Table 7 indicates that most teachers in the survey expressed their high agreement on solutions to improve the quality of preschool education teaching workforce in An Giang province at current time. The percentage of 'agree' and 'strongly agree' is nearly 90% while the percentage of 'strongly disagree', 'disagree', and 'neither disagree nor agree' is around 10%. This means all suggested solutions in the survey were approved by the teachers in the survey. Besides, some of them recommended some other ideas to improve the quality of the province's preschool education teaching workforce. They include reducing teaching hours, reducing work pressure, having democratic rights to raise their voices for suitable policies of financial income rewards and vacations. It is likely to understand that in some preschool education units in the province the issue of democracy and equal rights of teachers and teaching staff is still limited. Therefore, it is advisable that the educational leaders in some localities need to take this issue into consideration and make it better in the future.

**Table 7:** Solutions to improve the quality of preschool education teaching workforce

Solutions	1 Strongly disagree	2 Disagree	3 Neither disagree nor agree	4 Agree	5 Strongly agree
Likert Scale with the percentage of the agreement level 					
a. To improve teachers' salary policy	2.6	1.6	6.2	21.3	68.3
b. To develop care for teachers' life	2.8	1.6	6.4	23.3	65.9
c. To improve working conditions (e.g. classrooms, facilities, communications)	2.8	1.4	3.2	31.1	61.6

d. To upgrade preschool teachers' professional qualifications	2.8	1.2	2.4	33.9	59.8
e. To improve activities for preschool teacher testing and professional networks	2.6	4.0	3.0	42.8	47.6
f. To well organize preschool teacher professional training activities	2.8	1.2	2.4	37.8	55.8
g. To improve management styles by giving teachers autonomy in making professional decisions	3.0	1.8	3.8	37.1	54.4
h. To create conditions for preschool teachers to join making decisions and building school policies.	2.6	1.6	3.2	37.3	54.4
Other ideas:	The respondents also recommended other solutions that include reducing teaching hours, reducing work pressure, and they should have their rights of democracy to raise suitable policies of financial income rewards and vacations.				

## Conclusions and Recommendations

### 1. Conclusions

The development of teaching workforce for the education sector is very important for a country's socioeconomic development, and particularly the development of teaching workforce the first level of the education sector – preschool education level is even so crucial. This study aimed to explore the reality of the current preschool education teaching workforce in An Giang province, in the Mekong Delta region of Vietnam, seen as a 'low-lying area of education' in Vietnam and what the province's educational sector is preparing for the sustainable development for this education level. This study comes to several conclusions as follows.

Firstly, the issue of the shortage of teachers in the preschool education level is in a warning situation, and it is quite challenging to recruit new teachers from now to the year 2025. Besides, the shortage of teachers in rural areas is more serious than in towns and cities of this province. Moreover, the province has not had a clear roadmap for the development of teaching workforce at this educational level. Secondly, the province's school and class network for this level is developing in quantity but the ratio of preschool units that meet the national standard is still quite low. The issue of mobilizing various social sources to develop this educational level is still limited; therefore, the ratio of private and public preschool units is very low and it seems that there are no private preschool units in the rural areas. Thirdly, the ratio of teacher per pupils is very low and even below the average teacher-pupil ratio of the country. In the orientation towards to 2030 to reduce this low rate of teacher per pupils will not be also feasible. Fourthly, the study found that the teachers in this study felt dissatisfied with the current remuneration policies related to '*salary policy*', '*professional allowances*', and '*policies attracting teachers to work in difficult areas*'. Therefore, the educational leaders need to suggest better policies to attract more qualified teachers to work for the province. Last but not least, the teachers in this research agreed with some solutions for developing the quality of preschool education teachers and added some recommendations for it such as

reducing teaching hours and work pressure but improving their democratic rights to raise suitable policies of financial income rewards and vacations.

## 2. Recommendations

The province's educational sector will need to carry out the following things. Firstly, the province needs to manage and evaluate the team of teachers and educational managers according to legally professional standards for teachers and principals issued by the MOET, and annually continue planning a roadmap to improve the qualification standards for its preschool education teachers according to the Decree No. 71/2020/ND-CP dated June 30 /2020 by the Prime Minister. Secondly, it is advisable to complete planning of school and classroom networks, increase investment in facilities for this educational level. Thirdly, the province should develop and enhance the quality of managers, teachers, and employees at this level. Fourthly, it is recommended that the content, programs for preschool education and the management of this education level are to be innovated. Fifthly, the quality of care, health and nutrition for preschool pupils should be paid better attention. Finally, it is needed to mobilize variously social sources for the development of both public and private preschool education units and specially to build more preschool units in difficult and rural areas of the province.

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## Income smoothing through loan loss provisions in Vietnamese banks

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### Abstract

The aim of this research is to investigate whether Vietnamese banks engage in income smoothing and to identify the factors that influence the extent of income smoothing through loan loss provisions. Applying panel data regression analysis on a sample of 27 banks during the 2010-2019 period, we find that income smoothing, facilitated by loan loss provisions, is a common practice among Vietnamese banks. The results further suggest that the degree of income adjustment via loan loss provisions can be influenced by several factors. These include but not limited to a smaller board size, a lower percentage of independent board members, the lack of foreign board members, the presence of controlling shareholders, a smaller bank size, or a higher capital adequacy ratio.

**Keywords:** Income smoothing, Earnings management, Loan loss provisions, Factors

### Introduction

“‘Income smoothing’ is the process of manipulating the time profile of earnings or earnings reports to make the reported income stream less variable” (Fudenberg & Tirole, 1995, pp 75). Companies can use accounting policy choices, in which accruals are popular tools, to reduce reported earnings in years with favorable economic conditions and increase reported earnings in years with unfavorable economic conditions. This type of earning management practice makes the reported earnings more stable over time, helping managers conceal actual income, affect the risk assessment from outsiders, and stabilize their compensation and dividend flows to shareholders over time (Bhat, 1996). As a major accrual in banks, loan loss provisions (LLPs) were commonly employed to study such smoothing practices (Kanagaretnam et al., 2004, pp 128). Researchers suggests that banks’ managers intentionally overestimate LLPs to reduce reported income when banks’ performances are good, and conversely underestimate LLPs to raise reported income when banks’ performances are poor (Kanagaretnam et al, 2004; Curcio et al, 2014). Though many studies, which will be introduced in the literature review session, was conducted to test the income smoothing hypothesis at banks over the world, the number of research about this topic for Vietnamese banks is modest. Meanwhile, Vietnam is acknowledged as a bank-centric economy, which means that the

economy depends heavily on banks' performance and reputation, so earnings management at banks should have received more serious attention. This urges us to fill the gap in literature not only to gain more knowledge about how banks' managers manipulate earnings in the case of Vietnam but also to raise the awareness of the authority about this problem.

Motivated by the findings in Nguyen (2022) that changes in reported income of Vietnamese banks over years are concentrated irregularly high around 0, we first hypothesize that banks in Vietnam do manage earnings to reduce the fluctuation of reported income. Like previous studies, to test that hypothesis, we analyze the relation between LLPs and pre-managed earnings (i.e, earnings before LLPs and taxes). We found strong evidence supporting the smoothing practice in Vietnamese banks. Further, to better understand banks' income smoothing, we examine what factors influence the extent of earnings management through LLPs. In this research, we use several indicators to represent corporate governance, ownership structure and financial health. Our research indicates that factors including the characteristics associated with the Board of Directors (BOD), ownership concentration, bank size, and capital adequacy ratio (CAR) can influence the utilization of LLPs for income smoothing.

Our findings contribute to the literature in three folds. First, we provide the evidence that banks in Vietnam do manipulated earnings to smooth their reported income. Second, we explain how Vietnamese banks can engage in such practices, namely, through discretionary choices in recognizing LLPs. Finally, we show factors that affects the use of loan loss provisions in smoothing income.

### **Research Objectives**

1. To explore the possibility of Vietnamese banks employing the income smoothing strategy through loan loss provisions
2. To study the factors affecting the income smoothing practices of Vietnamese banks

### **Review of Related Literatures**

1. Income smoothing and loan loss provisions

LLPs is known as the largest accrual in banks' accounting system; thus, many researchers have related it to earnings management, especially income smoothing practices (Kanagaretnam et al., 2004). By examining the relation between LLPs and pre-managed earnings, they hope to find evidence supporting the income smoothing hypothesis.

The existing literature on income smoothing shows mixed empirical results. Though the use of LLPs to smooth income at banks has been documented internationally in many previous studies (among others, Collins et al., 1995; Shrieves & Dahl, 2003; Kanagaretnam et al., 2004; Liu & Ryan, 2006; Anandarajan et al., 2007; Taktak et al., 2010; Packer and Zhu, 2012; El Sood, 2013; Kilic et al., 2013; Curcio et al., 2014; Mohd Isa et al., 2018; Osma et al., 2019; Danisman et al., 2021), several studies could not find the relation between LLPs and earnings management (among others, Beatty et al., 1995; Ahmed et al., 1999, Ismail et al., 2005; Bouvatier & Lepetit, 2008).

While income smoothing at banks has been studied for decades, the number of analyses of earning management and income smoothing of Vietnamese banks is still modest. Apart from a few country-specific

analyses, Vietnamese banks have not appeared in any cross-country analysis considering income smoothing practices. Vietnam was even excluded from the study of Parker & Zhu (2012) about Asian banks' earnings management, which took into account Vietnam's neighbors such as Thailand, Malaysia, etc. Therefore, it is not wrong to say that we know very little about income smoothing in Vietnamese banks.

## 2. Determinants of income smoothing

Prior research on the determinants of earnings management as well as income smoothing in banks has identified various factors at different levels that can influence how bank managers manipulate their financial reports. As this paper focuses solely on Vietnamese banks, we do not include institutional factors and other country-level factors. Specifically, we aim to identify which bank-specific factors have a significant impact on the employment of loan loss provisions for earnings manipulation. Upon theories and prior research, our study opted to incorporate the following factors.

**Board size** is generally believed to influence the quality of corporate governance. While the agency theory prefers smaller boards due to better operation and control (Jensen, 1993), the resource dependence theory prefer larger ones for the better of boards' advisory capacity, more cautious decision-making, and the improvement of external relationships (Pfeffer, 1972). Cornett et al. (2009) demonstrates an inverse relationship between board size and corporate governance, suggesting that a larger size may enhance the level of earnings management. However, Adams & Mehran (2005) suggests that larger boards do not diminish the operational efficiency of banks. Therefore, the size of the BOD can either augment or diminish the quality of governance, thereby either limiting or facilitating income smoothing in banks.

**Independent directors** have long been viewed as a good practice in corporate governance to bolster its management and oversight capabilities. The BOD with a majority of external members is deemed superior for monitoring and controlling managers, according to Dunn (1987). Research by Benkel et al. (2006) provided evidence that a higher ratio of independent directors on the board limits earnings management of firms. Therefore, we anticipated a negative relationship between the proportion of independent members and the extent of income smoothing.

**Board diversity** may positively or negatively affect income smoothing behaviors. The diversity can bring more perspectives to the board, increasing the richness of experience and information resources that directors bring (Carter et al., 2010), thereby helping the board make better decisions and come up with creative, groundbreaking solutions. Besides the possible benefits, diversity can cause disengagement and more conflict among members, making communication more difficult and sometimes disrupting group activities (Frijns et al., 2016). In this context, we considered the **proportion of female directors** and the **proportion of foreign directors** as proxies for board diversity.

**Managerial ownership** may make managers pay more attention to the stock price and take actions to increase the stock price in the short term (Cheng et al., 2011). Research with non-financial companies, Cheng & Warfield (2005) showed that managers who hold more shares tend to adjust income to exceed analysts' expectations. Cheng et al. (2011) also found that bank managers with high equity incentives are more likely to manage earnings but only when the capital adequacy ratio is close to the minimum regulatory

capital requirement. In summary, empirical studies implied a positive impact between managers' ownership and earnings management.

**Ownership concentration** could provide more opportunities for large shareholders to control the company's operations and use this control to direct the BOD to work for their benefit (Bouvatier et al., 2014). This is even more likely to happen if one shareholder owns enough shares to have full control of the company. Bourkhis & Najjar (2017) pointed out that banks with distributed ownership structures, as opposed to concentrated ones, often have better earnings quality.

**Institutional investors** are often considered to have more skills and motivation to monitor companies' operations than individual investors (Elyasiani et al., 2017), so banks have higher institutional ownership would be expected to have lower earnings management. This relationship was confirmed through the study of Miller et al. (2021). The participation of **foreign investors** is also expected to have a similar impact because the presence of foreign investors with richer investment experience and expertise will help reduce asymmetric information between insiders and outsiders (Welker, 1998; Leuz & Verrecchia, 2000; Healy & Palepu, 2001; Francis et al., 2005).

**Firm size** is often suggested to be positively associated with the level of information transparency. This is because larger firms are typically required to disclose their financial information more transparently than smaller ones (Lee & Choi, 2002). Similarly, large-scale banks may find it challenging to manipulate profits due to increased public and regulatory scrutiny. However, there is a possibility that larger banks, under more performance pressure than smaller ones, might give managers more incentives to adjust income in order to meet public and investor expectations. Furthermore, larger firms, with their greater resources and capabilities, might have a higher ability to adjust earnings compared to smaller ones (Moses, 1987).

**Capital adequacy ratio (CAR)** is a crucial financial metric for banks. A higher CAR indicates lower risk in banking operation and solvency. As this ratio is fundamental in assessing a bank's financial health, regulatory bodies like the State Bank mandate a minimum requirement for this ratio and act against banks that fall below this threshold. Consequently, banks strive to maintain their CAR at a safe level. They tend to avoid reducing the CAR when it's close to the minimum. However, earnings management tools used by banks can impact the CAR. In summary, banks with a low CAR are less likely to adjust financial reports in a way that decreases the CAR compared to banks with a high CAR.

**The Big 4 auditors** have multiple reasons to restrict their clients' earnings management compared to auditors outside this group (Kanagaretnam et al., 2010). Specifically, these auditors are considered to have superior expertise and resources, and importantly, a stronger motivation to maintain their reputation and minimize litigation risks. The research findings of Kanagaretnam et al. (2010) supported the hypothesis that this characteristic of auditing can decrease the propensity for income smoothing.

**Banks' listing status** may have an influence on the quality of their financial reporting. Beatty et al. (2002) claimed that public banks have more incentives to enhance income to meet target thresholds compared to private banks since they are under more intense scrutiny. Nevertheless, public banks are subject to additional oversight from the stock exchange where their shares are listed. Fonseca & Gonzalez

(2008) and Bouvatier et al. (2014) provided evidence that banks are less likely to engage in earnings management practices when operating in a more tightly controlled environment and are required to disclose more information. Therefore, the listing status of banks can either promote or limit income smoothing practices.

## Research Methodology

### 1. Research Models

Within the framework of this study, to test whether Vietnamese joint stock commercial banks manage earnings to reduce the fluctuation of earnings over years, we examine the relationship between (1) LLPs and (2) pre-managed earnings. Specifically, we would like to test the following hypothesis: “The relation between LLPs and earnings before taxes and loan loss provisions (EBTP) is positive”. EBTP is used as a proxy for earnings before manipulated or pre-managed earnings. If banks have used LLPs to stabilize reported earnings, the coefficient of EBTP should be positive (Ahmed et al. 1999; Kanagaretnam et al., 2004; Liu & Ryan, 2006; Curcio et al, 2014). Beside EBTP, other explanatory variables were added to the model as controlling variables. These variables are used to explain the variation in LLPs that are not for earnings management. The following model is used to test the relationship between LLPs and EBTP.

$$LLP_{it} = \beta_1 EBTP_{it} + \beta_2 GDPGR_t + \beta_3 NPL_{it} + \beta_4 \Delta LOAN_{it} + \beta_5 CAR_{it} + \beta_6 SIZE_{it} \quad (1)$$

where:  $LLP_{it}$ : Ratio of loan loss provisions to total assets of bank  $i$  in year  $t$ ;

$EBTP_{it}$ : Ratio of earnings before taxes and loan loss provisions to total assets of bank  $i$  in year  $t$ ;

$GDPGR_t$ : GDP growth rate in year  $t$ ;

$NPL_{it}$ : Non-performing loan ratio of bank  $i$  in year  $t$ ;

$\Delta LOAN_{it}$ : Change in customer loan ratio of bank  $i$  in year  $t$ ;

$CAR_{it}$ : Capital adequacy ratio of bank  $i$  in year  $t$ ;

$SIZE_{it}$ : Natural logarithm of total assets of bank  $i$  in year  $t$ .

The regression model using equation (1) is called the baseline model. To evaluate the impact of factors on income smoothing behavior through loan loss provisions, we consider the equation below, which we call the factor model.

$$LLP_{it} = \beta_1 EBTP_{it} + \beta_2 GDPGR_t + \beta_3 NPL_{it} + \beta_4 \Delta LOAN_{it} + \beta_5 CAR_{it} + \beta_6 SIZE_{it} + \mathbf{B} \times [EBTP_{it} \times \mathbf{Factors}_{it}] + e_{it} \quad (2)$$

where **Factors**: Vector of dummy variables representing factors

For convenience, we modify the baseline model by adding interaction variables between EBTP and the factors we are interested in to evaluate the impact of the factors on the level of income smoothing. This method has been used by Fonseca & Gonzalez (2008), Gebhardt & Novotny-Farkas (2011) and Bouvatier et al. (2014) in their study. Due to the use of interaction terms, the factor variables in the factor model should be dummy variables. Dummy variables other than CONTROL, BIG4 and PUPUBLIC are formed through converting variables that initially take continuous values into discrete variables. We apply the interval division, thereby, each original variable is converted into 2 dummy variables denote as UPPER\_ and LOWER\_.

The UPPER\_ equals 1 if the variable's original value belongs to the first quartile of the data, otherwise equals 0. The LOWER\_ equals 1 if the variable's original value belongs to the fourth quartile of the data, otherwise equals 0.

## 2. Data

The study collected data from the annual reports of banks, except for the data on Vietnam's GDP growth rate, which was obtained from the World Bank database. The initial sample includes data from 27 Vietnamese commercial banks during the period 2010 - 2019 (equivalent to 270 observations). In the data processing stage, some observations were removed due to missing value. As a result, the final sample used for analysis in the models is an unbalanced panel data, comprising 228 observations from 27 banks.

## 3. Statistics for Data Analysis

Table 1: Descriptive statistics

	Mi n	Me an	Ma x	Std.D ev.
LLP	0.00	0.06	0.36	0.005
EBTP	0.05	0.16	0.64	0.011
NPL	0.01	0.12	0.60	0.007
$\Delta$ LOAN	0.148	0.086	0.265	0.057
GDPGR	5.25	6.327	7.080	0.626
SIZE	0.00	0.139	0.402	0.048
SIZE	30.32	32.31	34.94	1.114

Table 2: Correlation matrix of variables

	LLP	EBTP	NPL	$\Delta$ LOAN	GDPGR	SIZE	CAR
LLP	1.0000						
EBTP	0.6211	1.0000					
NPL	0.3336	0.1348	1.0000				
$\Delta$ LOAN	-0.0476	0.0850	0.0159	1.0000			
GDPGR	0.0731	0.0916	0.2329	0.1627	1.0000		
SIZE	0.2212	0.1989	0.1190	0.1238	0.2181	1.0000	
CAR	0.0231	0.1099	0.2007	0.0933	0.2626	0.5402	1.0000





Table 1 provides the descriptive statistics of variables used in our baseline models. As indicated in the table, the mean of LLP (0.006) is approximately 0.4 of the mean of EBTP (0.016). On average, the LLP seems to take a large portion of EBTP, supporting the view that LLP is the largest accrual of banks. There is a notable similarity among Vietnamese banks in terms of the variability of the variables used in the model. The standard deviation for all variables is relatively small compared to their mean. Table 2 presents the correlation between the variables used in the baseline model. LLP shows a strong positive correlation with EBTP, and a positive correlation with NPL, GDPGR, and SIZE. Conversely, it is negatively correlated with  $\Delta$ LOAN and CAR. The correlation coefficients among the explanatory variables are generally low, mostly under 0.3, except for the correlation coefficient between SIZE and CAR, which is -0.5402. Thus, according to Gujarati & Porter (2009), the likelihood of multicollinearity is low.

**Table 3:** Correlations between EBTP and LLP in subsamples

Factor (Original variable)	Factor characteristic	Dummy value	Correlation (LLP, EBTP)	Factor (Original variable)	Factor characteristic	Dummy value	Correlation (LLP, EBTP)
Size of BOD (BSIZE)	Large	UPPERBSIZE=1	0.454	Institutional ownership (INSO)	High	UPPERINSO=1	0.555
	Medium	Both equal 0	0.513		Average	Both equal 0	0.72
	Small	LOWERBSIZE=1	0.925		Low	LOWERINSO=1	0.581
Proportion of independent directors (BIND)	High	UPPERBIND=1	-0.251	Foreign ownership (FORO)	High	UPPERFORO=1	0.766
	Average	Both equal 0	0.714		Average	Both equal 0	0.573
	Low	LOWERBIND=1	0.395		Low	LOWERFORO=1	0.707
Proportion of foreign directors (BFOR)	High	UPPERBFOR=1	0.01	Bank size (SIZE)	Large	UPPERSIZE=1	0.812
	Average	Both equal 0	0.533		Medium	Both equal 0	0.531
	Low	LOWERBFOR=1	0.796		Small	LOWERSIZE=1	0.426
Proportion of female directors (BFEM)	High	UPPERBFEM=1	0.76	Capital adequacy ratio (CAR)	High	UPPERCAR=1	0.562
	Average	Both equal 0	0.507		Average	Both equal 0	0.783

	Low	LOWERBFE M=1	0.711		Low	LOWERCAR =1	0.467
CEO ownership (CEO)	High	UPPERCEO O=1	0.786	<b>Big 4 auditor (BIG4)</b>	Exist	BIG4=1	0.674
	Average	Both equal 0	0.657		Not exist	BIG4=0	0.659
	Low	LOWERCEO O=1	0.555		Public	PUBLIC = 1	0.784
Controlling shareholder (CONTROL)	Exist	CONTROL = 1	0.417	<b>Listing status (PUBLIC)</b>	Private	PUBLIC = 0	0.571
	Not exist	CONTROL = 0	0.667				

Table 3 shows the correlation coefficients between LLP and EBTP in subgroups divided by factor characteristics. Bank groups that use LLPs to smooth income more are likely to be observed higher correlation. The descriptive statistics suggest that there are negative relationships between the degree of income smoothing with the BOD size and the proportion of foreign directors, while there are positive relationships between income smoothing practice with managerial ownership and bank size. Banks with controlling shareholders have a lower correlation coefficient between LLP and EBTP than banks without controlling shareholders. The correlation coefficients between LLP and EBTP among groups audited and not audited by Big 4 auditors are similar. However, public banks have a correlation coefficient much higher than that of private banks. The relationships between income smoothing and other variables are not clearly defined.

## Results

### 1. Vietnamese banks' smoothing income practice through loan loss provisions

Table 4 presents the summary of our regressive results. The table shows how pre-managed earnings along with other bank-specific characteristics affect the level of LLPs. The first column [1] of the table presents the outcome of regressing LLP against EBTP and year dummy variables exclusively. The second column [2] displays the outcome when LLP is regressed against EBTP and additional control variables beyond year dummy variables. In our research, we employ the fixed-effect model (FEM) as our main regression method. Besides FEM, we also use pooled OLS and REM, but based on tests, FEM with year-dummy variables is the most appropriate model. Additionally, we employed White-Arellano (1987) estimator to obtain consistent standard errors in Table 4 since this method allows a fully general structure with reference to heteroskedasticity and serial correlation. The coefficient of EBTP is consistently positive in three specifications in Table 4 at 1% level as expected. This finding is consistent with what was found by, among others, Kanagaretnam et al. (2004), Liu & Ryan (2006), and Curcio et al, (2014). As explained, a positive and significant relationship between LLP and EBTP supports the hypothesis that Vietnamese banks smooth their income over time. The result also suggests that LLPs are used as a tool for earnings management.

### 2. The determinants of income smoothing of Vietnamese banks

Our initial approach for factor specifications involved running regressions with each model containing only one factor (i.e., each model had only one interaction variable or only interaction variables belonging to one factor). Then, we keep the interaction variables that are statistically significant and yield robust results, i.e., they are significant in all models where the variable appears, for inclusion in the model in column [3]. The signs of the interaction variables remain unchanged compared to the one-factor models. The result shows that banks with smaller boards tend to use LLPs to smooth income more than other banks, which aligns with the resource dependence theory. Banks with a high proportion of independent directors tend to have lower income smoothing level than other banks. This partially supports the notion that independent members of the BOD are better directors. Banks with fewer foreign directors have a higher level of income smoothing. Specifically, in our case, LOWERBFOR=1 if the proportion of foreign directors is 0. Thus, banks without foreign directors tend to smooth income more than other banks. This result supports the argument that board diversification will reduce earnings management. Banks controlled by a major shareholder tend to smooth income more than other banks. In our case, the major shareholder is also the State. Hence, state control has a positive relationship with income smoothing at banks, which is in line with the findings of Doan et al. (2020). Small banks tend to have a lower extent of income smoothing than other banks. This finding supports the assertion that larger banks can more easily implement income smoothing techniques than small banks. Finally, banks with low capital adequacy ratios tend to smooth income through loan loss provisions less than other banks. This result agrees with our initial argument that banks with capital adequacy ratios close to the minimum requirements of the State Bank will have less incentive to adjust earnings.

**Table 4:** The regression results

	[1]	[2]	[3]
EBTP	0.23433***	0.27924***	0.25674***
EBTP*LOWERBSIZE			0.06178***
EBTP*UPPERBIND			-0.11664**
EBTP*LOWERBFOR			0.15236***
EBTP*CONTROL			0.30946**
EBTP*LOWERSIZE			-0.22325***
EBTP*LOWERCAR			-0.05845*
Year Dummies	Yes	Yes	Yes
Controlling variables	No	Yes	Yes
No of Observations	228	228	228
R <sup>2</sup>	0.32586	0.43695	0.63959
Adjusted R <sup>2</sup>	0.20297	0.32015	0.55047

\*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent levels, respectively

## Discussion

Banks that have a high proportion of independent directors, small scale, and low capital adequacy ratio tend to practice less income smoothing. Conversely, banks with a small board of directors, no foreign director, or completely controlled by a large shareholder (or State) tend to smooth income more than other banks. Our analysis results indicate that corporate governance mechanisms related to the BOD do affect income smoothing in banks. Ownership structure factors can also impact earnings management. Therefore, the performance of the BOD and ownership structure are factors that should be considered when seeking solutions to this problem. Finally, it is worth noting that banks seem to smooth income because they can afford it (for example, when the size is large, or the CAR is sufficient) rather than because it is necessary.

## Suggestions

Bank managers often use LLPs to manage earnings, but this is not the only tool available to smooth income at banks. Hence, we recommend that future research should broaden the evaluation of income smoothing by exploring methods other than LLPs, to obtain a more comprehensive insight into this subject.

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## Changing behavior in climate change: exploring factors influencing environmentally friendly products adoption among urban consumers in Hue, Vietnam

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### Abstract

This study investigates the dynamics of behavior change in the context of climate change mitigation, specifically focusing on the adoption of environmentally friendly products among urban residents in Hue, Vietnam. With a growing concern for the environmental impact of consumer choice, understanding the factors that influence positive behavioral shifts becomes essential to contribute to reduce the environmental degradation and global climate change. Utilizing a sample of 232 respondents and employing the Theory of Planned Behavior as a theoretical framework, the study explores the determinants of individual intentions to embrace eco-friendly products, including attitudes, subjective norms, and perceived behavioral control. The findings of this research aim to contribute valuable insights to both academic discourse and practical strategies for promoting environmentally conscious choice and encourage the transition toward environmentally responsible consumer behavior within urban populations in the face of climate change

**Keywords:** Climate Change, Consumer Behavior, Environmentally Friendly Products

### Introduction

In the face of a rapidly changing climate, there is an undeniable need for a shift in consumer behavior, particularly in urban areas where the impact of climate change is most acutely felt (Whitmarsh et al., 2021). The effects of climate change, from extreme weather events to rising sea levels, storms, floods, and more, are becoming increasingly visible and threatening the livelihoods and well-being of communities across the globe. Urban areas, with their high concentration of population, industry, and consumer activity, play a significant role in contributing to these challenges. The choices made by urban consumers have a profound impact on the environment and can either exacerbate or alleviate climate-related issues. Understanding and influencing the behavior of urban consumers, especially regarding their choices of green products, is crucial for addressing climate change effectively. The continued growth of cities and



urbanization means that the collective impact of urban populations on the environment is becoming more pronounced. Consequently, the transition towards more eco-conscious consumer behavior is not merely a matter of personal preference; it has become a societal imperative for a sustainable future (Clayton S at al., 2015& Nielsen KS, 2021)

Urban consumers are not isolated actors; their choices ripple through supply chains, influence production practices, and affect market dynamics. Thus, their role in the fight against climate change cannot be underestimated. To achieve meaningful progress, it is essential to encourage urban consumers to make eco-friendly choices and embrace green products.

This research aims to identify the factors that influence on the purchase behavior of urban consumers toward environmentally friendly product consumption in urban Hue, Vietnam. By shedding light on the motivations and barriers influencing urban consumers, this study aims to provide insights into how sustainable and eco-conscious choices can be incentivized. Therefore, this research aims to contribute to broader environmental efforts and help steer urban consumers towards more environmentally responsible choices, ensuring a more sustainable future for all .

The hypothesis is presented as follows:

H1: Attitude towards EFPs has a significant positive influence on the Behavioral Intention

H2: Subject Norm has a significant positive influence on the Behavioral Intention

H3: Environmental Awareness has a significant positive influence on Behavioral Intention

H4: Product Available has a significant positive influence on the Behavioral Intention

H5: Price Sensitivity has a significant on the relationships between Behavioral Intention and behavior

H6: Government Incentive has a significant positive the relationship between Behavioral Intention and Behavior

## Literature Review

### Consumer behavior and sustainability

The study of consumer behavior and its relation to sustainability is a burgeoning field of research, propelled by the pressing global challenges of climate change, resource depletion, and environmental degradation. Within this context, adopting eco-friendly products—those with reduced environmental impact—has garnered considerable attention as a means for individuals to contribute to environmental sustainability (Peattie & Peattie, 2003). Urban areas, characterized by their high population density and resource consumption, are central to the discourse on sustainability (Glaeser, 2011). As most of the global population now resides in urban centers (United Nations, 2018), urban consumer behavior plays a pivotal role in addressing the challenges of climate change and resource conservation challenges.

### Consumer behavior in urban environments

Urbanization has fundamentally transformed the global landscape. Today, more than half of the world's population lives in urban areas, and this figure is expected to increase significantly in the coming



decades (United Nations, 2018). This unprecedented urban growth has implications for sustainability, resource consumption, and environmental impact. Urban environments, characterized by concentrated populations and resource-intensive infrastructure, are central to the discourse on mitigating climate change and enhancing sustainability (Glaeser, 2011).

Consumer behavior in urban contexts is influenced by a multitude of factors. The urban environment presents unique challenges and opportunities for adopting environmentally responsible practices. Urban consumers may have access to a wider array of eco friendly products, given the concentration of businesses and services, and may also be exposed to sustainability messaging and initiatives. However, they are also confronted with increased resource consumption, transportation emissions, and waste generation (Hoorweg et al., 2011).

### **Consumer behavior towards environmentally friendly products in Vietnam**

Vietnam, a rapidly developing nation with a growing urban population, offers a distinctive context for studying consumer behavior regarding environmentally friendly products (EFPs). The country's rapid urbanization is accompanied by increased resource consumption and environmental challenges (World Bank, 2020). Understanding how urban Vietnamese consumers perceive and adopt EFPs is pivotal for addressing climate change and sustainability within this dynamic context.

There is limited research on consumer behavior towards EFPs in Vietnam, particularly within urban settings like Thua Thien Hue. Existing studies in Vietnam have primarily focused on broader environmental issues, green marketing strategies, and sustainable development (Nguyen et al., 2014; Tinh & Minh, 2020). Thus, this research seeks to contribute to the existing body of knowledge by exploring the specific factors influencing the adoption of EFPs in Hue, Vietnam, and how these factors align with the global understanding of urban consumer behavior towards sustainability.

In summary, the literature reviewed here highlights the importance of understanding urban consumer behavior towards EFPs, particularly within the context of Vietnam's urbanization and climate change challenges. The Theory of Planned Behavior has proven effective in explaining and predicting environmentally responsible consumer choices and serves as a valuable framework for investigating urban consumer behavior in a Vietnamese context. The next section outlines the research method employed to explore these dynamics in Hue, Vietnam.

### **Research Approach and Conceptual framework proposed**

#### **The Theory of Planned Behavior (TPB)**

The Theory of Planned Behavior (TPB), introduced by Ajzen (1991), stands as one of the most influential models for understanding and predicting environmentally responsible consumer behavior. The TPB posits that an individual's behavioral intentions are the primary determinants of their actual behavior. These intentions are influenced by three core factors: attitudes, subjective norms, and perceived behavioral control. Attitudes represent the individual's evaluation of behavior, while subjective norms capture the perceived social pressure and expectations related to the behavior. Perceived behavioral control reflects the perceived ease or difficulty of performing the behavior (Ajzen, 1991).

Studies applying the TPB framework have consistently shown effectiveness in understanding and predicting various environmentally conscious behaviors, including recycling, energy conservation, and sustainable transportation choices (Bamberg & Möser, 2007; Kaiser, 1998; Kaiser et al., 2005). The TPB has been successfully employed to explain and predict consumer intentions to purchase green products in diverse cultural and geographical contexts (Biswas et al., 2018; Chan, 2001; Tonglet et al., 2004). Armitage and Conner (2001) conducted a meta-analysis on the efficacy of the theory of planned behavior which indicated not only that perceived behavioral control (PBC) has an indirect effect on behavior through intentions, but also that in the absence of volitional control, perceived behavioral control can be used to predict behavior directly.

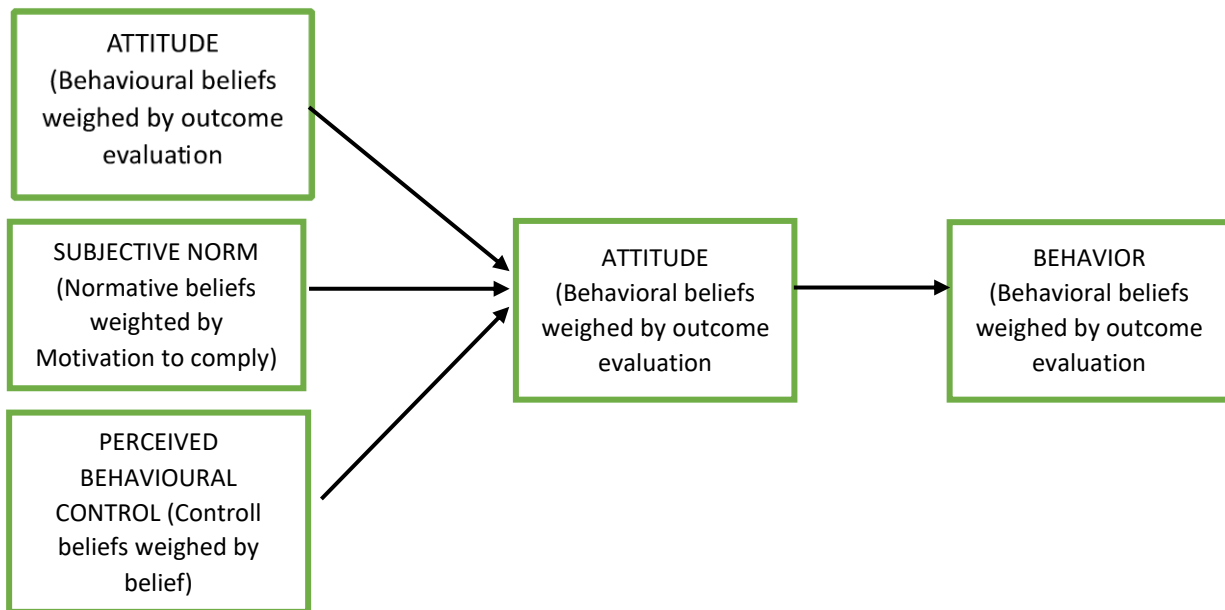


Figure 1: Original Model of Theory Planned Behaviour (Ajzen1991)

### Attitude influence Intention

In accordance with Ajzen's (1991) conceptual framework, the consumer's attitude toward a particular behavior can be described as a cognitive process that involves evaluating rationality, which pertains to a person's capacity to disrupt established beliefs (Rivis et al., 2009; Ajzen 1991, p.286).

The vast literature of TPB argued that two interactive components are involved in the construct: behavioral beliefs (i.e., beliefs about consequences of the specific behavior) and outcome evaluation (i.e., positive and negative evaluation of these behavioral beliefs (Ajzen, 2006).

In the Theory of Planned Behavior (TPB), consumers' positive attitudes towards purchasing EFPs consistently drive their preference for such items, as shown in various studies (Chen & Tung, 2014; Kim et al., 2013). Favorable perceptions of environmentally friendly products (EFPs) increase the likelihood of purchase and willingness to pay more. When consumers aim to reduce their environmental impact, they naturally seek out EFPs (OECD, 2008). Therefore, consumers with positive beliefs about buying EFPs exhibit a stronger preference for them and are willing to pay a premium.

### Subjective Norms

Many empirical studies within the TPB framework focus on the subjective norm, which gauges consumers' perceptions of social pressure regarding a specific behavior (Aertsens et al., 2009). Subjective norm reflects normative beliefs and the motivation to comply with family and friends' expectations about certain behaviors (Ajzen, 2001), often measured by questions like "People important to me believe I should act environmentally friendly" (Ajzen I. 2006).

In our context, research by Chen (2007) shows that conforming to others' desires increases the likelihood of purchasing environmentally friendly products (EFPs). Kim & Han (2010) find that societal norms have a more significant impact on pro-environmental behavior than environmental concerns. Vermeir & Verbeke (2006, cited by Aertsens et al., 2009) note that subjective norms can drive strong intentions to buy EFPs even when personal attitudes are low. Moreover, Chen & Tung (2014) and Kim et al. (2013) confirm that subjective norms significantly predict intentions to visit Green Hotels. However, empirical studies suggest that the subjective norm is the weakest predictor of intention (Armitage & Conner, 2001), partly due to its narrow conceptualization (Aertsens et al., 2009).

Lopez-Mosquera (2014) and Quintal et al. (2010) highlight a lack of in-depth studies examining the correlations between TPB components. To address this, Lopez-Mosquera et al. (2014) proposed that the subjective norm plays a central role as an antecedent to other TPB components, namely attitudes and perceived behavioral control. Their study reveals that the subjective norm positively influences attitudes and perceived control behavior components, with previous research supporting this (e.g., Peters et al., 2011, cited by Lopez-Mosquera et al., 2014). While their research found no direct effect of the subjective norm on intentions to buy EFPs, it indirectly influences these intentions through attitudes and perceived behavioral control (Lopez Mosquera et al., 2014; Thøgersen, 2009)

### **Perceived behavioral control**

The huge number of environmentally friendly behavior research has been stressed to be extensively concerned with the gap between environmental awareness-public concern and their real EFP purchasing (Akehurst et al., 2012; Chen & Tung, 2014; Roberts, 1996)

Ajzen (2001) introduced perceived behavioral control as a factor that can narrow this gap. This concept relates to consumers' perceptions of their abilities (e.g., financial resources) and barriers (e.g., availability and trust) to engage in a specific behavior, such as purchasing EFPs (Aertsens et al., 2009). EFP consumption barriers often include high price premiums (Organic Centre Wales, 2004; Hughner et al., 2007) and perceived availability issues (Chrysohoidis & Krystallis, 2005; Intel, 2000; Rodriguez et al., 2008). Uncertainty (Thøgersen, 2007) and a lack of information and trust in EFP supply chain actors (Padel & Foster, 2005) are also significant barriers (Krystallis et al., 2008). Therefore, the dissemination of information, such as labeling, can influence consumers' trust in EFPs, subsequently affecting their purchasing behavior (Krystallis et al., 2008).

However, the relevance of perceived behavioral control varies depending on the behavior in question. When a behavior is perceived as relatively easy to perform (i.e., consumers believe they have self-sufficient control over EFP purchasing), perceived behavioral control becomes a weak predictor of

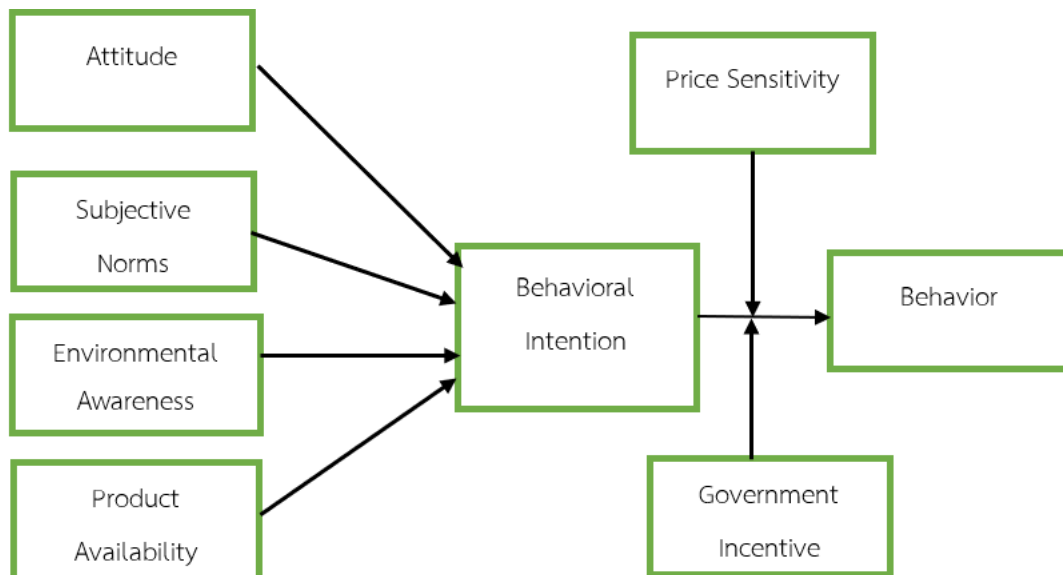
intentions (Lopez-Mosquera, 2014; Thøgersen, 2007; Dean et al., 2008; Padel & Foster, 2005; Vermeir & Verbeke, 2008). In particular, perceived behavioral control becomes more relevant when are included marketing variables as consumption barriers (i.e., labelling laws, certification systems, companies' environmental performance, EFPs systems regulation) (Aerstsens, 2009). Thus, bear in mind information from credible communication sources may show the absent of regulatory systems of EU (i.e.-differences in levels of labelling systems among countries) and makes this construct as relevant predictor (Torjusen et al, 2004)

**Intention towards EFPs.**

Many studies have proved that intention has the most important role in TPB and the most proximate domain to (real) behavior (Chen & Tung, 2014). Nonetheless, as mentioned above, the TPB model has been applied more for understanding the determinants of intentions, rather than real behavior (Kalafatis et al., 2009; Martiskainen 2007). The behavioural intention construct finds consumer's decision or motivation to enact behavior (Armitage & Conner, 1998). Different approaches to elicit the degree of behavioral intentions have been explored in the literature. The core technique to measure intentions is often with a self-reported question about respondents willing to purchasing, consumer awareness, self-prediction and willingness to pay for EFPs. (Shepperd, Hartwick, &Warshaw, 1988; Warshaw& Davis, 1985; Bagozzi, 1992).

**Conceptual Framework Proposed**

In light of these insights and drawing on consumer behavior theory, as well as an extension of the Theory of Planned Behavior (TPB) and relevant research, this study advances a theoretical framework encompassing several determinants of consumers' EFPs behavior, including Attitude towards environment, Subjective Norm, Environmental Awareness, Product Availability, Price Sensitivity and Government Incentive. The conceptual framework is proposed as follows:



**Figure 2:** Conceptual framework proposed

**1. Methodology**

To address the research aims effectively, a mixed-method research approach encompassing both qualitative and quantitative methodologies has been employed to collect data. The qualitative phase is

dedicated to the development and calibration of an evaluation scale designed to assess the factors influencing consumers' intentions to engage in sustainable consumption within the urban context of Hue City, Thua Thien Hue Province, Vietnam. This scale of development involves conducting in-depth interviews and organizing focus groups to collect insights and perspectives from consumers experienced in purchasing EFPs.

Subsequently, during the quantitative phase, structured personal interviews using questionnaires are conducted with customers actively involved in purchasing EFPs within Hue City. A Likert scale is used, featuring five response levels ranging from 1 (Strongly disagree) to 5 (Strongly agree), to evaluate the various factors incorporated into the research model, including both dependent and independent variables.

To obtain a representative sample, a stratified random sampling approach will be employed. Hue will be identified as key urban areas, and a proportional number of participants will be selected from this location. The sample size will consist of 300 respondents, providing adequate statistical power for analysis (Bryman, 2016). Sample size determination follows established estimation guidelines. Following the recommendations of Hair and Bollen (1989), a minimum sample size equivalent to at least five times the number of estimated parameters is considered essential. Given the incorporation of seven independent variables, one dependent variable, and a total of 28 items within the research model, the minimum required sample size is calculated as 7 multiplied by 28, resulting in 196 samples. To ensure statistical robustness, 300 survey questionnaires were distributed during the data collection process. Following a meticulous review and the exclusion of 88 questionnaires, which included 20 invalid submissions and 68 from respondents lacking familiarity with EFPs products, the final sample size was established at 232 respondents. The gathered qualitative and quantitative data underwent rigorous cleaning and analysis, using widely recognized statistical software such as SPSS 20 and Excel, adhering to the rigorous standards of academic research.

## 2. Sample descriptions

The research sample includes 232 customers who have made ecological friendly products purchases in Hue city. Among these customers, a majority are female (62.1%), married (72.8%), aged between 23 and 60 years (81.5%), and with the most common income range of 5-10 million (46.1%). Public officials are a significant portion of the sample (45.3%), with freelancers accounting for 18.5% of those demonstrating an intention to purchase environmentally friendly products.

**Table 1:** Demographic Profile

	Category	Frequency (n=232)	Percentage (%)
<b>Gender</b>	Male	88	37,9
	Female	144	62,1
<b>Age</b>	Less than 22 years of age	21	9,1
	23-34 years of age	90	38,8

	35-60 years of age	99	42,7
	60 years of age and older	22	9,5
<b>Income</b>	Less than 5 million dongs	84	36,2
	5-10 million dongs	107	46,1
	10-15 million dongs	21	9,1
	More than 15 million dongs	20	8,6
<b>Married status</b>	Single	63	27,1
	Married	169	72,8
<b>Occupation</b>	Students	21	9,1
	Officers	105	45,3
	Housewives	41	17,7
	Freelancers	43	18,5
	Pensioners	22	9,5

*Source: Survey results*

### 3. Findings

#### 5.1 Factor analysis

##### Exploratory factor analysis

The exploratory factor analysis (EFA) was conducted to determine the number of extracted factors on each scale. In this study, the principal components factor analysis and the Promax rotation method were applied. The results show that the measurement scale is satisfied all requirements: Kaiser–Meyer–Olkin coefficient > 0.5; the significance level of Bartlett's Test of Sphericity < 0.05; Eigenvalue of each extracted factor > 1; total variance extracted > 50%, and factor loading of each item > 0.5 (Table 2). eight representative factors are extracted from 28 observed variables in the proposed scale, including Attitude towards environment (AT), Subjective Norms (SN), Environmental Awareness (EA), Product Availability (PA), Behavioral Intention (IN), Price Sensitivity (PS), and Government Incentives (GI) Behavioral Intention (BI), Behavior (BH)

**Table 2:** EFA and CFA of the measurement models

Exploratory Factor Analysis				Confirmatory Factor Analysis			
KMO	Sig. Bartlett's	Total variance Extracted	CMIN/DF	GFI	TLI	CFI	RMSEA
0.822	0.000	76.668%	1.612	0.900	0.916	0.926	0.056

*Source: data processing*

### Confirmatory factor analysis

The confirmatory factor analysis (CFA) was conducted to test the scale reliability, convergent, and discriminant validity of the constructs. The confirmatory factor analysis allows for a more objective interpretation of validity and establishes item's reliability and construct's accuracy.

### Model fit

The key indicators in the measurement model provide good fit to the data:  $\chi^2/df < 3$ , Comparative Fit Index (CFI) > 0.9, Goodness-of-fit index (GFI) > 0.9, Tucker & Lewis index (TLI) > 0.9, and Root Mean Square Error Approximation < 0.08), (Table 2). These hypothesized models then were compared with possible alternative models. The results indicate that the hypothesized measurement models outperformed the alternative ones

### Reliability analysis

The indexes in Table 3 indicate that the reliability values of the measurement scale are higher than the recommended values: the Cronbach's alfa coefficients (Alfa) > 0.7, Composite Reliability (CR) > 0.7, and average variance extracted (AVE) > 0.5 [9]. These results mean that the research scale is reliable

**Table 3:** Scale reliability analysis

Scale	Scale Reliability		
	Alfa	CR	AVE
Attitude to environments (AT)	0.865	0.814	0.679
Subjective Norm (SN)	0.867	0.882	0.652
Environmental Awareness (EA)	0.850	0.850	0.685
Product Availability (PA)	0.868	0.867	0.681
Price Sensitivity (PS)	0.884	0.887	0.668
Government incentive (GI)	0.883	0.845	0.698
Behavioral Intention (BI)	0.878	0.807	0.668
Behavior (BH)	0.879	0.835	0.678

*Source: data processing*

### Construct validity

The construct validity is evaluated through convergent and discriminant. The scale achieves convergent validity if it satisfies two requirements: the standardized weights in the measurement model are higher than 0.5, significant with  $p$ -value < 0.05, and the average variance extracted (AVE) > 0.5 [10]. From the analysis results, the standardized weights range above 0,008 with all of the  $p$ -values less than 0.05. Besides, all of the AVE values are higher than 0.5 (Table 4)

**Table 4:** Analysis of discriminant validity

AT	SN	EA	PA	PS	BI	BH
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AT	0.823**						
SN	0.240	0.807					
EA	0.154	0.208	0.828				
PA	0.135	0.332	0.814	0.802			
PS	0.321	0.286	0.067	0.154	0.825		
GI	0.088	0.034	0.070	0.030	0.425	0.817	
BH	0.355	0.384	0.433	0.343	0.463	0.173	0.850

Note: \*\* - square root AVE of each variable -sqrt (AVE)

Therefore, the measurement model in this study achieves convergent validity. The discriminant validity assures that a variable is unique and captures the phenomena not represented by other varying constructs in the model. The Fornell–Larcker criterion is the most popular method used in assessing discriminant validity. This standard requires the square root of AVE of each variable to be higher than the correlations among variables in the measurement model. The results in Table 4 show that the research model meets these requirements. Overall, the three tests mentioned above suggest that the measurement model is fit, reliable, and constructs validity.

### 3.2 Hypothesis testing

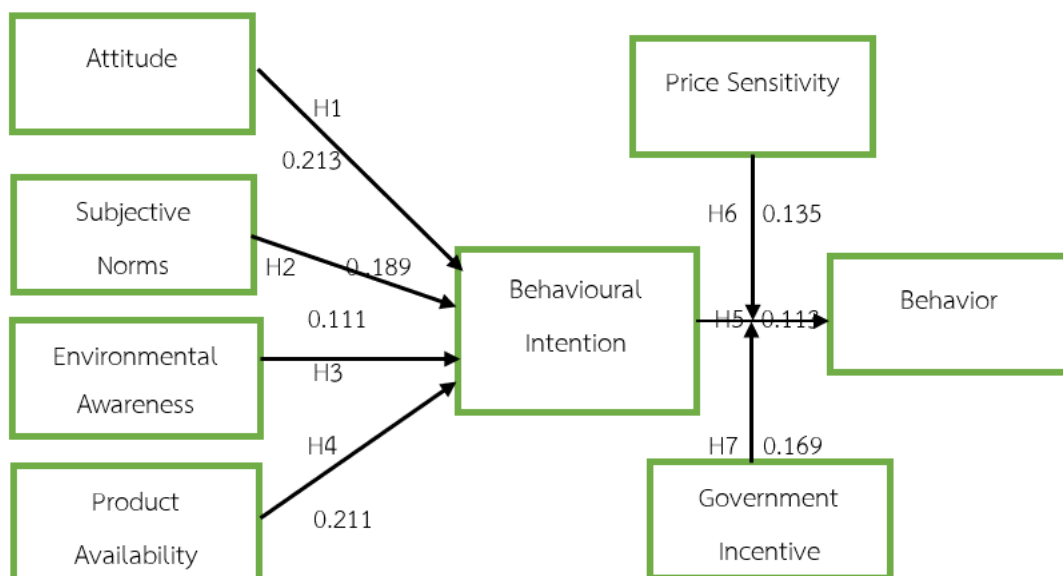


Figure 3: Hypothesis testing

Structural equation modelling was used to test the developed hypotheses. From the analysis results, all the eight are supported with the *p*-value ranging from 0.00 to 0.05. In there, Attitude, Subjective Norms, Environmental Awareness, Product Availability are positive effect Behavior Intention with the standardized regression weights of 0.213, 0.189, 0.111 and 0.2119, respectively. The Behavioral factor is directly affected by Behavioral Intention with the parameter estimate of 0.113. Meanwhile, Price Sensitivity



and Government Incentive play the mediate variable affected on the relationship between Behavioral Intention and Behavior with the  $p$ -value of 0.135 and 0.169 respectively.

### Discussion

The research model suggests that several factors play a significant role in influencing sustainable consumption behavior among urban residents in Hue, Vietnam. Firstly, Attitude towards the environment is expected to exert a strong influence on individuals' intentions to consume EFPs. Positive attitudes towards eco-friendly products, characterized by perceived benefits and favorable evaluations, are likely to enhance the intention to adopt sustainable consumption practices.

Secondly, Subjective Norms, reflecting the impact of social influences, are expected to play a pivotal role. Respondents who perceive social support and positive expectations from family, friends, and peers about sustainable consumption are more likely to develop intentions to embrace such behavior. These subjective norms represent the collective societal perspective on environmentally responsible consumer choices.

Thirdly, the level of Environmental Awareness is anticipated to be another key determinant of sustainable consumption intentions. Greater environmental awareness typically leads to a stronger intention to adopt EFPs, as individuals become more conscious of the ecological consequences of their consumption decisions.

Fourthly, the Availability of Products is also expected to be a significant driver. When environmentally friendly products are readily accessible and affordable, individuals are more likely to develop intentions to consume them. The availability factor encompasses aspects such as the range of EFPs products in the market and their affordability in comparison to conventional alternatives.

Furthermore, the research model suggests that these intentions, in turn, significantly influence actual sustainable consumption behavior. Respondents who possess strong intentions to consume EFPs are more likely to engage in environmentally responsible consumption practices.

However, the relationship between consumption intentions and behavior is not absolute; it is influenced by two moderating variables. Price Sensitivity, or the degree to which consumers are sensitive to price fluctuations, can influence the extent to which intentions translate into actual behavior. In some cases, high price sensitivity may hinder the translation of intentions into behavior if eco-friendly products are perceived as significantly more expensive.

Additionally, government policies aimed at encouraging EFPs consumption play a crucial role in shaping the relationship between intentions and behavior. Effective government policies, such as tax incentives, subsidies, or awareness campaigns, can serve as enablers that bridge the intention-behavior gap by making EFPs more accessible and affordable.

In conclusion, the research model anticipates that Attitudes towards the environment, Subjective Norms, Environmental Awareness, and the Availability of environment friendly products are key drivers of

sustainable consumption intentions. These intentions, in turn, significantly impact actual consumption behavior. However, the relationship between intention and behavior is subject to moderation by price sensitivity and government policies. The research findings are expected to provide valuable insights into the dynamics of consumption in the urban context of Thua Thien Hue, Vietnam, with implications for sustainable consumer behavior and policy development.

## Conclusion

In conclusion, this research paper has provided valuable insights into the transformation of consumer behavior in the context of changing climate and its implications for urban populations in Vietnam, with a specific focus on Thua Thien Hue. By applying the Theory of Planned Behavior (TPB), this study has unraveled the intricate factors shaping consumers' intentions to purchase Ecologically friendly products, which is crucial for mitigating the impacts of climate change.

The findings of this study underscore the pivotal role of consumer attitudes towards EFPs in driving their intention to make environmentally responsible choices. A positive attitude, characterized by genuine concern for climate change and a favorable disposition towards eco-friendly products, emerged as a potent predictor of consumers' intentions to opt for Ecological alternatives. As the climate crisis intensifies, fostering a positive attitude towards sustainable consumption becomes increasingly imperative.

Furthermore, this research highlights the significance of consumer awareness and knowledge regarding climate-related issues. Individuals with a heightened awareness of environmental challenges exhibited a stronger intention to embrace environmentally friendly products. This underscores the vital role of educational initiatives and awareness campaigns in raising the consciousness of consumers about climate change and environmental sustainability.

The study also emphasizes the influence of perceived social norms and subjective norms on consumer choices. The perceived approval and encouragement from social circles, including family and friends, were found to play a substantial role in shaping consumers' intentions to adopt environmentally friendly products. Leveraging these social influences can be a powerful strategy for promoting sustainable consumer behavior in the face of climate change.

Additionally, the research recognizes the role of pricing sensitivity in EFPs consumption. While price sensitivity had a relatively moderate impact on consumers' intentions, it played a more significant role in influencing their actual behavior. This highlights the importance of pricing strategies, subsidies, or incentives to bridge the gap between intention and actual behavior, particularly in the context of addressing climate change.

Finally, this study acknowledges the potent impact of government policies and initiatives in promoting sustainable consumption. State-sponsored efforts and incentives were found to significantly influence consumer behavior, emphasizing the importance of policy support in driving sustainable choices in the era of changing climate.

In the context of changing behavior in climate change, this research underscores the critical role of urban consumers in the collective effort to combat climate change. As global temperatures rise and climate-related challenges intensify, it becomes increasingly clear that individuals, communities, businesses, and governments must collaborate to foster a culture of environmentally responsible consumer behavior. By understanding and influencing consumer behavior in the face of climate change, we can collectively contribute to a more sustainable and resilient future for urban populations in Vietnam and beyond.

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## Assessing the impact of government responses to the covid-19 pandemic on stock market performance: insights from Asian countries

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### Abstract

The purposes of the research were to analyze the impact of COVID-19 pandemic on the performance of Asian stock markets and to investigate the impact of government intervention on these markets, focusing on China, India, Indonesia, Japan, Singapore, Sri Lanka and Vietnam. GARCH(1,1) and random-effect models incorporating country-fixed effect dummy variables were applied to daily data spanning from January 1, 2020, to December 31, 2021. The research findings indicated a positive response of stock returns in these markets to government interventions, providing valuable policy implications for mitigating the effects of future pandemics.

**Keywords:** Government intervention, Stock market performance, Asian countries, COVID-19 pandemic.

### Introduction

In March 2020, the global declaration of the COVID-19 pandemic presented an unprecedented challenge with an unknown origin and limited prior management experience. This widespread crisis inflicted substantial losses globally, affecting both economic and health dimensions. The pivotal role of the stock market in the economy led to negative influences during the pandemic, with March 2020 witnessing significant declines in global stock markets (Morales & Andreosso-O'Callaghan, 2020).

Governments worldwide responded to these challenges by implementing various measures in order to mitigate pandemic-induced losses. While numerous studies have explored the impact of COVID-19 on macroeconomic indicators and financial markets, there is a scarcity of research on how government policy responses specifically influence both the economy and stock markets. Additionally, existing studies have predominantly focused on countries like the US and China, leaving a notable gap in the examination of stock markets in Asian countries.

#### 1. Research Objectives

1.1 To analyze the impact of COVID-19 on the performance of the Asian stock markets, examining both stock return and stock volatility.

1.2. To access the dynamics of Asian stock markets during periods of government intervention amid the COVID-19 pandemic.

Seven Asian countries, representing developed, emerging, and frontier markets based on MSCI classification, have been selected, including China, India, Indonesia, Japan, Singapore, Sri Lanka, and Vietnam.

## 2. Literature Review

Amidst the swift emergence of research exploring the impact of the COVID-19 outbreak on the economy and financial markets, there is also a growing body of studies dedicated to analyzing the effects of government interventions on stock markets during the pandemic, resulting in divergent findings. Some studies, like Chang et al. (2021) and Yang & Deng (2021), have identified positive impacts, while others, such as Shanaev et al. (2020) and Alexakis et al. (2021), have reported negative effects of government policy intervention.

In the context of COVID-19-related studies in Asian countries, numerous recent investigations have predominantly focused on examining the pandemic's repercussions on stock markets. However, there is a limited body of research on the influence of governmental responses to COVID-19 on stock market performance in these nations. Therefore, this article aims to address this gap in the existing literature.

## Research Methodology

### 1. Data:

The study covers data collected from January 1, 2020, to December 31, 2021, representing the primary period of the COVID-19 pandemic. Stock indices for selected Asian countries, S&P500 and VIX, were obtained from Investing.com. Information on government policy responses came from the Oxford COVID-19 Government Response Tracker (OxCGRT) database, while confirmed case data was sourced from Our World in Data (OWID).

### 2. Methodology:

#### 2.1 GARCH(1,1) model

In order to analyze the impact of COVID-19 pandemic on the performance of Asian stock markets, we employ the GARCH(1,1) model, as presented below:

$$r_t = \beta_0 + \beta_1 r_t^{US} + \beta_2 Covid19_t + \varepsilon_t$$

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1} + \beta \sigma_{t-1}^2 + \gamma VIX \quad (1)$$

Where:  $r_t$ : return of stock index on the day t

$r_t^{US}$ : return of S&P500 on the day t

$Covid19_t$ : change of the world total cases on the day t

$\sigma_t, \sigma_{t-1}$ : the variance on the day t and t-1

$VIX_t$ : change of VIX Index of the day t

#### 2.2. Panel regression method

Our study employs the random-fixed effect model with country fixed-effect dummy variables to study the impact of government intervention on stock market performance. The baseline models are outlined below:

$$r_{i,t} = \alpha_0 + \beta_1 Covid19_t + \beta_2 GovernmentResponse_{i,t} + \beta_3 r_t^{US} + \sum_{i=1}^{C-1} \gamma_i C_i + \varepsilon_{i,t} \quad (2)$$

$$r_{i,t} = \alpha_0 + \beta_1 Covid19_t + \beta_2 GovernmentResponse_{i,t} + \beta_3 CrossProduct + \beta_3 r_t^{US} + \sum_{i=1}^{C-1} \gamma_i C_i + \varepsilon_{i,t} \quad (3)$$

Where:  $r_{i,t}$ : stock market returns in country  $i$  on day  $t$

$GovernmentResponse_{i,t}$ : indicate the action of government in country  $i$  during the COVID-19 pandemic on day  $t$

$C_i$ : represents for country dummy variables

CrossProduct: interaction variable between COVID-19 and GovernmentResponses

## Results

### 1. Impact of COVID-19 pandemic on Asian stock market performance

Table 1 displays regression results indicating statistically significant coefficient  $\beta_1$  at the 1% confidence level for all countries except Sri Lanka. This underscores the discernible influence of the US stock market on the return rates of Asian countries' stock markets. Notably, the COVID-19 variable is negative and statistically significant in most countries, excluding Japan, indicating the adverse impact of COVID-19 pandemic on Asian stock markets.

**Table 1:** Results of GARCH models

Coefficients	$\beta_0$	$\beta_1$	$\beta_2$	$\omega$	$\alpha$	$\beta$	$\gamma$
China	0.046	0.139***	-0.013***	0.031	0.097***	0.845***	0.001
	(0.904)	(4.376)	(-4.700)	(0.870)	(3.173)	(18.570)	(0.844)
Japan	0.049	0.229***	-0.001	-0.361	0.167***	0.190	0.058***
	(0.958)	(5.225)	(-0.201)	(-1.640)	(2.739)	(1.220)	(3.600)
Singapore	0.006	0.167***	-0.004***	-0.286***	0.246***	0.326*	0.028***
	(0.182)	(5.250)	(-3.706)	(-2.584)	(3.464)	(1.710)	(2.755)
India	0.092**	0.333***	-0.004***	-0.316***	0.166***	0.622***	0.027***
	(2.212)	(7.421)	(-2.593)	(-3.204)	(3.311)	(6.958)	(3.268)
Sri Lanka	0.171***	-0.028	-0.007**	-0.402***	0.142***	0.751***	0.029***
	(2.968)	(-0.478)	(-2.277)	(-4.067)	(4.231)	(19.107)	(4.364)

Coefficients	$\beta_0$	$\beta_1$	$\beta_2$	$\omega$	$\alpha$	$\beta$	$\gamma$
Indonesia	0.021	0.251***	-0.004***	-0.438***	0.122**	0.559***	0.035***
	(0.533)	(6.122)	(-3.746)	(-4.994)	(2.386)	(7.101)	(4.960)
Vietnam	0.164***	0.163***	-0.007***	-0.205	0.272***	0.420***	0.031***
	(3.410)	(4.137)	(-3.640)	(-1.189)	(4.379)	(3.981)	(2.649)

Notes: t statistics in parentheses. \*\*\*, \*\*, \*: significant at 1%, 5%, 10%

Source: Author's calculations

The volatility from the US market, as measured by changes in the VIX index, positively affects the volatility in the stock markets of the examined countries. Figure 1 illustrates the volatility of the stock markets in the studied countries during the 2020-2021 period. Notably, most countries encountered significant fluctuations in the early stages of the epidemic, gradually subsiding over time.

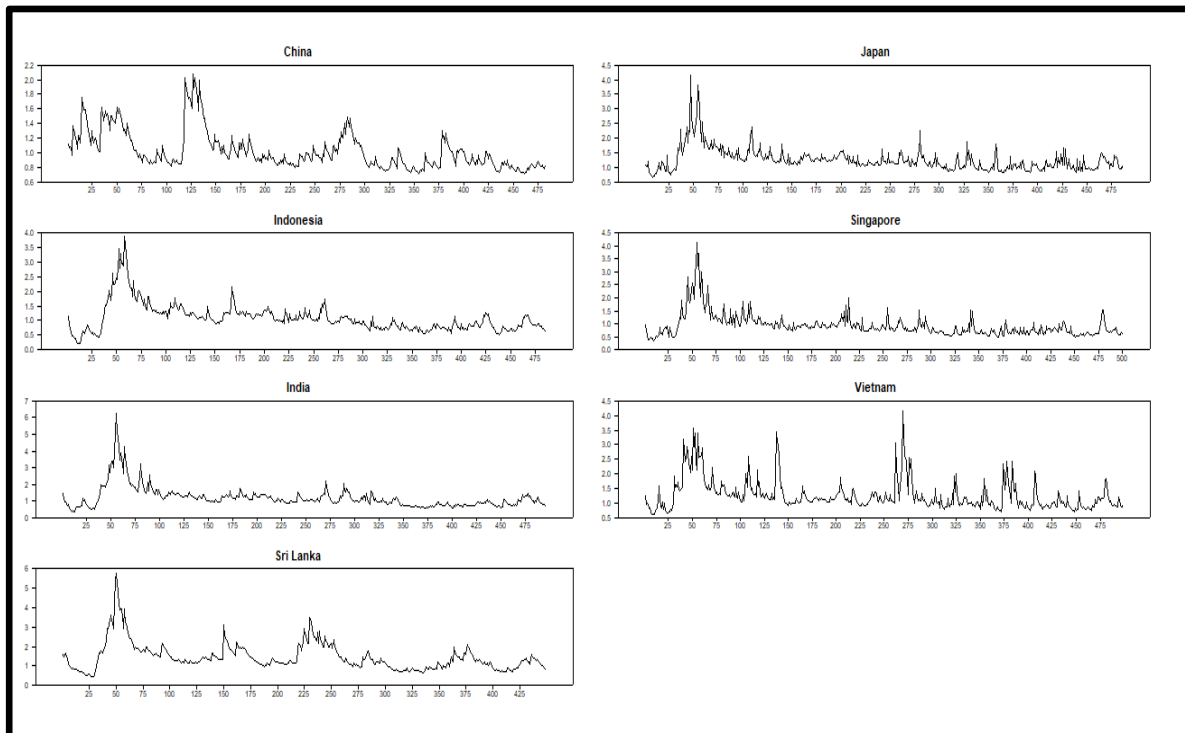


Figure 1: Stock volatilities of the seven ASIAN countries during the period 2020-2021

Source: Author's computation

## 2. Impact of government response to COVID-19 on Asian stock market performance

Table 2 displays the results of the panel data regression analysis. In model (2), the COVID-19 variable's coefficient is negative, signifying a decline in the return rates of Asian stock markets due to the impact of the epidemic. Conversely, government response policies show a positive impact on the profit rates of these countries, emphasizing the restorative effect of governmental measures on market recovery.

Table 2. Results of panel models



Dependent variable	Coefficients	
	Model (2)	Model (3)
Constant	-0.134 (-1.33)	-0.293*** (-2.88)
COVID19	-0.022*** (-6.11)	0.004 (0.84)
Government Response	0.004*** (2.18)	0.006*** (3.97)
$r_t^{US}$	0.213*** (14.92)	0.212*** (14.99)
Cross Product		-0.001*** (-8.17)
Year dummies	Yes	Yes
Number of observations	3397	3397

Notes: *t* statistics in parentheses; (\*\*\*) : significant at 1%

Source: Author's computation

To validate our findings, we introduced an interaction variable between the COVID-19 variable and the Government Response in model (3). The results show that the coefficient representing the impact of COVID-19 on the stock market's return rate is no longer statistically significant. However, the Government Response policy variable maintains a positive coefficient (+), affirming its contribution to the stock market's performance. Notably, the interaction variable has a negative coefficient (-), indicating that COVID-19 has diminished the influence of the Government's response policy on the market. Upon excluding Japan from the sample and re-running the model, we find similar results.

## Discussion

This article confirms a negative impact of the COVID-19 pandemic on the stock market performance of the ASIAN countries studied. However, government interventions are found to positively influence stock returns in these countries. These findings align with Chang et al.'s (2021) research, which highlights positive effects of government interventions on stock markets globally in 20 countries.

## Suggestions

This article's findings offer valuable recommendations for investors and policymakers in Asian countries. In the face of a potential future pandemic, it is crucial for governments to intervene promptly to boost public confidence and, by extension, restore stock market performance. Additionally, investors can use government interventions as signals to anticipate forthcoming market trends.

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## The volatility spillovers between the cryptocurrency market and traditional markets

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### Abstract

The present article analyzes the volatility spillovers between the cryptocurrency market and traditional markets from 2018 to 2022, divided into pre-Covid-19 and during Covid-19 pandemic periods. Bitcoin data is used to represent the cryptocurrency market while stock market data, the U.S. dollar index, WTI crude oil prices, and gold prices represents traditional markets. In addition, methodology is based on the VAR model and variance decomposition of forecast errors. The results indicate that the volatility spillovers of Bitcoin is significantly weaker compared to the volatility spillovers of other markets. Moreover, the Covid-19 pandemic has extended the degree of volatility spillovers across the entire system and turning Bitcoin into a net transmitter of volatility.

**Keywords:** Volatility spillovers, Bitcoin, Covid 19, Cryptocurrency

### Introduction

In recent times, with the development of fintech, many new types of assets have been well received by the market. Assets such as NFTs (non-fungible tokens) or cryptocurrencies have become popular with the public due to their flexible trading, high profits and few legal constraints. During the Covid-19 pandemic, in contrast to the stalled global economy, the market of decentralized financial products has seen exponential growth. The cryptocurrency market also peaked at the end of 2021 with a total market capitalization of up to \$2.9 trillion, and Bitcoin - the most popular cryptocurrency - has become one of the ten most valuable assets in the world along with gold and stocks of large corporations.

As the pandemic has been gradually controlled, the "winter" of the NFT and decentralized finance market came immediately and wiped out a huge amount of value that had been accumulated before. There have been many studies on the volatility of the cryptocurrency market in general and Bitcoin in particular. Studies by authors like Puri (2016) or Poyser (2019) have pointed out macro factors like inflation, industrial production, money supply that affect Bitcoin prices. Some other studies by Nguyen et al. (2019), Kapara and Olmo (2019) show that factors related to the supply and demand of the cryptocurrency market or futures prices are the culprits behind the strong volatility after 2018.

However, at the present time, there is limited research on volatility spillovers between the cryptocurrency market and other markets such as traditional stock markets or commodity markets (gold, oil, etc.). This is a new approach that does not focus on studying factors affecting cryptocurrency prices but aims to understand the interaction between markets. Therefore, the author has chosen this research to assess the impact between the cryptocurrency market and other traditional markets in order to have a clearer view on the nature and relationship between markets under the impact of the pandemic. In addition to traditional markets, cryptocurrencies are also playing a crucial role in the context of global finance, offering diversification and risk management opportunities for investors. All markets are interconnected, with events in one often influencing the other, reflecting global economic interconnectedness. Market sentiment, regulatory developments, and technological advancements impact both cryptocurrency and traditional markets, underscoring their importance in understanding and navigating financial fluctuations.

### **1. Research Objectives**

- 1.1 To study the static volatility spillovers between Bitcoin and other assets.
- 1.2 To study the dynamic volatility spillovers between assets and the entire system.
- 1.3 Try out the impact of the covid -19 epidemic on the volatility spillovers.

### **2. Review of Related Literatures**

According to Hasan et al. (2019), volatility spillovers are defined as the process of transmitting instability from one market to another. This occurs when price fluctuations in one market create a lagged influence on price fluctuations in another market, beyond the local influence of that market. This phenomenon is common mainly in financial markets. In many cases, a term that is often used interchangeably with spillovers is "connectedness". Connectedness refer to the relationships between variables in a network or system. It is synonymous with correlation or connection. Another related concept is "financial market integration", studying the relationships between multiple financial markets. In contrast to the concept of financial market integration, financial connectedness emphasizes a network or system perspective and includes relationships or connections at different levels, whether pairwise connections between two variables or system-wide connections between all variables in the system (Jiang, 2020)

The connection of the global economy, driven by the trends of globalization and the rapid advancements in science and technology, has led to a growing demand for need for research on the interlinkages between different markets. In particular, financial markets are increasingly strongly connected and subject to impacts from systemic risks such as epidemics, wars or political turbulence. There have been many studies on volatility spillovers between traditional markets in recent times. These include Beirne et al. (2013) examining volatility spillovers between stock markets from developed countries to emerging economies, Mohammed (2021) assessing foreign exchange market volatility spillovers, and Laborda & Olmo (2021) investigating volatility spillovers between economic regions during the financial crisis and Covid-19 pandemic. These studies on this topic have clarified the mechanisms and extent of market interconnectedness, providing very practical suggestions for both academicians and market regulators and investors.

Regarding the cryptocurrency market, this is a market that has attracted investors' attention recently due to its novelty and high profit potential. However, high profits always come with high risks – this is the most critical principle in finance. The cryptocurrency market has only developed in the past decade but has attracted enormous capital inflows and is increasingly prevalent in the market. Yet the nature of the cryptocurrency market remains a big question that requires comprehensive research on various aspects like legal, ethical, technical, economic issues...

Within the scope of this research, the author will delve deeper into introducing research related to the connectedness between the cryptocurrency market, led by Bitcoin, and other markets. According to Naeem et al. (2023), studies on return connectedness and volatility spillovers between the cryptocurrency market and traditional global markets can be classified into two main directions: (i) The first direction is research on the relationship between cryptocurrencies and the stock market, and (ii) The second direction studies price movement in cryptocurrencies market and interactions between cryptocurrencies and other markets (e.g. commodity or foreign exchange markets).

*(i) Research on the relationship between cryptocurrencies and the stock market*

In the first research direction, Matkovskyy & Jalan (2019) examined volatility spillovers between stock markets in developed countries including the US, Europe, the UK, Japan and the Bitcoin market denominated in major currencies USD/EUR/GBP/JPY. After analysis, the results show that Bitcoin is influenced by shocks from financial markets, implying the existence of volatility spillovers impacting Bitcoin.

Meanwhile, Kristjanpoller & Bouri (2019) investigated the long-term correlation relationship between major fiat currencies and popular cryptocurrencies. Empirical results provide evidence of strong connectivity between many conventional currencies and some leading cryptocurrencies.

In addition, in this research direction, authors also assessed whether cryptocurrencies can be used as a safe haven or hedging asset. Goodell & Goutte (2021), after employing the wavelet coherence model and neural network analysis, concluded that Tether is an important “safe haven” asset during the Covid-19 pandemic period. Similarly, Karim et al. (2023) found evidence that Bitcoin can help investors cope with uncertainty in global stock markets in the short term.

*(ii) Research on price movement in cryptocurrencies market and interactions between cryptocurrencies and other markets*

Firstly, the study by Mensi et al. (2021) examined the extent of volatility connectivity over short, medium and long term between cryptocurrencies and pointed out that BTC, ETH and LTC are transmitters volatility, while other cryptocurrencies are net receivers. More extensively, Yi et al. (2018) constructed a volatility connectedness network and indicated that 52 cryptocurrencies around the world are closely connected. The result showed that Bitcoin is not the dominant currency in volatility connectedness relationships. The total volatility connectedness system fluctuates cyclically and rises when the market is undergoing unstable economic conditions.

In the research direction on interactions between cryptocurrencies and other markets, Naeem et al. (2023) assessed the mutual information dependencies between various commodities as well as leading

cryptocurrencies. From both the spillover and network perspectives, the groups of authors indicate that energy and agricultural commodities are driving factors of the overall system.

## Research Methodology

### 1. Method for measuring volatility

Daily volatility is measured according to the method proposed by Parkinson (1980) based on the assumption of Brown motion of prices:  $V_{P,t} = 0.361R^2 = 0.361[\ln(H_t/L_t)]^2$

Then, the daily value is converted into annually standard deviation according to the formula (Diebold &

$$Yilmaz, 2015): \sigma_{it} = 100 \sqrt{365 \times \sigma_{it}^2}$$

### 2. Examine volatility spillovers

#### 2.1 Vector autoregressive (VAR) methodology and variance decompositions

To analyze volatility spillovers, we utilize the generalized vector autoregressive (VAR) methodology. Specifically, our study relies on the variance decompositions proposed by Diebold and Yilmaz (2009). The variance decomposition shows how volatility shocks in one market (e.g. market A) are attributable to exogenous shocks from other markets. We can represent this using variance decomposition together with an N-variable VAR by taking the shares of the forecast error variance for each asset i stemming from shocks to another asset j, for all  $j \neq i$ , and summing this across all assets  $i=1, \dots, N$ .

The p-order vector autoregressive (VAR) model can be expressed as:  $x_t = \sum_{i=1}^p \varphi_i x_{t-i} + \varepsilon_t$  where  $x_t$  represents the N-dimensional column vector of each market price yield, and  $\varepsilon \sim (0, \Sigma)$  is a vector of independently and identically distributed disturbances with zero mean and  $\Sigma$  covariance matrix. Given that  $\varphi_t (N \times N)$  is the autoregressive coefficient matrix concerning time  $t = 1, \dots, T$ , a moving average representation can be derived as shown in  $x_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i}$ . The coefficient matrix  $A_i$  is  $N \times N$ , satisfying:  $A_i = \varphi_1 A_{i-1} + \varphi_2 A_{i-2} + \dots + \varphi_p A_{i-p}$ . Where  $A_0$  is the  $N \times N$  identity matrix, and  $A_i = 0, i < 0$ .

#### 2.2 Net Spillovers

In the next step, the procedure for forecast error variance decomposition is presented. The variance decomposition is the proportion of the H-step prediction error variance of  $x_i$  explained by variable  $x_j$ , especially when variable  $x_i$  is externally affected, is frequently employed to quantify the spillover effect of variable  $x_j$  on  $x_i$ , denoted as  $\vartheta_{ij}^g(H)$ . The method of Koop et al. (1996) and Pesaran and Shin (1998) is used to ensure variance decomposition independence from variable ordering. The standardize the matrix as

$$\text{followed: } \tilde{\vartheta}_{ij}^g(H) = \frac{\vartheta_{ij}^g(H)}{\sum_{j=1}^N \vartheta_{ij}^g(H)}$$

With  $\sum_{j=1}^N \tilde{\vartheta}_{ij}^g(H) = 1$  and  $\sum_{i,j=1}^N \tilde{\vartheta}_{ij}^g(H) = N$ . Consequently,  $\tilde{\vartheta}_{ij}^g(H)$  is derived as an alternative metric for the pairwise directional connectedness from market  $j$  to market  $i$  at horizon  $H$ . In the connectedness table, it can be characterize the pairwise directional connectedness from  $j$  to  $i$  as  $S_{i \leftarrow j}^g(H) = \tilde{\vartheta}_{ij}^g(H)$

To assess the spillover effect transmitted (received) to (from) a specific variable, the directional spillover index through the matrix as

$$S_{\cdot \leftarrow j}^g(H) = \frac{\sum_{j \neq i}^N \tilde{\theta}_{ij}^g(H)}{\sum_{j=1}^N \tilde{\theta}_{ij}^g(H)} \times 100 = \frac{\sum_{j \neq i}^N \tilde{\theta}_{ij}^g(H)}{N} \times 100$$

$$S_{i \leftarrow \cdot}^g(H) = \frac{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)}{\sum_{j=1}^N \tilde{\theta}_{ij}^g(H)} \times 100 = \frac{\sum_{j=1}^N \tilde{\theta}_{ij}^g(H)}{N} \times 100$$

where the spillover "to others" index and the spillover "from others" index are represented by  $S_{\cdot \leftarrow j}^g(H)$  and  $S_{i \leftarrow \cdot}^g(H)$  respectively. The difference between the two is then defined as the net spillover index, as given by  $S_i^g(H) = S_{\cdot \leftarrow i}^g(H) - S_{i \leftarrow \cdot}^g(H)$ . When  $S_i^g(H) > 0$  market  $i$  should be regarded as a net transmitter of risk, exerting influence on other markets in the entire system. In contrast,  $S_i^g(H) < 0$  market  $i$  should be seen as a net receiver, being more sensitive to variations in other markets. Thus, the total spillover index can be calculated, given by

$$S^g(H) = \frac{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)}{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)} \times 100 = \frac{\sum_{j \neq i}^N \tilde{\theta}_{ij}^g(H)}{N} \times 100$$

which explains the proportional contribution of the spillover effect between  $N$  markets to the total forecast error variance and averages the off-diagonal elements.

### 2.3 Net Pairwise Spillovers

The total directional connectedness "from" the respective market,  $S_{i \leftarrow \cdot}^g(H)$ , is described by the sum of each row in the adjacency matrix (node-in degrees), and the total directional connectedness "to" the respective market,  $S_{\cdot \leftarrow i}^g(H)$ , is described by the sum of each column in that matrix (node-out degrees). This visualization allows us to observe the connectedness across markets, where both "from" and "to" directional connectedness are depicted by the edges of the network.

### 3. Descriptive Statistics

Table 1 provides descriptive statistics on volatility data, including the price of Bitcoin, the MSCI stock index, the US dollar index USDX, the daily price of WTI oil, and gold. All data are collected from the data provider investing.com with a daily frequency from January 1, 2018 to December 31, 2022. Volatility data are calculated according to the method presented in the methodology section. The study used 1,283 observations and was divided into two periods, 555 observations belonged to the pre-epidemic period and 471 observations belonged to the Covid-19 epidemic period.

**Table 1:** Descriptive statistics, annualized volatility from 2018 to 2022

Name	Count	Mean	Median	SD	Min	Max
BTC	1283	0.612	0.497	0.472	0.039	6.394
MSCI	1283	0.135	0.105	0.112	0.002	1.181
USDX	1283	0.066	0.059	0.036	0.004	0.348
WTI	1283	0.424	0.344	0.389	0.094	7.049
XAU	1283	0.149	0.128	0.086	0.026	0.909

## Results/Research

### 1. Volatility spillovers: Static analysis (spillover tables)

According to Diebold and Yilmaz (2009), Tables 2, 3 and 4 are called spillover tables, created based on the forecast error variance decomposition method. In these tables, assets are divided into “From” (initiating volatility spillovers) and “To” (receiving volatility spillovers).

**Table 2:** Spillover table, period from 2018 - 2022

To \ From	BTC	MSCI	USDX	WTI	XAU	C. from others
BTC	79.62	6.12	7.22	0.809	6.23	20.4
MSCI	5.24	63.52	12.70	5.333	13.20	36.5
USDX	5.71	15.67	61.70	2.180	14.73	38.3
WTI	3.53	15.79	5.47	65.676	9.54	34.3
XAU	7.93	13.84	14.10	4.991	59.15	40.8
C. to others (spillover)	22.41	51.42	39.49	13.312	43.70	34.1
C. to others including own	102.03	114.94	101.19	78.988	102.86	500.0

**Table 3:** Spillover table, period before Covid-19 epidemic (from January 2018 to February 2020)

To \ From	BTC	MSCI	USDX	WTI	XAU	C. from others
BTC	86.40	1.35	7.43	1.68	3.14	13.6
MSCI	1.08	67.53	11.00	11.04	9.35	32.5
USDX	5.51	7.74	69.47	8.42	8.86	30.5
WTI	1.75	15.82	8.60	62.29	11.55	37.7
XAU	2.21	9.61	12.38	16.25	59.55	40.5
C. to others (spillover)	10.55	34.52	39.40	37.39	32.90	31.0
C. to others including own	96.95	102.06	108.87	99.67	92.45	500.0

**Table 4:** Spillover table, Covid-19 epidemic period from (March 2020 to December 2022)

To \ From	BTC	MSCI	USDX	WTI	XAU	C. from others
BTC	70.41	10.4	12.07	0.424	6.66	29.6
MSCI	7.71	65.8	12.10	4.207	10.15	34.2
USDX	8.72	15.4	54.16	1.740	19.99	45.8
WTI	3.42	15.3	6.53	70.802	3.98	29.2
XAU	11.13	10.7	23.20	1.690	53.25	46.8
C. to others (spillover)	30.97	51.8	53.89	8.061	40.78	37.1
C. to others including own	101.39	117.7	108.06	78.864	94.03	500.0

Each cell in the matrix section of the table shows the percentage contribution of the volatility shocks from the "column" asset to the forecast error variance of the "row" asset. Each cell in the “From Others” column shows the total percentage of the forecast error variance for that asset coming from shocks of the other assets. Each cell in the “To Others” row sums up the contributions of that asset to the forecast error variances of all the other assets. The “net” directional connectedness row shows the difference between the corresponding “To Others” and “From Others” cells for each asset. The "Spillover index" is



the bold value located at the intersection of the "C.from others" column and the "c. to others" row. This represents the overall interconnectedness across all assets.

The total value of cells in a column (not including the cell on the diagonal) indicates the total spillover transmitted from the asset in that column to other assets. For example, the total spillover from the whole period for Bitcoin is 22.41%, and for the MSCI stock index it is 51.42%. As explained in the previous section, due to shocks to correlated variables, the total spillover value from each asset can be greater than 100%. Meanwhile, the total value of cells in the same row (not including the cell on the diagonal) indicates the total spillover received by the asset in that row. In Table 2, the total spillover received by MSCI is 36.5%, implying that 36.5% of MSCI's forecasted volatility is explained by impacts from the volatility of other assets.

According to the table above, the daily "to" volatility spillovers of Bitcoin is the lowest among assets (only 20.4% of the 10-day forecast error variance of Bitcoin prices is contributed by other assets). The volatility spillovers of traditional assets are higher, ranging from 34% to 40%. Specifically, gold has the highest spillovers (40.8%) while WTI oil has the lowest (34.3%). This reflects the speculative and high-risk nature of Bitcoin, which often has abnormal fluctuations beyond market expectations and has limited connection with other traditional assets like stocks or gold.

Over the entire 2018-2022 study period, it can be seen that oil prices have very little impact on Bitcoin volatility (only 0.8%) while stock indices, the US dollar index and gold prices have higher volatility spillover levels to Bitcoin prices above 6%. In the opposite direction, the effect is also quite similar when Bitcoin has the weakest volatility spillover impact on WTI oil prices at only 3.53% and above 5% for the remaining assets. The net receiver volatility level of Bitcoin is not high, only at 2.01% (contributes 100% and receives back 97.99%).

Compared to the entire period, volatility spillovers between assets were much weaker in the pre-Covid-19 period (01/2018 to 02/2020). Specifically, only 13.6% of Bitcoin's volatility was impacted by other assets, of which the US dollar had the highest impact (7.43%), followed by gold (3.13%) while stock indices and oil prices had impacts of just over 1%. In this period, Bitcoin has "to" spillovers was significantly lower than other assets (the total market spillover before the Covid-19 pandemic was 31%). This shows that in the pre-pandemic period, Bitcoin was least affected by shocks from traditional markets.

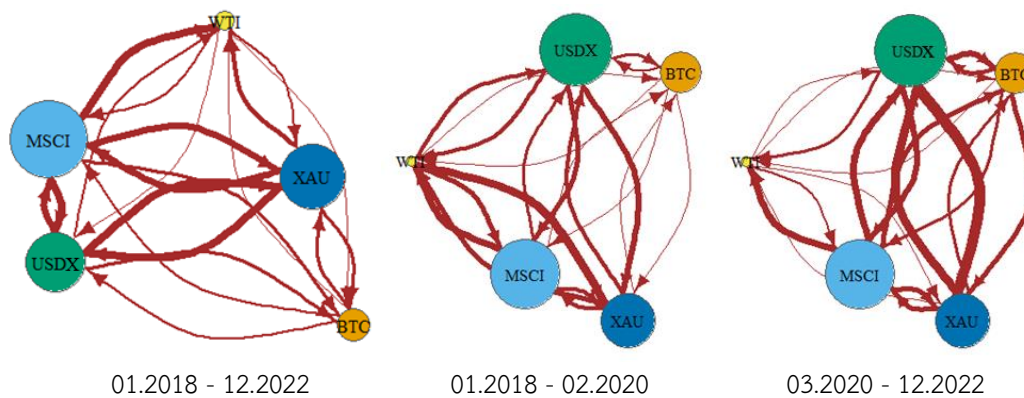
It can be seen that the volatility spillovers of most assets during the epidemic period is much higher than the pre-epidemic period. Specifically, the increase in spillover index from 31% to 37% after the disease outbreak shows that the system's volatility spillover level surged. Most assets have higher "from" and "to" spillover values compared to pre-pandemic levels. The only exception is WTI oil prices, when both "from" and "to" volatility spillovers are lower. This can be explained by crude oil being more heavily impacted by real economic activities which were stalled during high pandemic periods compared to other investment or speculative assets, while oil prices were also affected by limited supply sources and storage capacity.

In the pandemic period, the "to" spillover level of assets became more balanced with each other, ranging from 30% to 40%. Bitcoin's reception level was not too different from other assets, even higher

than that of WTI oil prices. According to Table 4, Bitcoin has also become a source of volatility initiation along with stocks and the US dollar.

Thus, it can be concluded that under the impact of the Covid-19 pandemic, the system's volatility spillover level is higher, the volatility of each asset is more heavily influenced by shocks from other assets (except for WTI oil). Bitcoin also has greater connectivity with other assets as both “from” and “to” of spillovers are much higher than the pre-pandemic period. Among those, the USDX i and gold prices have the highest volatility impacts on Bitcoin prices.

Figures 1 visualize the volatility spillovers between assets in the study over different periods. Each circle represents an asset and the arrows indicate two-way volatility spillover impacts.



**Figure 1:** Volatility spillovers network

## 2. Dynamics of volatility spillover (spillover plots)

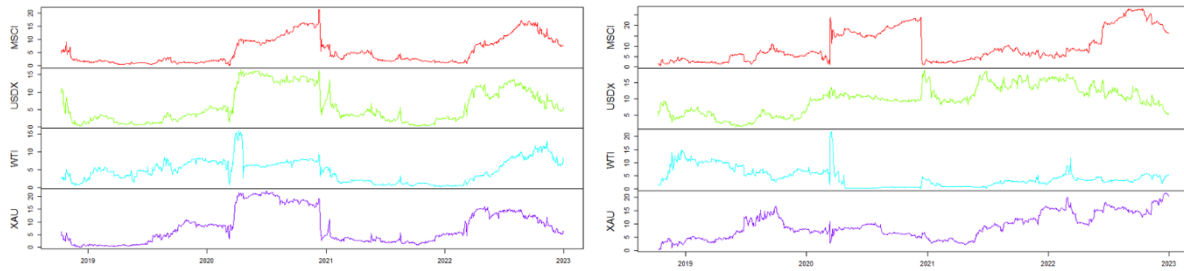
Figures 2 to 4 provide the evolution of dynamic volatility spillovers between assets in the study. To calculate the dynamic volatility spillover series, we use the framework proposed by Diebold and Yilmaz (2012) to estimate on rolling windows, each window containing 200 observations. Specifically, the first window contains the first 200 observations from the first day (01/01/2018) to the 200th day, the second window from 02/01/2018 to the 201st day and so on.

From the figures below, it can be concluded that:

First, the irregular changes in the spillover plots indicate time variation under the influence of different factors.

Second, the Covid-19 pandemic outbreak caused a spike in total system-wide volatility spillovers. Figure 4 shows the spillover plots surged after the global pandemic outbreak and persisted until early 2022 – when the pandemic began to subside due to the emergence of Vaccines.

Third, Bitcoin is a net receiver of volatility spillovers except for the period of the strongest outbreak of Covid-19. This is a very notable feature because in the pre- and post-pandemic periods (before 2020 and after 2021) Bitcoin was a large net receiver of volatility but turned into a source of volatility initiation when the pandemic occurred.



Volatility spillover from Bitcoin to other assets      Volatility spillover from other assets to Bitcoin

**Figure 2: Dynamics of volatility spillover**



**Figure 3: Net volatility spillovers from Bitcoin to the entire system**



**Figure 4: Dynamics of total volatility spillover**

## Discussion

Using the analytical framework of Diebold and Yilmaz (2009, 2012, 2015), based on the VAR estimation results, the study uses the variance decomposition method to calculate volatility spillover indices. Some notable points from the research results are:

- Over the entire study period from 2018 to 2022, only 20.4% of Bitcoin's volatility spillovers came from other assets, the lowest compared to traditional assets (ranging from 34% to 41%). This shows that Bitcoin have a weak linkage with the others, positioning itself as a valuable asset for portfolio diversification. The unique nature of Bitcoin, as a decentralized digital currency, allows it to operate independently from the traditional financial system. This autonomy is particularly advantageous for investors seeking to diversify their portfolios and guard against risks associated with more conventional assets. These results are consistent with some prior studies (Goodell & Goutte, 2021; Karim et al., 2023). However, this connection has increased significantly since the pandemic outbreak.

- In the pre-Covid pandemic period (from 01/2018 to 02/2020), only 13.6% of Bitcoin's volatility spillovers came from other assets, much lower than the market average of 31%. Bitcoin was also a net receiver of volatility spillovers (-3.05%) rather than a transmitter.

- However, during the Covid pandemic period (03/2020-12/2022), the proportion of Bitcoin's volatility spillovers due to impacts from other assets increased to 29.6%, which is still low but not too different from the market's average of 37.1%. In addition, Bitcoin has also become a net transmitter of volatility spillovers (1.37%) similar to the result of Mensi et al (2021), which is a remarkable point between the two pandemic phases.

- Besides, the Covid pandemic outbreak has led to a surge in systemic volatility spillovers (from 31% to 37%), while enhancing Bitcoin's connections and ability to transmit volatility spillovers. More specifically, Bitcoin became a source of spread only during the most intense period of the Covid epidemic (2020-2021). Overall, the Covid pandemic has caused a spike in volatility spillovers across the system, making assets more vulnerable to external shocks. This phenomenon is in line with the findings presented by (Yi et al., 2018).

## Suggestions

From the research results, some suggestions can be made as follows: For individual investors or portfolio managers: (i) It should be noted that cryptocurrencies (such as Bitcoin) are inherently highly speculative, volatile, and risky. The study shows that in the pre-Covid pandemic period, Bitcoin's volatility was little affected by traditional assets (13.6%) and was a net receiver of volatility spillovers (-3.05%). Therefore, investors can view Bitcoin as an effective risk hedging asset for their portfolio. The weak correlation with traditional assets means that Bitcoin's value may respond differently to market events, thereby reducing the overall risk exposure of the portfolio. (ii) However, during the pandemic period, Bitcoin's connectedness and ability to transmit volatility spillovers increased (29.6% and net transmitter of 1.37%). Hence, investors need to consider Bitcoin's portfolio weight to diversify risks when there are macro shocks. (iii) Overall, Bitcoin should be kept at 5% of the total portfolio value (Andrianto, 2017) to harness profit potential while still ensuring diversification.

For financial regulators and supervisors: (i) It is necessary to focus on monitoring volatility spillovers from cryptocurrencies to traditional financial markets, especially during crises and recessions. (ii) Regulators should concentrate on developing a legal framework to regulate the cryptocurrency market, avoiding risk contagion to banks and traditional financial institutions. (iii) International cooperation on cryptocurrency supervision and governance should be enhanced to cope with global risks.

This study can be expanded with research on return connectedness to further clarify the linkage between markets. In addition, with more updated data, research results can show the impact of the Russia-Ukraine conflict or other major events. The author also hopes to expand the research by adding more assets such as metals, grains... or other foreign currencies to see the comprehensive connection of the market.

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## Determinants of energy poverty in the central coastal area, Vietnam

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### Abstract

This study utilises the updated microdata from Vietnam to investigate the determinants of energy poverty in the Central Coastal region. Energy poverty is calculated using the income and expenditure-based approach, and the findings indicate that over 54% of households in the Central Coastal region spend more than 10% of their income on energy costs. The study reveals a significant difference in energy poverty concerning socio-demographic and geographical factors, such as gender, age, ethnicity, education and income in the Central Coastal region. These findings raise concerns for policymakers, emphasising the need to address adverse impacts on health and education for those experiencing energy poverty in the Central Coastal area.

**Keywords:** Energy Poverty, socio-demographic, policymakers

### Introduction

The significant implications of energy poverty, as highlighted by its substantial impact on various aspects of human life, including health, education and well-being (Churchill & Smyth, 2021; Zhang, Li, & Han, 2019), extend to the economic status of both developed and developing countries (Araújo, 2014; Halkos, 2017). Furthermore, the crucial role of clean energy has once again been underscored in the United Nations' Sustainable Development Goals, where clean energy now constitutes the seventh goal for sustainable development, aimed at alleviating energy poverty (UN, 2018).

In particular, an estimated 1.2 billion people suffer from a lack of access to electricity, and nearly 40 per cent of the world's population depends on traditional fuels like firewood and agricultural residues for cooking to meet their daily energy needs (UNDP, 2017). Therefore, addressing energy poverty and meeting the sustainable energy needs of residents with lower incomes, who spend more on insufficient energy, pose challenges for developing countries.

The Central Coastal region, in particular, and Vietnam, in general, are not exceptions to the challenges faced by developing countries. This region in Vietnam presents a typical case for an examination of determinants of energy poverty. Although this area is one of the regions with the largest percentage of



access to electricity in Vietnam, with over 97% of residents having access to electricity compared to other regions (Asian Development Bank, 2015), the monthly income per capita in the Central Coastal region is still among the lowest income groups compared to the Red River Delta, South East and Mekong River Delta, with about 3,400 thousand Vietnam dong in 2020 according to General Statistics Office (2021). In addition, there are many types of minority ethnicities in the Central Coastal region, with over 18 minority groups accounting for 10.9% in surveys, and most people live in rural areas. As a result, despite the higher percentage of people accessing electricity in this region, lower income still remains a constraint for the Central Coastal area residents to access clean energy.

To the best of our knowledge, this study represents the first research in the literature that investigates the determinants of energy poverty, focusing on households' characteristics and utilising microeconomic data from the Central Coastal area of Vietnam. The objectives of the current study are as follows: i) examining the level of energy poverty in the Central Coastal area of Vietnam; ii) identifying determinants of energy poverty through socioeconomic and demographic factors. By thoroughly analysing the extent of energy poverty in the Central Coastal region, our paper contributes valuable insights to this specific region and, more broadly, to Vietnam. Additionally, the insights found in this paper raise public awareness about energy poverty and enhance valuable public policies, not only in Vietnam but also in other developing countries.

## Literature review

Energy poverty has recently emerged as a significant concern in the formulation of sustainable energy policies across many nations, particularly evident with the ongoing trend in developed countries towards shifting to renewable energy sources. Besides, developing countries are making a concerted effort to enhance residents's access to modern energy, such as electricity. The impacts and determinants of energy poverty, along with its consequences on the well-being and socio-economics of human beings, have been extensively investigated in both developed and developing nations. The following literature provides a brief overview of empirical studies on energy poverty, with a specific focus on Asia, and, more particularly, Vietnam.

Using data from the Indian Human Development household survey, an assessment of energy poverty was conducted in India (Khandker, Barnes, & Samad, 2012; Sadath & Acharya, 2017). Khandker et al. (2012) identified a correlation between energy poverty and income poverty in India, as the country still relies on traditional sources such as firewood to meet about 90% of its energy requirements. In Pakistan, Qurat-ul-Ann and Mirza (2021) examined the intensity level of multidimensional energy poverty among residents, utilising data from the Pakistan Social and Living Standards Measurement survey. In Sri Lanka, using the latest data in the country to examine the determinants of energy poverty, the findings indicated



that the energy-poor population has been affected by health and education factors (Jayasinghe, Selvanathan, & Selvanathan, 2021).

Vietnam has witnessed rapid economic growth accompanied by an increased demand for electricity following the significant economic reform in 1986. Along with the support of international aid, the Vietnamese government has made substantial investments in the national electricity grid to meet the population's energy demand. There has been significant progress in the percentage of households with a grid electricity connection. In 1976, the rate was only 2.5% nationwide; however, by 1990, it increased to 14%, and in 2005 with the promulgation of the Electricity Law, the percentage of households accessing national electricity reached 98% by 2010 (Lee & Gerner, 2020).

Despite the expansion of the electricity grid in Vietnam, financial constraints are a barrier that creates a gap between the energy-poor and non-poor in utilising electricity or energy clean in Vietnamese regions. As a result, some empirical studies reveal energy poverty in Vietnam, which remains an unexplored definition and results in the country. Specifically, Feeny, Trinh, and Zhu (2021) examined the impact of temperature shock and energy poverty in Vietnam using VHLSS data from 2010 to 2016. The measurement approaches of energy poverty were utilised based on energy consumption, energy income and multidimensional poverty index. The findings indicated that households located in rural areas of the North and Central Coast regions suffer from the impact of temperature shocks. Additionally, utilising micro household data, Son and Yoon (2020) explored the relationship between household electricity and income in Vietnam. The study found that household income emerged as a crucial determinant of electricity consumption, revealing an inequality in electricity usage among households. In addition, the correlation between energy transition, energy poverty and inequality in Vietnam was examined using household data in the period 2004 and 2016 (Nguyen, Nguyen, Hoang, Wilson, & Managi, 2019). The authors found that despite the energy transition from traditional to modern energy sources among both rural and urban residents, the households characterised by poverty and belonging to minority ethnic groups continued to rely on traditional energy sources. The study found that the alleviation of energy inequality was more pronounced compared to income and consumption inequalities.

In summary, the above literature review can be further understood through several key points. Firstly, energy poverty has been extensively investigated in many countries, employing various measurement approaches, particularly in developing countries. Secondly, despite some studies analysing energy poverty in Vietnam, previous research has primarily focused on the transition of energy poverty, the relationship between temperature shocks and energy poverty, and the investigation of how income affects access to electricity. Thirdly, rapid economic growth also provides an opportunity to improve electricity access, especially for rural residents in developing nations. Although the high rate of ability to access electricity reflects a country's efforts to limit inequality in energy transition, income inequality remains a barrier for the energy poor. Hence, our study contributes to the literature on these points. We utilise updated microdata in Vietnam to investigate energy poverty in the Central Coastal region and apply an

econometric framework to explore the determinants of energy poverty in this region that have not been studied before.

### Data and Methodologies

#### Data

In this research, we utilize the Vietnam Household Living Standard Survey (VHLSS), conducted by the Vietnam Statistical Organization with technical support from the World Bank.

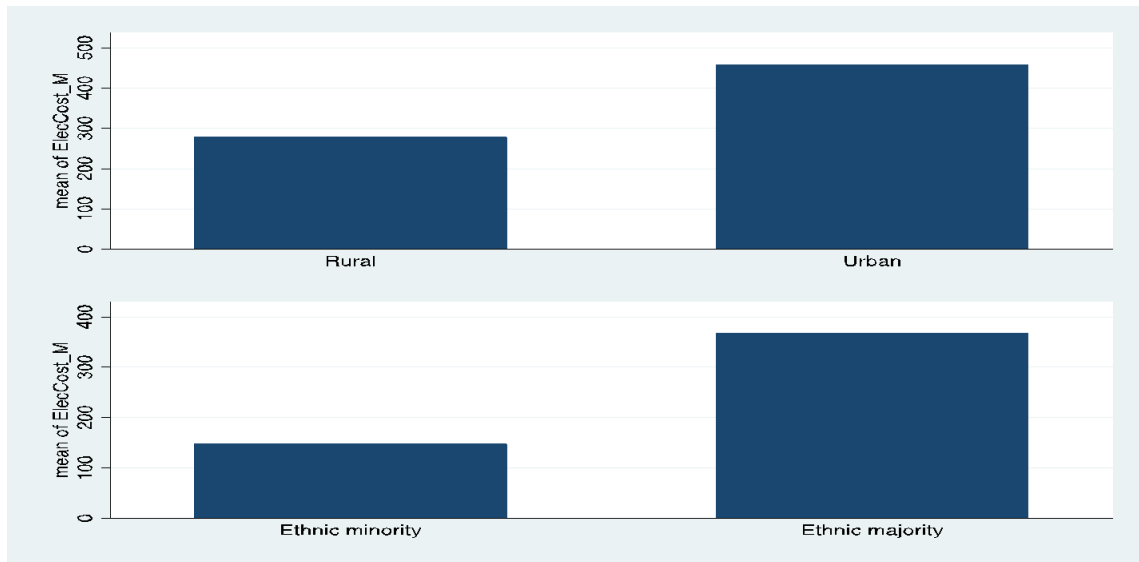


Figure 1: Average monthly expenditure on electricity costs across sectors and ethnic groups

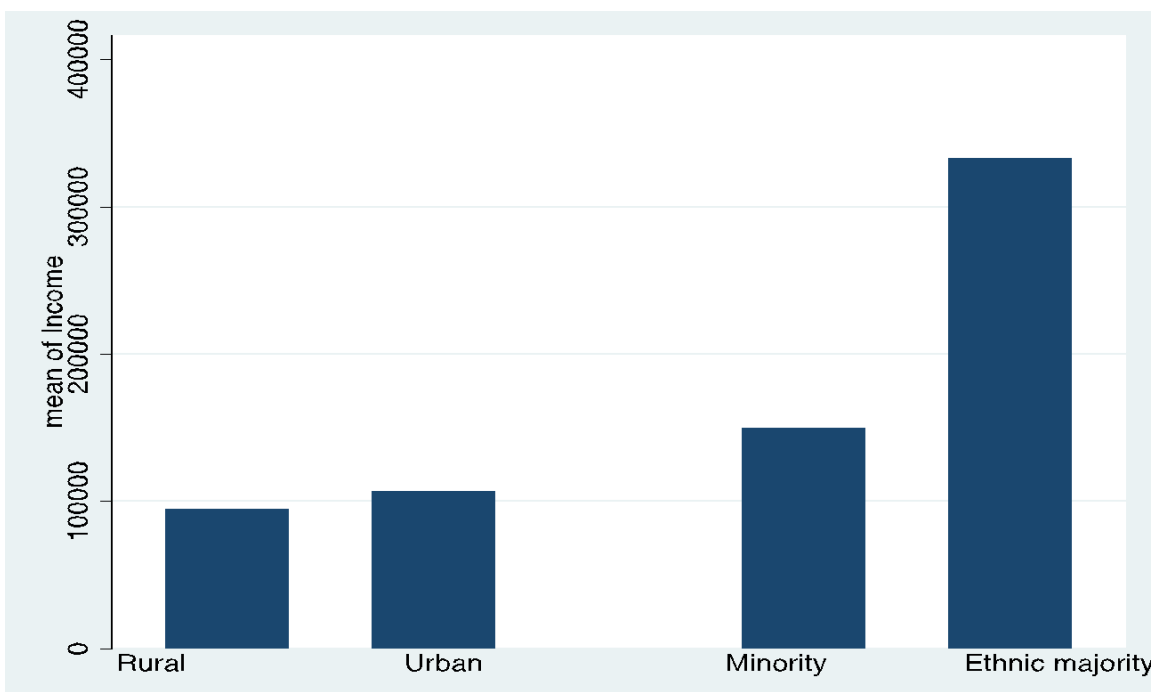


Figure 2: Average yearly income across sectors and ethnic groups

VHLSS provides socioeconomic and demographic information in the microdata, enabling a detailed analysis by residential sector (both rural and urban), income level, ethnicity and gender. The study uses

updated data from 2020, and the sample size of the VHLSS 2020 comprises 9399 households from 3133 communes across 64 provinces in Vietnam. However, the study only focuses on ten provinces in the Central Coastal region, with a sample size of 1230 households in 2020. Figure 1 and Figure 2 present significant income inequality and monthly expenditure on electricity costs across sectors and ethnic groups in this region. Detailed information on the demographic characteristics of the head of the household will be presented in Table 1.

**Table 1:** Summary Statistics

Demographic characteristics	Percentage	Demographic characteristics	Percentage
Ethnicity		Age category of household head	
Kinh	92.1	18-41	24.6
Other	7.9	42-59	49.6
Sector		Over 60	25.8
Urban	40.6	Education level of household head	
Rural	59.4	No schooling	17.4
Average number of employed members in a household	2.18	Primary level	30.7
Gender of household head		Secondary level	27
Male	71.87	Highschool level	15.5
Female	28.13	Advanced level and above	9.4
Average expenditure on firewood of a household	493.7	Average of energy costs as percent of income	0.195

### Methodology

We examine the determinant of energy poverty in the Central Coastal region in Vietnam, encompassing ten provinces, using the estimated energy poverty. The model specification is based on the literature review, as exemplified by previous studies (Abbas, Li, Xu, Baz, & Rakhmetova, 2020; Gupta, Gupta, & Sarangi, 2020; Jayasinghe et al., 2021).

$$\begin{aligned}
 EP = b_0 + \sum_{i=1}^2 b_{1i}ETHNICITY_i + \sum_{i=1}^2 b_{2i}URBAN_i + b_3SIZE + b_4NUMWORK + b_5FHH_i \\
 + \sum_{i=1}^3 b_{6i}AGE_i + \sum_{i=1}^5 b_{7i}EDU_i + b_8lnFIREWOOD + \varepsilon
 \end{aligned} \tag{1}$$

is the number of employed household members in each household, and lnFIREWOOD is the logarithm of expenditure on firewood in each household. FHH represents the gender of the household head and is a

dummy variable (female=1 and 0 otherwise). Age is also a dummy variable presenting the age group of the household head with the base age group 18-41yrs; age<sub>i</sub>; i=1 (42, 59); i=2 (60 and over). URBAN is a dummy variable denoting the residential location of the household in urban or rural areas, with urban=1 and rural equals 0.

Equation (1) employs a quantile regression model in this study, chosen for its three advantages as outlined by Cameron and Trivedi (2010). Firstly, it permits the examination of how the distribution of energy poverty is affected by independent variables, so quantile regression allows us to understand richer data. Secondly, in cases where the data contains outliers, the quantile model proves to be more robust compared to the OLS model. Finally, since heteroskedasticity is a common characteristic of cross-sectional data used in this paper, the quantile model is well-suited for addressing this issue.

In order to analyse the determinants of energy poverty, rather than focusing on the measurement of factors' impact on energy poverty, the endogeneity problem will not be addressed in this paper. Additionally, there are specific concerns about utilising instrumental variables to tackle the endogeneity problem in non-linear models (Jayasinghe et al., 2021; Mahadevan & Hoang, 2016; Subramanian & Deaton, 1996). Hence, this paper exclusively concentrates on examining the determinants of energy poverty.

The empirical literature has witnessed substantial approaches to measuring energy poverty, given the ongoing lack of a universally defined definition for this concept. Energy poverty can be measured through both objective and subjective methods. The subjective measure is directly obtained through surveys, indicating whether a household can meet its energy needs. Objective measures comprise three common approaches. Firstly, the income and expenditure-based approach introduced by Boardman (1991) indicated that a household is energy-poor if it spends over 10% of its income on energy bills. Secondly, the low-income and high-cost measure states that a household will be considered poor if the costs of fuels are more than the median level (Hills, 2012). Lastly, the multidimensional energy poverty index involves the utilisation of several dimensions in the measurement of energy poverty (Nussbaumer, Bazilian, & Modi, 2012).

Due to the limitations in the microdata without the subjective questions related to energy poverty, this paper only employs the objective dimensions of energy poverty. Among some approaches to objective measurement of energy poverty, including measurement-based income, consumption and multidimensional index, each method still contains some limitations. In this paper, we employ the income-based energy poverty measurement introduced by Boardman (1991). This method has demonstrated yielded results compared to alternative measurements (Awaworyi Churchill, Smyth, & Trinh, 2022; Churchill & Smyth, 2021; Feeny et al., 2021).

## Results

The results of OLS and quantile regression models are presented in **Table 2**, which is associated with Eq. (1). In both models, the majority of the estimated coefficients are statistically significant at the 5%

and 1% levels of significance. Additionally, the consistency of the direct relationship between energy poverty and other explanatory variables is observed in both OLS and quantile regression models. Compared to the rural sector as a base dummy, urban sector households exhibit a higher degree of energy poverty.

**Table 2:** Determinants of energy poverty in the Central Coastal region, Vietnam

Variables	Quantile regression model	OLS model
(1)	(2)	(3)
Ethnicity	0.0532** (0.013)	0.0406** (0.036)
Urban	0.0513*** (0.000)	0.0507*** (0.000)
Household Size	0.0288*** (0.000)	0.0349*** (0.000)
Number of employed members in the household	-0.0250*** (0.000)	-0.0382*** (0.000)
Female-headed households (HH)	0.0282** (0.026)	0.038*** (0.009)
Age category of HH (base: 18-41)		
42-59	-0.0493*** (0.001)	-0.0449*** (0.008)
Over 60	-0.0340** (0.042)	-0.0286 (0.120)
Education level of HH (base: no schooling)		
Primary level	-0.0268 (0.109)	-0.00180 (0.912)
Secondary level	-0.0397** (0.023)	-0.0259 (0.124)
Highschool level	-0.0462** (0.021)	-0.0461** (0.018)
Advanced level and above	-0.0336 (0.158)	-0.0321 (0.217)
Infirewood	0.0464***	0.0797***

Variables	Quantile regression	OLS model
	model	
(1)	(2)	(3)
	(0.000)	(0.000)
Constant	-0.155***	-0.294***
	(0.000)	(0.000)
Observations	1,229	1,229
Pseudo R-squared / R-squared	0.2	0.239

Note: p-values are in parentheses, \*\*\*, \*\*, \* indicate at 1%, 5% and 10%, respectively.

Moreover, female-headed households present higher levels of energy poverty compared to male-headed counterparts. The degree of energy deprivation is lower for household heads aged 42-59 and those over 60, compared to the age category of 18 to 41 for household heads. In addition, the results suggest that higher education among household heads is associated with lower levels of energy poverty. Furthermore, households that increasingly rely on firewood show a higher prevalence of energy poverty, and larger household sizes are correlated with increased levels of energy deprivation.

## Conclusion

The study fills a gap in the current literature on energy poverty by investigating its determinants in the Central Coastal region of Vietnam. Utilising an income and expenditure-based approach, we measure energy poverty as households spending more than 10% of their income on energy bills, indicating that the household is experiencing energy poverty. Over 57% of households in the Central Coastal region spend more than 10% of their income on energy bills, signifying a significant prevalence of energy poverty in the region. Furthermore, the study indicates that there is a notable inequality in energy poverty in the Central Coastal region, with a variety of socio-demographic and geographic factors serving as determinants of energy poverty in this region of Vietnam. Consequently, policy implications play a crucial role and are drawn in this study. The Vietnam energy policy should ensure that the energy poor have access to electricity, and households are willing to shift to clean energy for cooking. In addition, it is essential to improve household income to overcome the income barrier, thereby alleviating reliance on traditional energy sources and supporting the energy poor. Furthermore, affordable pricing mechanisms and subsidising clean energy should be considered as national policies to alleviate energy poverty in Vietnam.

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## A study of customer behavior and satisfaction towards online technology product distributors who receive products through transport service providers in Samut Sakhon province

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### Abstract

With the emerging technologies and changes in customers' behaviors in responding to the pandemic, this study aimed to study customer behavior and satisfaction with the services of carriers via online technology in Samut Sakhon Province from May – December 2021 by using a questionnaire as a data collection tool with a sample of 400 people and using One-way ANOVA, to test the hypothesis. The results showed that most customers who use the service are female, aged 25 years and over, with a bachelor's degree, occupation of company employee Average monthly income of 15,0001 baht or more. The most frequent period of use is during May – October, using the service on average once per month. The reason for using the service is convenience. The purchaser cannot choose the freight forwarder for the service's cost per time; the average value is more than 500 baht. The customers who come to use the service have moderate satisfaction. The hypothesis testing revealed that gender, occupation, and income of service users affect the service marketing in all aspects. The age of service users affects all aspects of the service marketing except service-related product efficiency and quality of service. The service users' education level affects the price service marketing, distribution marketing, and promotion. Behavioral factors, different periods of service users from May to December, and service users' frequency affect the service marketing in all aspects. The results can be used to develop strategies for improving product quality, service, and the selection of freight forwarders for distributors through online technology to continue creating greater customer satisfaction.

**Keywords:** Customer behavior, Customer satisfaction, Online Technology, E-commerce

### Introduction

Changes in customer needs, technology development, social media, and social conditions cause E-commerce businesses' rapid emergence. These social conditions ranged from empathy towards others to the need for communication and short commuting time to satisfy customer needs and reduce costs. When coupled with the recent outbreak of the COVID-19 pandemic, the boots in new business development and

the use of online channels are more significant than ever, and it continues to grow steadily in response to the changes.

Thailand is experiencing a severe economic crisis resulting from the global economic crisis, the country's political factors, and the COVID-19 pandemic. As a result, adopting e-commerce played a crucial role in Thailand's economic crisis recovery by stimulating economic expansion, continuous business investment from investors in and out of Thailand, and employment, allowing better money circulation in Thailand's economy. Hence, e-commerce is a force driving Thailand's economic growth that can be applied in many business sectors, causing continuous development and improvement of services and product quality through the adoption of online technology. Thus, resulting in customer satisfaction improvement and encouraging the customers to return to use the services or product in the future.

From observing the business sector in Samut Sakhon Province, even in the light of emerging crises, the Samut Sakhon business sector remains very competitive. Different businesses aim to continuously improve their performance and service quality to stay in business in this highly competitive environment. Customer satisfaction is essential regarding service quality, and companies must comply with customers' needs to improve service satisfaction to stay in a highly competitive environment. Merchandising must focus on enhancing product and service distribution channels and facilities that provide new services to satisfy customers' needs.

Hence, this study aims to study customer behavior and satisfaction toward quality of service using online technology or e-commerce businesses and to receive products through courier service providers in Samut Sakhon to improve service efficiency to comply with customer's needs, which affects their behaviors and satisfaction level which are the core of the services.

## 1. Research Objectives

To compare consumer opinions on different online services marketing factors of courier service users in Samut Sakhon in the following aspects: 1) Product or Service 2) Price 3) Sales 4) Marketing Promotion 5) Service Process 6) Efficiency and quality of Service 7) Personnel and 8) Physical Characteristics.

## 2. Review of Related Literatures

Marketing is a principle a marketer uses to analyze their and competitor's products to consider a business approach which are well-known and used worldwide. Marketing consists of 7 components: Product, Price, Place, Promotion, People, Process, and Physical Evidence, which contain information regarding the details of products and recommendations offered to the consumers (Kotler,2000; Kotler & Armstrong,1996) and allow businesses to understand the overall picture of their branding and products. Marketing defines components used to satisfy customer needs and satisfaction, which the marketer uses to present the products in various ways to meet customer satisfaction and generate sales.

- Product in Marketing is how the marketer presents and generates interest in their products using quality, variety, and uniqueness as compared to their competitors

- Price in Marketing is regarding determining the product's value and used as information such as values, price, and quality for consumers to compare and make decisions. The manufacturer will also include costs and profits in price selection to keep the business operational and use promotions to generate the incentive to buy
- Place in Marketing or distribution channel is where the products are shipped, or consumers can purchase certain products or services. Distribution Channels are critical in creating consumer awareness and helping generate higher sales.
- Promotion in Marketing is part of the marketing process in which consumers receive information regarding the products between the seller and buyers, where effective communication helps create an awareness of products, increase sales, and create sales opportunities for other products and services in the future.
- People are part of how the business manages its human resources to help serve its customers and workforce allocation to provide better services and support during sales and distribution.
- Process in Marketing describes the ease of use according to the users' perception of how the business operates. The process is also a key factor in designing applications and media, which helps businesses generate and influence customer movement throughout their applications and media.
- Physical Evidence is the physical items that can be seen and touched, such as physical stores, products, or an application's interface, which can be implied to attractiveness, confidence, and safety

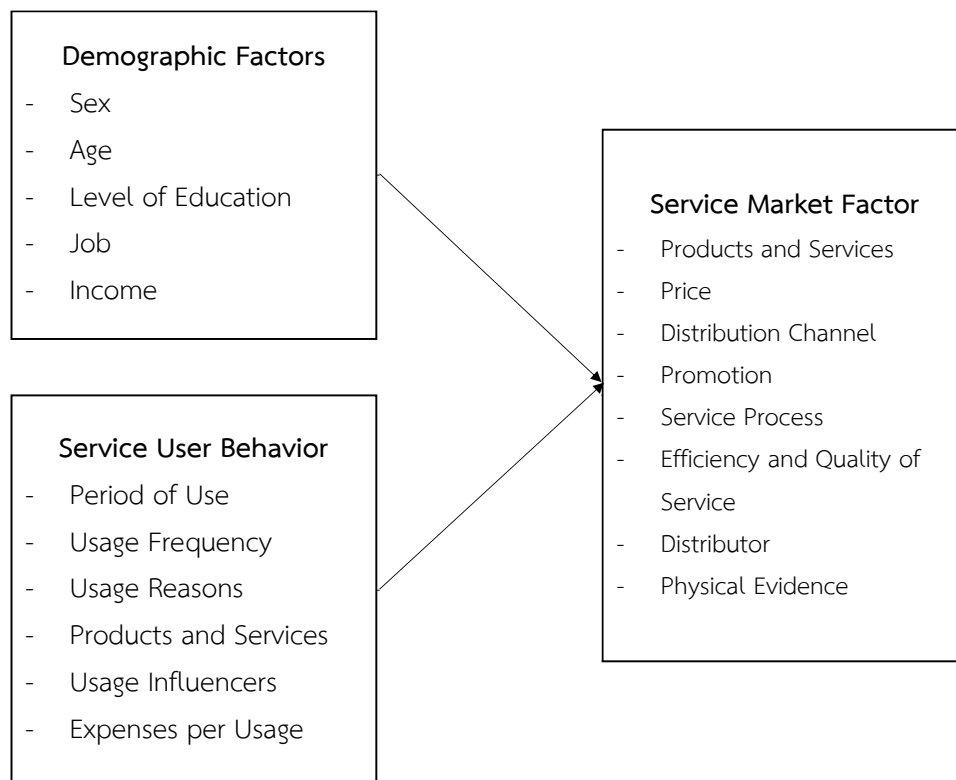
## Research Methodology

The quantitative research principle is used to conduct survey research by selecting a purposive sampling group: Thai citizens living in Samut Sakhon province who used e-commerce services from May to December 2021. The data were collected using an open-ended questionnaire based on the related literature, which consisted of 3 parts: 1) Personal status of the respondents, 2) Customer behavior, and 3) Service Marketing factors affecting customer satisfaction. The data was analyzed and evaluated using SPSS to validate the data using both descriptive and inferential statistics.

## 2. Research Instruments

In this study, the quantitative research is conducted using an open-ended questionnaire, which consists of 3 parts: 1) Personal status of the respondents, 2) Customer behavior, and 3) Service Marketing factors affecting customer satisfaction to analyze using the framework as shown in figure 1.

- **Personal status of the respondents:** this section is about respondents' gender, age, level of education, occupation, income, online/e-commerce service usage, and usage frequency.
- **Customer behavior:** this section is about customers using online/e-commerce services, such as the usage period, usage frequency, usage reasons, products and services, usage influencers, and expenses per usage.
- **Marketing factors affecting customer satisfaction:** this section included eight aspects related to marketing factors affecting customer satisfaction: 1) Products and Services, 2) Price, 3) Distribution Channel, 4) Promotion, 5) Service Process, 6) Efficiency and Quality of Service, 7) Distributor, and 8) Physical Evidence of service provider.



**Figure 1:** Research Framework on how demographic and user behaviors can affect Service Marketing related factors

### 3. Populations and Samples

The target sampling group in this study is male and female Thai customers who used e-commerce via online applications from May to December 2021 without knowing the matched description population size.

- The purposive sampling size is 400 people who used the e-commerce service, which was randomly selected.

#### 4. Statistics for Data Analysis

In this study, both descriptive statistics and inferential statistics with the information as follows:

- Descriptive Statistics included the frequency distribution, percentage, mean, and standard deviation.
- Inferential Statistics include one-way analysis of variance (ANOVA) (t-test) for analyzing the difference between the mean of two sampling groups and the difference between mean scores of variables of more than two sampling groups using one-way ANOVA F-test and t-test using statistics significant value of 0.05.

## Results

### 1. Personal information

Service users are females and males, with a distribution of 60.5% and 39.5%, respectively. The users' age ranged from 46 years and above (40.8%) and between 25-35 years (35.3%), with a bachelor's degree education level at 71.0% and a master's degree at 16.0%. Most users are company employees at 33.3%, followed by self-employment or freelancers at 28.0%. The users' incomes ranged from 15,001 baht per month and above at 47.0%, followed by 20,001-25,000 baht per month at 24.5%.

### 2. Service Users' Behaviors

Customers' behavior collected in this study includes service accessing period, usage frequencies, convenience, and the period in which users often accessed the e-commerce service is November to December (58.0%), followed by May to October (42.0%). As for the usage frequencies, 46.5% used the e-commerce service once per year, followed by a frequency of twice per year with a percentage of 27.0%, and other aspects of users' behaviors are categorized as follows:

- The **usage reasons** for online services are convenience (37.3%) and to reduce the pandemic risk (36.3%).
- The **products and services** ordered using online services include: food ordering (28.3%), and clothing (23.5%)
- In terms of **usage influencers**, 40.0% of users are not influenced by others to use the e-commerce services, while family members influenced 34.0% of the users.
- Customers' **expenses per usage** are ranged from 500 Baht (25.8%) and 501-1,000 Baht (22.0%)

### 3. Service Quality Satisfaction

From the final part of the questionnaire, the service quality satisfaction evaluation on eight aspects, deriving from the Service Marketing including: 1) Products and Services, 2) Price, 3) Distribution Channel, 4)

Promotion, 5) Efficiency and Quality of Service, 6) Distributor, and 7) Service Process are summarized in Table 1.

**Table 1:** Service Quality Satisfaction

Satisfaction Factor Evaluation	$\bar{X}$	S.D.	ระดับความคิดเห็น
Price	3.29	0.6	Neutral
Products and Services	3.35	0.7	Neutral
Distribution Channel	3.43	0.7	Neutral
Promotion	3.66	0.6	Satisfied
Efficiency and Quality of Service	3.72	0.8	Satisfied
Distributor	3.76	0.6	Satisfied
Service Process	3.64	0.7	Satisfied
<b>Average</b>	<b>3.55</b>	<b>0.7</b>	<b>Satisfied</b>

Scale evaluation: 1-1.5 (strongly dissatisfied), 1.6-2.5 (dissatisfied), 2.6-3.5 (neutral), 3.6-4.5 (t satisfied) 4.6-5.0 (strongly satisfied)

From Table 1, the average satisfaction score of seven factors related to Service Marketing is 3.53, with the highest average score of 3.76 for the distributors, the second highest for efficiency and quality of service with an average score of 3.72, followed by the satisfaction on promotion with the average score of 3.66.

#### 4. Descriptive Data Analysis

Demographic information of the customer using e-commerce service in terms of gender, age, level of education, occupation, and income affect the Service Marketing factors as shown in Table 2:

**Table 2:** Relationship between customer’s demographic data and Service Marketing related factors

Factors	Product and Service	Price	Promotion	Service Process	Efficiency and Quality of Service	Distribution Channel	Distributor	Physical Evidence
Gender	✓	✓		✓				
Age	✓				✓			
Level of Education	✓				✓			
Occupation								
Income		✓		✓	✓		✓	

#### 5. Inferential Data Analysis

Customer Behavioral factors affecting online/e-commerce services usage include 1) the usage period, 2) usage frequency, 3) usage reasons, 4) products and services, 5) usage influencers, and 6) expenses per usage, which have different effects on the service quality satisfaction factors as follows:

- Usage frequency is shown to be statistically different in Service Marketing related factors regarding the distributors, with a significant level of 0.05. In contrast, other factors do not display any significant difference in the service marketing factors in terms of service quality satisfaction.
- Usage period, Usage reason, Usage Influencers, Expenses per usage, Products, and services show no statistically significant effects, at 0.05 confidence level, on the Service Marketing related factors in service quality satisfaction.

### Discussion

The survey reveals the significance of factors affecting e-commerce service users and how they perceive the service in terms of customer satisfaction. These factors can be grouped into 2 groups, displaying how the customers in the study area perceived e-commerce service providers in relation to business branding and its operations.

- **Service Quality Satisfaction** shows that service users are prone to reasonable prices, location and safety, good services, and politeness.
- **High Influence Factors** affecting users are fames, organizational service age, and promotion with clear organization identification.

Although, customer satisfaction in service quality is necessary for businesses to gain a competitive advantage over competitors. It is also important to continuously adapt to the customers' needs to attract customer attention. This also includes how customers access the services and products, such as online applications, and the shift to e-commerce services for convenience, as shown in the inferential data where the time of usage and frequency become irrelevant to the customer using an online application to gain access to the products and services. Hence, it is important to identify additional factors or how impactful the existing factors affect the user perception of e-commerce and how the existing service can improve the perception clarity for all users.

### Suggestions

1. This research focused on demographic and behavioral science. The demographic data focused on gender, age, level of education, occupation, and income; behavioral science focused on period, frequency, reasons, type of e-commerce services, influencers, and prices. Hence, the subsequent study will include additional variables such as user status, domicile, and contact method for using the service for planning marketing strategies.
2. Comparing Thai and foreign users are necessary to identify the impactful factors affecting service usage.
3. To meet customers' needs and expectations, a feasibility study on continuously improving and developing the service is necessary.

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KSUC-OI-019

## Risk evaluation and mitigation strategies for Chinese investments in overseas public-private partnerships

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### Abstract

The purposes of the research were to examine the critical role of Public-Private Partnerships (PPPs) in China's Belt and Road Initiative (BRI), to explore the challenges faced by international PPPs, and to provide a comprehensive analysis of the risks and mitigation strategies associated with BRI PPP projects. Additionally, the study aimed to contribute to academic discourse and practical policy formulation for the successful implementation of BRI, with a focus on strengthening global infrastructure development risk management practices. To achieve these objectives, the research employed a comprehensive approach that included a literature review, thematic and comparative analysis of selected case studies, and application of theoretical frameworks. The research findings showed that PPPs are essential in mobilizing private capital and expertise to address the risks of transnational projects, foster cooperation and mutual understanding among countries, and achieve common developmental goals. However, international PPPs face various challenges, and a multi-dimensional risk catalogue is necessary to enhance the possibility of success for BRI PPP projects. The thematic analysis categorized risks into political, economic, social, and technical risks, with mitigation strategies revolving around policy support, regulatory enhancement, and strategic preparedness. Results indicated that the success or failure of PPP projects is most influenced by political risk, social risk, and economic risk, with the most favored mitigation strategies being policy support, strategic preparedness, and multi-faceted safeguards. Insights from five case studies corroborated these viewpoints, emphasizing the practical impacts of these risks and their management in real-world scenarios. Moreover, the study highlighted the indispensability of prudent stakeholder management and strategic risk management, based on stakeholder theory and risk management theory. Ultimately, the study championed a robust, sustainable, and mutually beneficial BRI framework, emphasizing the importance of a symbiotic relationship between academic exploration and practical application, and fostering a resilient and enriching international investment environment..

**Keywords:** Belt and Road Initiative, Risk management, China, oversea investment

## Introduction

Public-Private Partnerships (PPPs), pivotal in uniting public and private sectors for infrastructural and service projects, have gained traction globally, especially in developing nations like China and are notable for risk-sharing and mutual benefits across diverse domains, such as transportation and energy. Originating in the late 20th century, PPPs were initially utilized for physical infrastructure projects but have broadened to encompass various public services. Various models of PPPs involve differing degrees of participation and risk, from management contracts to Build-Operate-Transfer (BOT) and joint ventures (ADB, 2021; Iossa & Martimort, 2015; The World Bank, 2022, 2023).

Public-Private Partnerships, crucial in global infrastructure development, have become increasingly significant in developing nations like China. Particularly, in the context of the Belt and Road Initiative (BRI), PPPs are instrumental, facilitating resource amalgamation and risk distribution while mitigating challenges related to transnational infrastructure projects (CliffordChance, 2019). However, challenges, including political, legal, economic, and cultural risks, demand meticulous management to harness the comprehensive benefits of PPPs in such expansive, cross-border projects (Yu et al., 2018).

With the emergence of China's BRI in 2013, aimed at strengthening infrastructure development across Asia, Africa, and Europe, today's BRI encompasses more than 150 countries and 30 international organizations, unveiling an epoch where promising economic prospects and emerging challenges intertwine, forming a complex narrative that requires meticulous examination and robust strategic development (IOSC, 2023). PPPs have become an integral part of the BRI, serving as a pivotal investment and construction mechanism amidst the colossal capital requirements (Zhang et al., 2016). While offering financial resources, technical expertise, and enhanced efficiencies, PPPs within the transnational framework of the BRI are confronted with significant challenges, such as differences in legal systems, economic development, and cultural communication barriers (Zhang et al., 2016). These issues could jeopardize the potential returns on investment of up to 30% for emerging public projects, thus necessitating a thorough review to understand the nuances of overseas investment and mitigate potential risks (Matt & Anarkalee, 2019). This complexity has intensified over recent years, with increasing geopolitical shifts and economic uncertainties globally, amplifying the need for a comprehensive understanding of the BRI's impact on international PPPs. However, a notable research gap exists in understanding the specific risks and strategic responses required for overseas PPPs under the BRI framework, which this study aims to address.

### 1. Research Objectives

1.1 To specifically explore the cultural and political risks, along with other key risk types, and their corresponding mitigation strategies in overseas PPPs within the BRI context, emphasizing the diverse geographical and sectoral domains and stakeholder considerations.

1.2 To develop a detailed risk catalogue encompassing cultural, political, economic, and technical risks, a refined risk assessment framework, and targeted mitigation strategies with stakeholder-specific recommendations. This aims to enhance the success probabilities of BRI's PPP projects and provide

significant contributions to both academic research and practical risk management in global infrastructural development..

1.3 To elucidate the integration of findings from extensive literature reviews and in-depth case studies, thereby providing nuanced insights for effective policymaking, comprehensive risk management, and sustainable development in real-world BRI implementations.

## 2. Review of Related Literatures

Public-Private Partnerships (PPPs) are inherently complex and come with various risks that both public and private parties must understand and mitigate to ensure project success. These risks can be broadly categorized into economic, political, legal, technical, and cultural. Economic risks include market fluctuations, changes in inflation, cost of raw materials, and shifts in market demand that can affect the project's financial feasibility. Political risks may arise from changes in government policies, political instability, and public opposition, while legal risks may include regulatory changes, legal disputes, or difficulties in enforcing contracts. Technical risks encompass design errors, construction difficulties, and unanticipated technical challenges, while cultural risks, particularly in international projects, can lead to misunderstandings and conflicts (Cheung et al., 2009; Xu et al., 2010).

These risks are even more pertinent in overseas PPPs, such as those under the Belt and Road Initiative (BRI), where political instability, exchange rate fluctuations, cultural differences, and legal inconsistencies can significantly impact project success (Yu et al., 2018). To manage these risks, various models and frameworks have been proposed, including comprehensive risk management processes, evaluation models that consider both qualitative and quantitative factors, and frameworks focusing on risk allocation (Akintoye et al., 2003; Cheung et al., 2009; Xu et al., 2010).

Effective risk mitigation strategies include risk identification, management, and operational responses. Risk identification involves understanding each risk and its potential impact on the project, while risk management includes risk assessment, allocation, and response planning. Operational responses refer to measures taken during the project execution phase. Porter's Five Forces model can provide valuable insights into potential risks in the competitive environment of a PPP project (Akintoye et al., 2003; Porter, 2008).

For overseas PPPs, specialized and localized risk mitigation strategies are required, including comprehensive market research, robust contract design, utilization of local expertise, and securing political risk insurance (Yu et al., 2018). Stakeholders within PPPs, including government agencies, private sector organizations, financiers, end-users, and the broader community, all play crucial roles in a project's success. Each stakeholder has specific interests and strategies that must be considered in the risk mitigation process, and stakeholder-specific mitigation strategies should include effective communication, engagement, and risk-sharing arrangements (Roehrich et al., 2014).

## Research Methodology

### 1. The Research Procedure Includes 3 Steps which are:

#### 1.1 Literature review method

The literature review methodically separated themes related to risks, mitigation strategies, and PPP frameworks in BRI projects. Each theme was further supported by relevant theories, such as Risk Management Theory and Stakeholder Theory, to provide a solid theoretical foundation for the study. This process facilitated the positioning of the study within the broader scholarly discourse, identification of gaps in the current knowledge, and informed the research design.

Criteria for Selection of Literature: Given that the BRI was initiated in 2013, the literature selected spans the last ten years. Inclusion criteria encompassed relevance to overseas PPPs and BRI, recent publication date (within the last decade), and a high citation count, signifying the work's recognition and impact in the field.

Analysis Approach: A thematic analysis was conducted by summarizing and refining the content from various academic articles and industry reports. The literature was categorized into review-type literature and case-type literature. Review-type literature was used to extract the developmental trajectory of BRI-PPP, summarizing the risks faced by different PPP projects and the corresponding solutions proposed by various scholars. By comparing different literature, the most widely recognized impactful risks and optimal solutions were identified. Additionally, since different scholars have different classification standards, and these standards are not uniform across the industry, the risks were classified into broad categories to make the final analysis more intuitive.

#### 1.2 Case Study method

This study explicitly focuses on PPP projects within the BRI framework, spanning key regions in Asia, Africa, and Europe, and covering sectors such as transportation, energy, and infrastructure development.

Selection of Case Studies: To enhance the understanding of risks and mitigation strategies in overseas PPP projects, a preliminary screening was conducted based on their relevance to the BRI, success or failure, availability of information, and representativeness of various types of PPP projects and risk scenarios. Through in-depth investigations, five cases were specifically selected for in-depth analysis based on their international influence and the typicality of their success or failure, aiming to profoundly understand the complex phenomena in the actual context.

Analysis of Case Studies: The case studies were scrutinized using theoretical frameworks, involving the identification of key stakeholders, their interests and influences, risks faced in the project, and mitigation strategies employed. This analysis aimed to unravel the underlying dynamics and intricacies of each case, extracting lessons applicable to other projects. For each case study, data was meticulously gathered from a variety of sources to ensure a comprehensive understanding. This included official project reports, financial statements, government publications, scholarly articles, and news coverage. Where possible, interviews were conducted with key project stakeholders, including project managers, government officials, and industry experts.

Comparative Analysis: Subsequent to analyzing the individual cases, a comparative analysis was performed to discern commonalities and differences amongst the cases. This exercise further illuminated the factors instrumental to the success or failure of overseas PPP projects and the efficacy of varied mitigation strategies.

### 1.3 Theoretical Analysis

Explanation of the Selected Theories: The study was predicated on two primary theoretical frameworks: Stakeholder Theory and Risk Management Theory. Stakeholder Theory posits that organizations are complex systems where diverse groups or individuals (stakeholders) exert varying degrees of influence based on their interest, power, and the urgency of their claims (Freeman et al., 2010). This framework is invaluable for dissecting the intricate relationships amongst various actors in a PPP project, such as the government, private firms, financiers, and the public. Conversely, Risk Management Theory provides a robust set of tools for identifying, assessing, and responding to risks in a project (Hopkin, 2013), thereby proving instrumental in deciphering the different types of risks inherent in overseas PPP projects and formulating the most effective strategies for their mitigation.

Application of Theories to PPP and BRI Context: The theoretical frameworks were employed to analyze selected overseas PPP projects, utilizing Stakeholder Theory to probe how the divergent interests and levels of influence of various stakeholders impinge upon project outcomes. This analysis also shed light on the negotiation processes preceding the establishment of a PPP contract and the potential conflicts that may arise during project implementation. Risk Management Theory was applied to categorize the potential risks endemic to these projects, encompassing a meticulous analysis of each project phase, from the initial project appraisal to the operational stage, with the aim of pinpointing the potential risks at each juncture and formulating the optimal strategies for their management.

## 2. Interpretation of Results

The insights gleaned from the theoretical analysis were synthesized to develop a comprehensive understanding of the risks and mitigation strategies in overseas PPP projects under the BRI. The application of Stakeholder Theory illuminated the paramount importance of effective stakeholder management in ensuring project success. In contrast, Risk Management Theory equipped us with the necessary tools for crafting effective risk management strategies in these projects. Through this analysis, the study is poised to proffer practical recommendations for stakeholders involved in overseas PPP projects under the BRI.

## Results/Research

### 1. Summary of in-depth literature review

In order to reveal the complex network of risks and mitigation strategies associated with the BRI within the framework of PPPs, an exhaustive literature survey was conducted. Utilizing "BRI", "PPP", and "Risk" as keywords, hundreds of English and Chinese literature resources were unearthed on Google Scholar and China National Knowledge Infrastructure (CNKI). To extract the essence from the literature and gain an

overview of the developmental trajectory of BRI adopting PPP for investments, an in-depth analysis of review literatures was conducted. Consequently, fourteen valuable review articles and three relevant research reports were specially selected as the subjects of study, providing a solid foundation for identifying contemporary risks and management strategies related to PPP projects under the BRI context. Given that different literature has varying degrees of detail and definitions for classifying risks, we have summarized the classification methods from these literatures and divided the risks into major categories such as: political risks, economic risks, social risks, geographical risks, operational risks, technological risks, and legal risks (Table 1).

**Table 1:** Risk classification and corresponding literatures

Risks	Referenced Literatures
Political Risk	(Zhao et al., 2018)(BFTD, 2019)(Sibo & Choudhary, 2018)(Zhou, 2018)(Li et al., 2021)(Xiang et al., 2022)(Kong, 2023)(Li et al., 2020)(Sun, 2017)(Luo et al., 2022)(Lv, 2022)(Wang et al., 2021)(Liao et al., 2019)(Liang, 2020)
Economic Risk	(Zhao et al., 2018)(BFTD, 2019)(Zhou, 2018)(Li et al., 2021)(Xiang et al., 2022)(Kong, 2023)(Li et al., 2020)(Sun, 2017)(Luo et al., 2022)(Lv, 2022)(Wang et al., 2021)(Liao et al., 2019)(Liang, 2020)
Social Risk	(Zhao et al., 2018)(Sibo & Choudhary, 2018)(Zhou, 2018)(Li et al., 2021)(Xiang et al., 2022)(Kong, 2023)(Li et al., 2020)(Sun, 2017)(Luo et al., 2022)(Lv, 2022)(Wang et al., 2021)(Liao et al., 2019)(Liang, 2020)
Geographical Risk	(Zhou, 2018)(Xiang et al., 2022)(Kong, 2023)(Liao et al., 2019)(Liang et al., 2023)
Operational Risk	(Zhao et al., 2018)(Li et al., 2021)(Li et al., 2020)(Sun, 2017)(Lv, 2022)(Wang et al., 2021)(Liang, 2020)
Technical Risk	(Zhao et al., 2018)(Sun, 2017)
Legal Risk	(BFTD, 2019)(Sibo & Choudhary, 2018)(Kong, 2023)(Li et al., 2020)(Sun, 2017)(Luo et al., 2022)(Lei, 2017)(Lv, 2022)(Wang et al., 2021)(Liao et al., 2019)(Liang, 2020)

Delving into these categorized risks, political risk envelops issues such as corruption, government stability, law and order, and international relations. Economic risks highlight elements like local GDP, funding sources, yields, and investment openness. Social risks bring to the fore disparities in culture and ethnicity, social security, and public opinion. Geographical risks underscore geographical resources, climate, and natural disaster propensities. Operational risks unveil aspects related to competition and market dynamics, while technical risks include incompatibilities arising from different technological protocols, technology innovation, reliability, and obsolescence.

In addition to the classification, a thorough evaluation was conducted to understand the severity and impact of each risk type. This evaluation involved a detailed analysis of the probability of occurrence, potential impact on the project, and the effectiveness of existing mitigation strategies. Political Risks: These were closely examined considering factors such as governmental stability, policy changes, and international relations. Our findings suggest that political risks are among the most significant, requiring careful navigation and proactive engagement strategies. Economic Risks: Economic risks were evaluated in terms of market

fluctuations, funding stability, and economic growth projections of the host countries. The analysis revealed that economic risks are highly variable and often correlated with the host country's financial stability and global economic trends. Social and Cultural Risks: The assessment of social risks involved understanding the cultural context, public opinion, and social dynamics of each project location. Our study found that social risks could significantly derail projects if not managed with a deep understanding of local contexts. Legal and Regulatory Risks: Legal risks were assessed by examining the legal framework and regulatory environment in different countries. The evaluation highlighted the importance of understanding and adapting to varied legal systems to avoid potential disputes and delays. Technical and Operational Risks: Technical risks, including technology compatibility, innovation challenges, and operational risks, were evaluated based on project complexity and technical requirements. Our analysis indicates that technical risks are often underestimated but can have significant implications for project timelines and costs.

A spectrum of mitigation strategies emerges from the literatures, albeit with varied terminologies and contexts, primarily coalescing around themes such as policy support, multi-faceted safeguards, streamlining processes, profit allocation, training professionals, regulatory augmentation, strategic preparedness, robust investment, and emergency response (Table 2).

Policy support alludes to auxiliary policies, framed at national, corporate, or project-specific levels. The multi-faceted safeguarding revolves around comprehensive pre-project research and evaluation, ensuring a protective net for the interests of enterprises involved post-project commencement. Streamlining project processes entails the elimination of superfluous procedures to expedite project timelines and economize on expenditures. Profit allocation suggests a deliberate distribution of profits to stimulate collaborative endeavors. Training professional is geared towards bridging the prevalent expertise and personnel gaps in China's overseas investments. Regulatory augmentation seeks to avert issues stemming from a paucity of oversight, while strategic preparedness establishes a holistic risk assessment system to preemptively ward off risks. Robust investment pertains to rallying additional funds into projects and emergency response mechanisms involve crafting a spectrum of strategies to various unpredicted scenarios to safeguard stakeholder interests.

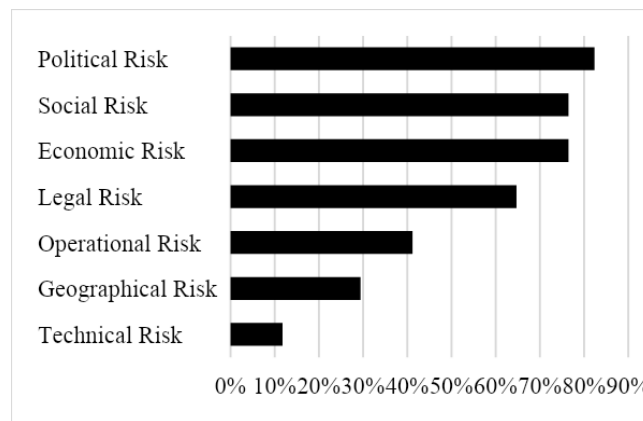
**Table 2:** Mitigation Strategies and corresponding literature

Mitigation Strategies	Referenced Literatures
Policy Support	(Zhao et al., 2018)(Kong, 2023)(Sun, 2017)(Lei, 2017)(Lv, 2022)(Wang et al., 2021)(Ma & Xu, 2022)(Liao et al., 2019)(Liang, 2020)
Multi-faceted Safeguards	(Zhao et al., 2018)(BFTD, 2019)(Zhou, 2018)(Li et al., 2020)(Sun, 2017)(Wang et al., 2021)(Ma & Xu, 2022)(Liao et al., 2019)(Liang, 2020)
Streamlining Processes	(Zhao et al., 2018)(BFTD, 2019)(Kong, 2023)(Sun, 2017)(Lv, 2022)
Profit Allocation	(Zhao et al., 2018)(BFTD, 2019)(Kong, 2023)(Lv, 2022)(Wang et al., 2021)
Training Professionals	(Zhao et al., 2018)(Li et al., 2020)(Luo et al., 2022)(Ma & Xu, 2022)



Regulatory Augmentation	(Zhao et al., 2018)(Luo et al., 2022)(Lei, 2017)(Wang et al., 2021)(Ma & Xu, 2022)(Liao et al., 2019)
Strategic Preparedness	(BFTD, 2019)(Zhou, 2018)(Liang et al., 2023)(B. Li et al., 2020)(Luo et al., 2022)(Lei, 2017)(Lv, 2022)(Wang et al., 2021)(Ma & Xu, 2022)(Liao et al., 2019)
Robust Investment	(Sibo & Choudhary, 2018)(Kong, 2023)
Emergency Response	(Zhou, 2018)(Liang et al., 2023)

By analyzing the risk classification from different literatures, it could be found that the risks mentioned from most frequently to least frequently are political risk (82.4%), social risk (76.5%), economic risk (76.5%), legal risk (64.7%), operational risk (41.2%), geographical risk (29.4%), and technical risk (11.8%) (Figure 1). Through this, several crucial insights were deduced:



**Figure 1:** Probability of different risks being addressed in literatures.

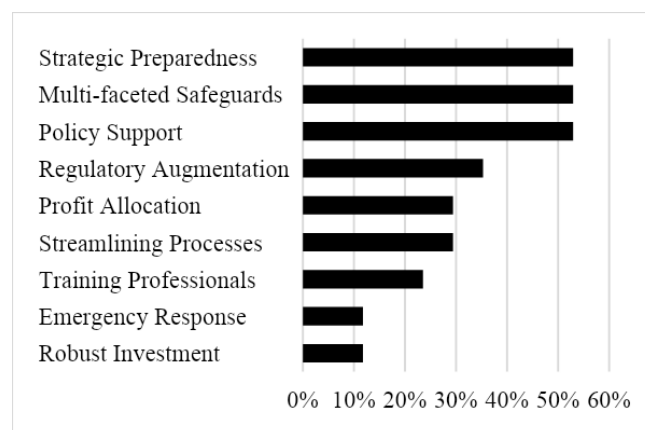
1. **Predominant Risks and Solutions:** Through an integration of the frequency of various risks mentioned in the literature, it was found that the most important and most frequently mentioned risk is political risk, with a mention rate as high as 82.4% (Figure 1). This indicates that the stability, integrity of the local government, and the support for China's proposed initiative are all crucial to the successful implementation of a PPP project. Only by properly handling political risk can a PPP project be considered to have laid a solid foundation. Following closely are social risk and economic risk, tied for the second biggest influencing factors. This points out that although many projects receive local government support, they may still encounter disruptions from local public opposition, cultural conflicts, insufficient funds, and low investment openness. A typical project hindered by public opposition is the Myitsone Dam project, which will be discussed in the case study section. As for the mitigation strategies, there isn't as much consensus among scholars as there is for the risks. Generally, different mitigation strategies are divided into three tiers. The most mentioned are strategic preparedness, multi-faceted safeguards, and policy support, each with a mention rate of around 50% (Figure 2). The second tier includes Regulatory Augmentation, Profit Allocation, Streamlining Processes, and Training Professionals, with mention rates between 20% to 35% (Figure 2). The last tier consists of Emergency Response and Robust Investment, with a mention



probability of only about 10%. Compared to risks, the consensus that most scholars can reach in the risk classification is not reflected in the risk mitigation strategies. For example, the mention rates of Political Risk, Social Risk, and Economic Risk are all above 70%, while the highest in risk mitigation strategies doesn't exceed 55% (Figure 1 and 2).

2. Potentially Underscored Risks and Solutions: Although political, economic, and social risks as well as legal support have received more attention, the infrequent mention of technological risk may indicate that contemporary research may be insufficient or neglectful in this area. Although technological risks are mentioned less frequently, they may have significant impacts in practice, such as technical obstacles in project execution or the reliability of deploying technology. This highlights the potential inconsistency in research focus. As for solutions, enhanced investment and emergency plans, although not dominant in discussions, need further exploration and discussion in academia. Although their theoretical utility may not be as useful as policy support or multi-faceted safeguards, the nearly five-fold difference in mention rates shows that there is potential for further research in these two directions.

3. Diversity in Existing Research: Overall, the data highlights the diverse discussions of risks and solutions in the literature, presenting a variety of theories. Within these theories, there are both commonalities and differences, indicating that existing academic debates are healthy and diverse.



**Figure 2:** Probability of different mitigation strategies being addressed in literatures.

## 2. The results of case studies analysis

Public-Private Partnership investments, typically characterized by extensive investment cycles, hefty financial inputs, and sluggish returns, predominantly feature projects related to terrestrial and maritime transport, as well as energy. To corroborate and delve deeper into the risks and risk control measures synthesized in our literature review, scrutinizing both successful and failed practical cases is imperative. This enables us to furnish more reliable investment advice for future endeavors. Consequently, five classic cases have been picked for representation, with the initial three exemplifying relative successes and the latter two illustrating impediments (Table 3).

**Table 3:** Five representative cases analysis

Project	Country	Major Risk	Major Mitigation Strategy	Outcome
Karot Hydropower Project	Pakistan	Debt	Debt Restructuring	Successfully constructed and initiated operational phase
Yamal LNG Project	Russia	International sanctions, environmental issues	Policy Support, Robust Investment, Technical Support	Successfully constructed and initiated operational phase
The Hambantota Port Project	Sri Lanka	Debt, political pressures from societal discontent	Debt Restructuring, policy support	Successfully constructed and initiated operational phase
Jakarta-Bandung High-Speed Railway Project	Indonesia	Land acquisition, financing issues	Social communication, Robust Investment	Completion was postponed by 4 years, currently commenced operations, profitability remains unknown
Myitsone Dam Project	Myanmar	Opposition from local inhabitants	Policy Support	Suspended

1. Pakistan’s Karot Hydropower Project: Entailing the construction of a 720MW hydroelectric power station on the Jhelum River, aimed to address the nation's power supply issues through a cooperative endeavor with China (Butt, 2021; GlobalData, 2023; Khan et al., 2020). Chinese corporations invested and provided technological support, while Pakistan, through Karot Power Company, managed the project. Facing risks like debt concerns, technical issues, and environmental impacts, mitigation included debt restructuring, technical cooperation, and stringent environmental measures to balance and manage economic, technical, and environmental challenges.

2. Yamal LNG Project in Russia: This project emerged as a substantial Liquefied Natural Gas production endeavor involving key stakeholders like Novatek from Russia and CNPC from China (M. M. Bennett, 2016; Defraigne, 2021; Katysheva, 2019). The project navigated through various risks, including market and environmental ones, by adopting strategies like in-depth market analysis, solidifying Sino-Russian relations, and adherence to international environmental standards, aiming to successfully establish and operate in the harsh Arctic conditions with an emphasis on maintaining ecological balance. Despite facing international sanctions, the project still received support from international investors, including China, which helped ensure the project's financing.

3. The Hambantota Port Project in Sri Lanka: It is crucial to China's BRI, aimed to enhance regional connectivity and strengthen economic ties between the nations through infrastructure development (Carrai, 2018; Wibisono, 2019). A myriad of stakeholders, including the governments of both countries and local communities, were impacted by various risks like financial and political pressures and environmental

concerns. Mitigation strategies, like debt restructuring by transferring port control to Chinese enterprises and engaging in multilateral cooperation, were implemented to navigate through these challenges.

4. Jakarta-Bandung High-Speed Railway Project: It is an Indo-Chinese joint venture in Indonesia, aspires to stimulate economic growth by reducing travel time between key cities (Maryani & Abidin, 2022; Negara & Suryadinata, 2018; Purba & Purba, 2020). Despite its potential, it encountered challenges like land acquisition problems and financial risks, maneuvering through these via heightened social communication, stringent financial management, and technological collaboration to uphold the project's quality, timeline, and budget amidst the impediments. The final outcome indicates that, despite the effectiveness of risk mitigation strategies employed, the project was eventually completed with a four-year delay, and its profitability remains unknown at this point (Negara & Suryadinata, 2018).

5. Myitsone Dam Project in Myanmar: This project primarily financed by Chinese enterprises, was envisioned to spur local economic development but was halted in 2011 amid an array of social, environmental, and political conflicts (Chan, 2017; Kiik, 2016). The risks, spanning from political instability and local opposition to environmental concerns, have yet to find a comprehensive mitigation strategy, with prior attempts at policy communication and environmental conservation being overshadowed by persisting issues, resulting in an ongoing suspension of the project.

The synthesis of these cases reveals a complex interplay of recurrent patterns and unique variations, providing valuable insights into generalized understandings and discrete, case-specific abnormalities.

In each case study, political and economic risks were prevalent, often significantly affecting project implementation and success. For example, the Hambantota Port and Myitsone Dam projects underscore the impact of political dynamics and pressures. This is similarly seen in the projects in Pakistan and Russia, where, despite robust economic planning, geopolitical and macroeconomic fluctuations created substantial barriers.

The Karot Hydropower Project in Pakistan exemplifies effective management of technical and environmental risks through collaborative strategies, illuminating the application of our findings in real-world scenarios. The Jakarta-Bandung High-Speed Railway Project in Indonesia underscores the importance of addressing land acquisition and financing issues, reflecting the operational risks identified in our research.

Technical and operational risks, particularly those associated with novel or sophisticated technologies and strategic management, were highlighted in the Karot Hydropower Project and the Jakarta-Bandung High-Speed Railway. These cases show that such risks can present significant challenges, even in favorable political and economic climates.

Furthermore, the Myitsone Dam and Jakarta-Bandung High-Speed Railway projects demonstrate the crucial need for careful consideration of social and environmental factors, with underestimation of local and environmental resistances having the potential to halt strategically planned projects.

Mitigation strategies employed varied across diplomatic, economic, technical, and community-engagement realms. Debt restructuring and renegotiation were common, as seen in Sri Lanka and Pakistan,

while in-depth stakeholder communication and collaboration were prominent, particularly with local communities.

Patterns across these cases reveal the importance of robust financial strategies, including debt structuring and capital allocation, and comprehensive stakeholder engagement. Inconsistent stakeholder involvement or disproportionate benefits can lead to severe project hindrances. International relations and geopolitical dynamics were also found to play a significant role, either facilitating or impeding project trajectories.

Anomalies include variations in local resistance, the contextual efficacy of mitigation strategies, and the degree of environmental prioritization. For example, while the Myitsone Dam project faced significant local and political opposition, the Karot Hydropower Project successfully mitigated local resistance through community engagement. Similarly, technical and financial mitigations were effective in the Yamal LNG Project, but less so in the Jakarta-Bandung High-Speed Railway.

These implications underscore the need for explicit alignment between risks, mitigation strategies, and project contexts. Future projects should intertwine financial, technical, and sociopolitical strategies, tailored to both the project and the specific geopolitical and cultural contexts. The analysis also highlights the necessity for further research into adaptable, contextually relevant mitigation strategies, particularly those addressing underexplored risks identified in the literature review.

### **3. The results of theoretical frameworks**

Applying the Stakeholder Theory to overseas PPP projects under the BRI framework is essential as it emphasizes the importance of not solely creating value for shareholders but also considering and balancing the interests of all stakeholders involved, including governments, investors, project contractors, local community residents, NGOs, and more (Freeman et al., 2010).

In order to ensure the smooth progression of a BRI-PPP project, it is imperative to first identify all involved stakeholders and analyze their respective interests and needs. Proactive communication and collaboration are then crucial to balance the varying interests and develop strategies tailored to meet the needs of all parties involved. Regular monitoring of stakeholders' needs and satisfaction levels, along with periodic assessments of the project's progress, should be conducted to ensure the success of the project (R. J. Yang et al., 2016).

Moreover, the application of Risk Management Theory (Hopkin, 2013) is necessary to systematically identify, assess, mitigate, and monitor risks throughout the project. As shown in the case of the Karot Hydropower Project in Pakistan, economic and technical challenges were both anticipated and addressed through debt renegotiation and technical cooperation. This highlights the crucial role of preemptive risk identification and management in ensuring the project's smooth progression (Zou et al., 2007).

The analysis of our five selected case studies provides a practical illustration of Stakeholder Theory and Risk Management Theory in action. Each case study reflects a unique interplay of stakeholder interests and risk management approaches, demonstrating the theories' relevance and applicability in diverse

contexts. These case studies collectively reinforce the importance of integrating Stakeholder Theory and Risk Management Theory in managing overseas PPPs. They demonstrate how understanding and addressing the concerns of various stakeholders, along with identifying and mitigating risks effectively, are essential for the successful execution of BRI projects.

However, the integration of Stakeholder Theory and Risk Management Theory brings about a more comprehensive effect on project management. Comprehensive risk identification and assessment should include communication and cooperation with all stakeholders, which can reveal more potential risk factors, such as political, legal, environmental, and social risks. Feedback from stakeholders can help the project team to more accurately judge the severity of the risk and the likelihood of its occurrence, thereby formulating more appropriate risk response strategies (Yang et al., 2009).

Effective risk mitigation can be achieved through communication and cooperation with stakeholders, which helps the project team better understand their needs and expectations, thereby taking more effective measures to reduce or eliminate risks. Participation of stakeholders also allows the project team to share risks, utilize their resources and experience, and handle risks more proficiently.

Furthermore, communication and cooperation with stakeholders can improve the social impact of engineering projects and enhance project social responsibility. Effective risk management can reduce the negative impact of engineering projects on the environment and society, contributing to more sustainable development.

In summary, the integration of Stakeholder Theory and Risk Management Theory results in a dual-faceted approach that navigates through the complexities of stakeholders' interests and influences, while also adeptly addressing potential risks through effective identification and mitigation strategies. This comprehensive approach propels PPP projects towards achieving their intended outcomes, overcoming the challenges posed by the international investment landscape, and ensuring project sustainability and success.

## Discussion

In synthesizing the findings of our study, the multiplicity of risks in overseas PPPs is addressed within the BRI framework. Echoing the themes outlined in the literature review and the insights from the case studies, we contextualize these risks within the broader ambit of international investment challenges and opportunities. The political, economic, and technical risks delineated in our analysis, underscore the complexities faced in executing cross-border projects. Furthermore, the application of Stakeholder Theory and Risk Management Theory becomes particularly relevant. Our case study analyses demonstrate how these theoretical frameworks are crucial in navigating the intricate dynamics of international PPPs.

One notable revelation from the results and analysis lies in the nuanced yet potentially overlooked domain of technical risks and their multifaceted implications on the overarching project success and stakeholder satisfaction. While the extant literature often heralds the examination of political, economic, and social risks in the context of BRI-PPP projects, a potential underemphasis on technical risks and

emergency planning strategies warrants a closer look, especially in light of the rapid technological advancements and their permeation into various sectors and industries (Yang et al., 2023). As observed in the Karot Hydropower Project in Pakistan, technical challenges, even when intricately intertwined with economic dimensions, can significantly impact project outcomes and stakeholder satisfaction, thereby mandating a more in-depth exploration and systematic integration of technical risk management in both research and practice.

The challenges highlighted in the Yamal LNG Project illustrate the intersection of economic risks and mitigation strategies, as discussed in our results. This case reinforces the need for strategic financial planning, a key finding of our study that has significant implications for policy formulation in similar international ventures. The Hambantota Port Project exemplifies the political and social risks identified in our research. This project's trajectory, as analyzed in our results, offers insights into the critical role of stakeholder engagement in mitigating risks and ensuring project success, in line with the theoretical perspectives we explored.

Moreover, the alignment - or potential misalignment - between scholarly discourse and practical implications is palpably evident, thereby accentuating a need to not only traverse the bifurcation between theory and practice but also to synergize them for a more robust and mutually beneficial BRI framework (Du & Zhang, 2018). This is particularly salient in the context of emergency planning strategies, where theoretical frameworks and scholarly discourses might benefit from a more practical, on-the-ground insights and experiences, fostering a research agenda that is not only contextually relevant but also pragmatically applicable in diverse scenarios and settings.

The pivotal role of stakeholder management, as illuminated through the application of Stakeholder Theory, underscores not only the varied interests, influences, and interactions among diverse stakeholders but also emphasizes the criticality of astute stakeholder engagement and management in navigating through the complex terrains of international investments and partnerships (Freeman et al., 2018). Such engagement and management, especially in the context of BRI-PPP projects, necessitate not merely a recognition of divergent interests and influences but also a strategic alignment and integration of these interests towards a mutually beneficial and sustainable partnership and investment trajectory.

In navigating through the future paths of BRI-PPP projects and their associated research trajectories, this research invites scholars and practitioners alike to delve deeper into the relatively underexplored realms of technical risks and emergency planning strategies. The multifaceted complexities and challenges, as showcased through varied case studies, offer a fertile ground for not only understanding and managing risks and stakeholders but also for proactively innovating and strategizing towards a future that is resilient, sustainable, and mutually enriching for all stakeholders involved.

## Suggestions

In this paper, we have provided an in-depth analysis of the risks and mitigation strategies associated with overseas PPPs within the BRI framework. Our extensive literature review and case study analysis

revealed a multifaceted network of political, economic, social, technological, operational, and legal risks, with political risks being the most predominant. We identified various mitigation strategies, such as policy support, multi-faceted safeguards, strategic preparedness, and financial strategies, to navigate through these risks.

Our findings suggest that a keen understanding and adept handling of political and economic risks are essential for the success of a project, as demonstrated by the case studies of the Hambantota Port and Myitsone Dam projects. While technical and operational risks may appear less prevalent, they present significant hurdles, as evidenced by the challenges faced in the Karot Hydropower and Jakarta-Bandung High-Speed Railway projects. Moreover, the importance of social and environmental considerations cannot be overstated, as neglecting local and environmental resistances can lead to project failure.

The application of Stakeholder Theory and Risk Management Theory has been highlighted as a vital approach in managing overseas PPP projects within the BRI framework. This dual approach underscores the necessity of balancing the interests of all stakeholders while systematically identifying and mitigating risks to ensure project sustainability and success.

The outcomes of this study are expected to provide valuable insights and practical recommendations for both the academic community and practitioners involved in global infrastructure development, specifically within the BRI framework. By emphasizing the need for comprehensive stakeholder engagement, robust financial strategies, and the significance of geopolitical dynamics, our study aims to contribute a unique perspective to the existing body of literature on PPPs. We believe that our findings can pave the way for more successful and sustainable international PPP projects in the future.

In conclusion, while our study may not have covered all possible aspects of this complex subject, we believe it underscores the paramount importance of a holistic approach in managing the diverse risks associated with overseas PPPs within the BRI framework. The insights and strategies delineated in this paper provide a foundational roadmap for stakeholders, practitioners, and policymakers aiming to navigate the intricate landscape of international PPP projects, ultimately contributing to more successful and sustainable global infrastructure development.

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## Improvement strategies of quality in textile and garment production in Shanghai

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### Abstract

The purposes of the research were to examine the quality expectations of textile and garment products in Shanghai, investigate the developmental patterns for improving the quality of textile and garment products, and explore the impact of unrealistic expectations on enhancing product quality management strategies. This study employed both quantitative and qualitative data. Regarding quantitative data, information was gathered through questionnaires distributed to participants in Jing'an District, Xuhui District, Hongkou District, Changning District, and Huangpu District, totaling 400 sets. The analysis of quality expectations for textile and garment products in Shanghai was conducted using statistical measures such as percentages, averages, and standard deviations. The examination of the effect of unrealistic expectations on the enhancement of product quality management strategies utilized regression analysis. For qualitative data, interviews were carried out with 15 textile and garment enterprises and 15 government officials associated with departments related to the textile and garment industry. The data were analyzed through content analysis to reveal patterns in the developmental improvement of textile and garment product quality. The research findings revealed that customer satisfaction with pricing and service in Shanghai's textile industry was high, but there was room for improvement in product quality. Also, the improvement pattern for textile and garment product quality in Shanghai involved TQM principles in leadership, vision, values, and strategic goals. Process management, cost optimization, and employee training were crucial for quality improvement. Besides, the multiple regression analysis revealed a pivotal relationship between unrealistic expectations and the enhancement of product quality management strategies in Shanghai's textile and garment industry that the combination of consumer, entrepreneur, and government official expectations demonstrated a significant predictive capacity, emphasizing the need to incorporate these expectations into quality management strategies. Therefore, aligning strategies with stakeholder expectations, despite potential challenges, proved crucial for improving product quality in the apparel and textile sector in Shanghai.

**Keywords:** quality expectations, quality management, textile and garment products

## Introduction

Since the textile industry has reformed and opened up in China, textile and garment industry has been ushering in the market competition. The main factor that affects the competitiveness is the quality of the products. After the economic reforms of China's markets, the textile industry went through a transformation which made the industry had been gradually eliminated from the quota system. As a result, the textile and garment industry entered a new era characterized by market competition which shifted towards a more market-oriented system and brought about significant changes in the industry prospect.

With the increased open and accessible of the market, the domestic and international textile and garment industry is engaged in intense competition in the market, thanks to the removal of the quotas and more freedom for trading. Among the intense competitive circumstance, the primary determinant of the competitiveness of these enterprises is the quality of the textile and garment products. Quality assurance became a critical factor in differentiating products, meeting consumer expectations, and ultimately succeeding in the global marketplace.

In spite the fact that the clothing industry in China has a vast market, there are still some problems in the quality of clothing products. For textile and garment products, the quality problems mainly exist in fiber composition, formaldehyde content, ph value, color fastness and product labels do not match several aspects. The quality problem may affect the consumer's experience, or even lead clothing products to be harmful for human health. The relevant departments and clothing enterprises should emphasize on in-depth analysis of product quality factors and causes of the problem, in order to take scientific and effective measures to strengthen the quality inspection and supervision of textile and garment products.

There are still some questions in the quality of textile and garment products on the market, and it is significant to enhance the quality of the products in the future. Therefore, the researcher is interested and decided to study the topic of "Improvement strategy of textile and garment product quality supervision".

### 1. Research Objectives

- 1.1 To study the quality expectation of textile and garment products in Shanghai.
- 1.2 To study the pattern for improving the development of textile and garment product quality in Shanghai.
- 1.3 To study the relationship between unrealistic expectations and the improvement of product quality management strategies for textile and garment products in Shanghai.

### 2. Review of Related Literature

The study related with the concept of the quality of the 2020 is in Shanghai, "Shanghai Municipal Bureau of Market Supervision and administration" (2021) states that, by 2020, Shanghai will carry out the plans of the CPC Central Committee, the State Council, the Shanghai Municipal Committee and the municipal government on building a quality country and promoting high-quality development. Also, the

plans will focus on improving the environment for quality development, as well as modernizing Shanghai's quality management system and capacity. According to the "Quality is the life of Shanghai", Shanghai's quality work around the National Service Strategy to build a quality of international competitiveness and promote upgraded quality work. To formulate the quality improvement in Shanghai, there are three-year action plan for strengthening quality brand building and promoting high-quality development: "1+85" policy which is including product, service, engineering and human settlement quality promotion, organizing quality improvement projects in 11 key areas such as high-end equipment manufacturing, as well as in 17 key industries such as intelligent software, and new breakthroughs in the regional quality development of the Yangtze River Delta.

Adhere to the Feigenbaum's concept of quality management theory, total quality control and management, Feigenbaum emphasizes on the the management perspective and believes that interpersonal relationships are fundamental to quality control activities. For a quality plan to work, the organization's managers must take responsibility, which includes getting leaders to commit and contribute to the organization's performance (Feigenbaum, 1983).

In 1987, the ISO 9000 quality management system (QMS) is developed by the International Organization for Standardization (ISO), the world's leading non-governmental international organization. The system promotes the quality management of industrial enterprises and quality assurance of both supply and demand sides in the world.

There is a thought on risk monitoring of quality and safety of textile and garment products. With the development of the country economy and society, the level of productivity, the great variety of products, and the growing attention to product quality, product quality and safety risk monitoring based on "Risk management" was introduced into the market supervision system. As the textile technology has been developed, the economic proportion of garment industry is increasing. On the other hand, the quality of clothing products has gone backward. Therefore, it is very necessary to strengthen the level of quality management and improve the quality of clothing.

Clothing products easy to complain points and related testing. (Wang Dan, Mao Zhu, and Shu Guifang, 2020). With the increasing awareness of consumer protection, the complaints of garment quality problems are also increasing. Through the Consumer Protection Commission data collection, the quality problem of clothing products is the first of the total number of complaints, and is the main aspect of consumer complaints. So, the enterprises should detect unqualified products as soon as possible.

In the development of textile industry, fiber technology has been developed and innovated in an all-round way. With the development of modern chemical engineering, synthetic fibers such as polyester, polyamide and acrylic have better textile properties and corresponding advantages and disadvantages. As different fibers have different properties, consumers would easily buy the fiber which is not in accordance with their actual content. The problems affect the overall quality of clothing products, and even cause damage to the interests of consumers and hit the market consumer confidence. In addition, the production process of modern textile and garment products is mainly based on industrial production. Thus, clothing

products in the production process will be exposed to a variety of chemical products. For example, in the production process, the relevant enterprises usually add formaldehyde to optimize the treatment of clothing products, but the formaldehyde material has the extremely harm to the human body. Unqualified PH is also harmful for the human body. The chemical dyes also affect the quality of the garment and cause the damage to the health of consumers. Therefore, the relevant quality inspection and the mark of the quality products are necessary.

## Research Methodology

### 1. The Research Procedure Includes 4 Steps which are:

- 1.1 Determine the research objectives and research objects.
- 1.2 Explore the variables: collecting all possible variables, categorizing and merging all the resulting variables, generating the scale and carrying out the pre-test.
- 1.3 Collect data: questionnaire design, sampling design, formal survey.
- 1.4 Analyze the statistical: correlation coefficient and delete unnecessary variables, factor analysis and delete unexplained variables, get the structure of the elements.

### 2. Research Instruments

There are two types of used in the research for data collection: qualitative and quantitative research methods.

The quantitative investigation is used to count the quality problems in textile and garment market, as well as studies the ways to improve the product quality. The factors considered in the quantitative are the selection of the statistical measurement of the sample size, and the use of statistical methods to determine the appropriate number of samples.

The questionnaire survey is a research method that the interviewees fill in the questionnaire to answer the questions without the interviewees. The questionnaire will be conducted to represent two objectives: to study the quality problems of textile and garment products in Shanghai, and to study the pattern improving development textile and garment product quality.

### 3. Populations and Samples

3.1 Quantitative Research: The population was divided into five categories: infant, juvenile, young, middle-aged, and elderly. A sample size of 10 people was selected from various consumer groups to answer simple questions about consumption and experience. The sample size for this study was 400 out of the total 500 survey sets sent, with a response rate of 80 percent.

3.2 Qualitative Research: Key informants were interviewed, including 15 textile and garment enterprises and 15 government officials affiliated with departments linked to the textile and garment industry.

#### 4. Statistics for Data Analysis

The selection of the statistical measurement of the sample size, the use of statistical methods to determine the appropriate number of samples, the factors considered in the quantitative, and can estimate the sample error, thus making the method more convincing. The following table is provided by Alan Dutka, an American market researcher, who gives the sample size needed to satisfy various confidence levels and error combinations.

**Table 1:** Confidence interval table

Confidence Interval Allowable Error	50%	75%	80%	85%	90%	95%	99%	100%
1%	1140	3307	4096	5184	6766	9604	16590	19741
2%	285	827	1024	1296	1692	2401	4148	4936
3%	127	358	456	576	752	1068	1844	2194
4%	72	207	256	324	423	601	1037	1234
5%	46	133	184	208	271	385	664	790
7.5%	21	59	73	93	121	171	296	351
10%	12	34	41	52	68	97	166	198
15%	6	15	19	24	31	43	74	88
20%	3	9	11	13	17	25	42	50
50%	2	2	2	3	3	4	7	

Alan Dutka Confidence interval

In this research, the researchers established that the confidence level required for inference was, in general, 95%. This was done by setting the research hypothesis as follows.

H1: Customer expectations affect the improvement of strategies for managing product quality.

H2: Entrepreneur expectations affect the improvement of strategies for managing product quality.

H3: Government expectations affect the improvement of strategies for managing product quality.

## Results

Based on the research objectives, the results are provided as follow.

### 1. The Quality Expectation of Textile and Garment Products in Shanghai

The quantitative analysis of customer, entrepreneur, and government official expectations regarding apparel and textile quality management in Shanghai provides the insights into the quality challenges caused



by customer, entrepreneur, and government officials expectations. First, the findings reveal that customers are generally satisfied with pricing and service.

**Table 2:** Consumer expectations of product quality

Consumer expectations	Mean	S.D.	Interpret	Ranking
1. Product quality satisfaction	3.26	.823	Moderate	3
2. Service satisfaction	4.12	.723	High	2
3. Product price satisfaction	4.63	.742	Highest	1
<b>Overall Average</b>	<b>4.00</b>	<b>0.76</b>	<b>High</b>	

*“Chinese customers are searching for apparel and materials that can perform admirably in particular environments, such as for outdoor or athletic wear. In other words, the materials must possess the necessary technical qualities, including moisture-wicking or UV protection.”*

However, their satisfaction with product quality is relatively modest. This indicates that in spite of the industry excels in some areas, there is room for improvement in product quality. Next, entrepreneurs in the industry prioritize service attitude and color fastness, as well as competitive service prices and addressing market-specific issues. Issues related to honesty and discipline, and improper pH values, are significant challenges.

**Table 3:** Entrepreneur expectations of product quality management

Entrepreneur expectations	Mean	S.D.	Interpret	Ranking
1. Company service attitude	4.52	.792	Highest	2
2. Company technological capability in the market	4.12	.842	High	5
3. Company honesty and discipline	3.25	.881	Moderate	10
4. Company service prices	4.15	.486	High	4
5. The fabric content issue	3.86	.756	High	8
6. Marketed textiles exceed formaldehyde limits.	3.93	.896	High	7
7. Market textiles have improper pH values.	3.42	.458	High	9
8. The colour fastness of market textiles	4.89	.365	Highest	1
9. Marketed textile labeling difficulties	3.96	.896	High	6
10. Other textile product market issues	4.28	.248	Highest	3
<b>Overall Average</b>	<b>4.03</b>	<b>0.896</b>	<b>High</b>	

*“Chinese business owners anticipate having a thorough quality management system in place for their organizations. The entire process of product development, production, and delivery should be covered by this system.*

*Constant product quality improvement is something Chinese business owners want from their companies. This calls for routinely examining and modifying the systems and procedures for quality management.”*

Lastly, government officials' primary concern is the reliability of independent certification and testing processes. Additionally, they emphasize the need for government supervision of textile and garment companies to maintain quality and safety standards.

**Table 4:** Government officials’ expectations of product quality management

Government officials’ expectations	Mean	S.D.	Interpret	Ranking
1. The government supervises textile and garment companies.	3.56	.792	Moderate	1
2. Trust independent certification and testing	3.12	.842	Moderate	2
<b>Overall Average</b>	<b>3.34</b>	<b>0.836</b>	<b>Moderate</b>	

Chinese consumers seek durable, comfortable, fashionable, and reasonably priced apparel and textiles. Sustainability and performance are also crucial considerations. Entrepreneurs in Shanghai emphasize a comprehensive quality management system, prevention of faults, constant improvement, employee participation, and customer feedback. Besides, Chinese government officials focus on establishing national standards and quality certificates for textile and apparel.

## 2. The Pattern of Improving Development in Textile and Garment Product Quality

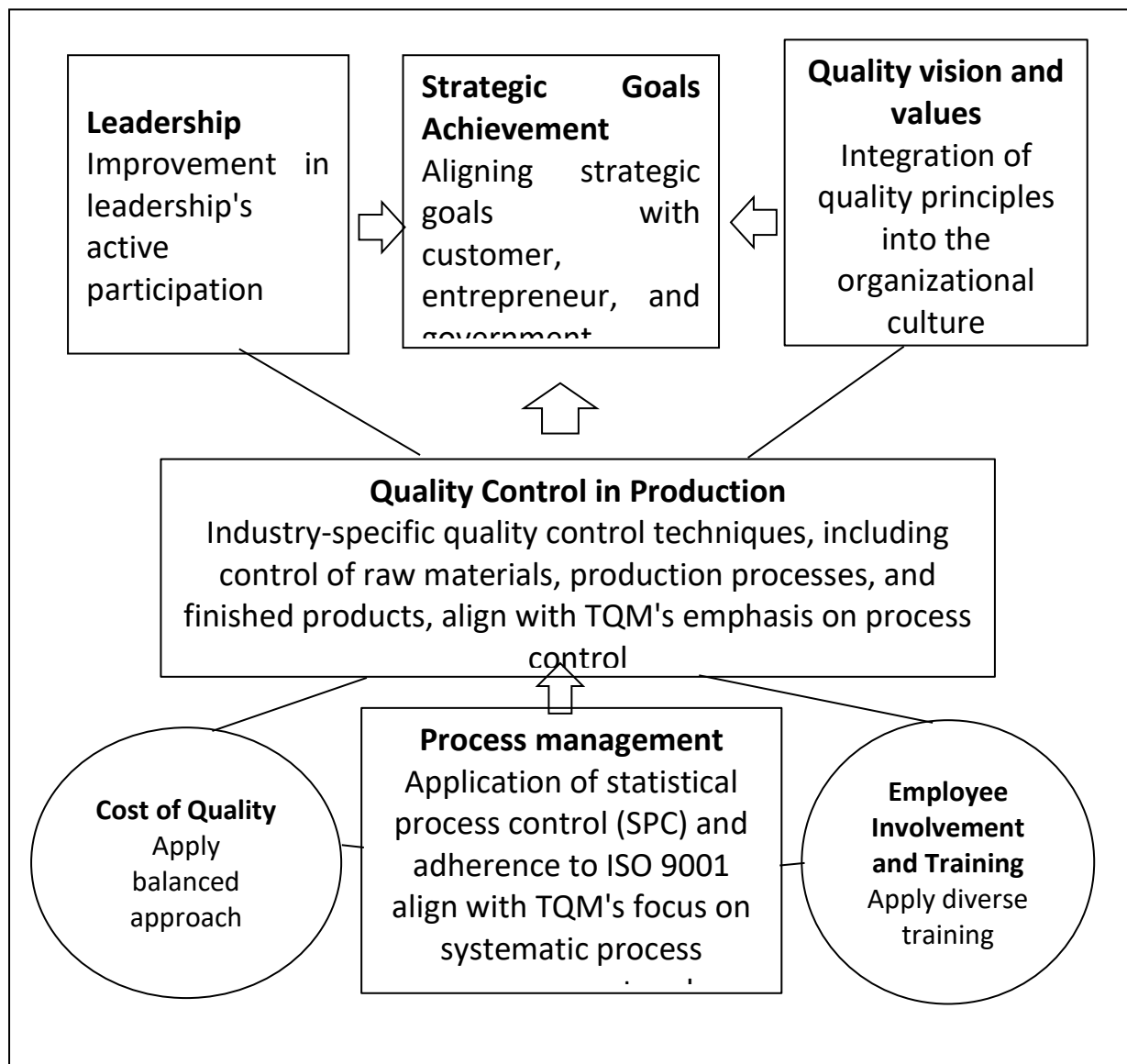
The analysis reveals positive outcomes from the quality management strategy, including improved consumer satisfaction, loss reduction, enhanced operational effectiveness, collaboration with the government sector, and internal business management capabilities. However, there is room for improvement in leadership's active participation in quality improvement efforts. Integration of quality principles into the organizational culture needs attention.

In the context of strategic goals achievement for quality enhancement, the research findings suggest that the enterprises are encouraged to align strategic goals with customer needs and regulatory requirements for overall quality improvement. To drive successful goal achievement, process management is necessary. The application of statistical process control (SPC) and adherence to ISO 9001 align with TQM's focus on systematic process management and continuous improvement. Nevertheless, in quality improvement, managing the cost of quality is crucial, and organizations falling within this range suggest a balanced approach to quality investment without excessive costs. The research findings also highlight

varying approaches to quality control training for employees to recognize, prevent, and fix errors is essential. This approach ensures that employees are well-prepared to contribute to quality enhancement.

For improving development in textile and garment product quality, the research findings show that a significant proportion of organizations align with ISO 9001 standards. The entrepreneurs have to prioritize continuous improvement. In consequences, there are improvements in consumer satisfaction, reduced losses, enhanced operational effectiveness, and increased collaboration with government supervision.

The research findings reveal a pattern for improving the development of textile and garment product quality in Shanghai, aligning with principles of quality management as shown in Figure 1



**Figure 1:** Pattern of Improving Development in Textile and Garment Product Quality

In Figure 1, the pattern for improving the development of textile and garment product quality in Shanghai covers TQM principles in dimensions such as leadership, quality vision and values, and strategic

goals achievement following the system & strategic approach. This involves incorporating various standards into process management to drive operations towards quality control in production. To achieve success, it is crucial to prioritize the cost of quality and employee involvement and training.

The analysis reveals positive outcomes from the quality management strategy, including improved consumer satisfaction, loss reduction, enhanced operational effectiveness, collaboration with the government sector, and internal business management capabilities. This underscores the importance of well-defined quality management strategies. The analysis indicates that 37.5% of senior management lacks a clearly defined approach to quality control. TQM emphasizes the role of leadership in setting a clear vision and systematic approach to quality. There is room for improvement in leadership's active participation in quality improvement efforts. In terms of quality vision and values, a significant number (41.05%) of organizations lack a distinct quality vision and values. TQM stresses the importance of a shared vision and values throughout the organization. Therefore, integration of quality principles into the organizational culture needs attention.

In the context of strategic goals achievement for quality enhancement, the research findings suggest that around 47.37% of organizations successfully balance consumer demands and regulatory standards, indicating a strategic approach to quality. TQM encourages aligning strategic goals with customer needs and regulatory requirements for overall quality improvement. While many organizations successfully meet consumer demands, there is still room for improvement in complying with client requirements and regulatory standards. The observation that some organizations prioritize customer requirements over core practices highlights the necessity for a balanced approach to goal achievement.

To drive successful goal achievement, process management is necessary. The analysis indicates varying levels of effectiveness in corporate quality management. The application of statistical process control (SPC) and adherence to ISO 9001 align with TQM's focus on systematic process management and continuous improvement. Process control, industry-specific quality control techniques, including control of raw materials, production processes, and finished products, align with TQM's emphasis on process control to ensure consistently high-quality outputs. The research findings show that 57.89% fall within the 2 to 4% range of direct quality costs. Therefore, in quality improvement, managing the cost of quality is crucial, and organizations falling within this range suggest a balanced approach to quality investment without excessive costs. The optimization of cost percentages linked to quality management is pivotal to ensuring efficiency.

It is also crucial to prioritize employee involvement and training. The research findings highlight varying approaches to quality control training. In quality improvement, continuous training for employees to recognize, prevent, and fix errors is essential. The diverse training approaches observed indicate a need for standardized and comprehensive training programs. Organizations should focus on comprehensive annual quality training plans and assessments aligned with operational frameworks and objectives. This approach ensures that employees are well-prepared to contribute to quality enhancement.

Improving development in textile and garment product quality must rely on a systematic approach. The research findings show that a significant proportion (40%) of organizations align with ISO 9001 standards,

showcasing a commitment to a systematic quality management approach. Quality Management (QM) encourages the implementation of effective quality management systems for continuous improvement. The key is that textile and garment entrepreneurs must genuinely prioritize continuous improvement. The results demonstrate improvements in consumer satisfaction, reduced losses, enhanced operational effectiveness, and increased collaboration with government supervision. These align with QM's focus on continuous improvement and customer satisfaction.

### 3. The Effect of Unrealistic Expectations and Improvement in Product Quality Management Strategies

There are three principal findings of the relationship between expectations and strategies for managing product quality. Firstly, the combination of consumer expectations, entrepreneur expectations, and government official expectations can bring about the improvement of strategies for managing product quality. Secondly, the analysis of variance table corroborates the statistical significance of the independent variables. The rejection of the null hypothesis implies that at least one independent variable can serve as a predictor for the dependent variable. And thirdly, the regression analysis underscores the positive impact of consumer expectations, entrepreneur expectations, and government official expectations on the improvement of product quality management strategies.

**Table 5:** Regression analysis of the improvement of strategies for managing product quality

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	1.265	.236	
	customer_expect	.860	.039	.053
	entrepreneur_expect	.056	.089	.008
	Gov_expect	.023	.047	.005
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.726	.527	.501	.2347

The findings obtained from the multiple regression analysis conducted on the factors influencing the improvement of strategies for managing product quality are presented below.

$$\begin{aligned}
 & \text{quality}_{\text{managment}} \\
 & = 1.265 + 0.86\text{customer}_{\text{expect}} + 0.056\text{entrepreneur}_{\text{expect}} \\
 & + 0.023\text{Gov}_{\text{expect}}
 \end{aligned}$$

These findings emphasize the significance of aligning strategies with stakeholder expectations. The results also underscore the importance of considering and addressing the expectations of consumers,

entrepreneurs, and government officials when formulating strategies to manage and enhance product quality in the apparel and textile industry. The combination of these factors demonstrates the capacity to predict the dependent variable with an accuracy rating of 50.1 percent. Thus, while unrealistic expectations may pose challenges, incorporating these expectations into strategic planning can lead to the development of more effective product quality management strategies that align with stakeholder needs, ultimately resulting in improved product quality.

## Discussion

According to the result of the study, the discussion can be divided into three issues, including the quality expectation of textile and garment products in Shanghai, the strategy for enhancing the development of textile and garment product quality management, and the relationship between the unrealistic expectation and improvement of product quality management strategies.

The analysis of the quality expectations of textile and garment products in Shanghai points out the differing priorities and concerns of different stakeholders in the apparel and textile industry in Shanghai. The industry players address quality issues, enhance overall product quality management, and align their strategies with the expectations of key stakeholders. While customers were found that there is a high level of consumer satisfaction with the product's quality. This is similar to the result of the study of Schneiderman's, Cao, and Oslon (2004) which states that the average quality rating of Chinese items was a rating of poor quality. This discovery supports the idea that Chinese manufactured products are seen to have a much lower quality than those imported from other nations. Besides, the quality remains significantly high, with a more nuanced perspective, emphasizing the importance of service and color, but also identifying challenges related to honesty and discipline. This is similar to the result of Yiping, L., and Yan, Z. (2017) simplified the process of being an entrepreneur into simply three stages: the preparation for the official opening of new businesses, the virtual launch of new enterprises, and the inventive expansion of existing firms. However, in today's competitive society, the opportunity can disappear rapidly. Thus, optimizing resources and chances can be an important factor in determining the success in a business.

This analysis equips organizations with valuable insights into areas that necessitate improvements in their quality management practices, as well as the strategy for enhancing the development of textile and garment product quality management. This is similar to the study of Zgirska, A.; Ruževičius, J.; Ružele, D. (2021) which presents the initiative to reduce incidents, to use the standard for marketing purposes, or to improve communication in the company. Additionally, organizations should integrate quality management, process enhancement, workforce development, and strategic planning. Similar to result of Zgirska, A.; Ruževičius, J.; Ružele, D. (2021), the study shows that the benefits of quality management standards that directly contribute to the growth of the organization have also been highlighted.

For the relationship between the unrealistic expectation and improvement of product quality management strategies, entrepreneur's expectations affect the improvement of strategies for managing product quality. As the result of Evanschitzky et al. (2012), customers' repeatedly purchase a particular

brand's products is known as "brand loyalty," whereas the public's perception of a particular company is known as its "reputation." Moreover, government officials' expectations affect the improvement of strategies for managing product quality. According to Patwa et al. (2021), government involvement can be advantageous for innovative consumer initiatives, the circular economy, and government programs. Therefore, it can be considered that incorporating these expectations into strategic planning can lead to the development of more effective product quality management strategies that align with stakeholder needs, ultimately resulting in improved product quality.

## Suggestions

Regarding this study, several suggestions can be produced to enhance the quality of the textile and garment industry in Shanghai. First, the organizations should focus on implementing quality control measures, continuous improvement processes, and responsive feedback mechanisms to consistently enhance the quality of their products. Next, to meet the business expectations, entrepreneurs should invest in employee training programs to ensure excellent customer service and product appearance, as well as foster a culture of integrity and implementing codes of conduct can address concerns about honesty and discipline. Lastly, collaborative efforts with government authorities can ensure that the quality and safety of the products are always met. In summary, by adopting these recommendations, organizations in the textile and garment industry can address the specific challenges identified in the research, enhance product quality management, and align their strategies with the expectations of key stakeholders. This holistic approach will result in improved product quality, increased customer satisfaction, and enhanced overall organizational effectiveness.

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## The effect of financial performance and firm size on bond rating

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### Abstract

This study aims to test and analyze the factors that influence bond ratings involving variables of profitability, liquidity, leverage, activity ratio, and firm size in banking firm listed on the Indonesia stock exchange for the period 2017-2021. The analytical tool we use is logistic regression. The findings in this study are that the activity ratio proxied by total asset turnover and firm size has a positive and significant effect. Meanwhile, another finding of our research is that liquidity with the current ratio indicator also has a positive although insignificant effect on bond ratings. Meanwhile, leverage using the debt to equity ratio indicator and profitability with the return on assets indicator have a negative and insignificant.

**Keywords:** Return On Assets, Current Ratio, Debt to Equity Ratio, Total Asset Turnover, Firm Size, Bond Ratings

### Introduction

Signaling theory according to Brigham & Houtson (2019), is an action taken by firm management that provides clues to investors about how management views the firm's prospects. Signaling theory is a theory that explains the rise and fall of stock prices in the market, so that it will influence investor decisions. However, there is still information asymmetry between firm and investors and creditors, making it difficult for third parties to provide accurate assessments of firm performance and provide assessments related to prospects and quality. Bonds are one of the securities that investors can choose besides stocks, because bonds can provide fixed income for investors. Bonds themselves are attractive assets, besides that in recent years the bond market has received more attention, due to the increasing value of bond trading (Pandutama, 2012). In most cases, bond regulators declare a business insolvent and force it to file for bankruptcy if bond interest is not paid. According to Dewi & Utami (2020) bondholders are more likely to pay interest than common or preferred stocks, which pay dividends at the discretion of management.

The description of the bond issuer's ability to repay debt and interest related to the bonds offered, the bonds are rated. A high bond rating indicates that the signal that will be received by investors is a good signal. Bonds are the right choice for issuers because it allows them to obtain funds for their operational purposes without having to go through many steps such as applying for credit to financial institutions. According to Khalqi (2018) the firm issues bonds is to obtain funds for financing the firm's operations.

A bond rating is an assessment of the creditworthiness of a bond issuer based on relevant risk factors. Ratings do not imply a recommendation to buy, sell or hold a bond. This opinion focuses on the capacity and willingness of the bond issuer to fulfill its obligations in a timely manner (Nurhariyaningsih & Nazar, 2020).

When compared to investing in stocks, Indonesian bond ownership is still very small. Bonds offers a number of advantages, one of which is the ability to receive yields. Bondholders receive income from dividends and capital gains when interest payments are made. Another advantage is that bondholders will take precedence over shareholders when it comes to guaranteeing the return of loans to the business. Despite the fact that there are risks involved, bonds are considered a safe investment. The risk of bonds is that the firm fails to pay its obligations to investors or is unable to repay its bonds (default risk). When buying bonds, investors should consider the bond rating among other factors. The firm's ability to fulfill its future obligations is the bond rating. Investors can see how safe a bond is on this scale.

The rating given to a bond is a security given to the bond rating agency. PT Pemeringkat Efek Indonesia (PT. PEFINDO) is an Indonesian bond rating agency, established in 1993, PT. PEFINDO has evaluated more than 500 businesses and local governments. Rating agencies only evaluate the occurrence of an event and do not monitor the firm's financial performance on a daily basis, which is why they issue bonds. (Oktaviyani, 2021). Meanwhile, Moody's and Standard & Poor's are responsible for international bond ratings. Bonds usually fall into one of two categories: investment grade (AAA, AA, A, and BBB) and non-investment grade (BB, B, CCC, and D). For a bond to be worth investing in, it must fall into the investment grade category if the firm is considered to have sufficient funding sources to fulfill its obligations. Conversely, bonds that fall into the non-investment grade category are not worth investing in because the firm does not have much funding available to pay off its obligations.

The financial performance of a firm is an achievement achieved by the firm in a certain period that reflects the health level of the firm. According to Ela & Sumartono [7] evaluation of the management of firm assets by firm management is provided by financial performance measurements. Financial factors such as profitability, liquidity, *leverage*, activity and firm size can have an impact on high and low bond ratings, as stated in the requirements (Sulistiani & Meutia, 2021). A firm receives a higher rating due to the low risk of bankruptcy (*default*) associated with its higher level of profitability. A ratio called profitability is used to determine how effective a firm is overall based on how much money it will spend and make from sales or investments. According to Dewi & Sudiarta (2018) profitability examines the extent to which the investment invested is able to provide the expected return. The firm's profit position and asset utilization increase with higher ROA. Nuriman & Nurdiansyah (2021) and Rivandi & Gustiyani (2021), state that profitability is considered to have a significant positive effect on bond ratings. Meanwhile, research Darmawan et al. (2020) and Sulistiani & Meutia (2021) state that profitability has a negative effect on bond ratings.

Liquidity can affect the bond rating, because the firm's ability to pay short-term debt will reduce the risk of bond default. According to research results Mardiana & Suryandani (2021) and Kustiyaningrum

et al. (2017) shows that liquidity has a positive effect on bond ratings. Meanwhile, research Sulistiani & Meutia (2021) and Nuriman & Nurdiansyah (2021) shows that liquidity has a negative effect on bond ratings. Besides liquidity, a measure of the firm's ability to pay off its total debt can also affect the bond rating. *Leverage* states debt policy, so debt can be used to estimate the benefits that are likely to be obtained for investors if they invest in a firm. aDarmawan et al. (2020) and Mardiana & Suryandani (2021) stated that *leverage has a significant positive effect on bond ratings*. Meanwhile, research Kustiyaningrum et al. (2017) and Rivandi & Gustiyani (2021) state that *leverage has a negative effect on bond ratings*.

The ratio of the level of efficiency (effectiveness) of the utilization of firm resources or the ratio to assess the firm's ability to carry out its daily activities also affects the bond rating.. Based on research conducted by Herlinasari (2021) and Setiawan et al. (2022) a stated that activity has a positive effect on bond ratings. Meanwhile, research from Esensia et al. (2020) states that activity proxied by TATO has a negative effect on bond ratings. Another variable that can affect bond ratings is firm size. According to Rezky (2013) asserts that large businesses are less risky than small businesses because small businesses face greater risks. In addition, the potential to diversify non-systematic risk is also getting bigger so that the firm's bond risk decreases. Firm size describes the category of *investment grade* or *non- investment grade* firm. Because the size of the firm is assessed from published information. The larger the size of the firm means that more investors can get a lot of information easily and reduce the uncertainty that investors have so that it can improve the firm's bond rating. According to Darma & Sulistiyani (2020) increasing the firm's bond rating requires investors to access more information and reduce their level of uncertainty. According to Darmawan et al. (2020) and Sulistiani & Meutia (2021) and state that firm size has a positive effect on bond ratings.

This study aims to test and analyze the factors that influence bond ratings involving variables of profitability, liquidity, *leverage*, activity, and firm size in banking firm on the Indonesia Stock Exchange in 2017-2021. Banking firm were chosen in our study, because as a financial institution whose main function is to intermediate funds, trust from the public is the main driving factor. On the other hand, with the strict supervision of the Indonesian government on the financial sector, it is very interesting for us to further examine how the impact of banking financial performance on bond ratings, as a reference for parties with an interest in banking.

### 1. Profitability and Bond Rating

Firm with high profits are considered capable of running their business well and have more potential to maintain their business continuity in the long term, so they will have a greater ability to fulfill their obligations than firm with low profits. Return on assets is used to measure management's ability to earn profits and reflects the managerial ability to manage the firm as a whole. The higher the level of Return on assets, the better the firm's rating will be (Lestari, 2019). With the firm making good profits, this shows that the firm is able to fulfill its obligations to investors in a timely manner. The study found that return on assets has a positive and significant effect on bond ratings (Angel & Sudjiman, 2020) (Dewi & Utami, 2020. Darmawan

et al., 2020, Hung et al., 2021, Nuriman & Nurdiansyah, 2021, Hafiz et al., 2021, Tambunan et al., 2023, and Azizah & Ady, 2023). Although other results show that Return on Assets has a positive and insignificant effect on bond rating (Risawati, 2020). and even according to Ruspriono & Marsoem (2021) shows that Return on Assets has a significant negative effect on bond rating, while Esensia et al. (2020) found a negative and insignificant direction of influence. Based on this description, the first hypothesis can be formulated as follows:

H1: Return on Asset has a positive and significant effect on Bond Rating

## 2. Liquidity and Bond Rating

Based on signaling theory, firm with healthy liquidity will provide interesting information and become attractive to investors compared to firm with poor liquidity, thus avoiding information asymmetry between owners and stakeholders. Current Ratio is a liquidity ratio that measures the firm's ability to pay off its short-term obligations. The higher the firm's Current ratio, the better the firm's bond rating (adelia gufita, 2022). A high current ratio causes an increase in bond ratings because the firm has the ability to fulfill its short-term obligations in a timely manner, so the risk of default will be reduced (Prastiani, 2018). The study found that current ratio has a positive and significant effect on bond ratings (Kustiyaningrum et al., 2017, Utami et al., 2021, Mardiana & Suryandani, 2021, and Hung et al., 2021) The results of another study found that the current ratio has a positive although insignificant effect on bond rating (Dewi & Utami, 2020, Risawati, 2020, and Azizah & Ady, 2023). whereas Tambunan et al. (2023) found a negative although insignificant influence of the current ratio on bond rating. Based on this description, the second hypothesis can be formulated as follows:

H2: Current Ratio has a positive and significant effect on Bond Rating

## 3. Leverage and Bond Rating

The higher or lower the leverage ratio value means that only a small portion of the assets are financed with debt and the smaller the risk of firm failure, and vice versa, the lower the firm's leverage, the higher the rating of a firm. Firm with a low level of leverage tend to be favored by investors because investors have confidence that the firm will be able to pay off all its obligations when the debt is due. Debt to equity ratio is used to measure the firm's ability to pay off its obligations (Suprpto & Aini, 2019). The greater the Debt to equity ratio value indicates that the risk a firm has is high, while the lower the debt to equity ratio, the better the firm's rating and the higher the debt to equity ratio, the greater the risk of failure, which has an impact on the firm's burden on external parties. Based on research debt to equity ratio has a significant negative effect on bond ratings (Kaltsum & Anggraini, 2021, Sulistiani & Meutia, 2021, Rivandi & Gustiyani, 2021, and Ruspriono & Marsoem, 2021). Although there are also studies that find that debt to equity ratio has a significant positive effect on bond rating (Hung et al., 2021, and Azizah & Ady, 2023). Based on this, the third hypothesis is as follows:

H3: Debt to Equity Ratio has a negative and significant effect on Bond Rating

#### 4. Activity and Bond Rating

Total Asset Turnover is an activity ratio that measures how efficiently a firm uses its assets to generate sales (Prastiani, 2018). The activity ratio assumes that there should be a proper balance between sales and assets owned by the firm. The purpose of the activity ratio is to measure how long it takes to collect receivables during one period, calculate the average collection of receivables, and how many times the funds invested in the working model. The higher the Total Asset Turnover, the firm's financial performance will improve. The results of the study state that total assets turnover has a positive and significant effect on bond ratings (Prastiani, 2018, Suharmadi & Suripto, 2021, Rosita et al., 2022, and A. Setiawan et al., 2022). Meanwhile, Ruspriono & Marsoem (2021) found a positive and insignificant effect of total assets turnover on bond ranking. Based on this, the fourth hypothesis is as follows:

H4: Total Asset Turnover has a positive and significant effect on Bond Rating.

#### 5. Firm Size and Bond Rating

Signal theory and prospect theory explain that the size of a firm will affect corporate governance. firm have a large asset capacity, it can be predicted that the firm has good governance and can generate large profits within a certain period of time. A large firm will show that the firm has large assets so that it is a good sign for investors (Sulaksono & Sandra, 2022). This makes investors able to know the ability to pay bond interest and pay off principal loans which can increase the firm's bond rating (ISetiawan & Mahardika, 2019). According to research firm size has a positive and significant effect on bond ratings (Sri & Dwi, 2009, Risawati, 2020, Darmawan et al., 2020, Sulistiani & Meutia, 2021, and Suharmadi & Suripto, 2021). While Tambunan et al. (2023) produces a positive although insignificant direction of influence from firm size on bond rating. Based on this, the fifth hypothesis is:

H5: Firm Size has a positive and significant effect on Bond Rating

### Methodology

#### 1. Data Collection and Sources

The type of data in this study is secondary data, with the data source used coming from the financial statements of banking firm on the Indonesia Stock Exchange in 2017-2021. This research data is panel data, which is a type of data that is a combination of *cross sectional* data and *time series* data (Gujarati, 2003). Regression analysis is used to answer research objectives with return as the dependent variable.

#### 2. Empirical Model and Variable Measurement

The focus of the research is on empirical testing of the integration of variables related to Bond Rating which includes Return On Assets (ROA), Current Ratio (CR), Debt to Equity Ratio (DER), Total Asset Turnover (TATO), and Firm Size. The empirical study model is presented in Figure 1.

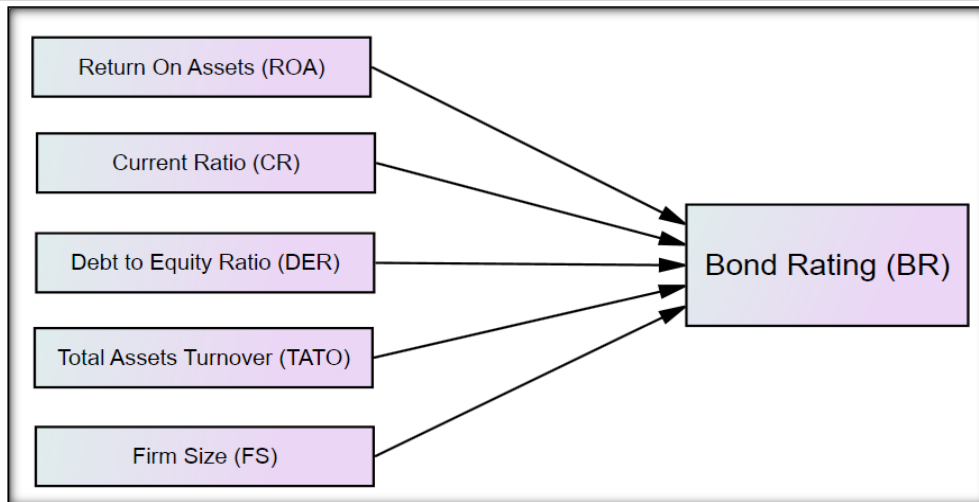


Figure 1: Empirical Research Model

In Figure 1, an equation can be formed that shows the causal relationship between ROA, CR, DER, TATO, and FS variables with bond rating variables, as follows:

$$BR = \beta_1 ROA + \beta_2 CR + \beta_3 DER + \beta_4 TATO + \beta_5 FS + \varepsilon_1$$

Where:

- BR = bond rating
- ROA = return on equity
- CR = Current ratio
- DER = debt to equity ratio
- TATO = total assets turnover
- FS = firm size

Return on Assets is used as an indicator of profitability (Esensia et al., 2020, Hung et al., 2021, and Mahirun et al., 2023). Current ratio is used as a proxy for liquidity variables (Dewi & Utami, 2020, Esensia et al., 2020, Hung et al., 2021, Ruspriono & Marsoem, 2021, Azizah & Ady, 2023, and Tambunan et al., 2023). Debt to equity ratio is used as an indicator of Leverage (Mahirun, 2019, Hung et al., 2021, Ruspriono & Marsoem, 2021, and Azizah & Ady, 2023). Total Asset Turnover is used as an indicator of the activity ratio (Suharmadi & Suropto, 2021, Ruspriono & Marsoem, 2021, Rosita et al., 2022, and Setiawan et al., 2022). The natural logarithm of total assets is used as an indicator of firm size (Risawati, 2020, Suharmadi & Suropto, 2021, and Tambunan et al., 2023). The bond rating from PT Perneringkat Efek Indonesia (PT. PEFINDO) is used as a bond rating indicator (Dewi & Utami, 2020, Esensia et al., 2020, Suharmadi & Suropto, 2021, Hung et al., 2021, and Azizah & Ady, 2023).

## Result and discussion

### 1. Descriptive statistics

The firm used as the object of research is a banking firm listed on the Indonesia Stock Exchange for the period 2017-2021. Based on the criteria needed in the study, firm that qualify as samples amounted to 85. The results of the descriptive statistical test obtained the average bond rating reached 0.76, the highest bond rating was 1, and the lowest was 0. The average return on assets reached 0.0098%, the highest reached 0.03%, and the lowest was -0.04% (table 3).

**Table 1:** Descriptive Statistics Test Results

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Return On Assets	85	-0.04	0.03	0.0098	0.01059
Current Ratio	85	0.16	1.06	0.3235	0.21451
Debt to Equity Ratio	85	0.01	17.07	6.5742	2.90646
Total Asset Turnover	85	0.00	0.09	0.0479	0.01833
Firm Size	85	29.13	35.08	32.6777	1.51053
Bond Rating	85	0	1	0.76	0,4270

Source: SPSS data processing results

### 2. Overall Model Fit Test Results (Overall Model Test)

The overall model fit test is shown in Table 4 and Table 5.

**Table 2:** Results of Overall Model Fit Test Block Number = 0

Iteration History <sup>a,b,c</sup>			
Step	Iteration	-2 Log likelihood	Coefficients
			Constant
Step 0	1	92.975	1.059
	2	92.751	1.175
	3	92.751	1.179
	4	92.751	1.179

Source: SPSS data processing results

Based on table 2 and table 3, the resulting -2logL value (block number = 0) is 92.751, after entering the variables of Profitability, Liquidity, Leverage, Activity and Firm size, the -2logL value (block number = 1) is 35.026. This shows that the -2logL value at the beginning has decreased by 57.725, so the regression model shows a good regression model or in other words the hypothesized model fits the data.

**Table 3:** Overall Model Fit Test Result Block Number = 1

Iteration History <sup>a,b,c,d</sup>		
Iteration	-2 Log likelihood	Coefficients



		Constant	Return on Assets	Current Ratio	Debt to Equity Ratio	Total Assets Turnover
Step 1	1	56.473	-8.657	-26.078	-0.834	57.822
	2	43.715	-16.523	-47.460	-0.725	100.717
	3	38.130	-27.530	-64.520	0.855	139.877
	4	35.612	-42.048	-77.821	3.281	176.477
	5	35.064	-51.842	-88.899	4.558	205.313
	6	35.026	-55.167	-92.757	4.971	215.668
	7	35.026	-55.456	-93.090	5.006	216.582
	8	35.026	-55.458	-93.092	5.006	216.588
	9	35.026	-55.458	-93.092	5.006	216.588

Source: SPSS data processing results

### 1. Testing Model Feasibility (Hosmer and Lemeshow)

Testing the feasibility of regression with Hosmer and Lemeshow is carried out with the aim of testing the hypothesis whether the empirical data fits or fits the model. If the significant value ( $<0.05$ ) then the hypothesis is rejected, meaning that there is a significant difference between the model and its observation value. If the significant value ( $>0.05$ ) then the hypothesis is accepted, meaning that the model fits the observation value (Pefindo, 2020).

**Table 4:** Hosmer and Lemeshow Test Result

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	1.719	7	0.974

Source: SPSS data processing results

Based on table 6, the Hosmer and Lemeshow test results show that the Chi-square value is 1.719 with a significant value of 0.974. This means that the significant value of  $0.974 > 0.05$ , then the observation or in other words the model can be accepted because it is in accordance with the observation data.

### 2. Coefficient of Determination (Nagelkerke's R Square)

Nagelkerke's R-Square is a modification of the Cox and Snell coefficient to ensure that its value varies from 0 to 1. Nagelkerke's R-Square is used to obtain a coefficient of determination that can be interpreted. The following is the coefficient of determination (Nagelkerke's R Square) in table 7.

**Table 5:** Nagelkerker's R Square Test Result

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	35.026 <sup>a</sup>	0.493	0.742

Source: SPSS data processing results

Based on table 7, the Cox and Snell R Square value is 0.493 and the Nagelkerke's R Square value is 0.742. These results indicate the variability of the dependent variable which can be explained by the variability of the independent variable by 74.2%. This means that in this study the variables of Profitability, Liquidity, Leverage, Activity and Firm size can explain the Bond Rating as the dependent variable by 74.4% and the remaining 25.7% is explained by other variables not used in the study.

### 3. Classification Matrix Test

This test is used to clarify the description of the prediction of the logistic regression model with observational data. The classification table shows the predictive power of the regression model to predict the likelihood of a firm getting a bond rating of either High Investment or Low Investment.

**Table 6:** Classification Matrix Test Result

Classification Table <sup>a</sup>					
Observed		Predicted			
		Peringkat Obligasi		Percentage Correct	
		Low Investment	High Investment		
Step 1	Low Investment	14	6	70.0	
	High Investment	6	59	90.8	
Overall Percentage				85.9	

Source: SPSS data processing results

Based on table 8, of the 20 firm in the Low Investment category that correctly get the Low Investment Bond Rating category there are 14 firm, while 6 firm are in the High Investment category with a value for the correctness rate of firm with Low Investment is 70%. Meanwhile, out of 65 firm in the High Investment category that are correctly categorized as High Investment, there are 59, while the other 6 firm are categorized as Low Investment with the correct classification rate for firm experiencing High Investment is 90.8%. The overall prediction accuracy of this model is 85.9%.

### 4. Logistic Regression Model Analysis

Hypothesis testing is carried out with logistic analysis with the aim of knowing the effect of the variables of Profitability, Liquidity, Leverage, Activity and Firm size both individually and simultaneously on the Bond Rating (table 9).

**Table 7:** Logistic Regression Model Analysis Result

Variables in the Equation						
Variable	B	S.E.	Wald	df	Sig.	Exp(B)

Step 1 <sup>a</sup>	Return on Assets	-93.092	53.681	3.007	1	0.083	0.000
	Current Ratio	5.006	3.453	2.102	1	0.147	149.300
	Debt to Equity Ratio	-0.212	0.158	1.804	1	0.179	0.809
	Total Assets Turnover	216.588	73.496	8.684	1	0.003	1.156E+94
	Firm Size	1.535	0.654	5.509	1	0.019	4.643
	Constant	-55.458	21.919	6.402	1	0.011	0.000

Source: SPSS data processing results

The regression equation model that can be written based on the test results in table 9 in the form of a logistic regression equation is as follows:

$$BR = -55,458 - 93,092 (ROA) + 5,006(CR) - 0,212(DER) + 216,588(TATO) + 1,535(FS)$$

Where:

BR = bond rating

ROA = return on equity

CR = Current ratio

DER = debt to equity ratio

TATO = total assets turnover

FS = firm size

#### 4.1 Test Results of the Effect of Profitability on Bond Rating

Based on the test results, the coefficient value is negative 93.092 and the significance value is 0.083, meaning that the return on assets variable has a negative and insignificant effect on the Bond Rating. The variable return on assets in this study is not able to improve the firm's bond rating. The firm's ability to generate profits is not necessarily able to improve the bond rating, although high profitability performance is a signal that the firm has bright prospects in generating profits. This is allegedly because the use of profit is prioritized for dividend payments, not for the repayment of long-term debt (bonds). Our findings support Esensia et al. (2020) and Sulistiani & Meutia (2021) found a negative and insignificant direction of influence of return on assets on bond rating, but did not support the results of research stating that return on assets has a significant positive effect on bond rating (Angel & Sudjiman, 2020, Dewi & Utami, 2020, Darmawan et al., 2020, Hung et al., 2021, Nuriman & Nurdiyansyah, 2021, Hafiz et al., 2021, Tambunan et al., 2023, and Azizah & Ady, 2023).

#### 4.2 Test Results of Liquidity Effect on Bond Rating

Based on the results of hypothesis testing, the coefficient value is positive 5.006 and the significance value is 0.147, meaning that the current ratio has a positive and insignificant effect on the Bond Rating. The firm's current ratio increases, it will have little effect on the increase in bond rating. A high level of current ratio indicates the strong financial condition of the firm so that finance will affect the

prediction of bond ratings. Firm that are able to fulfill their financial obligations on time can signal to investors that the firm is liquid and has assets greater than its current debt. The higher the current ratio, the better the bond rating given. The findings support research that finds the current ratio has a positive although insignificant effect on bond rating [23, 24, 30, 31, 44]. However, it does not support research which states that Liquidity proxied by Current ratio has a positive and significant effect on Bond Rating (Kustiyaningrum et al., 2017, Utami et al., 2021, Mardiana & Suryandani, 2021, and (Hung et al., 2021).

#### 4.3 Test Results of the Effect of Leverage on Bond Rating

Based on the results of hypothesis testing, the coefficient value is negative 0.212 and the significance value is 0.179, meaning that the Leverage variable has a negative and insignificant effect on Bond Rating. This indicates that high and low leverage has no effect on bond rating. Leverage shows the proportion of debt use in financing investment which is proxied by the debt to equity ratio, if the proportion of debt tends to have a low ability to fulfill its obligations. High leverage in a firm indicates that the firm's financial default risk is high. Not all firm with a high level of leverage will default because if the firm is able to manage the funds it borrows properly and correctly, the firm can generate profits, for example the firm uses the debt to add new products or open new factories so that the use of debt is able to generate profits that are likely to be greater than the loan (Idawati et al., 2018). This is because some firm in this study have guarantees or are guaranteed by their parent firm so that the bond rating is not based on financial ratios but rather on the firm that guarantees it. If the firm's debt is weak, it will be strengthened by the guarantee firm, so that the bond will be given the same rating as the guarantee firm. Our research results support the findings debt to equity ratio has a negative and insignificant effect on Bond Rating (Kustiyaningrum et al., 2017, Sulistiani & Meutia, 2021, and Rivandi & Gustiyani, 2021). However, it does not support research that states that the debt to equity ratio has a significant negative effect on bond ratings (Kaltsum & Anggraini, 2021, Sulistiani & Meutia, 2021, Rivandi & Gustiyani, 2021, and Ruspriono & Marsoem, 2021), and also found that debt to equity ratio has a significant positive effect on bond rating (Hung et al., 2021, and Azizah & Ady, 2023).

#### 4.4 Test Results of the Effect of Activity on Bond Rating

Based on the test results, the coefficient value is positive 216.588 and the significance value is 0.003, meaning that total assets turnover has a positive and significant effect on Bond Rating. high activity tends to produce high bond ratings. The higher the firm's total asset turnover, the better the firm's ability to carry out firm activities in order to get maximum results to pay off its obligations. The firm's ability can be used as a positive signal that will attract investors. The research findings support research that finds that total assets turnover has a significant positive effect on bond ranking (Prastiani, 2018, Suharmadi & Suropto, 2021, Herlinasari, 2021, Rosita et al., 2022, and Setiawan et al., 2022). However, it does not support research that finds total assets turnover has a positive but insignificant effect on bond ranking (Ruspriono & Marsoem, 2021).

#### 4.6 Test Results of Firm Size on Bond Rating

The results of hypothesis testing obtained a positive influence direction of 1.535 and a significant value of 0.019, meaning that Firm Size has a positive and significant influence on Bond Rating. Large firm are considered to have good prospects, are relatively more stable and more capable of generating profits than small firm. Large size firm are widely recognized by the public because the firm's ability to pay periodic interest and pay off the principal of its loans will also be better with the assets owned by the firm. firm that have high assets show that the firm has a large ability to fulfill each of the firm's obligations and has collateral in the form of assets if the firm fails to fulfill its obligations, so that it will minimize default risk so that it can improve the bond rating of a firm. The study results are in accordance with research that found that bond ratings are positively and significantly influenced by firm size (Sri & Dwi, 2009, Setiawan & Mahardika, 2019, Risawati, 2020, Darmawan et al., 2020, Sulistiani & Meutia, 2021, and Suharmadi & Suropto, 2021). However, it does not support research Tambunan et al. (2023) which results in a positive although insignificant direction of influence from firm size on bond ranking.

#### Discussion

The findings place profitability does not affect the bond rating and even the direction is negative. The interesting thing is the assumption that the proportion of the use of profits generated by the firm is not used in funding cash flow or long-term debt (bonds) but is used to pay dividends to investors whose nominal value is greater. So the profit is not used to pay financial obligations related to bonds, resulting in profitability has no effect on bond ratings. That way PT PEFINDO in examining the rating of a bond not only looks at the firm's ability to generate high profits but by assessing the management of current assets and liabilities. This is evidenced by the test results which show that the level of effectiveness of the firm in optimizing its assets to create sales is a factor that has a positive and significant impact in determining the bond rating.

#### Conclusion and implications

##### 1. Conclusion

The main result of our research is that total assets turnover and firm size have a positive and significant effect on bond rating. This indicates that the more effective and efficient the use of assets to create sales and supported by the strength of the firm to obtain access to funding because of the large size of the firm can improve the bond rating and attract investors to make purchases. Meanwhile, the firm's ability to pay short-term debt does not affect the bond rating, because bonds include long-term liabilities. While the firm's ability to generate profits and also the firm's funding policy can affect the bond rating although not significantly.

## 2. Limitations

Our research object is still limited to banking firm and the use of variables that are thought to affect bond ratings. Future researchers are expected to expand the object of research and add other variables that are thought to strongly influence bond ratings, both micro and macro variables of the firm.

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## Interlinking the cooperative and work-integrated education programs of COLA KKU vis-à-vis english language teaching and learning

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### Abstract

Higher education institutions nowadays are eyeing the potential of cooperative & work-integrated education programs (CWIE) in increasing the English proficiency level of Thai students. Hence, this study aims to interlink English language teaching and learning vis-à-vis the various CWIE programs utilized by the College of Local Administration, Khon Kaen University in Thailand, and to identify its pedagogical challenges. By way of participatory observation and interviews, data were collected for this study. Likewise, phenomenology was performed on the data in the study. Results showed that the integration of additional English subjects in the new curriculum which foster the 21st century skills and concepts, the employment of foreign native and non-native English language teachers of English, partnerships with universities abroad, the conduct of English camps and intensive English programs, and the sending of soon-to-be graduates for internships abroad help facilitate English language teaching and learning. However, challenges remain, such as lack of exposure to an English-speaking environment, the native-speakerism ideology, the learners' motivation and attitude toward language learning, and the prevalence of Thai as the medium of instruction and pedagogy.

**Keywords:** Cooperative and Work-Integrated Education (CWIE), English camps, English as Second Language, International internships, Language pedagogy

### Introduction

Due to the societal and academic demands brought about by globalization in recent years, the clamor for more globally competent graduates has risen. Consequently, today's employers undoubtedly seek employees who possess competence, resilience, and high adaptability especially to the global marketplace (Usher, 2019; Lambert Snodgrass et al., 2021).

To equip students with the necessary competencies they need to meet the needs of the job market after graduation, the College of Local Administration of Khon Kaen University implements a novel concept of educational management which is the Cooperative and Work-Integrated Education (CWIE). As promising as it sounds, various CWIE programs are also seen as terrific opportunities to improve the students' English competencies for a prospective global workplace.

## Research Objectives

1. To interlink the various Cooperative and Work-Integrated Education programs of COLA KKU with English language teaching and learning.
2. To identify the challenges in the implementation of these CWIE pedagogies and English language teaching and learning.

## Review of Related Literature

In the academe, globalization has always been a motivating factor for institutions of higher education to reassess their mission statements and to consider how to best prepare students for an increasingly globalized world (Green et al., 2008, as cited in Jensen, 2022). As Usher (2019) put it, learning as a finite suite of knowledge and skills at university to prepare for a static career is now anathema, with industry demanding constant new insight and innovation to meet the needs of an ever-changing global society. Nowadays, most employers prefer street-smart graduates to book-smart ones. Hence, universities are developing programs and initiatives to assist in this effort including on- and off-campus international learning experiences (American Council on Education, 2017 as cited in Jensen, 2022).

Thailand, like other members of the ASEAN Community, enjoins its government to improve its citizens' competency in the English language. The continuing wave by Thai governments to develop and modernize the quality of education has influenced Thai society. It is quite alarming to note that within Thailand, English proficiency has been reported as being inferior to many ASEAN countries (Wannachotphawate, 2015). Therefore, since English is extensively used among linguacultural users to access life opportunities, it has become a requisite foreign language in the Thai educational system (Boonsuk & Ambele, 2021). As a result, the Thai state has launched alternative educational policies to elevate the quality of education and the English skills of its citizens. In fact, as early as 1995, the Thai Ministry of Education (MOE) already commenced persuading Thai schools to initiate its English Program (EP) curriculum (Wannachotphawate, 2015).

In the study of Boonsuk and Ambele (2021), it was found that pedagogy is less responsive to the changing roles of English use and its widespread use worldwide, especially among diverse linguacultural interlocutors. Hence, English university lecturers should reconsider, adjust, and make more practical global changes in English language teaching for the purpose of language teaching, language planning, and predicting language change. After all, the primordial goal of language learning is its practical applications and not just rote understanding.

An educational model which is seen to achieve the above-mentioned goals is cooperative education. In fact, Eames and Cates (2011) proved that there is sound evidence that the pedagogical structure of cooperative education provides a valuable contribution to students' overall learning because it encourages students to integrate academic and work-based learning. In cooperative education programs, learning facilitation occurs in two distinct settings: the educational institution and the workplace (Eames & Cates, 2011).

One of the concrete illustrations of the cooperative education programs is the Cooperative and Work-integrated Education (CWIE) programs, which is a term coined by the World Association for Cooperative & Work-Integrated Education. These CWIE programs are eyed to effectively connect what students are learning to the world of work through placements (Khampirat & McRae, 2016). Since it is one of the mechanisms for organizing teaching and learning at higher education institutions and external agencies, CWIE is implemented in a co-production manner with various formats such as internships, semester in industry, international co-op exchanges, study abroad, service learning and community service, among others (“WACE - Advancing Cooperative & Work-Integrated Education - What Is WACE and CWIE,” n.d.). The College of Local Administration (COLA) of Khon Kaen University (KKU) is among the educational institutions which utilize CWIE educational pedagogies not only to promote global visibility, but also to increase the English proficiency level of Thai students. This insight instigated this study.

Three major theories are linked with this study, namely (a) Piaget's Cognitive Development Theory, (b) Atkinson's Model of Achievement Motivation, and (c) Bandura's Social Learning Theory. The first theory concentrates on the three fundamental processes in the development of logical thinking: assimilation, accommodation, and equilibrium. For the co-op student, the process of assimilation, accommodation, and equilibrium are naturally at work, as they encounter new knowledge, skills, and experiences in the new context of the workplace. Meanwhile, the expectancy-value model derived from Atkinson's model of achievement motivation states that expectancy, in combination with value, leads to task involvement and subsequent achievement (Atkinson, 1964 as cited in Eames & Cates, 2011). Lastly, the Social Learning Theory developed by Bandura (1977, as cited in Eames & Cates, 2011) states that in cooperative education, students experience social learning as they observe the behaviors and consequences of those behaviors in their colleagues in the workplace. While co-op students will learn from their own successes and failures, they also learn from the successes or failures of others (Eames & Cates, 2011). Remarkably, the Social Learning Theory is also one of the major theories of language learning and development.

## Research Methodology

### 1. Research Design

This qualitative study made use of the descriptive paradigm. The data generated from the participatory observation and interviews were analyzed and interpreted to interlink the Cooperative and Work-Integrated Education programs of COLA KKU with English language teaching and learning. The study also sought to determine the challenges attached to such.

### 2. Research Instruments

Participatory observation was the primary tool used in this study. Participant observation allows researchers to check definitions of terms that participants use in interviews, observe events that informants may be unable or unwilling to share when doing so would be impolitic, impolite, or insensitive, and observe situations informants have described in interviews, thereby making them aware of distortions or inaccuracies

in the description provided by those informants (Marshall & Rossman, 1995 as cited in Kawulich, 2005). In this study, the researcher is an English Language Lecturer of COLA.

The interviews were also used as a supplementary tool. The interviews were verbal, individual, a combination of face-to-face and virtual, and voluntary. The participants were assured of their anonymity. Interviews allow the establishment of rapport between the interviewers and the interviewee. This facilitates the acquisition of more in-depth information needed for the study. Since the interviews were conducted using the English language, some questions were also repeatedly rephrased, explained, and simplified by the researcher to ensure that the participants fully understood the questions. Follow-up questions were also raised during the individual interviews to probe and to clarify their answers.

### **3. Target Group / Populations and Samples**

Purposive sampling was utilized for this study. The population of this study is comprised of two (2) COLA KKU administrators, two (2) English language teachers, six (6) COLA graduate and undergraduate students who participated in the two-week English camp in February to March 2023, and ten (10) fourth-year COLA students who underwent English for CWIE special course prior to their international internship in October 2023. Hence, this study is limited to the perspectives of the COLA KKU EFL teachers, administrators, and students.

### **4. Data Analysis**

Phenomenology was used in this study since this research method is best used in educational settings to explore the essence of a certain phenomenon from the perspective of the one who has experienced it (Bonyadi, 2023). The researcher performed verbatim transcriptions of the interviews. To assure the reliability and validity of the gathered data, the researcher repeatedly reviewed and verified all the transcriptions, and the relevant details were listed and interpreted. Specifically, only the pertinent data related to the study were identified. Repetitive referencing to the concepts and the choice of words by the participants was indispensable in the identification process. These concepts were supported by various theories and concepts in cooperative education and second language learning.

## **Results and Discussion**

### **1. The CWIE pedagogies interlinked with English language teaching and learning**

#### **1.1 Integration of additional English subjects in the curriculum which foster the 21<sup>st</sup> century skills and concepts**

Previously, COLA had been offering several English courses in its programs' curriculum. However, in the new curriculum for the Academic Year 2023-2024, three new English subjects were added with the end goal of improving the English language macro skills of the freshmen students, namely: (1) Basic English Academic Reading and Writing; (2) English Listening and Discussions on Current Issues; and (3) Advanced English Academic Reading and Writing. Notably, the instruction and pedagogy utilized in these English subjects are mostly task-based or performance-based to allow more interactive teaching strategies for the teachers and more realistic learning outputs from the students.

This finds support in the study of Chaovanapricha and Chaturongakul (2020) which emphasized that students show positive attitudes toward the collaborative process of interdisciplinary teaching in English for Specific Purposes subjects because of the enjoyable and knowledgeable activities. In line with this, Wattanavorakijkul (2019) believed that teachers should always understand and incorporate the 21<sup>st</sup> century skills and concepts into the classroom and these shall be reflected in what and how they teach foundation English courses especially among Thai university students who are non-English majors like the COLA students.

### **1.2 Employment of foreign native and non-native teachers of English**

To ensure effective teaching and learning of the English language, COLA had employed both foreign native and non-native speakers of the English language. In the past, one American native speaker used to handle an English graduate course. At present, there are two Filipino English Language Lecturers who teach English the newly offered English courses both in the undergraduate and graduate levels. Meanwhile, other English subjects are being taught by Thai English professors from the Language Institute of KKU.

This novel English educational pedagogy of COLA KKU is an illustration of the new and empowering concept of trans-speakerism. Hiratsuka et al. (2023) used the term trans-speakerism to pertain to an ideological stance committed to advancing diversity, equity, and inclusion for all language teachers, irrespective of their first languages or cultures. This is one of the cooperative learning practices that COLA KKU aims to sustain because it undeniably promotes intercultural and multicultural communication and competence.

### **1.3 Exchange programs and partnerships with universities abroad**

With the goal of promoting research and academic collaboration, fostering a deeper understanding of the ASEAN region, and facilitating the English language learning of the COLA students, COLA KKU has established partnerships with universities abroad such as the University of Baguio in Baguio City, Philippines, Eastern International University in Binh Duong New City, Binh Duong Province, Vietnam and Portland State University in the United States of America, among others. In May 2023, the fourteen COLA exchange students who had their international internships in the Philippines and Vietnam participated in the Presentation for the International CWIE of KKU. Apart from sharing their acquired knowledge and perspectives on academic development and administration, they also showcased their English skills in the said presentations.

The study of Ariyanti (2020) proved that international exchange students experience development in terms of their English oral proficiency, vocabulary, and pronunciation since natural condition in using English as language of communication was formed when conversing with local people and teaching in classrooms. Hence, due to the effectiveness of international exchange programs, Ma et al. (2023) stressed that educational research and policy makers should move beyond an emphasis on language proficiency and further examine the role of other factors when developing strategies to facilitate supportive learning environments for English language learners and international students in a university setting.

### **1.4 The conduct of English camps**

In February to March 2023, COLA collaborated with the University of Baguio, Philippines for a two-week English camp. Two exchange faculty members and two BA English Language students from the University of Baguio School of Teacher Education and Liberal Arts were invited to COLA KKU in Khon Kaen, Thailand to facilitate the said program. This English camp has been specifically designed to train Thai students to become effective, confident, and competent speakers of the English language through the utilization of fun learning concepts and principles of effective oral communication. One student participant proudly shared his experience:

*“...before I coming to this camp I’m not good at English and I don’t have confidence to speak. but after I’m coming to this camp I feel I have improved my speaking and learning skills and more speak. it’s not very good but it’s better than before.”*

English camps are becoming a trend in English language pedagogy especially among non-native speakers of English not only because of their fun nature, but because of their influence on decreasing some students’ anxiety factors (Jing & Junying, 2016; Noguchi, 2019), increasing their perception of their English communicative competence (Noguchi, 2019; Srisermbhok, 2020), improving their language acquisition (Rugasken & Harris, 2009) and aiding in their overall cultural understanding (Rugasken & Harris, 2009; Srisermbhok, 2020). In the study of Asmara et al. (2016), it was also shown that students enjoyed non-formal activities during English camps like playing games, competitions, and adventures, and their interests towards English learning were also strengthened. Hence, Srisermbhok (2020) suggested that outdoor activities should indeed be integrated in teaching English to develop students’ communication competence, good character, resilience, and cross-cultural understanding and awareness of ASEAN community in Thailand. Apart from the goal of English language learning, COLA’s English camp also aimed at familiarizing the student participants with each other’s culture, religion, arts, and customs since the COLA international graduate students from Myanmar and Indonesia also partook in the event.

### **1.5 Implementation of special English courses**

Ten fourth-year students of COLA signed up for an international internship for the Second Semester of the Academic Year 2023-2024. Since interns must engage in boundary crossing when connecting academic learning with professional practices, the role of COLA’s administrators and English language lecturers in the development of professional learning in such complex professional learning settings is very crucial (Chue & Säljö, 2022). Thus, to prepare the students for their respective international sojourns to government and non-government institutions in Laos, Taiwan, and Vietnam, COLA organized a 30-hour intensive English for International CWIE crash course for them. For Bekteshi and Xhaferi (2020), the highest priority for the students is learning English for employment purposes, with the primary focus on the enhancement of their communicative skills. Hence, the said English course was centered on English for Work Purposes and basic functional English particularly their speaking and listening skills.

In relation to this, a separate one-month intensive English training program focused on English for Work Purposes was also conceptualized for the COLA employees and staff to boost their English proficiency

and overall communication skills which would be useful for their intercultural official businesses in COLA and abroad.

### 1.6 International Internships

One of the work-integrated learning (WIL) activities under CWIE which is deemed to be essential for career exploration, preparation, and development is the post-course internships. Specifically, international internship experiences facilitate students to become culturally savvy, build their international professional networks, enhance their level of self-perceived competency, and cultivate a globalized career adaptability perspective (Kattiyapornpong & Almeida, 2022). This is possible because the intentional incorporation of experiential learning principles in the design and implementation of internship abroad programs has clear potential to increase participants' intercultural competence and develop their skills for the 21st century workplace (Lambert Snodgrass et al., 2021). The international internships not only offer a rich training ground for college students to gain valuable international and intercultural career experience (Lambert Snodgrass et al., 2021), but they also enhance the students' globalized social, cultural, and human capital and their ability to adapt to culturally diverse business contexts. The international internship experience can also increase student's confidence to enter the global labor market and seek opportunities beyond their original country of residence (Kattiyapornpong & Almeida, 2022). Aside from these, COLA KKU has been sending students for their international internships believing that their English language proficiency would improve as a result since the student have no other choice but to use English in communicating with people from various countries.

## 2. The challenges in the implementation of CWIE *vis-à-vis* English language teaching and learning

### 2.1 Lack of exposure to an English-speaking environment

Most participants shared that one of the reasons why they think they lack English proficiency skills is that they do not have the opportunity to practice what they have learned in school. They added that they may be trained to use English in school or in special English programs organized by COLA, but they revert to speaking in Thai outside the English classroom and at home. In line with this, one student-participant of the English camp shared:

*“I have learned a lot of English and I learned about speaking English is very easy if you want to say you say because when you say everyone understand but you don't speak everyone don't understand.”*

Certain studies prove the truth of the lack of exposure to the English language not only in terms of speaking, but also in writing. For instance, the study of Dueraman (2015) showed that only the students who chose to major in English at universities in Thailand were given opportunities to experience writing skills.

These occurrences find support in Bandura's Social Learning Theory which emphasizes the role of the environment and exposure in language learning. Specifically, the study of Zhao and Dersingh (2022) suggested that an L2-supportive learning environment can help increase the participants' self-confidence



and self-esteem, which are very important factors affecting the students' willingness to communicate in English. Thus, if Thai English language learners would want long-term opportunity to practice their English skills, promoting an English-speaking environment must be implemented with consistency and sustainability. It is high time for administrators to review their language policies.

## **2.2 Native speakerism ideology**

Like most countries, Thailand indubitably conforms to the native speakerism ideology, making them still prefer English language teachers who are native English speakers to non-native English speakers (Huttayavilaiphan, 2021; Hiratsuka, Nall, & Castellano, 2023; Liu, 2021). On the other hand, the study of Jumsai Na Ayudhya (2021) proved that English language students nowadays are already aware of the differences between native and non-native English speakers and that they perceive both to have unique linguistic, cultural, and teaching strengths and weaknesses -- eventually debunking the native speaker ideology.

Thus, to prepare Thai learners for the new changing role of English and reduce English language teaching dependency on the native English variety (Boonsuk & Ambele, 2021), several schools and universities in Thailand already employ English teachers from the Philippines (Nawamawat & Cedar, 2021; Ulla, 2021). English is an official language in the Philippines. It is considered as a second language or even a first language to some Filipinos. However, although Filipino teachers were positive about teaching English to Thai students, majority still perceive that English language teaching in Thailand is challenging because of students' lack of interest in the English language; lack of exposure to and support for an English-speaking environment; unclear and unsuitable English language curriculum; and lack of teacher professional development (Ulla, 2018). Other technological challenges also arose during the pandemic.

Nonetheless, regardless of the racial background, English teachers remain as the main interlocutors in increasing the students' willingness to communicate in the classroom. What matters is that the English teachers can bridge the gap between the classroom and the outside world by preparing students for real social situations (Tan et al., 2020). Indeed, this is the gist of trans-speakerism.

## **2.3 Prevalence of Thai as the medium of instruction and pedagogy**

In the past curricula of COLA KKU, English subjects were not given much attention. Although the graduate school programs of COLA are being offered in both Thai and English languages, the Thai language is still the prevailing medium of instruction for all the undergraduate courses. Thus, if COLA wants to produce more globally competitive and English-proficient graduates, the administrators must consider using English as a Medium of Instruction for certain subjects.

On the other hand, caution must be observed when it comes to the implementation of English as a medium of instruction as this concept is subject to vulnerability and subjective interpretation. To illustrate, the study of Jantadej (2021) shows that English language teachers did not entirely implement English as an international language teaching (EILT) in their classrooms. It was manifested that they were confused with the concept and principles of EILT as they considered it a new language teaching paradigm. Unfortunately, it led to uncertainties on how to implement EILT into practice.

Thus, the abovementioned issues strengthen the clamor for an informed and systematic implementation of the English curriculum in Thailand (Dueraman, 2015), the possible development of a TESOL degree curriculum and teacher preparation (Jumsai Na Ayudhya, 2021), and the urgent and sustainable endorsement and integration of the EILT paradigm into the English teaching curriculum in Thailand (Jantadej, 2021).

#### **2.4 Learners' motivation and attitude**

Despite the strong and proud localism of Thai students (Jantadej, 2021), the results of this study still prove that most COLA students are enthusiastic to learn English not only due to extrinsic, but also intrinsic motivation. This is in accordance with the Atkinson's model of achievement motivation. In fact, in the study of Thongprayoon et al. (2020), willingness and motivation emerged as implementation forces to drive students to exhibit intercultural communicative language learning competencies.

During the COLA English camp, confidence in using the English language was the leading takeaway of most of the student participants. Events such as this encourage them not only to speak using the English language, but it helped them gain more friends as well. They also underscored that one of the traits of an effective future leader is good English-speaking skills so that effective communication could be attainable.

Meanwhile, another student participant also shared that he would like to do an internship abroad that is why he considered joining the English camp as first step towards achieving his goal. However, although international internship opportunities are available to students, few students are willing to challenge themselves in a foreign setting (Kattiyapornpong & Almeida, 2022). In COLA, only 10 out of 224 fourth-year students signified their intention for international internship even if there would be financial support by the college. In cases such as this, one of the solutions proposed by Kattiyapornpong and Almeida (2022) is the setting up of a task force of academics and professional staff that would form part of a cohesive resourcing structure for the long-term sustainability of the international internship programs.

### **Suggestions**

The results of this study provide supporting evidence that there is a need to implement certain measures in language policy and educational pedagogies, namely: (1) a global quality standards framework, (2) an effective implementation strategy, and (3) a quality evaluation model for CWIE programs. In other words, administrators, language policy makers, and English language teachers should exert due diligence and attention on the planning, execution, and the evaluation of these CWIE programs. This could be an effective springboard for establishing, developing, and accrediting quality CWIE programs (Khampirat & McRae, 2016).

Therefore, since CWIE can also be seen as being the basis for any practice across professional fields where resilience and adaptability are essential (Usher, 2019), it is important to educators that learning through work experience is understood so that appropriate curricula, pedagogy, and assessment can be designed and implemented (Eames & Cates, 2011). Specifically, a standards framework and a well-tested quality evaluation model could function as a valuable resource and guide, as well as a tool, for CWIE

practitioners and administrators across all disciplines on a global scale (Khampirat & McRae, 2016). In the case of COLA who is still in its exploratory stage of the implementation stage of some of its CWIE programs, long-term and sustainable plans should be established and institutionalized.

Furthermore, to cope with the demands of the global market, notable revolutionary academic concepts related to CWIE could be considered by Thailand's higher education institutions such as strengthening international mobility (Myhovych, 2019) and considering the utilization of English as a Medium of Instruction (Tang, 2020).

Overall, to borrow the words of Wannachotphawate (2015), there is a need to re-evaluate institutional rules and to participate in the formation of a political will where the stakeholders have their roles as citizens to play. The implications of such a commitment to a new concept in learning management innovation will indubitably affect curriculum planning and overall educational pedagogy especially in higher education, and the English language learning development of students. Moreover, it would also pave the way for more partnership opportunities in the global arena.

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## Factors affecting year 2 students' poor english reading ability At department of foreign languages faculty of languages, Souphanouvong University, academic year 2020-2021

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### Abstract

This research factors affecting the students year 2 poor English reading ability of 36 students at the Department of Foreign languages, Faculty of Languages, Souphanouvong University in the 2020-2021 academic year. Factors affecting reading ability were determined and divided into the two internal factors of learning preferences, and motivation, and the two external factors of reading texts and environment. Quantitative data were analyzed with descriptive statistics (frequency, mean, and standard deviation). The results reveal that all respondents answer questionnaires believed that the selection of the texts that they read was the most important factor affecting their English reading ability. Moreover, respondents scored 'learning preferences' as a highly important factor, while 'environment' and 'motivation' were seen as moderately important factors. A discussion of the findings, and conclusions for the development of teaching and studying are also presented.

**Keywords:** Factors, Reading ability, Y 2 Students, Poor reading ability

### Background of the study

According to Grabe and Stoller, (2002, p. 3), English language learning is one of the important factors that affect international communication activities. Learners use English language in different areas such as listening, reading, speaking, and writing for their communication purposes. One of the most important factors for learning is the method that teachers use in their classes to facilitate language learning. Along with the improvement of international communication activities in the world, reading motivation is becoming more important and focuses on the four language skills and reading comprehension is of vital importance in English language learning. Grabe and Stoller (2002, p.4), also emphasized that reading motivation is very important for learners and it increases learners' reading comprehension. It is important for learners to read and understand texts easily and effectively. Therefore, all EFL learners need to improve their reading motivation for a better understanding of written texts.

Gilakjani, & Sabouri (2016, p.182) Observes that the ability to read comprehension is influenced by a number of factors. Each factor has an effect on a student's ability to read comprehension. The first factor

that affects learners' reading comprehension is the difficulty of the texts. This aspect is influenced by the readers' language intensity and fluency, as well as their understanding of the language's uses and various definitions. The second consideration is the effect of the learners' surroundings on their ability to read a passage. In an unorganized atmosphere, readers can have more difficulty understanding a text than those who read in a relaxed and regulated environment. The third element has to do with the anxiety that comes with reading comprehension. Exams, classwork, and homework conditions will place a greater strain on readers' reading than reading for pleasure. The fourth factor is enthusiasm and motivation. Some students respond positively to exams, while others are frustrated by the need to complete a reading task.

Hollowell (2013 p.183) States that bad reading comprehension skills may be linked to a medical problem that isn't treated until the child is older. Undiagnosed ADD (attention deficit disorder), speech disorders, and hearing impairments are all examples of this. These are the two exercises that aid in the development of reading comprehension skills

However, the students' year 2 are studying at the Department of Foreign Languages, Faculty of Languages, Souphanouvong University have advanced abilities in reading English and this affects the management of their English learning and teaching. Indeed, even students majoring in English regularly show significant problems with their reading in the language and so the researcher was interested in analyzing the factors affecting English reading ability, it is hoped, be useful for the development of teaching and studying in this field. According to Karen L. Sanford (2015) found that reading difficulties are a major problem within the United States for both children and adults.

## **Objective of study**

In line with the main objective, the following were the specific objectives of this study:

- To find out the main factors affecting year 2 students' poor English reading ability are motivation factor, learning preferences factor, reading texts factor, and environmental factor of Department of Foreign languages at Faculty of Languages in Souphanouvong University.

## **Research Questions**

The following research questions based on the research objectives guided the investigation of this study:

- What are the factors which affected year 2 students' poor English reading ability at the Department of Foreign Languages, Faculty of Languages, Souphanouvong University?

## **Significance of the study**

This topic is conducted to find out what the main factors affecting year 2 students' poor English reading ability foreign language at the Faculty of Languages, Department of Foreign Languages. The finding of this study possibly provides helpful information for students to understand what makes poor reading ability, so learners would better know the ways to improve their reading ability.

## Scope of the study

- Scope of this study research focuses on the second-year students' poor English reading ability of the Department of Foreign languages at faculty of Languages in Souphanouvong University, there are 36 students.
- This study used the questionnaire with the second-year students in Department of Foreign languages at Faculty of Languages in Souphanouvong University.
- Scope of time in 26/05/2021.

## Definition of reading skills

Reading is a skill that is necessary for those who are seeking knowledge. More specifically, the integration of the ASEAN Community in 2016 also points to the great importance of English language ability in all sectors of life in Laos but beyond this, reading is a skill necessary for learning; Aksaranugraha (2012) observes that the language learner who has studied English in Thailand (thus as a foreign language) has the opportunity to use the skill of reading more than the other skills and thus of all four skills, reading is the skill on which teachers focus the most. (Cited in Tarahorm Kongkeaw, 2014) and (Mingsakoon 2010) states that the four language skills are tools to achieve English language proficiency but that reading is more important than the other three skills as it is an important means of acquiring knowledge. Indeed, a wide variety of English-language printed materials are available for Thai people to read, while opportunities to speak, listen and write are not as easy to come by in daily life.

Taladngoen et al, (2020, p.13-14) when the attribution principle is applied to the field of reading comprehension in an EFL environment, both internal and external influences play a role in improving or hindering EFL learners' reading comprehension abilities. The capacity is the first internal factor, and it refers to the learners' linguistic knowledge of English, such as grammatical and vocabulary skills. Learners' views of themselves and other elements in their environment are another internal influencing factor. Learners' experiences include feelings of fascination, boredom, anxiety, sickness, and discomfort as a result of personal issues. The presence or absence of positive or negative personal impressions of oneself and one's surroundings will either help or hinder one's ability to read comprehension (Habibian, Roslan, Idris & Othman, 2015).

## Reading problems

English as a Second or Foreign Language (ESL/EFL) Students' Reading Problems Most ESL/EFL students have problems in reading English texts. Limited knowledge of vocabulary and of sentence structure is regarded as the main problem (Gunning, 2002:2). Similarly, Asraf and Ahmad (2003:34) found that the main problem encountered by ESL/EFL students was word difficulty word difficulty is a major problem for ESL/EFL students; that is, they could not discover the meaning of words in context. found that students in all three fields of study needed all four English skills, and poor reading was the main problem of these



students. CHAWWANG, (2010) said that the following research indicated that Thai students' reading ability is at a low level.

A study by Songsiri (1999:4) involving 12th-grade students found that their English reading ability was very disappointing. Students had poor skills in vocabulary, syntax, and grammar, and they lacked the ability to guess meaning from the context which was considered as the causes of the problems in skimming for main ideas, scanning for details, making inferences, finding the reference, restating, sequencing facts from opinions, and determining the author's mood and tone.

- **The type of reading skills**

Here is a quick overview of four types of reading skill used in English language.

1) *The skimming*

Raihan and Nezami (2012, p.308) said that skimming is a technique for quickly identifying a text's main points at a rate three to four times faster than normal reading. When there is a lot of material to read in a short amount of time, people tend to skim. When you want to see if an article is relevant to your research, skim it.

**Example of Skimming:**

- The newspaper (quickly to get general news of the day)
- Magazines or book (quickly to discover which article you would like to read in more detail)
- Business and travel brochures (quickly to get informed)

2) *The scanning*

Raihan and Nezami (2012, p.308) said that when looking up key words or ideas in a text, you may use scanning as a technique. In most cases, you already know what you're looking for, so you're focused on finding a specific answer. Scanning entails rapidly moving your eyes down the page in search of specific words and phrases.

**Example of Scanning:**

- The "what's on TV" section of your newspaper
- A train / airplane schedules
- A conference guide

3) *Extensive reading*

Sana, Ahlem, and Samira, (2013, p.14) said that extensive reading refers to reading material for pleasure outside of the classroom; it is what we mean by reading culture. Some researchers, such as Krashen and Hill and Holden, have labeled this process with different names, such as reading with pleasure or free voluntary reading. Students who read for pleasure are better readers, higher achievers, and more advanced.

**Example of Extensive Reading**

- The latest marketing strategy book
- A novel you read before going to bed
- Magazine articles that interest you

#### 4) *Intensive reading*

Sana, Ahlem, and Samira (2013, p.13) Said that an activity involving intensive reading is one in which you read for specific information. According to Hudge, “the goal of intensive reading is to arrive at profound details” (100), understanding a text not only what it means but also how meaning is produced; it entails very detailed reading to certify everything in the text; it entails a close examination of the text and an examination of the features of a foreign language.

Hairul, Ahmadi, and Pourhosein (2012, p.2) Found that reading encouragement is one of the most important factors that encourages students to read more, and it has a significant effect on reading comprehension. As a result, many researchers are well aware of the importance of motivation in target language learning and how motivation improves language learners' comprehension. There are various forms of motivation, which are described in the following sections.

- The previous of studies

Celik (2019) Sought to identify a study on the factors affecting Reading and reading habits of preschool children. To find which factors affecting reading habits, the methods of their study, used questionnaires survey analyze data, descriptive study, structured interview technique was used to provide information about the effects. There is a objective used as data study: Find the factors affecting children's reading habit. The results this study indicate: the study showed that families engaged in various activities such as reading books, buying books and telling fairy tales for their children to gain reading habits and thus, families enabled children to become interested in reading and acted as motivators for their children to gain reading habits in the future.

According to Setianingsih, (2017) Research under title Factors Affecting the English Reading Literacy of Junior High School Students type of the research: This study employs the quantitative approach and was an ex-post facto design, in which there is no treatments given in the model. In their study technique according to Seliger and Shohamy (1989, p.201), data analysis refers to sifting, organizing, summarizing, and synthesizing the data. “Descriptive analysis” questionnaire and the tests are in the form of descriptive statistics. There are three aims: 1 The Effect Learning toward the English Reading Literacy, 2 The Effect of Learner's motivations English reading, and 3 The Effect of Vocabulary English Reading Literacy.

The results of this study: “the F value was 5.166 on  $p < 0.05$  (0.024). It showed that the inputs available for language learning variable significantly affect the reading literacy”, the F value of 1.985 on  $p < 0.05$ , but with greater p value, i.e. 0.160 there is no significant effect of learner's motivations for reading English texts on English reading literacy”, and “the F value was 48.660 on  $p < 0.05$  (0.000). It showed that vocabulary mastery significantly affects the English reading literacy”.

Wutthisingchai (2015) Said that topic “An Analysis of Factors Affecting the English Reading Comprehension of Mattayomsuksa 5 Students in Amphur Mueang, Lampang Province” In their methods there are three instruments were used in the research: a questionnaire, a reading comprehension test, and interview questions. These factors can be divided into two main areas: those which are internal (learning preferences, motivation and attitudes) and those which are external (teaching techniques, reading texts and

environments). The point of this study “ To find which factors are important affecting reading ability” The results showed that all respondents believed that the nature of the text being read was the most important factor.

Moreover Sanford (2015), research under title Factors that affect the reading comprehension of secondary students with disabilities, “The research design” there are two types: 1 Multiple regression allows the researcher to examine the relative importance of the cognitive and affective variables for reading comprehension, and 2 to make inferences about the factors that most contribute to reading comprehension in these students. Instrument has been identified along with a description of what each test measures. The purpose of this study, then, was to examine the relative importance of working memory, vocabulary, prior knowledge, word recognition, reading strategies, and motivation-to-read to the reading comprehension of secondary students with disabilities.

The result students do not engage in the activity that can help improve their comprehension (i.e., reading), then the best lesson and activities will be ineffective. Reading is integral to future success, and self-determined and intrinsically motivated students are more successful readers

## Research Design

In order to investigate the factors affecting the year 2 students’ poor reading ability at the Department of foreign languages, Faculty of Languages, Souphanouvong University., the quantitative was affected to study a proposed problem under investigation. Creswell (2012, p.376) defines that ‘survey research is a popular design in education. Survey research designs are procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, behaviors, or characteristics of the population’. To further deepen an understanding of the issue raised, the questionnaire was developed by Wandashisha (2017) which was adapted in the present study.

- Population

The population of this study will be male and female of factors affecting students’ poor English reading ability. This study adapted convenient sampling of non-probability sampling to select the participants. In the present study, there are total 36 students are selected as samples, 18 female.

- Sampling Techniques

In this technique, researchers can select respondents who are already available, for whom participation is convenient, and who respondent some of the features that the researchers are seeking to investigate. In some situation, the researchers might include respondents who need to be involved in the study (Creswell, 2012).

- Instrumentation

The tools are used in this inspection are 25 questionnaires which adapted from Wutthisingchai (2015) To investigate about the an analysis of factors affecting the English Reading Comprehension. There are two main parts for the questionnaire, part one personal information, and part two; Their opinions on factors affecting students’ poor reading ability which were separated these factors can be divided into two main

areas: those which are internal (learning preferences, and motivation) and those which are external (reading texts and environmental)

- Data Collection Procedures

Prior to accumulating data, there were a number of steps were conducted. In first place, the adapted questionnaire was submitted to the advisor for approval and consultation whether they were appropriate and adjustable. The second step the questionnaire (25 items) was distributed to the simple affecting students' poor reading by Google form, researcher were given to complete the provided survey. The questionnaires were collected at a later time by researcher.

- Data Analysis

The data obtaining from the questionnaires are analyzed by using SPSS (Statistic Package for Social Science version 23.). The result of analysis as put in the result of value with analyses the factors affecting the English reading ability. Wutthisingchai, S.J. (2015) The five-point Likert scale was used in this questionnaire with the following criteria:

- 5 Strongly agree
- 4 Agree
- 3 Not sure
- 2 Disagree
- 1 Strongly disagree

The data obtained for this part was computed into arithmetic means which were then interpreted through a scale of the following ranges

Scale value	Meaning
3.67-5.00	Major
2.34-3.66	Moderate
1.00-2.33	Low

## FINDINGS AND DATA ANALYSIS

This chapter presents the data analysis. The result of the study was presented into four main parts as result of the motivation, environment, learning preferences and the reading texts. That was the result of questionnaires shown below.

### Personal information

**Table 1:** Percentage of students in the simple gender

No	Gender	Frequency	Percentage
1	Male	18	50%
2	Female	18	50%
<b>Total</b>		36	100%

As can be seen from the table 1, the number of male and female were even tie score. It was apparent from the table the agree of the key information were male (50%), and female were (50%).

**Table 2:** Percentage of students’ poor reading skill in the simple by age

No	Age	Frequency	Percentage
1	20-22 years old	24	66,7%
2	23-25 years old	11	30,6%
3	More than 25 years old	1	2,8%
<b>Total</b>		36	100%

As depicted in the table 2, there were three age groups participated in the current study. The biggest groups of respondents aged 20-22 ( 66,7%), followed by age less than 23-25 ( 30,6% ), and age more than 25 ( 2,8% ).

**Table 3:** Percentage of students’ experience studied English in the simple groups

No	Experience of studied in English	Frequency	Percentage
1	1-2 years	15	41,7%
2	2-4 years	20	55,6%
3	More than 4 years	1	2,8%
<b>Total</b>		36	100%

As depicted in the table 3, there were three experience groups participated in the current study. The biggest groups of respondents experience 2-4 years ( 55,6% ), followed by experience less than 1-2 years ( 41,7% ), and less more than 4 years (2,8%).

**\*\* Factors affecting students’ poor English reading ability**

**Table 4:** Factors affecting students’ poor English reading ability

All factors	$\bar{x}$	S.D
Motivation	3.66	1.06
Learning preferences	3.71	0.78
Environment	3.52	0.91
Reading texts	4.29	0.61

N= 36

Overall, the table 4 shows that students rated motivation, learning preferences, and environment reading texts as the factors that major affected their English reading ability. The remaining factors (reading texts) were considered to be major important.

**\*\* Internal and External Factors Affecting Students' poor Reading Ability**

**Table 5:** Internal and external factors affecting students' poor reading ability

Internal factors	$\bar{x}$	External factors	$\bar{x}$
Motivation, and Learning preferences	3.68	Environmental, and Reading texts	3.78

N= 36

With a rating of ( $\bar{x} = 3.68$ ) compared to ( $\bar{x} = 3.78$ ), students rated internal factors as slightly more important than external factors.

**\*\* Data Analysis of Motivation Factors**

**Table 6:** Motivation affecting English reading ability

No	Motivation factors	$\bar{x}$	S.D.
1	Love in reading	3.61	0.93
2	An interest in the reading text	3.94	0.82
3	Reading gaining more knowledge	3.47	1.23
4	Reading gaining the awards	3.69	1.06
5	Reading make a requirement to succeed in future career	3.58	1.25
<b>Overall</b>		3.66	1.02

N= 36

In line with Table 6, it was expected that being able An interest in the reading text the average mean ( $\bar{x} = 3.94$ ) with std Deviation 0.82 that shows it at a high level was going to be a greater motivation than reading gaining the awards the average mean ( $\bar{x} = 3.69$ ), and std Deviation 1.06, saw it the major level and then Love in reading the average mean ( $\bar{x} = 3.61$ ), and std Deviation 0.93 it show that in moderation, and A requirement to succeed in future career with Gaining more knowledge that shown in moderately. Therefore, students should be interested in reading more text to have more knowledge.

**Table 7:** Learning preferences affecting English reading ability

No	Learning preferences Factors	$\bar{x}$	S.D.
1	Using speed reading	3.55	0.80
2	Reading frequently	4.11	0.74
3	Finding the keywords	3.75	0.87
4	Finding the main ideas	3.41	0.99
5	Using grammar and structure knowledge	3.72	0.77
<b>Overall</b>		3.71	0.78

N= 36

Table 7 shows that respondents rated learning preferences ( $\bar{x} = 3.71$ ) as the least important factors. Reading frequently the average mean ( $\bar{x} = 4.11$ ) with std Deviation 0.74 it is clear at the highly level were

rated as important, Finding the keywords the average mean ( $\bar{x} = 3.75$ ), and std Deviation 0.87 it at in major level. Using speed reading, and finding the main ideas. It was rated as moderately important. Students should read more often.

**Table 8:** Environment affecting English reading ability

No	Environmental Factors	$\bar{x}$	S.D.
1	Being encouraged to read in English by one's school	3.58	0.90
2	The encouragement of reading English from the family	3.05	0.62
3	The importance which society places on reading in English	3.61	0.96
4	The importance of reading English given by the society	3.30	1.19
5	The expectation of surroundings which encourage a student to be able to read English	3.63	0.96
6	One or more bookcases in your home or room	3.08	1.15
7	The encouragement of reading English from the school	4.33	0.71
8	Living in the same environment with native speakers	3.52	1.05
9	Living in the different environment with native speakers	3.69	1.11
10	The environment of school is not comfortable to read	3.44	0.96
<b>Overall</b>		3.52	0.91

N= 36

Table 8 shows that overall, students rated environments as a moderate important factor ( $\bar{x} = 3.52$ ). Regarding the individual items, The encouragement of reading English from the school the average mean ( $\bar{x} = 4.33$ ) and std Deviation 0.71 it at the highly level important. Living in the different environment with native speakers the average mean ( $\bar{x} = 3.69$ ), and std Deviation 1.11 it is clear as major level. the students rated four as moderately important and the remainder three as moderate important.

**Table 9:** Reading texts affecting English reading ability

No	Reading texts factors	$\bar{x}$	S.D.
1	Texts reading with simple grammar and structure	4.27	0.61
2	Reading texts of a story interesting	4.27	0.61
3	Reading texts with pictures	4.30	0.66
4	Reading texts with good organization and pattern for eyes comfort	4.27	0.65
5	Reading texts with one's own schemata	4.33	0.58
<b>Overall</b>		4.29	0.61

N= 36

Overall, the table 9 shows that students rated the texts themselves as the most important of all the factors ( $\bar{x} = 4.29$ ). When considering reading texts, reading texts with pictures the average mean ( $\bar{x} =$

4.30) with the std Deviation 0.66 it is clear at in highly level. The students rated all of the three items as major level very important. Therefore, the students have an understanding and it is a factor that affects them a lot. So, such factor is important for students and teachers to know how to teach the selection of the more important to make it better.

### Summarizing Major Findings

The aim of this is to investigate the factors affecting second students' poor reading ability at the Department of Foreign languages, Faculty of Languages, Souphanouvong University. To investigate the above topic, the survey method was deployed in an attempt to gain an in-depth understanding of the research issue. The findings present study suggest a few factors affecting students' poor reading ability.

The current study reveals that the main factors committed by affecting students' poor reading ability at the Department of Foreign languages, Faculty of Languages, Souphanouvong University were "reading texts" it was highly important factor that affecting students understand, "Learning preferences" that was as major affecting students. In addition, Motivation, and environmental factors are rated at lower scores, Therefore, these two are found as moderate level.

### Discussion

This section presents a discussion of the study findings, which was discussed based on the research question. The discussion focused on investigate the factors affecting year 2 students' poor English reading ability at the Department of Foreign languages, Faculty of Languages, Souphanouvong University as the following:

\*\* The research was What are the factors which affected year 2 students' poor English reading ability at the Department of Foreign Languages, Faculty of Languages, Souphanouvong University?

The finding found that the committed by affected students second year at the Department of Foreign languages were "reading texts factor" which has average mean 4.29 with std Deviation 0.61, and learning preferences has average mean 3.71 with std Deviation 0.78. Base on the criterion averages mean 4.29 with mean 3.71 are major. Motivation, and environmental factors were as moderate factors. The results of motivation, reading texts, and learning preferences factors were rated by respondents as important factors. Students regard these as having affecting their understanding of English reading in general. In addition, finding the result of environment factor affecting students may have prior knowledge of the topic (which they may have to read about or studied in Lao before reading about it in English) and so the students should more easily understand vocabulary in text. Given this familiarity with the topic, they may more easily understand the entire text. This research result is similar to other research result that had been conducted by Wutthisingchai (2015) investigated on "An Analysis of Factors Affecting the English Reading Comprehension of Mattayomsuksa 5 Students in Amphur Mueang, Lampang Province" The results reveal that all respondents believed that the selection of the texts that they read was the most important factor affecting their English reading ability. Moreover, respondents scored 'attitude' as a highly important factor,



while ‘environment’, ‘motivation’, ‘learning preferences’ and ‘teaching technique’ were seen as moderately important factors. A discussion of the findings, and conclusions for the development of teaching and studying are also presented. Moreover, Sanford (2015) had completed a research under the title “Factors that affect the reading comprehension of secondary students with disabilities” The results of the study indicate that both the motivation-to-read factors and the cognitive components were successful in predicting reading comprehension for secondary SWD. Additional analyses also showed a difference in the factors that affect the reading comprehension of low- and high-comprehenders.

## Conclusions

This research analyzed the self-reported factors affecting year 2 students’ poor English reading ability at the department of Foreign languages, Faculty of Languages, Souphanouvong University. The results showed that all respondents believed that the nature of texts being read was the most important factor. Moreover, the respondents scored reading texts and learning preferences as highly important factors while environmental, and motivation were thought to be moderately important factors. The study shows that the texts selected were regarded as the most significant variable in influencing students’ ability to read in English and therefore the teacher should select texts that are appropriate for the students’ levels and interests. However, these latter vary within a class and so the teacher should use a range of techniques to maintain students’ attention and should also provide sufficient background knowledge. This is because English reading texts are mostly written from a native speaker’s point of view since they are targeted at the global market of EFL students around the world. On the other hand, there are few reading texts written specifically for Lao students who are learning English and this means that students may feel that the material is not relevant to their daily lives.

## Recommendation

For the further study should be conducted to investigate the challenges faced by students after factors affecting English reading ability, and Research on the factors affecting English reading ability will help teachers to be better able to adapt their teaching techniques or text selection to students’ understanding of their own reasons for improving their reading.

However, the researcher would like to offer further added that reading ability in English is a skill that is very important to learn English.

- The urge teachers to take reading skills this principle, should texts students read and several activities.
- Students should always reading skills is the often several have new knowledge.
- Want to offer them research to make it better than this so, hope the research study will be useful for students to develop reading skills better not more or less, to develop its own future to society.

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## Students' reluctant in English speaking: A cased study of English teacher students at the faculty of education, Souphanouvong University, Lao PDR

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### Abstract

The purpose of this study was to find out the causes making students' reluctance in English speaking. The participants of this study were 63 students with 43 females and 20 males who have been studying in English major, at the faculty of education, Souphanouvong University, Lao PDR of academic year 2020-2021. The instruments of this study were questionnaire for both teacher and students. The researcher used program SPSS version 21 to calculate the data base on the mean; standard deviation and percentage. The results showed that the first main cause students' reluctance in English speaking was language competency, while Self-confidence was the second main cause and language anxiety and shyness was the third and teacher's role was the last one. When identifying to the detail of each item on the tables given the results, it could be indicated that students talked less because they did not have enough vocabulary exhibited the highest mean ( $M=4.37$ ;  $SD=0.89$ ). So the capacity of English vocabulary belong the main cause making students' reluctance in English speaking in English major, at the faculty of education, Souphanouvong University. Coming up with the words pronunciation ( $M=4.35$ ;  $SD=0.77$ ), it was the second one belong the serious problem or cause making students reluctance in English speaking.

**Keywords:** Causes, English speaking, Reluctance

### Introduction

#### 1. Background of the study

Speaking is one of the four basic skills of language which is used as a medium of interaction to express one's thought and emotions. In the teaching of English, as one of the productive skills, the English teachers who instruct English speaking required to focus on how to assist students to use and to communicate in English (Richard, 2008). This is important most students often evaluate their success in language learning as well as the effectiveness of their English course on the basis of how much they feel they have improved in their speaking proficiency. That is why teachers' efforts should be focused on developing students' ability to speak since learning to speak is considered as the greatest challenge for all language learners (Pinter, 2006). Supporting this, Tsou (2005) emphasizes oral participation of the four skills

as the most observable phenomenon in the classroom. Therefore, when students fail to participate in class in the language being taught, it can be generally accepted that the teacher is likely to feel that there is a deficiency either in the learners or in their practice. In addition to this, although, teachers and textbooks make use of a variety of approaches, ranging from direct approaches focusing on specific features of oral interaction (e.g., turn taking, topic management, and questioning strategies) to indirect approaches that create conditions for oral interaction through group work, task work, and other strategies, the desired outcome of students' performance in the language taught become unsatisfactory (Richards, 1990). For this reason, it is clear that, students are still reluctant to speak in learning speaking. Souliya (2017) finds that students who participate actively tend to have better academic achievement compared to students who do not participate. Students' oral participation can help students fill the gap between what they want to say and whether they are able to say it. Furthermore, it is a common belief that in participating in verbal interaction offers language learners the opportunity to follow up on new words and structures to which they have been exposed during language lessons and to practice them in context (Liu, 2005). Viewing the pervading reluctance of speaking in the classroom, the researcher aims at finding the major causes of the students' reluctance in speaking English at English major, faculty of education.SU, Lao PDR.

Regarding to the government policies for education in Laos, English language was included in the curriculum from primary school until university, the main goal of language teaching is to encourage learners to communicate effectively. However, number of students absent English classes and many of them are uninterested to join or participate in English activities especially students in English major, faculty of education in SU. In addition, there are not ample opportunities for the students to practice their language and their practice is limited to classroom environment albeit rare even in classroom (Phunmanyvong, 2017). If they do not take the opportunity to speak in the classroom, there is no other chance for them to practice their language because their family members are mostly English illiterate. They will thus notice they are not making any progress in their learning in terms of English language. The linkage between classroom participation and students' academic achievement is undeniable. It is crucial to find out why many students of English program, at the faculty of education, SU are reluctant to speak in language classrooms. Such reluctance will make learners lose their interest in learning the language.

Riasati (2012) explored factors that influence willingness to speak. Many researchers have been conducting research in the area of exploring factors of students' reluctance in EFL speaking classroom particularly in speaking English classroom in different context even though the change was not satisfactory in the researcher's point of view in the area of students' speaking in EFL. Since the problem of students' reluctance to speak English is serious, the researcher observed that there is no significant research

conducted on the similar aspect in this faculty. Therefore, the researcher has focused mainly on studying the causes of students' reluctance in speaking among second year students at English program faculty of education, SU. Being an EFL learner as well as a teacher of English Language, the researcher not only experienced students' reluctance to speak English in class but also observed this problem while teaching them in a regional context at study area. The researcher spotted a problem that delayed students' learning and that is students' reluctance to speak English in class particularly when they are required to speak, converse, have dialogue and introduce themselves in the classroom in front of their classmates and teachers. Therefore, their unwillingness to speak or participate in class affects their learning because firstly, they lose the chance of practicing their oral English. Secondly, they will not be able to learn from "trial and error" as nobody could spot out the mistakes, and the learners will not know where their mistakes lie in order to make correction. Finally, if students do not speak or answer questions, it would be impossible for the teachers to check their understanding, to correct their mistakes and to provide further explanation on the problematic areas. Therefore, the researcher was interested in knowing particularly why second year students at English major, faculty of education, Souphanouvong University in Laos felt reluctant to speak English.

## **2. Objective of the Study**

To explore the causes of second year students' reluctance in English speaking

## **3. Research Questions**

1. What are the causes making the sixth year students reluctant in speak English?

## **4. Scope of the Study**

Scope of the content: as mentioned above, the main research objective of this study was to explore the causes of second year students' reluctance in English speaking. The questionnaire was the tool for gathering the data, the researcher scope the content in 6 categories: Language Competency, Self-Confidence, Language Anxiety and Shyness, motivation, Fear of making mistake and Teacher's role.

Scope of the sample group and time: second year students who were studying English teacher, at the faculty of education Souphanouvong University Lao PDR. The data of current study was gathered during January- February of 2021.

## **Research Methodology**

### **1. The sample group**

The sample group of this study was selected based on convenient sampling technique because the amount of population was 45 students, so all year 2 students were the sample group of this study.

## 2. Instruments

As this study has a mixed research design, ample involvement of the researcher was of great importance to get the desired answer for the research questions. Therefore, data were gathered from the selected participants, students and EFL teachers at English major, Faculty of Education, SU with the help of direct questionnaires.

### 2.1. Questionnaire

In research, questionnaire was used to obtain information about certain conditions of an individual or groups. In this study, the researcher used a questionnaire since it has been one of the most popular instruments to gather data. Therefore, in this study the researcher used a questionnaire in order to explore the causes that lead to students' reluctance in EFL speaking classroom. The questionnaire was prepared in English language to be common for all. The questionnaire contained a set of questions or statements that were used to gather information from students of EFL about their causes of reluctance in speaking classroom, the effects of causes on learners in English speaking classroom and strategies to overcome the problem. The questionnaires that were used in this study consist of 20 items of open-ended and closed – ended types. These questionnaires were for students so that they would give their responses regarding the causes of their reluctance in speaking in the class. The researcher distributed these questionnaires and read the items in front of the students to see if there were unclear items. In short, in order to obtain sufficient data for this study, each copies of each three pages questionnaire were delivered to sixth year students to gather information about students' opinions of their reluctance in speaking English to investigate the opportunities for and constraints on developing their oral skill.

## 3. Procedures of data Collection

To gather data regarding the causes of reluctance in speaking classroom, the researcher followed some data collection procedures. The researcher first designed the questionnaire and distributed it to the sample participants chosen through convenient sampling. Then the researcher proceeded to gather data regarding the problem by carrying out practical English speaking classroom observation of teaching learning progress. Last but not least, the researcher gathered data through the EFL teachers of the school. In doing so, the researcher kept on checking every data gathered through all tools have consistency and are to the point of the issue.

## 4. Method of data Analysis

To analysis data, both quantitative and qualitative data analysis techniques were employed carefully and systematically. Data gathered from students through quantitative (questionnaire) were put into tables with their percentile and analyzed through description statistics methods. Whereas data gathered

through qualitative data through were organized and analyzed in a narrative way in line with the quantitative data. That is data from teachers were discussed, explained and interpreted in strengthening to data from principal tool after frequent were carried out carefully. All the information from questionnaire, were analyzed simultaneously to cross check the internal consistency of the data.

#### 4.1 Criteria

Analysis of Variance (ANOVA)—One-way in General Linear Model in Statistical Package for the Social Science (SPSS) was used quantitatively in the questionnaire to analyze the results for individual ideas. Descriptive statistics were obtained to see the overall patterns of the causes of students’ reluctance in English speaking classroom. And percentile of data was analyzed as well. The data was calculated based on the five scales as:

- 5 = strongly agree            4.00-5.00 = high
- 4 = agree                        3.00-3.99 = average
- 3 = undecided                 2.00-2.99 = low
- 2 = disagree                  1.00-1.99 =very low

### Findings

#### 1. The results derived from questionnaire for students

**Table 1:** Students’ reluctance in English speaking relate to Language competency.

No.	Statement	Mean	S.D	Scale level
I	Language Competency			
1	I talk less because I do not have enough vocabulary	4.37	0.89	high
2	I talk less because my grammar is weak	4.00	0.75	high
3	I talk less because I do not know how to pronounce a lot of words	4.35	0.77	high
4	I talk less because I am not fluent in English	3.99	1.11	average
5	I talk less because I do not understand everything in the class	3.97	0.67	average
<b>total</b>		<b>4.14</b>	<b>0.84</b>	<b>high</b>

The results has been shown in table 2 exhibited that students’ reluctance in English speaking relate to language competency was on high level with the mean= 4.14 and SD= 0.84. The major causes that make students reluctance in English speaking in term of language competency is lacking vocabulary show the highest mean (M= 4.37) and S.D= 0.89, this mean that English proficiency in term of vocabulary of the



second year students at English major, faculty of education, Souphanouvong University is very low. In addition, they talk less because they do not know how to pronounce a lot of words ( $M= 4.35$ ) and  $S.D= 0.77$ . Moreover, they talk less because their grammar is weak ( $M=4.0000$ ;  $S.D.75593$ ). In order to see another evident exhibited on, the results, so the followings presented about the results related to students' self-confidence

**Table 2:** Students' reluctance in English speaking related to Self-Confidence

No.	Statement	Mean	S.D	Scale level
II	<b>Self-Confidence</b>			
1	I feel nervous when I speak English	4.12	1.11	high
2	I talk less because I cannot express myself in the right way	3.55	0.75	average
3	I talk less because I already know that I will not succeed in my speaking turn	4.00	0.577	high
4	I talk less because I lack self-confidence	4.21	1.11	high
5	I speak less because I have negative previous experience in speaking in classrooms	3.84	0.55	average
<b>Total</b>		<b>3.94</b>	<b>0.82</b>	<b>average</b>

According to the results on table 3 indicated that students' reluctance in English speaking related to Self-Confidence was on average level mean= 3.94,  $SD=0.82$ . Students talk less because they lacked self-confidence was the highest range ( $M= 4.21$ ;  $S.D=1.11$ ) this meant that confidence is the main cause made second year students at English major, faculty of education, Souphanouvong University reluctance in English speaking. Students, additionally feel nervous when they spoke English comes the second range ( $M= 4.12$ ;  $S.D =1.11$ ) and students talk less because they already know that they would not succeed in their speaking turn is the other high range ( $M=4.00$ ;  $S.D=0.57$ ).

**Table 3:** Students' reluctance in English speaking related to Language Anxiety and Shyness

No.	Statement	Mean	S.D	Scale level
III	<b>Language Anxiety and Shyness</b>			
1	I talk less because I am shy.	4.11	1.11	high
2	I do not speak because I am afraid of embarrassment.	4.00	0.75	high

3	I do not like to be in a large English classroom (more than 15 students).	4.00	0.57	high
4	I do not like to participate in a mixed class (males & females).	3.71	1.11	average
5	I do not like to talk with other students.	3.84	0.57	average
<b>total</b>		<b>3.93</b>	<b>0.82</b>	<b>average</b>

The results of students' reluctance in English speaking related to language anxiety and shyness was on average level with the mean= 3.93, SD=0.82, the results revealed on the table 4 that students talk less because they were shy person in general (M=4.11; S.D=1.11) as the first range and they did not speak because they were afraid of embarrassment (M=4.00; S.D=0.75) and they also did not like to be in a large English classroom (more than 15 students) with (M= 4.00; S.D=0.57) as the second range of the mean.

**Table 4:** Students' reluctance in English speaking related to Teacher's role

No.	Statement	Mean	S.D.	Scale level
IV	<b>Teacher's role</b>			
1	The teacher sometimes finds my participation is a waste of time.	3.72	1.11	average
2	The teacher does not encourage me to speak.	4.00	0.75	high
3	The teacher's comments intimidate me when I speak.	3.92	0.57	average
4	The teacher sometimes does not control the speaking activities well.	3.71	1.11	average
5	The teacher sometimes does not divide the participation between all students.	2.59	0.75	low
<b>total</b>		<b>3.59</b>	<b>0.86</b>	<b>average</b>

Students' reluctance in English speaking related to teacher's role was on average level (M= 3.59, SD=0.86). In this section, the researcher found a variety of means: the teacher did not encourage students to speak was a highest mean recorded in mean= 4.00 followed S.D by equal 0.75. Another items were not come over 4, this meant that English teachers at English major, faculty of education, Souphanouvong University did not encourage students and so it could cause reluctance in English speaking. In contrast, unexpectedly as shown on item 5 "The teacher sometimes does not divide the participation between all

students” with mean 3.59 and S.D= 0.75, this result indicated that English teacher at English major, faculty of education, Souphanouvong University divided participation between all students well.

**Table 5: summary of students’ reluctance in English speaking derived from students’ responds**

No.	Causes making students’ reluctance in English speaking	Mean	S.D.	Scale level
1	Students’ reluctance in English speaking relate to Language competency.	4.14	0.84	high
2	Students’ reluctance in English speaking relate to Self-Confidence.	3.94	0.82	average
3	Students’ reluctance in English speaking relate to Language Anxiety and Shyness.	3.93	0.82	average
4	Students’ reluctance in English speaking related to Teacher’s role.	3.59	0.86	average
	<b>total</b>	3.90	0.83	average

In order to explore the causes making sixth year students reluctance in English speaking, the current researcher emphasized on 4 categories: Language competency, Self-Confidence, Language Anxiety and Shyness and Teacher’s role. Based on the results derived from the students’ responds on table 6, the first main cause making sixth year students’ reluctance in English speaking is language competency, while Self-Confidence is the second main cause and language anxiety and shyness is the third and teacher’s role is the last one.

As mentioned on previous chapter, the data were gathered not only from the sixth year students, but it also gathered from local English teachers as well, the following tables exhibited the students’ reluctance derived from the local English teachers.

## 2. The results derived from questionnaire for the teachers

**Table 6: Students’ reluctance in English speaking related to Language competency**

No.	Statement	Mean	S.D.	Scale level
I	<b>Language Competency</b>			
1	Students talk less because they do not have enough vocabulary.	4.32	1.11	high

2	Students talk less because their grammar is weak.	4.24	0.79	high
3	Students talk less because they do not know how to pronounce a lot of words.	4.20	0.57	high
4	Students talk less because they are not fluent in English.	3.71	1.14	average
5	Students talk less because they do not understand everything in the class.	4.00	0.8	high
<b>total</b>		<b>4.09</b>	<b>0.90</b>	<b>high</b>

Students' reluctance in English speaking related to language competency derived from the teachers was on high level ( $M=4.09$ ,  $SD=0.90$ ) The result of this table show that lack of enough vocabulary was the highest reason with  $M= 4.32$  and  $S.D=1.11$ , while students talk less because their grammar is weak was the other high mean with  $M=4.24$  and  $S.D=0.79$ . Meanwhile, students talk less because they do not know how to pronounce a lot of words with  $M=4.20$  and  $S.D=0.57$ . As the results shown on the table 7, only item 4 was quite les reluctance in English speaking.

**Table 7:** Students' reluctance in English speaking related to Self-Confidence

No.	Statement	Mean	S.D.	Scale level
II	<b>Self-Confidence</b>			
1	Students feel nervous when they speak English.	4.12	1.12	high
2	Students talk less because they cannot express themselves in the right way.	4.00	0.87	high
3	Students talk less because they already know that they will not success in their speaking turn.	3.52	0.67	average
4	Students talk less because they lack self-confidence.	4.31	1.21	high
5	Students speak less because I have negative previous experience in speaking in classrooms.	3.68	0.77	average
<b>total</b>		<b>3.92</b>	<b>0.93</b>	<b>average</b>

Students' reluctance in English speaking related to Self-Confidence from teachers' responses was on average ( $M=3.92$ ,  $SD=0.93$ ). In this section, participants gave diversity of the mean for each item. Results derived from the local English teachers found that students talk less because they lack self-confidence was

the first range with the  $M=4.31$  and  $S.D=1.21$ . Meanwhile students feel nervous when they speak English come as the second range with  $M=4.1208$  and  $S.D=0.12$  and coming up with students talk less because they cannot express themselves in the right way with the mean of  $4.00$  and  $S.D=0.87$ . Regarding to the results on table 8, item 4, 1, and 2 in order were the main causes making second year students at English major, faculty of education, Souphanouvong University reluctance in English speaking.

**Table 8:** Students' reluctance in English speaking related to Language Anxiety and Shyness

No.	Statement	Mean	S.D.	Scale level
III	<b>Language Anxiety and Shyness</b>			
1	Students talk less because they are shy person in general.	3.52	1.11	average
2	Students do not speak because they are afraid of embarrassment.	3.42	0.95595	average
3	Students do not like to be in a large English classroom (more than 15 students).	2.87	0.67	low
4	Students do not like to participate in a mixed class (males & females).	2.11	1.13	low
5	Students do not like to talk with other students.	1.21	0.77	low
<b>total</b>		<b>2.62</b>	<b>0.93</b>	<b>low</b>

Students' reluctance in English speaking related to Language Anxiety and Shyness from teachers' responses was on low level ( $M=2.62$ ,  $SD= 0.93$ ). Rely on the result exhibited on table 8 found that not many students are shy in general because the highest mean is  $3.5208$  on Item 1 "Students talk less because they are shy person in general" ( $M=3.52$  and  $SD=1.11$ ). Whereas, students do not speak because they are afraid of embarrassment come as the second range with the mean  $3.42$  and  $SD=0.95$ . The results revealed on the table 9 can endorse that language anxiety and shyness was not cause making second year students at English major, faculty of education, Souphanouvong University reluctance in English speaking.

**Table 9:** summary of students' reluctance in English speaking derived from English teachers' responses

No.	Causes making students' reluctance in English speaking	Mean	S.D.	Scale level
1	Students' reluctance in English speaking relate to Language competency.	4.09	0.90	high
2	Students' reluctance in English speaking relate to Self-Confidence.	3.92	0.93	average
3	Students' reluctance in English speaking relate to Language Anxiety and Shyness.	2.62	0.93	low
	<b>total</b>	3.54	0.92	average

The results derived from the English teachers' responses revealed that language competency was high level which led students' reluctance in English speaking, while Self-Confidence was the second cause that made students' reluctance in English speaking. And students' reluctance in English speaking relate to language anxiety and shyness was the last one.

## Conclusion

### 1. Conclusions

This study was to investigate the causes of sixth year students' reluctance in English speaking at English major, faculty of education, Souphanouvong University in academic year 2020-2021. A questionnaire was used to collect the data in the study. Based on the analysis of the collected data, the conclusions can be drawn as follows:

In order to explore the causes making sixth year students' reluctance in English speaking, the current researcher emphasized on 4 categories: Language competency, Self-Confidence, Language Anxiety and Shyness and Teacher's role. Based on the results from both local English teachers and the students' responses in table 9 in the previous chapter, the first main cause making sixth year students' reluctance in English speaking is language competency, while Self-Confidence is the second main cause and language anxiety and shyness is the third and teacher's role is the last one.

When identifying to the detail of each item on the tables given the results on chapter 4, it could be indicated that students talked less because they do not have enough vocabulary exhibited the highest mean ( $M=4.37$ ;  $SD=0.89$ ). So English vocabulary was the main cause making sixth year students' reluctance in English speaking at English major, faculty of education, Souphanouvong University. Coming up with the

words pronunciation ( $M=4.35$ ;  $SD=0.77$ ), this is the second one belong the serious problem or cause of students reluctance in English speaking.

## **2. Recommendations for Further Studies**

Based on the limitations discussed above, and the results of the current study, the researcher offers some recommendations.

### **2.1. Recommendation for teacher**

According to the results of the study concerning to the teacher's role, on the item 2, table5 "The teacher does not encourage me to speak" ( $M=4.00$ ;  $SD=0.75$ ), it was clear that the local English tended to not encourage students to speak English in classes, so the researcher would like to recommend the instructors give more encouragement students to speaking. However, the teachers who need to use this results to teach in speaking should know the types of causes making students' reluctance in English speaking to adapt them in the right situation.

### **2.2 Recommendation for students**

Students should try to learn English vocabulary hardly to improve their speaking skill because language vocabulary is very necessary for speaking. Moreover, as the results shown on table 2, sixth year students also encountered the problems in term of words pronunciation, so, students should practice more and more about pronouncing words by effective strategies such as: word repeating, say words loudly alone, and recording sound.....

### **2.3 Recommendation for further study**

Firstly, the researcher for further studies strongly need to focus on the participants when responding any items in the questionnaires in order to avoid unexpected data and gained the true data from the participants.

Secondly, more research methods/instruments such as classroom observation, diary studies, etc. together with questionnaire and interview are needed to use triangulated to collect data in the future studies so that the findings of the study could be more reliable.

Thirdly, more research questions related to the students' motivation on English learning could be conducted in future studies, such as the correlation between motivation and academic performance on English learning, etc.

Finally, more studies in this area are clearly needed: 1) a case study of other language targets in academic English performance in a certain school could be conducted to find junior or senior high school students; 2) the causes concepts related to the teachers' role should be studied extensively

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## Error analysis of Lao undergraduate students' in english speaking and writing skills 4th year students faculty of languages, Souphanouvong University 2023-2024

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### Abstract

Learning a foreign language is not an easy task and the peculiarities of natural languages like syntactic and morphological differences, ambiguities, anaphors, divergences from one language to another, etc. make this task even harder to complete. Also, in order to be professionally equipped, one needs to be proficient in speaking, listening, reading as well as writing the language, which increases the difficulty fourfold for the students learning a second language. To understand and resolve these difficulties, it is important to first identify these issues, which can be done through the errors made by the language learners and an attempt has been made to do the same in the current study for the undergraduate students of Souphanouvong University (SU), Luangprabang Province in Laos PDR 2023. This paper analyzes a set of interview based spoken data and written data collected through a picture based writing task, of 30 undergraduate students. This study identifies the different types of speech and writing errors from the dataset and also calculates the percentage of the same while discussing a few examples from the data. The findings indicate that the student's speech and writing skills are still heavily influenced by their mother tongue Lao, with contribution from intra-language errors as well. A topic for further study can be designing a curriculum based on the errors found in the data.

**Keywords:** Analysis, Laos, Lao Linguistics, Speech errors, Writing errors

### Introduction

A language holds the key to understanding the cultural and social concepts as well as the way in which a speech community cognizes the world. Learning new languages gives an extra edge, not only to the professional profile of a person but also to his/her personality. Moreover, when a language like English, which has become the lingua franca of the world, is in question, it becomes necessary for everyone to have a working level knowledge of the language so as to ensure that they stay afloat in the hard-core global competition that the present generation has to face.

However, learning a foreign language is not an easy task and the peculiarities of natural languages like syntactic and morphological differences, ambiguities, anaphors, divergences from one language to

another, etc. make this task even harder to complete. Also, in order to be professionally equipped, one needs to be proficient in speaking, listening, reading as well as writing the language, which increases the difficulty fourfold for the students learning a second language. To understand and resolve these difficulties, it is important to first identify these issues, which can be done through the errors made by the language learners and an attempt has been made to do the same in the current study for the undergraduate students of Souphanouvong University (SU), Luangprabang Province in Laos PDR.

## Background of the Study

A common concept across authors defines error as a gap in the knowledge of a language user, which in turn affects the performance of that user negatively. As a result of this gap a speaker might use a word, a sentence or other grammatical items incorrectly in a consistent manner. Errors are often contrasted with mistakes, which are not a gap in knowledge per se, but a gap in the performance of the language speakers i.e. even after knowing the correct usage, sometimes the users are unable to use certain words, grammatical entities, etc. incorrectly. One way of differentiating errors from mistakes can be the consistency of errors as opposed to the inconsistency of mistakes i.e. an error will be consistent throughout a speaker's speech or written production whereas a mistake may or may not vary. Hence, it can be said that errors are the mirrors of what the students are lacking in terms of knowledge in the course of learning a new language. The focus of the current study is a group of Lao undergraduate students and the difficulties they face while learning English and to understand these issues in a better way, it was decided to analyze the errors the students make in the spoken and written productions of English. For this, it was necessary to research about the different aspects of error analysis.

Pit Corder (1967) and his colleagues established the Error Analysis theory and Corder (1981) introduced the theory that the errors made by the second language learners can be indicative of the developmental phases of language learning that they are going through. Norrish (1983) defines an error as "a systematic deviation that happens when a learner has not learnt something, and consistently gets it wrong". According to J Richard et.al. (2002), "an error is the use of a word, speech act or grammatical items in such a way it seems imperfect and significant of an incomplete learning".

Before the establishment of Error Analysis (EA) by Pit Corder (1965) and his colleagues, Contrastive Analysis (CA) was the approach taken by the researcher's to explain the errors made by the language learners. In CA, mother tongue influence (MTI) is the major perpetrator which causes the learners to make errors, while in EA, MTI or interlanguage approach is just one of the two approaches to explain the errors besides the intralanguage approach which explains certain errors as the misuse of some target language rules, hence being caused by the target language itself instead of the influence of the native language. Hence, the approach taken by the current study in order to identify the different issues faced by Lao undergraduate students during learning English as the second language, is the Error Analysis approach. This will help in not only identifying the MTI of Lao on English for these students but also in identifying as to what are the generalizations made by these students while learning English. It is also necessary to

understand the Lao language and how it is linguistically different from English in order to identify the interlanguage issues that the Lao students might face while learning English.

Lao is the native language of the country Laos and belongs to the Tai group of the Tai-Kadai language family. This language is considered an isolating language while English is regarded as an inflection language. Lao is known as a tonal analytic language, the combination of tonality, a complex orthography, relational markers and distinctive phonology can make Lao difficult to learn for those who do not already speak a related language (spoken Lao is mutually intelligible with the Thai language-the two language are written with slightly different scripts but are linguistically similar) (Phetsamai 2020). English and Lao have the same external structure, i.e. both languages follow the SVO structure, however Lao's internal arrangement of words and morphology are different than English. First of all, Lao is a tone language and in Lao, there are no verb inflections. Every concept like tense and aspect is expressed by a separate free morpheme. For nouns, prefixes are used to express plurality, and the modifiers like adjectives are generally placed after the nouns. Hence, students while speaking English are often found placing adjectives after the noun as can be seen in the later sections.

### Objectives of the study

- To identify the errors made by Lao undergraduate students while speaking English.
- To identify the errors made by Lao undergraduate students while writing English.
- To identify the percentage of inter-language errors for Lao undergraduate students while speaking and writing English as a second language.
- To identify the percentage of intra-language errors for Lao undergraduate students while speaking and writing English as a second language.

### Literature Review

A review of literature related to the topic of the current study was done in order to understand the subject better and to identify the gaps in this area.

Jennifer Mancone (2009) did an in depth analysis of the people and culture of Laos PDR and the Lao language to understand what problems will the Laos students face when they start learning English due to their mother tongue influence (MTI). She gave a brief account of the issues which included:

- Problem with understanding and using the multi-morpheme structure of English i.e. bound morphemes which denote tense, plurality, etc. since in Lao each concept is represented with a free morpheme.
- Issues like using word boundaries, punctuation marks, and appropriate capitalization in a sentence while writing English texts since in written Lao only uses spaces between two sentences and not two words.
- Wrong word order between adjectives and nouns since in Lao, the adjectives come after the noun.
- Problems in pronouncing certain phonemes of English which do not exist in Lao.

Other common mistakes presented in this report included incorrect usage of pronouns, omission of articles, possessives and conjunctions from sentences. A few examples have been presented in the report as well, however no focused data analysis was done in the report.

Thongma (2008) did a preliminary study on what 30 2<sup>nd</sup> year students and student-teachers of various undergraduate programs in the National University of Laos (NUOL), thought about the question, "*Why Lao students weak in English?*". The respondents had to answer to this question in an A4 sheet paper with 10 points that they thought could be a reason for why Lao students were weak in English. As a result of this survey, 18 unique reasons were identified by the author. The top reasons included lack of English background, lack of proper curriculum and trained teachers, student's lack of confidence and their fear of speaking incorrectly, difficulty of the English language, etc. In conclusion, the authors suggests an overhaul in the ELT system in the country including training of the teachers as well as the curriculum used for teaching English in Laos.

Thongma et. al. (2013) aimed at exploring the learning requirements of 160 undergraduate students across eight different faculties of the National University of Laos (NUOL) for learning English proficiently. The authors prepared 1 questionnaire divided into 3 sections which had 65 questions in total. The questions in the first section required the students to provide their demographic information in the first part and asked them to choose ratings for their proficiency skills LSRW in English and which skills they would like to focus on more, in the second part of the first section, The second and the third sections used the five point Likert scale to get the ratings on the rest of the questions which were related to the strategies used for learning English by the students in the second section and the need that the students felt for improving their English proficiency in the third section. The results of this study showed that the students, despite having a moderate English proficiency level, judged themselves to be low in speaking and conversational skills. This study also found out that the highest learning activities the students used for learning English were learning new words through dictionaries or electronic medium. Finally the study concludes that there is a need for reanalyzing and redesigning of the curriculum used for ELT in Laos so that it meets the requirements of the students and the social and educational environment in Laos.

Nokthavivanh Sychandone (2016) studied the English written productions of 54 Lao undergraduate students out of which 14 were from the first year, 20 from the second year and 20 from the third year. The author provided an analysis of the errors which were found in the writings. He divided the errors into two major categories, namely lexical errors which had three subcategories of wrong spelling, wrong selection of word and false friend i.e. words that are similar in spelling get switched with each other and form erroneous data; and syntactic errors which had five subcategories of verbs to be, verbs, prepositions, conjunctions and sentence construction. The study showed that the first year students made the highest number of errors in all categories while the third year students made the lowest number of errors.

## Methodology of the Study

For the purpose of this study, it was decided to adopt the two approaches of Error Analysis i.e. interlanguage error analysis and intra-language error analysis in order to understand the extent of errors made due to mother tongue influence as well as due to overgeneralization of English grammar rules.

This research was conducted on students from a Foreign Language Study course in Souphanouvong University (SU), Luangprabang Province Laos PDR over a period of two weeks during 9<sup>th</sup> September 2023 to 21<sup>st</sup> September 2023. For the calculation of the sample size, the Krejcie and Morgan (1970) sample size calculator formula was used, which is presented below:

Equation (1)

*Formula for determining sample size*

$$s = \frac{X^2 NP(1 - P) + d^2 (N - 1) + X^2 P(1 - P)}{d^2}$$

$s$  = required sample size.

$X^2$  = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

$N$  = the population size.

$P$  = the population proportion (assumed to be .50 since this would provide the maximum sample size).

$d$  = the degree of accuracy expressed as a proportion (.05).

*Source: Krejcie & Morgan, 1970*

Where,  $n$  = sample size required  $N$  = number of people in the population  $e$  = allowable error (%).

The total number of students who were studying at the faculty of foreign languages were 421 including the first year to four years students, hence based on the above formula, the sample size was formulated as shown below:

Hence, 111 students from this course were asked to answer a questionnaire which included questions related to listening, speaking, reading and writing skills in English based on the format of IELTS, TOEFL examinations, however, this research paper is only focused on the error analysis of the speaking and writing skills of randomly chosen 30 students based on the picture based writing section in the questionnaire and an interview with the researcher.

The data for this study was collected in the form of the answers to the picture based writing question in the questionnaire and the recordings of the students speaking for two minutes on one of the multiple topics (future goals, travel, holiday, music, movies, place, stories, computers, best friend, Lao cuisine, best teacher, free time, animals, sports, rivers in Laos, zoo) provided by the researcher. The researcher then processed the data in two different parts: the spoken data was transcribed and the hand written data was typed on a computer with the errors kept intact. After this, the data was analyzed by an English Linguist, who counted the errors in each category.

The researcher then applied the below formula to find out the percentage of total erroneous data (sentences and words with errors) out of the total spoken and written data separately:

Equation (2)

$$e_{SP} = \frac{e_{sn}}{e_{sn} + c_{sn}} \times 100$$



Where,  $e_{SP}$  = percentage of erroneous sentences,

$e_{sn}$  = number of erroneous sentences,

$C_{SN}$  = the total number of correct usage of the sentences in the written data

And, equation (3)  $e_{WP} = \frac{e_{wn}}{e_{wn} + C_{WN}} \times 100$

Where,  $e_{SP}$  = percentage of erroneous words,

$e_{sn}$  = number of erroneous words,

$C_{WN}$  = the total number of correct usage of the words in the written data

After the percentage of the total erroneous data was calculated, the researcher also calculated the percentage of each error type out of the total number of errors using the following formula:

Equation (4)

$$e_{cP} = \frac{e_{cn}}{e_N} \times 100$$

Where,  $e_{cP}$  = percentage of errors in a particular category 'c'

$e_{cn}$  = number of errors in a particular category 'c'

$e_N$  = the total number of errors in the written data

Depending on whether the error was a syntactic error i.e. sentence structure, tense, etc. or a morphological error i.e. related to used of incorrect word or word category, wrong inflection, etc. the denominator in equation (4) i.e.  $e_N$ , was changed with  $e_{SN}$  from equation (2) or  $e_{WN}$  from equation (3), respectively. The different categories for which the data was analyzed, have been presented with examples in the next sections. It is to be noted however that the word errors can also account for syntactic errors i.e. the errors can be overlapping.

## Results and Discussion

From the 30 students' spoken paragraph on the topics provided by the researcher, a total of 7113 words over 264 sentences were collected in the form of spoken productions, while from the picture based written questionnaire the total data collected was 4152 words over 279 sentences in the form of written productions.

Phonetic Transcription of Lao recordings

1 Miss Pakaymouk

/helomainemiz .../ /naʊamstədi:ŋ æ .... jʊnɪvəsɪtɪɪnfækətʰɔflæŋgwidʒɪz/  
 /maɪtʰɔpɪkɪzbesfren/ /aɪhæv ə besfɪen/ /hənemɪz .... bəɔæmkʰɔlhəfʊmu:n/ /çɪ:  
 ɪʒtʰwenɪəsɔɪ ænkəmfɔm ... pʰovɪns/ /çɪstɔdɪ:d æ ...  
 jʊnɪvəsɪtɪɪnfækətʰɔflæŋgwidʒɪz/ /naʊfɪli:fɪnəpʰa:tɪmennɪə:wəsəkʰu:/  
 /çɪvɔktʰʊskʰu: evɪɔde/ /... ɪzverɪbjʊɪfu:/ /çɪhæzbrəʊ he  
 ænhəsəkɪnæzʰa:ɪæzənɔɪpæz red æzɔɔd/ /çɪɪʒtʰəænskʰɪnnɪ/  
 /dəfzɪmpɛçənvenəɪmɪtʰəaɪtʰəwəzveɪçəɪbɪkʰɔzçɪdɪɪnttʰɔktʰenɪwənbətʰwəndeven  
 aɪntʰɔdʒʊmaɪseɔlæn vi stətʰtʰɔktʰɔi:ɪfɔdə/  
 /aftʰɔkɪŋaɪtʰɔçɪwəzveɪɪnəɪspʰəsən/ /aɪwəntʰɔbɪhəbesfɪen/ /aftʰɔʒvɪ:kswɪgɔttʰɔ  
 nɔ i:ɪfɔdæveɪweɔl/

After the analysis of the data of the 30 students it was found that the total percentage of errors were as follows:

**Table 1:**

Type of data	Error percentage
Spoken	59%
Written	63%

As can be seen in the table, 59% of the spoken data was found to be erroneous while 63% of the written data had errors. These errors majorly consisted of errors from the mother tongue influence of Lao from the speech such as the placement of words, incorrect sentence structures, etc. However there were a few generalizations made as well. It was interesting to see that the interlanguage errors occurred mostly in the phonetic and syntactic framework, while intralanguage errors were seen in the morphological framework more often. For a detailed view on error percentages in each of the categories, please see the table below:

**Table 2:** Percentage of error types out of the total number of errors in the Spoken data:

Category of error	Type of error	Percentage out of total errors
Phonetic		
	Pronunciation of vowels	12.45%
	Pronunciation of consonants	18.26%
Morphological		
	Use of Incorrect word	12.42%
	Incorrect affixes	7.13%
Syntactic		
	Sentence Structure	22.52%
	Incorrect placement of wordclasses	11.91%
	Incorrect tense	11.43%
	Missing words	5.88%

As can be seen in Table 2, the syntactic errors at a total of 51.74% are the biggest category of errors that the students made followed by the phonetic errors at 30.71% and lastly the morphological errors at 19.55%. The morphological errors seem to be less in number due to the fact that students generally tried to explain concepts through a combination of words instead of affixed words. For example, instead of using past tense, they used a supportive main verb like 'used to'. Sentence structures were mostly incorrect, due to the influence of Lao over their speech. An example can be seen below:

Example 1: *She is both love and about hefriend nice.*

Students tried to create a structure similar to their mother tongue in English as well, which works to an extent since both languages have an SVO structure, however, the placement of adjectives often creates an issue for the students and they use an adjectival phrase instead of a one word adjective to modify a noun. In terms of pronunciation, the students face difficulty in pronouncing certain consonants at the end of the word, or in a consonant cluster. See the transcription of one of their sentences below, where the student was unable to pronounce a word ending /l/ in *full*, and converted a voiceless word ending /t/ to a voiced /d/:

Example 2: /hənemɪʒ ... bədæmkʰəlhəfʊmu:n/

**Table 3:** Percentage of error types out of the total number of errors in the Written data:

Category of error	Type of error	Percentage out of total errors
Morphological		
	Spelling errors	19.56%
	Use of Incorrect word	14.23%
	Incorrect affixes	6.19%
Syntactic		
	Sentence Structure	23.47%
	Incorrect placement of word classes	14.69%
	Incorrect tense	8.90%
	Missing words	12.96%

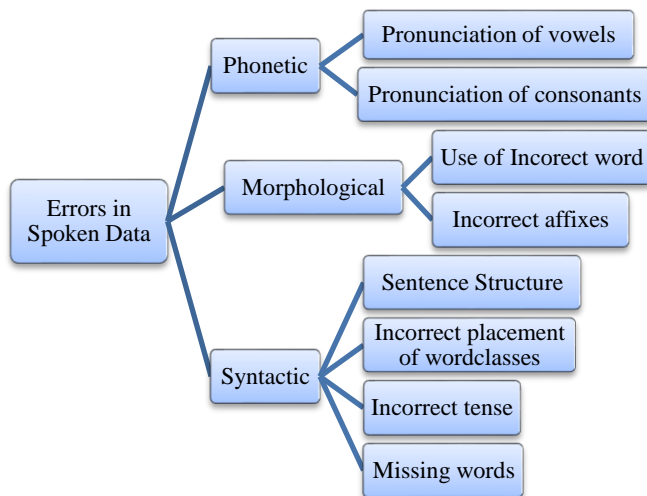
In the written data as well, it can be seen that the largest group of errors is the syntactic category with 60.02% errors and the morphological category errors were at 39.98%. Some of the examples of the written data can be seen below:

Example no.	Incorrect Sentence	Proposed Correction
3	Then the girl going to made some food then gave to her dog eat	Then the girl went to make some food and gave it to her dog to eat.
4	Once upon of time there is a beautiful girl.	Once upon a time there was a beautiful girl.
5	When the doy are healthy, she give it to save her house.	When the <b>dog</b> was healthy, she assigned it as the protector of her house.
6	long time ago Pupy grew up, they live happhy	After some time, the puppy grew up and they were living happily.
7	So that she took her smart Puppy to the doctor who is studied about to treat animals.	So she took her smart puppy to the vet.

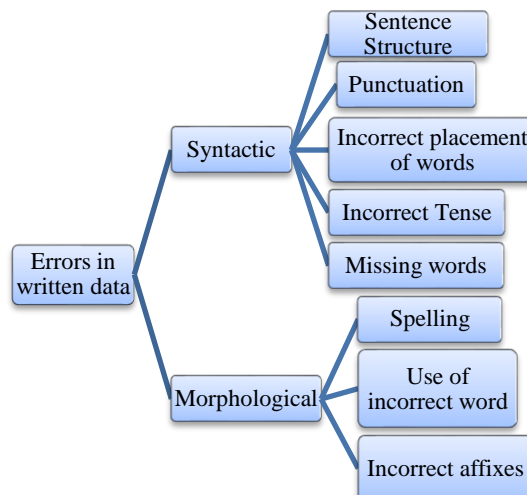
Example no.	Incorrect Sentence	Proposed Correction
8	The Girl help Pupy from Cage in somewhere and take it home.	The girl helped puppy to get out of a cage somewhere and took it home.

## Conclusion

The undergraduate students still make a lot of errors in English speaking and writing skills. The spoken and the written data were treated separately and the error categories were also formulated separately for the two skills. The errors in the spoken data were divided as shown below:



The errors in the written data were majorly divided into two categories which were further divided into sub-categories as shown below:



The syntactic errors are the largest category of errors in both skills and needs special attention. In conclusion, it can be said that there is a need to redesign the English learning module in this university, which can be done after a more thorough analysis of all 111 students included in the study and the research paper is only focused on

the error analysis of the speaking and writing skills of randomly chosen 30 students. The author has taken it up to complete the analysis and create an appropriate curriculum for the undergraduate students in Laos, which will help them overcome their issues which they face while learning English as a foreign language.

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## Training and recruitment of male teachers at the preschool level with a gender equal approach

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### Abstract

Currently, students majoring in early childhood education at colleges and universities in the locality are mainly female. The work of preschool pedagogical career counseling for male students is still limited. Therefore, the scarcity of male teachers at preschool education institutions is an urgent requirement for human resources. By collecting information from several countries around the world combined with observation from practice in Vietnam, this article summarizes research issues to reflect some inadequacies in human resources for male preschool education students at teacher training establishments. At the same time, I reflect on the reality status of enrollment counseling and career guidance; prejudices of public opinion; the thinking of the educational force has not changed and is compatible with the new context; and factors affecting the status and career prospects of male preschool teachers. So, I will propose some measures to attract this human resource. The contents include salary regime, criteria for considering emulation regulations related to the student's career orientation for the field of study; and labor division plan for male teachers in preschool educational institutions. The goal of gender equality is to renew awareness about training and recruiting male teachers of preschool pedagogy to meet the requirements of practice.

**Keywords:** Male students majoring in preschool education, Male teachers of preschool, Nurture and take care of boys, The need to educate, Recruiting male teachers

### Introduction

#### 1. Research Objectives

The objective of this article is to expect a change in society's perception to create a change in training innovation and recruitment of male teachers in preschool education institutions.

#### 2. Review of Related Literature

Gender equality is one of the challenges facing society today, reflected in wages, job opportunities, and access to education. Society is changing. Equality in child care and education through the role of men is increasingly promoted. Yet, this issue is not reflected in the professional early childhood education environment, where men as teachers are underrepresented. Men's participation in cultural experiences and

attitudes is a determining factor in the next step toward improving gender balance in early childhood care and education practices. Because the gender identity and expression of the early childhood classroom have an impact on children's development. Gender is an identity that children struggle to understand. This is also a problem that female preschool teachers do not always solve in the best way. External influences have impacted the preschool classroom, on children's interactions, play choices, and explorations. Accordingly, male teachers at this educational level have a certain influence on young children, especially boys at the first level of education.

In their study on the recruitment and compensation of male teachers in preschools, Chinedu Okeke and Enock Nyanhoto said that misunderstandings about the cultural role, stigma, fear, and prejudice in the preschool education sector; Lack of policies to recruit men will negatively affect the recruitment of men into the preschool sector [2]. Xinqiao Deng, Ying Tang, Leyang Wang, and Feng Zhou use the international survey on Changsha as an example of stereotypes about male preschool teachers. The purpose is to raise people's awareness about the situation of male kindergarten teachers in China [13]. For Meher Saigol, Sana Danish, in her article on factors affecting the proportion of men participating in preschool teaching in private schools in Pakistan, identified barriers related to inequality. gender and the lack of male role models for preschool children [5]. Besides, Tingting Xu believes that preschool teacher training programs can rely on the limitation of the relatively small number of men choosing this major to build enrollment plans [11]. At the same time, Ruzica demonstrated family pedagogy and opened up a field of research on the growing number of children born to single mothers, who lack a father figure both in the family and kindergarten. [12]. Meanwhile, according to Seno Seno, Yuli Utanto, Yuli Kurniawati Sugivo Pranoto, men being preschool teachers is considered an uncommon phenomenon. Because, according to American research, the number of male preschool teachers accounts for only 5.2%. Male preschool teachers in European countries have a rate of 1-4%. In Türkiye, the number of male preschool teachers is only 4%. In Hong Kong, only 1.2% of teachers are male. Indonesia is similar. The world is experiencing a crisis of male preschool teachers [10]. The role of male teachers at the preschool education level, the difficulties and challenges that preschool teachers themselves face, and the value they bring to the learning and teaching process at the early stages of education [3] are the main content that authors Husam Helmi Alharahsheh, Abraham Plus, Imad Guenane presented in their research work.

Thus, related to this issue, the content is mainly presented by each author in different countries around the world. In Vietnam, there is currently no typical research work addressing gender equality in training and recruiting male teachers at preschool education establishments. Therefore, this is a topic that needs to be resolved in the current context of preschool education innovation given the urgent need for a shortage of male teachers in general and male teachers in particular.

## Research Methodology

I used the method of comparing legal theory on the Constitution, Labor Code, and Gender Equality Law with the reality of students choosing to study preschool pedagogy at colleges and universities. Learn

based on the experience of other countries combined with observations from practice at local training facilities. Along with that, research methods from practical professional requirements for preschool teachers in nurturing, caring for, and educating children; The work and responsibilities of educating children often focus on the role of women in the family, and the issue of cultural access in children's education, all of which have an impact on the role of teachers from an equality perspective gender.

## Results/Research

### 1. Legal basis for gender equality in education and labor

The National Assembly issued a legal document in Clause 1, Article 35 of the 2013 Constitution, noting: "Citizens have the right to work, choose a career, job, and place of work" [6]. Therefore, educational institutions conduct admission based on the qualifications of candidates through test scores, regardless of the gender of admitted candidates. Both men and women have equal opportunities to choose to study professions and fields that suit their interests, abilities, and talents. Also according to the National Assembly, Clauses 1, 2, and 3 of Article 14 of the Law on Gender Equality 2006 stipulate: "Men and women are equal in terms of age for going to school, training, and fostering; in choosing majors and professions for study and training; in accessing and enjoying policies on education, training, fostering, expertise and profession". [8]

Along with that, the National Assembly recognized the current national education system including preschool education, general education, vocational education, and university education. Depending on each person's different needs, characteristics, and abilities, learners can participate in different levels of education and training depending on age without gender discrimination. Learning is the right and obligation of citizens. All citizens regardless of ethnicity, religion, belief, gender, personal characteristics, family origin, social status, or economic situation are equal in educational opportunities [7]. Thus, the 2019 Education Law does not have regulations on gender discrimination for beneficiaries of educational policies.

The 2019 Labor Code stipulates: that workers have the right to learn a trade, improve their professional qualifications, and not be discriminated against, and strictly prohibits gender discrimination against workers. In particular, there is no gender discrimination in the selection of employees sent for training and professional development. It can be said that gender equality in the field of education means that individuals are equal in terms of age to go to school, receive training, be able to choose fields and occupations for study and training; have access to and benefit from policies on education, training, and professional development; have equal opportunities to participate in teaching and educational management; have access to educational programs with GMO content, and study in a safe and equal educational environment. Gender equality in the field of education is one of the factors that strongly impacts the gender equality process. Because education is the process of forming and developing a personality under the influence of all activities.

### 2. Practices of male preschool teachers in some countries

According to Jeong Eun Yang, in New Zealand, less than 1% of male teachers work in the field of preschool education. Researchers have identified the lack of male teachers as a problem for gender equality



in different ways. Barriers affecting men's attitudes toward early childhood education as a career. Realizing that teaching is a woman's job. At the same time, concerns were expressed about the possibility of child abuse, low wages, low social status, and the absence of a male peer group. These are common reasons for men to give up thinking about becoming teachers, especially male preschool teachers.

No country in Europe has been able to increase male participation without specific Government policies to encourage it. Children with single mothers need a male role model for boys to learn and understand what it means to be a man. Female teachers understand the psychology and physiology of girls as a necessity to develop their feminine qualities. Therefore, boys may be disadvantaged in this aspect. Male teachers are more likely than female teachers to identify and respond to boys effectively through a shared understanding of boys' experiences and perspectives and the necessary masculinity set.

At that time, the workforce became more diverse. Men and women are considered necessary to improve the quality of early childhood education for children. Many different perspectives and ways of working for the ECCE profession are also explored more deeply in this aspect. Early childhood educators can bring positive energy and unique perspectives to child care, education, and nurturing programs, especially in early childhood education facilities with male staff, contributing part of bringing gender balance in the early childhood education environment and a gender-equal learning environment. Because men often have a more open and straightforward communication style than women. Workplace tensions can increase if men maintain gendered power relationships. [4]

Meanwhile, Zou Shuo said that in 2018, according to the Chinese Ministry of Education and Training, only about 2% of the more than 2.58 million preschool teachers in China were men, the lowest rate of all educational levels. The lower the levels, the fewer male teachers. Gender imbalance among teachers in preschools can lead to serious social consequences. Because education is very important for personality formation in the early stages of life. Therefore, the lack of male teachers causes many boys to grow up to be shy. A female teacher can be a caring mother figure, while a male teacher can be a brave, masculine figure. This helps create a harmonious atmosphere for children in preschool. With their masculine qualities and thinking, male teachers will provide a different approach to teaching. That distinct approach used by male and female teachers helps provide children with an all-round good learning experience.[14]

For Aaron Loewenberg: in the United States, preschool classrooms today almost completely lack the presence of male teachers. Although the teaching profession in general is predominantly female, this is especially true in the early grades of preschool, where men only make up about 2% of the preschool teacher force. After the COVID-19 pandemic, men lost their jobs in manufacturing sectors, most of the fast-growing industries. This could be an important opportunity to encourage more men to enter the vital early childhood education sector. Studies show that children benefit when they are surrounded by a diverse group of teachers that reflect the general population of society, including educators of different races and genders.[1]

In principle, having access to diverse teachers is in children's best interests. Children have access to many different forms of play and communication. Thereby, forming healthy ideas about gender. Those are

also the concerns of parents and social forces about children's gender that are shaped by the educational environment, the impact of trends that need thorough and timely attention with the policy, and concrete actions.

### **3. Training and recruitment activities for male preschool teachers in Vietnam**

Gender dominance according to the perception of a part of rural families influences the future career choices of Vietnamese students, especially high school graduates. Besides, there is a difference between career orientation in the educational environment of rural and urban areas. Especially in the process of applying information technology in teaching, male teachers will have the potential to master more technological skills than women. Meanwhile, the training program for the preschool education industry focuses on skills specifically for women through the process of integrating dancing, dancing, and dexterity activities in some artistic modules. techniques in the training program. It can be said that Vietnamese law recognizes that regardless of educational level or field of study, men and women have the same right to study. On national forums and agendas, gender equality is often seen in terms of creating conditions for women and girls to participate in education at all ages. However, from the perspective of preschool teacher training, the role of male preschool teachers has not been resolved based on the principle of connection between theory and practice.

In general, not only Vietnam but countries around the world are facing many difficulties with male teachers in charge of preschool classes. However, mechanisms, policies, and social awareness do not ensure that men can feel secure in the profession of nurturing, caring for, and educating children. In vocational training programs for students, the preschool education sector has not yet attracted male learners. Meanwhile, for boys, especially for disabled families and single mothers, the above problems lead to many consequences related to boys. Because children lack a good environment from the caring hands of men in the role of teachers at the preschool level. This is an overall situation that needs solutions in implementing the Gender Equality Law. Gender balance in the role of the teacher needs to be placed in the overall relationship with children as learners. From there, the gap and lack of men's hands to care for children will be the factor affecting the child's personality and formation and development related to children's rights groups according to the Law on Children and Justice. The United Nations Convention on Children's Rights needs to become a reality.

## **Discussion**

### **1. The goal of admission consulting has not been applied to the relationship between gender equality**

In face-to-face and online admission consulting programs at colleges and universities, there is often a bias in focusing on female preschool education students. Stemming from the characteristics of the field of study suitable for men the image of "a teacher as a kind mother" has become prejudiced in the thinking of any individual. That traditional element is difficult to change before the rapid development of the 4.0 industrial revolution and every person will become a digital citizen. Gender equality is receiving attention

from the perspective of creating the best conditions for children to go to school, not to mention men going to school for the whole future generation in the preschool education sector where the learners are children. This is also the main reason leading to the shortage of male preschool teachers in charge of nurturing, caring for, and educating children in the classroom at preschool educational establishments, although the element of love for the job and love for children is still present. hidden from male students. Meanwhile, society's expectations often focus on women in the field of early childhood education in practice.

## **2. Preschool education skills need to meet men's requirements for qualities and specific abilities of the profession**

To become a preschool teacher, during the training period, in addition to qualities and skills in professional ethics, men must gain basic skills in aptitude and pedagogical methods in handling situations about singing, dancing, playing musical instruments, drawing, telling stories; Resolving conflicts between children, pedagogical capacity in language, society, science, health and art. For men, the elements that need to be understood during training are a process of constantly striving to overcome. However, the mechanism for recruiting male teachers according to the Plan of the Department of Home Affairs and the District Department of Education and Training, especially the number of targets for men entering the preschool education sector, has not been determined. Social opinion sometimes still assumes that male preschool teachers can sexually abuse girls. This unfounded inference stemming from the psychology of young parents has become a common fear of men who want to choose to study preschool education. That is also a barrier for men interested in this field of study that men cannot automatically overcome.

## **3. Thinking about the awareness of social forces is not proportional to development in the digital age**

Cultural career barriers and resistance for preschool teachers are due to social cognitive biases. The outdated thinking of many people has caused male individuals who expected to be preschool teachers to give up their dreams and careers. Human thinking in the era of the 4.0 industrial revolution is ready to adapt to access to digital technology devices but still turns away from careers that inherently favor women when working at early childhood education facilities. young. However the vision is still narrow regarding gender inequality in preschool teacher training. This is the paradox and lack of balance in thinking. Children are in need of the best educational environment. It's not simply the facilities, the natural landscape, or the diet. Here, the environment is also expressed in the relationship between teachers and students, between preschool teachers and boys and girls. Furthermore, for students majoring in preschool pedagogy, the presence of male students in the training process will reflect the most authentic and comprehensive features related to intelligence, emotions, and educational methods. for both girls and boys. The presence of men as teachers in preschool education facilities will assist schools in setting gender-inclusive codes of conduct.

## **4. Limited social status and career prospects**

Recruitment announcements for officials working at public preschool education establishments under district-level People's Committees have recently been posted on local information websites.

Accordingly, the content of this document includes information such as the number of grade III preschool teachers (Code 107.02.26) who must have a pedagogical college diploma or higher in preschool education, and be able to Ability to apply information technology in performing tasks, the ability to use foreign languages or ethnic minority languages. Thus, this Notice does not stipulate that men are given priority in recruitment or that there is a specific mechanism specifically for men. This partly reflects the lack of respect for male students majoring in preschool education when becoming teachers. This is also one of the reasons why the number of male teachers in preschools is almost non-existent. There are even cases that claim that preschool teachers are nannies and that preschool education graduates themselves cannot accept themselves.

## Suggestions

### 1. For training facilities

Training institutions need to rebuild the preschool education training program towards a gender equality approach. With the application of digital technology, the requirement for mastery of skills in teaching preschool children is an appropriate requirement according to the new trend. In particular, men will gain strength when exploiting information technology to standardize the content of training programs for College and University levels. Modules related to artistic activities need to be built neutrally so that both men and women can easily perform the exercises in practice. The interference in this model aims to gradually replace the gap and difference in the perception of the preschool teaching profession for men and women.

### 2. For the Department of Internal Affairs

The Department of Home Affairs needs to develop a recruitment plan for male preschool teachers. Job position standards in the Recruitment Notice need to be clearly and strictly expressed. This option demonstrates the openness of the recruitment process for male teachers. In addition to general recruitment conditions, the job position for male preschool teachers needs to be specified to avoid public opinion that men only take on management roles at public preschool education establishments. Established and private. Recruitment notices clearly stating priority for graduates of preschool education will be the legal basis for organizations, units, and individuals to meet the goals of gender equality.

### 3. For the Department of Education and Training

The Department of Education and Training submitted draft documents proposing district-level People's Committees to implement salary reform for male preschool teachers to attract human resources based on foreign experience. Because, due to the lack of human resources for male preschool teachers, recruitment or division of labor needs to be guaranteed according to a special priority mechanism. Initial steps to attract human resources for local replication. The early childhood education environment needs a diverse workforce with a variety of interaction styles, interests, and teaching methods to ensure children receive a comprehensive education. This is also a way to encourage more male teachers based on what some typical countries around the world have done. Zou Shuo emphasized in his research that China has

paid them higher salaries than women from 500 yuan to 1,000 yuan (70 to 140 USD per month [14]) as a specific action to attract human resources for male preschool pedagogy students.

In addition, there needs to be a document specifically regulating the permitted activities of male teachers toward female children at preschools. Propaganda work can continue to be carried out using traditional methods using loudspeakers, newspapers or radio, and slogan banners. Along with that, deploy a real-life model from the story of a kindergarten with male teachers. Traditional recruitment methods find it difficult to address the gender imbalance in this field. At the same time, male preschool teachers operate under constant scrutiny that affects every aspect of men's teaching lives. Schools should conduct comprehensive background checks on all male individuals who want to work with children, regardless of their role as teachers or substitute teachers. To protect children and provide clarity for male or female teachers, the education sector needs to set out clear, written policies on what activities are permitted between boys and girls teachers by preschool teachers. Children are men in charge of the classroom, instead of male teachers having to research and evaluate the best things for children. Therefore, there is a need for guidance documents from the industry to create better conditions and motivation for men to participate in studying and working at preschools, especially for classes with male teachers in charge of children, is a girl.

In summary, to meet the national goal of gender equality, changing perceptions about male preschool teachers is an issue that needs to be resolved to meet the need for this resource for preschool educational establishments. Based on the experience of countries around the world and the practice of training students in preschool education in Vietnam, the article hopes for a change in society's perception of the teaching profession. This is so that the process of training and recruiting male students will ensure an effective enforcement mechanism for Gender Equality laws. With that meaning, the goal of the article is aimed at male preschool teachers to improve the quality of preschool children's education from the perspective of gender equality in training and recruiting preschool teachers.

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## The optimization of the may fourth commune online learning platform: Improvement and efficiency

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### Abstract

Due to the bugs in the curriculum design and teacher-student interactions during the use of the May Fourth Commune, the use of this system has caused some problems for both students and teachers. This research aims to 1) study the problems in the use of online learning platforms; 2) redesign and develop the online learning platform of the May Fourth Commune; 3) study the efficiency of online learning platforms. This study decides to adopt a mixed research method. Firstly, a preliminary interview was conducted with 10 students to collect their feedback, with convenience sampling method to conduct a questionnaire survey on 100 students who studied in Zhengzhou Normal University, Henan Province, China for the later stage to obtain user feedback data. Statistics used to analyze the data include mean, standard deviation, and t-test. This research has found that there were 2 main problems during the use of the May Fourth Commune Online Learning Platform, namely the Task Treasure function and competition platform. Students can not only integrate their knowledge but also monetize it. The optimization of the May Fourth Commune Online Learning Platform has a high promoting impact on students' learning efficiency and a significant benefit to their enthusiasm for learning.

**Keywords:** MAY FOURTH COMMUNE, Online Learning Platform, Redesign

### Introduction

Yao Xiaojuan (2021) mentioned that with the rapid development of the social economy and the continuous progress of science and technology, numerous information technologies have gradually been closely integrated with university work and played an important role. The traditional teaching mode is no longer able to keep up with the rapid development of learning needs, and it is necessary to continuously optimize existing learning modes. Especially with the rise of internet technology, by providing online teaching modes, different users can complete corresponding learning content in different places according to their own needs, meeting people's specific needs for online learning. Through this approach, it has gained relatively high support and has gradually become mainstream at present. Compared to traditional courses, online learning utilizes online teaching mode to complete learning, relying on the Internet to obtain teaching knowledge. Internet technology can also demonstrate great flexibility in fields such as information

transmission, storage, and use. Being able to provide a large number of rich teaching resources according to user needs, online learning systems have gradually gained recognition from users. At the beginning of COVID-19's popularity in 2020, the use of online teaching systems solved the learning problems of a large number of students. Through the use of online learning systems, regardless of the user's identity and age, or a series of other conditions, there were no restrictions on the content and knowledge learned by system users. Different users can analyze their specific levels and obtain corresponding knowledge, and the application of these conditions can provide convenience for students to quickly improve their abilities.

Huang Pengfei (2019) informed about autonomous learning for college students refer to the process of independently determining learning goals, selecting learning resources, executing learning activities, supervising and evaluating learning outcomes without the guidance of teachers. The diverse learning needs of current college students have led to an increasing proportion of independent learning time. With the development of "Internet plus Education", online learning platforms have emerged in large numbers, such as Courser, Udacity, edX, China Learning Connect, Xuetang Online, China University MOOC, etc. Due to the advantage of accessing global teaching resources anytime and anywhere, online learning platforms have quickly attracted the attention of contemporary college students, who are indigenous to the Internet, and have become their preferred choice for independent learning. In particular, from 2020 to 2023, affected by the COVID-19, the Ministry of Education of China proposed the initiative of "suspending classes without stopping classes" for colleges and universities, making online learning platform the main battlefield for college students to learn independently and an important way to acquire knowledge. According to the 46th "Statistical Report on the Development of China's Internet" released by CNNIC in 2020, the scale of online education in China has reached 381 million, of which the proportion of college students who mainly aims to obtain knowledge and information exceeds 70% of the total number of college students.

In conclusion, the dilemmas and challenges faced by online learning platforms are multifaceted, but at the same time, they also nurture more opportunities and innovations. Only by continuously improving the innovation and stability of online learning platforms and meeting the learning needs of corporate users can we remain invincible in the fierce market competition.

The "May Fourth Commune" self-media learning platform is a self-media interactive community integrating news and information reading, course teaching, innovation and entrepreneurship. It is developed by in-service teachers of Zhengzhou Normal University, and the main service object is college students. The platform is committed to helping colleges and universities realize real-time interaction between teachers and students, seamlessly connecting teachers' teaching methods with students' learning methods. By combining the popular media communication methods, students can not only learn interactively, conduct operational training, but also engage in content entrepreneurship in practice.

## Research Objectives

1. Study the problems in the use of online learning platforms, the problem of lacking socialization design is that as the online learning model is usually an individual learning model, it is difficult to meet the



interaction and communication between students and peers, which affecting students' learning experience and interests. The online learning platform satisfaction scale and online learning efficiency scale are analyzed by questionnaire.

## 2. Redesign and develop the online learning platform of the May Fourth Commune.

In order to improve the function and efficiency of the May Fourth Commune, this study conducted a questionnaire survey to investigate the problems that various users encountered during the use of the learning platform. The survey results were statistically analyzed to understand the major problems in the online learning platform and the learning efficiency issues of the online learning platform. Relevant improvement suggestions were proposed, and the May Fourth Commune online learning platform was redesigned and developed.

### Review of Related Literatures

Duan Gangping (2021) conducted research on the key elements of the learning experience of online learning platforms based on the KANO model, screened and analyzed the elements that affect the learning experience in the construction of online learning platforms from the perspective of the learning experience, and sought for breakthroughs in the development of online learning platforms themselves and the improvement of user experience. The positive and negative impact of each element on the learning experience was accurately identified by the use of the KANO model questionnaire analysis, expectation factors, etc. The results showed that through the selection line of key elements, 7 key elements such as "establishing feedback mechanism" were filtered out to provide a reference for the optimization and construction of online learning platforms.

Wu Xiaolong (2019) studied the design and implementation of an online learning system based on Microservices architecture, developed an online learning system based on Microservices architecture, so that college students can learn and assess courses through online teaching platforms, to solve problems such as the decline in learning efficiency, the inability to understand the class and the difficulty of reviewing after the class, etc. Adopting the design method of Microservices architecture, the system is divided into four Microservices according to business logic: user service, course service, review service, and exam service. The online learning system based on Microservices architecture can integrate many excellent teaching resources, cover multiple disciplines, and meet the personalized learning needs of college students.

Zhao Yang (2019) studied the design and implementation of an adaptive learning system for online courses. Online education platforms make learning no longer limited by time and space. How to let learners find the possibility of truly realizing their learning goals in a rich and complex curriculum has become one of the focuses of attention in the field of education and educational platforms. Based on the general model of an adaptive learning system, the functions of each module in the overall architecture of the domain-oriented steering discipline system are improved, and the overall workflow of the system is designed. Taking the subject of network security as an example, the adaptive learning system of network courses is designed

and realized, aiming to provide new ideas for the research of adaptive learning systems in subsequent professional fields.

Xue Kunyu (2018) studied the design and implementation of online lesson preparation and classroom interaction systems in colleges and universities. Traditional lesson preparation is paper-based, and the preservation of information has become a major problem, resulting in low efficiency in querying data. At the same time, the interaction between teachers and students in the classroom is not flexible enough. The traditional education model is no longer able to adapt to the rapid development of modern teaching. It is mainly divided into five modules: online lesson preparation, classroom interaction, online learning, online tutoring, and learning reports. The teacher platform is based on the B/S model, while the student platform is an APP. Through the use in the School of Information, Shanxi Agricultural University, the system is simple in operation and friendly in interface, which can effectively help teachers improve their work efficiency, and make teaching more collegiate and management more scientific.

Ni Jingyue (2019) studied the design and realization of the one-stop autonomous learning platform for Era Guanghua. To solve the shortcomings of the traditional distance education courseware in terms of security, compatibility, and other aspects, such as the single form of recess and the tedious production process. During the system development process, software engineering concepts, NET platform, and three-layer architecture design were adopted. Course management can manage course information on the platform, as well as information related to courses, such as discussion areas, handwriting information, etc. In the learning mall, students can purchase courses and teachers can sell courses; in statistical analysis, platform administrators can analyze the usage of the platform through reports.

College students' learning satisfaction refers to the overall perception of the education process of college students when they are receiving higher education, compared with their pre-set expectations. College students' learning satisfaction is one of the important indicators for measuring the organization and management of higher education, which has a significant impact on the quality of education received by students during their university studies. (Wen Jing, 2015) In distance education, students' learning attitudes and behaviors are closely related to their learning satisfaction. Since learning satisfaction can directly reflect the physical and mental experience of college students during online course learning, it can intuitively reflect their self-evaluation. Therefore, it is of great significance to study the satisfaction of current college students studying online courses in China to improve the teaching quality of online courses in China. In this study, we measured college students' overall perception of online learning, interaction experience, and whether online learning has helped them improve their professional learning and educational development, to study college students' satisfaction with online learning.

2.1 Current status of research on the relationship between interaction and online learning satisfaction

Interaction can serve as a prior organizer, allowing learners to connect new and old knowledge and generate new meanings or frameworks. (Juwah, 2006) The most famous interaction framework in online

learning was proposed by Moore, including three elements: learner-teacher interaction, learner-learner interaction, and learner-learning content interaction. (Moore, 1989a)

There are various forms of interaction between learners and teachers, such as teachers evaluating, encouraging, and instructing learners, learners' responses to teachers, and so on. The research by Yukselturk and Yildirim showed that in the process of online learning, learner-learner interaction is decreasing, while learner-instructor interaction remains constant throughout the entire learning process. (Yukselturk & Yildirim, 2008b) Further research suggested that learner-instructor interaction is the most important indicator for predicting online learning satisfaction. (Battalio, 2007) All of these findings indicate that learner-teacher interaction is the most important factor affecting learners' learning satisfaction.

Some studies have shown that learner-to-learner interactions have a greater impact on online learning satisfaction than learner-instructor interactions. (Jun g, Choi, Lim, & Leem, 2002) In the process of online learning, learners interact with other learners on a peer-to-peer basis through various communication channels, which can enhance their interest and emotions in learning the course, deepen their understanding of the content learned, and promote the construction of new knowledge systems. Therefore, if online learning can provide a platform for learner-learner interaction, the learners' satisfaction with the online course will increase. However, more interactions are not better. If online learning requires too much communication and cooperation between learners and learners, learners' satisfaction with online learning will decline.

Unlike the two types of interaction mentioned above, learner-content interaction refers to a one-way communication process that occurs between learners and carefully crafted materials that reflect the course theme or content. (Moore, 1989b) When learners reflect on the information, knowledge, or viewpoints gained in course learning and use them as experiences gained in course learning, the interaction between learners and the learning content occurs. In the instructional context of online learning, learners spend most of their time interacting with online learning content. For example, pre-course materials related to learning allow learners to establish a preliminary connection between old knowledge and new knowledge, achieving the goal of being a prior organizer; systematic online course content enables learners to master what they have learned; extension materials related to this learning content provide learners with the opportunity to expand the depth and breadth of their learning. Therefore, learners' experience with learning content will greatly affect their satisfaction with online learning.

## 2.2 Current Research on the Relationship between Internet Self-Efficacy and Online Learning Satisfaction

Previous studies have shown that internet self-efficacy can moderate learners' use and choice of the Internet and will modulate learners' perceived learning and learning satisfaction to a small extent. Research has found that internet self-efficacy has a certain impact on learning motivation, learning process, and learning outcomes. For example, Liang and Tasi pointed out that learners with high internet self-efficacy prefer online learning environments and are more willing to use the internet to solve problems, demonstrate the sources of various problems, and describe in detail what they had learned during learning

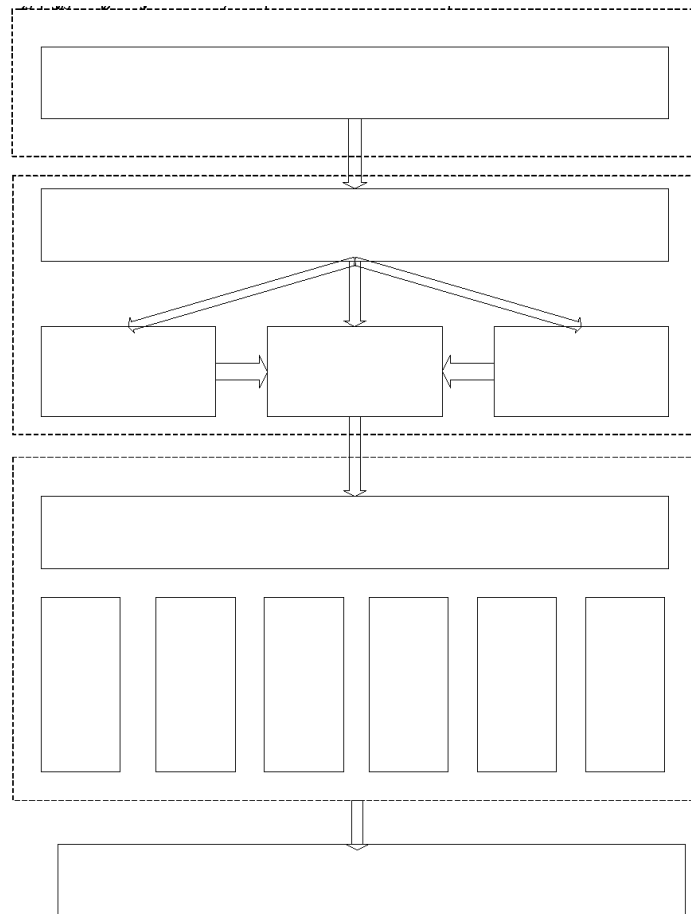
activities. (Liang & Tsai, 2008b) Meanwhile, in web-based learning, higher internet self-efficacy leads to more positive learning motivation. However, some scholars hold a skeptical attitude and believe that there is no decisive connection between Internet self-efficacy and satisfaction. For example, Rodriguez Robles tested a predictive model of adult online learning satisfaction and found that Internet self-efficacy was not the main predictor of learning satisfaction. (Rodriguez Robles, 2006)

Looking at previous studies, it can be seen that different scholars have different perspectives on the relationship between Internet self-efficacy and online learning satisfaction, and there is insufficient research on the importance of Internet self-efficacy for online learning in existing literature. Therefore, this study has decided to consider Internet self-efficacy as another important research factor beyond interaction.

### 2.3 Current Research Status on the Relationship between Self-Regulated Learning and Online Learning Satisfaction

Research in recent years has shown that self-regulated learning has a certain impact on online learning. Unlike previous classroom teaching, online learning places learners at the center of teaching and learning, and the learner has more self and at the same time takes more responsibility. Online learning has the characteristics of flexibility, immediacy, and learner-centeredness, requiring learners to use more self-regulation skills. The more self-regulation skills learners possess, the greater their chances of success in online learning. Therefore, this study suggests that self-regulated learning may affect online learning satisfaction. Puzifer Ro found that metacognitive self-regulation, time management, and learning environment were significantly associated with learners' learning satisfaction (Puzifer Ro, 2008). In a 2011 survey, Peterson found that a certain attribute of self-regulation can be used in the future to predict learners' willingness to actively learn online courses. Therefore, from these studies, more research is needed to investigate the relationship between self-regulated learning and online learning satisfaction. According to Puziferro's research, this study explores the extent to which self-regulated learning affects college students' satisfaction with online learning from four aspects: learning motivation, time management, metacognitive self-regulation, goal setting, and planning, based on the dimensions of self-regulated learning and the characteristics of online learning that is flexible time and autonomy.

## Research Methodology



**Figure 1:** Research framework

In this study, 10 students were firstly selected for interviews to collect students' problems and find out the problems of May Fourth Commune learning platform, and the data were analyzed for the problems to find out the solutions; Then the May Fourth Commune learning platform was redesigned and developed according to the program; After the development was completed, 100 students were randomly selected to conduct a questionnaire survey on platform usage satisfaction; Finally, the data was analyzed to see if the problems were solved.

This study starts with collecting course and student information, and then conducts statistical analysis on the collected data to summarize the influencing factors of students' online learning efficiency, gives a new course organizational structure and a new development design plan, and finally summarizes the impact mechanism of students' online learning efficiency. Finally, the overall architecture, modules, and outline design of the MAY FOURTH COMMUNE online learning platform were determined, and further detailed design was carried out to complete the coding implementation of each module. Afterward, the developed MAY FOURTH COMMUNE online learning platform was tested and debugged to find out the problems again, corrected, and launched into the production environment.

Through a questionnaire survey on the problems encountered by various users during the use of the learning platform, a survey was conducted and the results of the survey were statistically analyzed. We understood the major problems in the online learning platform and learning efficiency issues of the online learning platform. We have redesigned and developed the May Fourth Commune online learning platform, adding task treasure and competition functions.

This analysis was conducted by using of SPSS25 data analysis professional tools, while different individuals' basic information in the study may have some influence on the research conclusion. Therefore, if there is no significant difference between individuals' basic information, the control variables will have no significant influence on the establishment of the model. At this time, the credibility of the model is higher and the model is more reliable.

1) Before the improvement of the online learning platform, this paper was used to fill out the questionnaire by QR codes through Questionnaire Star's WeChat platform. To gain a more accurate understanding of students' attitudes toward online learning platforms, this survey determined the middle of the semester as the distribution time. A total of 100 questionnaires were distributed, and 100 questionnaires were collected with a recovery rate of 100%. There were no randomly filled-out questionnaires, no missing answers, and the questionnaire efficiency was 100%.

2) This study aims to provide reasonable suggestions for the organization of online learning resources for the upcoming online learning platform and currently operating online learning platforms that are already in operation by exploring the impact of the organization of online learning resources on the effectiveness of autonomous learning for college students. This questionnaire used the Likert scale, in which 1 means "strongly disagree" and 5 means "strongly agree". Considering the different requirements of students of different genders and grades for online learning resource organizations, this study selects freshmen, sophomores, juniors, and seniors as the respondents. This study conducted two surveys, and the questionnaire was distributed through the WeChat questionnaire mini-program before and after the platform was perfected.

3) This study used SPSS25 to analyze the collected questionnaire data. To compare whether the learning platform efficiency of the MAY FOURTH COMMUNE improved before and after the improvement, a descriptive analysis was first conducted on the questionnaire data. In this study, the scores of each dimension are calculated in the form of the total score, in which there are 5 items in the online learning efficiency scale, 9 items in the course setting dimension in the online learning platform satisfaction scale, 10 items in the platform operation dimension, 10 items in the learning behavior dimension, and 6 items in the teacher-student interaction dimension.

## Research Methodology

### 1. The results of the MAY FOURTH COMMUNE using problems

The student user group also believes that the online learning platform of the MAY FOURTH COMMUNE has abundant course resources, and the respondents have high selectivity in courses in the

same field, including public courses, professional courses, interest courses, and vocational training courses, which can meet different learning needs. In addition, the teaching modes provided by the MAY FOURTH COMMUNE are also quite diverse, including live webcasting courses in different fields and new tutoring functions. Therefore, this paper believes that recruiting more teachers to complete the production and development of more course resources can improve the learning efficiency of the MAY FOURTH COMMUNE online learning platform and solve current problems. In addition, through this survey, it was found that student user groups of online learning platforms, due to the lack of interaction in the learning process of online learning platforms, it is difficult to effectively supervise and evaluate the learning situation, resulting in difficulty in ensuring the quality of learning; the presentation of course content on the MAY FOURTH COMMUNE online learning platform is relatively single, mainly in the formats of text, images, videos, etc., lacking more high-quality and innovative methods, which is also a manifestation of the lack of practical links for students. Many online learning platforms lack practical links in their courses, which cannot provide students with practical opportunities to help them apply their theoretical knowledge to practical life. At the same time, online learning platforms are less efficient in communication between teachers and students, due to the single mode of communication, which is mainly in the form of dialog for text communication, so it is not possible to provide instant answers to all students. There is also the problem of lack of socialization design in the online learning platform of the MAY FOURTH COMMUNE. Since the online learning mode is usually individual, it is difficult to meet student-peer interaction, and student-student interactions and exchange, which affects students' learning experience and interest.

After investigation, the MAY FOURTH COMMUNE added two functions: Task Treasure and Learning Competition.

1.1 The Task Treasure platform is a task docking platform integrating task release, task undertaking, and knowledge service. The platform mainly serves college students. The platform is pioneering in building a Two-sided market between students and enterprises. Through online and offline resources and Big data precipitation, students and enterprises can be seamlessly connected.

A high-quality user experience platform requires reasonable and perfect layout settings, which can facilitate user operation and enhance the interaction between users and the system. The homepage module of the task treasure displays the webpage that users can click to jump to, mainly including user login, task hall, and personal center.

After logging in, users can undertake all tasks in the task hall. This system supports WeChat and QQ login; the task hall consists of three main categories, each of which includes several sub categories, namely e-commerce entrepreneurship tasks, WeChat promotion tasks, and self-media promotion tasks; the personal center includes task publishing, order management, and user center. Publishing tasks is that the user selects the corresponding portal according to the type of task to be published, and fills in the specific needs of the task to publish the task; the order management contains my undertaken tasks, my posted tasks, and my favorites. Order management is an effective extension of customer relationship management,

where tasks posted by users are displayed. Users can view the completion status of tasks and pay fees to task recipients based on the completion status.

2.2 The learning competition platform is a skill competition software designed to support the practical teaching of network marketing and e-commerce-related majors. The design of the competition platform is based on the core concept of "race to promote learning, race to promote teaching, race to promote reform, and race to promote construction", and fully integrates self-media, soft writing, marketing promotion, product design, and other teaching contents, which can effectively test the mastery of the students on the network marketing promotion of various skills, cultivate students' network marketing skills, and enhance their vocational quality ability, promote the communication and coordinated development between students' vocational abilities and enterprises' talent demand.

The competition platform is a skill competition software designed for practical teaching in online marketing and e-commerce-related majors. This competition platform is built by teachers themselves, and students can freely participate in the competition. Through the built-in network scoring mechanism, the scores and rankings of the participating works are achieved, thereby mobilizing students' initiative in practice and effectively improving teaching effectiveness.

The competition registration module is a convenient and efficient entry portal for individuals or teams to register; the competition management module includes adding competitions and maintaining competitions. Teachers can add competitions in the adding competitions module, such as competition titles, competition introductions, start and end times, etc. Competition maintenance allows teachers to modify competition details at any stage of the competition; the backend management function is a system that provides management functions for websites, used by administrators to manage and control competitions. It can provide management competitions, management reviews of registered works, work scoring, and so on. The backend management system allows administrators to manage websites more conveniently and quickly.

## **2. The results of efficiency evaluations**

### **2.1 Samples and sampling method.**

The sample of this research was students who studied in Zhengzhou Normal University, Henan Province, China. Convenience sampling method used for data collection with questionnaire survey on 100 students. The questionnaire of this article was filled out via QR codes through the Questionnaire Star WeChat platform.

### **2.2 The reliability of questionnaire**

Firstly, the reliability of the questionnaire is analyzed. During the questionnaire survey, it is necessary to conduct a reliability analysis on the data collection and analysis of this study, whether the questionnaire design is reasonable, and whether the data collection is reliable. A questionnaire with high reliability has high reliability and reasonable design. The results of this questionnaire reliability analysis are as follows:



**Table 1:** Cronbach's analysis of questionnaire reliability

Factors	Cronbach's alpha	Number of Items
Online learning efficiency	0.903	5
Curriculum	0.922	9
Platform operation	0.953	10
Learning behavior	0.936	10
Teacher-student interaction	0.871	6

Table 1 shown the Cronbach's alpha of each dimension in this survey is greater than 0.8, and the Cronbach's alpha of online learning efficiency, curriculum setting, platform operation, learning behavior, and other dimensions is greater than 0.9, which indicates that the questionnaire design of this survey is well-structured and has very high reliability.

Then, factor analysis is conducted on the survey results to test the validity of the questionnaire. The higher the validity of the questionnaire, the closer the content of the questionnaire is to what is being examined, and the more reasonable the questionnaire topics are designed. The results of this questionnaire analysis are shown as follows:

**Table 2:** Validation analysis for efficiency questionnaire

Statistics	Statistic list	Value
KMO value		0.907
Bartlett sphericity test	Approximate chi square	5414.433
	Freedom	780
	Significance	0.000

Table 2 shown the KMO value is between 0 and 1, and the closer to 1, the better the validity of the questionnaire. If the KMO value is greater than 0.9, the validity of the questionnaire is very good. The KMO value of the questionnaire in this study is 0.907, which is greater than 0.9, so the validity of the questionnaire in this study is excellent. At the same time, the P-value of Bartlett's spherical test is significantly less than 0.05, so the results of this survey are suitable for factor analysis.

If satisfaction with the use of the online learning platform has an impact on online learning efficiency, there is a correlation between satisfaction with the use of the online learning platform and the dimensions of online learning efficiency. Therefore, to analyze the influencing factors of online learning efficiency, it is necessary to first analyze the correlation between dimensions. If there is no significant correlation between satisfaction with the use of online learning platforms and online learning efficiency, satisfaction with the use of online learning platforms may not affect the efficiency of online learning. The results obtained in this study by use of SPSS25 are as follows:

**Table 3:** The factors correlation analysis

Factors	Online learning efficiency	Curriculum	Platform operation	Learning behavior	Teacher-student interaction
Online learning efficiency	1.000				
Curriculum	0.024	1.000			
Platform operation	0.394**	0.094	1.000		
Learning behavior	0.217**	0.088	0.261**	1.000	
Teacher-student interaction	0.054	0.029	0.098	-0.006	1.000

From the above table, it can be seen that the correlation coefficient between curriculum and online learning efficiency is 0.024, which is not a significant correlation. There is also no significant correlation between teacher-student interaction and online learning efficiency, curriculum, platform operation, and learning behavior. On the contrary, there is a significant correlation between platform operation and online learning efficiency, and there is also a significant correlation between learning behavior, platform operation, and online learning platforms. There is a significant correlation between online learning efficiency, platform operation, and learning behavior, and both platform operation and learning behavior have a significant impact on online learning efficiency.

### 2.3 The efficiency evaluation of before and after improvement

The actual learning effectiveness and evaluation mechanism of the system is not perfect enough, especially since the system design and development can provide an environment for student users to operate and process while utilizing teaching resources on the Internet to supplement their data deficiencies. In addition, learners also need to monitor and analyze their learning status. Students can understand the learning situation, and the system can help them improve their grades. Students can analyze problems that occur during learning and provide targeted supplementation. The online learning system should also provide the function of online tests to help students test the learning effect. The survey results are as follows:

**Table 4:** Comparison of scores for efficiency on 5 factors before and after improvement

Factors	Before improvement		After improvement	
	Mean value	Standard deviation	mean value	Standard deviation
Online learning efficiency	10.00	3.587	16.34	4.742
Curriculum	25.99	7.705	28.76	8.506
Platform operation	21.90	8.374	35.71	7.80
Learning behavior	25.14	8.889	32.50	9.085
Teacher-student interaction	17.88	5.518	19.61	4.813

From the table above, it can be seen that the total score of students' online learning efficiency scale was 10 before the improvement of the online learning platform of the MAY FOURTH COMMUNE, while the total score was 16.34 after the improvement, and there is a high increase in students' online learning efficiency. Therefore, the online learning platform of the MAY FOURTH COMMUNE has had a significant positive impact on students' online learning efficiency after the improvement. The curriculum dimension scored 25.99 before the improvement and 28.76 after the improvement. Students' satisfaction with the curriculum of the MAY FOURTH COMMUNE online learning platform showed a small increase after improvement; In addition, the platform operation dimension scored 21.9 before the improvement and 35.71 after the improvement. Therefore, after the improvement of the MAY FOURTH COMMUNE online learning platform, there is a very big increase in students' satisfaction with the platform's operation. This indicates that the stability and smoothness of the platform operation have been greatly optimized during the improvement process of the MAY FOURTH COMMUNE online learning platform. In addition, the score of students' learning behavior dimension before the improvement was 25.14, and the average score after the improvement was 32.5. Therefore, the MAY FOURTH COMMUNE also had a significant impact on students' learning enthusiasm after improvement. The average score of the teacher-student interaction dimension was 17.88 before refinement and 19.61 after refinement. Therefore, the optimization of the MAY FOURTH COMMUNE online learning platform had a relatively small impact on the teacher-student interaction dimension.

The following is an analysis of the variability of the dimensions of the online learning platform of the MAY FOURTH COMMUNE before and after the improvement. The results of the variability analysis obtained are as follows:

**Table 5:** Differentiation of score for efficiency on 5 factors before and after improvement

Factors	F	significanc e	T-test	P value	Mean difference
Online learning efficiency	10.005	0.002	-10.662	0.000	-6.34
Curriculum	1.18	0.279	-2.414	0.017	-2.77
Platform operation	0.856	0.356	-12.067	0.000	-13.81
Learning behavior	0.258	0.612	-5.791	0.000	-7.36
Teacher-student interaction	2.78	0.097	-2.363	0.019	-1.73

From the above table, it can be seen that the p-value of the variance homogeneity test for online learning efficiency is 0.002, which is significantly less than 0.05. However, under the condition of not meeting the variance homogeneity condition, the p-value of the t-test for online learning efficiency is significantly less than 0.05; In the satisfaction scale of online learning platforms, all dimensions meet the homogeneity

of variance, while the p-value of the t-test for platform operation, learning behavior, course setting, and teacher-student interaction is significantly less than 0.05. Therefore, the original hypothesis is rejected. There are significant differences between the four dimensions of platform operation and learning behavior, curriculum, and teacher-student interaction before and after the improvement of the online learning platform, that is, after the improvement of the online learning platform, the curriculum is more reasonable, course tutorial resources and exercises are more abundant, and course updates are more timely; After the improvement of the platform's operational dimensions, there has been a significant improvement, with fewer platform lag issues, smoother video playback speed, and more reasonable video duration settings on the platform. The dimension of learning behavior has also been significantly improved after the improvement, which indicates that after the improvement of the online learning platform, students' active learning ability in the learning platform has been improved, and students can actively consult curriculum teachers. The online learning platform also provides multiple channels for students to interact and exchange, thus improving students' learning ability and learning enthusiasm. After the improvement of the platform, there has also been a significant improvement in teacher-student interaction, indicating that the teaching ability of online teachers has improved, and the frequency of teacher-student interaction has increased. Online teachers can also communicate with students through more channels.

After the optimization of the online learning platform of the MAY FOURTH COMMUNE, students' learning efficiency has increased, the rationality of curriculum design is higher, students learning behavior enthusiasm is higher, and the interaction rate between teachers and students is higher. At the same time, the efficiency of students' online learning will be improved through the dimensions of platform operation and learning behavior after the improvement of the online learning platform. In addition, the smoother and more stable the platform runs, the higher students' enthusiasm for online learning will be. On the contrary, if the platform crashes and stutters too many times, it will seriously affect students' enthusiasm for online learning. Therefore, the optimization effect of this online learning platform is relatively excellent.

## Results/Research

This paper mainly studies the influence of course setting and teacher-student interaction of online learning platform on students' learning effect. Through literature reading, the task treasure and the competition platform are sorted out, and the concepts of each dimension of teacher-student interaction are defined and analyzed, thus establishing the research framework of this paper. The questionnaire was designed according to the model, the results of the questionnaire were tested, and then the correlation analysis between the dimensions of teacher-student interaction and students' learning effect was carried out to draw conclusions and give reasonable suggestions on teacher-student interaction to improve students' learning effect.

The problems encountered by users during the use of the learning platform were investigated through a questionnaire survey, and it was found that there are two key issues in the platform: curriculum design and teacher-student interaction. In response to these two issues, task treasure and competition

platform have been added. Through these two functions, students can enhance their learning effectiveness and interest, thereby clarifying their learning objectives and enhancing their initiative and enthusiasm in learning.

After optimizing the online learning platform of the May Fourth Commune, through a survey of students, it was found that the efficiency of students' online learning has been significantly improved. Therefore, the improvement of the May Fourth Commune online learning platform has a significant positive impact on students' online learning efficiency; The satisfaction of the curriculum setting dimension has shown a small increase after improvement; The operational dimensions of the platform have significantly improved after improvement, indicating that the online learning platform of the May Fourth Commune has greatly improved students' satisfaction with the platform's operation; The improvement of students' learning dimensions indicates a significant impact on their learning motivation.

Through specific testing of the functions of the personal center, front-end display, and back-end management modules in the entire system, it was found that the test results met the expected functional requirements. The system interface response speed is normal, and data transmission and acquisition are correct. Users can operate the system according to the user manual. The system runs stably, the overall functionality is correct, and the test results are completely consistent with the expected results, meeting the user's expectations for the system.

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## User experience of intelligent center of vocational education platform based on blended teaching: the perspective of higher vocational teachers

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### Abstract

The purposes of the research were to investigate teachers' demand for Intelligent Center of Vocational Education (ICVE) platform, to investigate the influence of platform function, platform interaction and interface on teachers' satisfaction, and compare satisfaction with the ICVE platform before and after modifying platform functions and interactions for teachers. Data were collected from interviews and questionnaires of 15 teachers in Guangxi Modern Polytechnic College by random sampling. Among them, 46% were male teachers, 53% were female teachers, 60% were young teachers and 40% were old teachers. Data analysis used thematic analysis method, descriptive statistics and independent t-tests. The research findings showed that most teachers did not satisfy with the function, interaction and beautiful interface of the platform before modifying the design. After improving the functional requirements, simplifying the interaction process and optimizing the interface design, teachers' satisfaction is obviously improved. The results of the comparison of 3 matters include Interaction experience of ICVE redesigned, satisfaction with the revision function, and the aesthetic level of use between before and after the system improvement. It was found that all 3 matters after the improvement were higher than before the improvement with a statistical significance of 0.05.

**Keywords:** UX, Blended teaching, ICVE platform, Vocational education

### Introduction

ICVE platform, short for the "Intelligent center of vocational education", is a vocational education digital teaching resource sharing platform and online teaching service platform built and operated by Higher Education Press. It serves as a professional education digital teaching resource sharing platform and online teaching service platform and a designated platform for the national "Vocational Education Professional Teaching Resource Library" project to be shared with the whole society which has been promoted and used in vocational colleges nationwide. Due to the short construction time of the ICVE platform, many of its functions are not yet complete, leading to certain problems in the use process, and generating poor user experience. Therefore, the user satisfaction is not ideal. Compared to other platforms of the same type, the rating for this platform is relatively low. In the Xiaomi App Store, it has been downloaded 1.61 million

times and only scores 1.5 from a total of 5. In this regard, the process of vocational college teachers using the ICVE platform teacher end for blending teaching is combined with the user experience of teachers in this paper to carry out the new version prototype design of the ICVE platform teacher end.

The quality of constructing blending vocational courses is a key issue of concern to the country. According to the relevant requirements of the "Notice on Accelerating the Key Tasks of Reforming the Construction of Modern Vocational Education System" by The State Council, The People's Republic of China (2023), online courses and offline courses should be coordinated to promote the construction and implementation of first-class core courses in vocational education in the local area. Taking professional core curriculum reform as the starting point, focusing on key areas of the industry, the curriculum content is designed to be in line with actual job requirements and fully incorporates new technologies, new processes, and new standards. The curriculum design follows the principle of teaching according to students' aptitude and fully integrates ideological and political education into the curriculum. The teaching implementation adheres to the student-centered concept and makes full use of digital technology. The evaluation of teaching pays full attention to students' comprehensive growth. According to the "Opinions on Promoting the High-Quality Development of Modern Vocational Education" issued by The State Council, The People's Republic of China (2021), vocational education should improve the comprehensive education mechanism of "job, course, competition, and certification", design and develop courses based on actual production and job demands, develop modular and systematic practical training curriculum systems, and enhance students' practical abilities. It is necessary to innovate teaching modes and methods, generally carry out project teaching, situational teaching and modular teaching, promote the in-depth integration of modern information technology and education and teaching, and improve the quality of classroom teaching. Combining teaching resources with teaching practices, using the ICVE platform as a link, and building a blending online and offline teaching model has become the main direction of vocational education informatization development, which is in line with the requirements proposed by the country for vocational education planning, as well as the transformation of teaching models and the needs of talent cultivation.

However, teachers have discovered in the process of using ICVE platform for blending course construction and teaching practice that the platform cannot fully meet the current needs of China's blending course construction and teaching practices, especially in the context of "job, course, competition, certification". It fails to integrate job requirements, competition training, and certification topics, thus making research on the user experience of the teacher community particularly important. Through research on the user experience of the teacher community, new ideas and directions can be provided for the revision of the ICVE platform's teacher end.

## Research Objectives

1. To investigate teachers' demand for ICVE platform.
2. To investigate the influence of platform function, platform interaction and beautiful interface on teachers' satisfaction with ICVE platform before and after the design revision.



3. To compare the satisfaction of the designed prototype manuscript before and after, and finally provide the new prototype design of ICVE platform for teachers.

## Review of Related Literatures

### 1. UX and Evaluation

The concept of User Experience (abbreviated as UE or UX) was first proposed by American cognitive psychologist and computer engineer Donald Norman, which refers to the subjective feelings and needs satisfaction that users experience when using a product, and it is a collection of all subjective feelings associated with interaction. Donald Norman first applied the concept of UCD (User-Centered Design) to computer-human interface design in his book "User Centered System Design: New Perspectives on Human-Computer Interaction" in 1986, thus initiating systematic research on "user-centered design". UCD is an attractive and efficient method of user experience. The main concept of UCD is user-centered design, which focuses on user experience as the central decision-making factor in the design process and emphasizes a user-first design approach rather than forcing users to adapt their habits to fit the developer's ideas (Norman, D. A., & Draper, S. W., 1986). Peter Morville mentioned the user experience honeycomb model in "User Experience Design", which includes 7 modules, namely Useful, Desirable, Usable, Findable, Accessible, Credible, Valuable (Morville, P., 2004).

Meili Hua and Hang Qiu discussed the concept and basic principles of prototypes and affirmed the value of prototypes in interaction design. As a research tool, prototypes have relatively low production costs, which encourages design teams to boldly explore new solutions and have a more positive attitude towards design errors. Using the prototype as the core of the design enables to discover more problems in the initial design stage. With the prototype as the core, the design team can integrate the prototype with research and evaluation, while executing these three design activities. Through prototyping, designers can review the feasibility of the product. On the other hand, by utilizing the results of research and evaluation, they can ensure that prototype development activities are on the right track, which in turn provides new ideas for prototype development (Hua, M., & Qiu, H., 2008).

S. Rajeshkumar, Ridha Omar, and Murni Mahmud (2013) conducted a review and summary of several UX and usability evaluation methods, with the analysis and observation results indicating the existence of both correlation and non-correlation between UX and usability. They also classified the evaluation methods for UX, allowing UX researchers and practitioners to easily determine the most suitable UX evaluation method for their research.

### 2. Blended teaching

Jingya Wang and Yuhui Qi discussed the main problems in the practice of blending teaching in higher vocational education, which are mainly reflected in the three aspects of "misplacement of centrality," "separation of experience," and "lack of effectiveness". They proposed that the integration of deep learning can effectively solve the problems in blending learning. Effective implementation of vocational blending learning can be based on the deep learning DELC path, constructing a blending learning path covering the

'preparation zone-resource zone-pre-test zone-construction zone-practice zone-interaction zone-evaluation zone-post-test zone', in order to stimulate the occurrence of deep learning in the learning process of students and improve the current implementation status of vocational blending learning which provides ideas for the overall design of blending learning (Wang, J., & Qi, Y., 2021).

Fangfang Lv discussed the problems of insufficient depth of industry-education cooperation, poor integration effect of course certification, difficulty in achieving long-term integration of competition and education, and lack of innovation in comprehensive education in the practice of "job, course, competition, certification" comprehensive education. She clearly defined the dual main responsibility of schools and enterprises, highly integrated the elements of production, education, and innovation, and incorporated "innovation" into the "job-course-competition-certification", which is an innovative exploration and practical attempt of the integrated education model. By constructing a "dual element triple transformation" curriculum system, a blending teaching model, and an value-added evaluation system, she promoted the establishment of a new model of integrating education and competition, and cultivated high-quality technical and skilled talents with innovation and entrepreneurship abilities (Lv, F., 2023).

Yaoxiang Zhong and Bifeng Zhou conducted research on the reform of blending teaching mode in the course of "Business Data Analysis", carried out blending teaching practice, designed blending teaching for the course, and concluded in practice that "increasing resources, increasing activities, increasing interest" can enhance skills, "using grading to promote learning, using competition to promote teaching, using evaluation to promote improvement, using group work to promote creativity" can promote improvement, and "excellent teaching materials, excellent teaching methods, excellent evaluation" can optimize the teaching process. These blending teaching implementation strategies can effectively promote further improvement in teaching quality. "Integrating teaching methods, teaching resources, student interests, student performance, student competitions, student innovation, teaching evaluation, textbooks, teaching methods, etc. into blending learning has provided new strategies for blending learning." (Zhong, Y., & Zhou, B., 2022)

Hong Guo, Siyi Li, Zhanwen Song, and Shuyan Lin integrated the PBL project-based teaching method into the blending online and offline teaching mode, exploring new ideas for hotel English teaching. They redesigned the curriculum from the aspects of teaching objectives, teaching content, teaching methods, teaching process, and teaching evaluation, aiming to enhance students' interest and habits in learning English, promote personalized and team learning abilities, and improve students' English application and comprehensive abilities which provides new possibilities for effective teaching in blending learning. (Guo, H., & Li, S., & Song, Z., & Lin, S., 2021)

Wanting Lai, Qihua Pang, and Song Zhang conducted a microbiology project-based discussion class in a blending learning environment, focusing on "selecting projects, developing plans, collaborative exploration, creating works, showcasing and exchanging, summarizing and evaluating". They attempted to quantitatively analyze and evaluate the teaching effectiveness of project-based discussion classes through methods such as questionnaires, interviews, and knowledge tests, figuring out that project-based discussion

classes can to some extent enhance students' interest in learning, internet literacy, and memory and application of knowledge and play a positive role in improving teaching effectiveness and students' overall quality. However, teaching teams still need to continuously optimize teaching design and provide differentiated guidance based on research data and student characteristics to better stimulate students' learning autonomy and further enhance the classroom effectiveness of blending learning. Project-based learning provides a method for the practice of blending learning, optimizing the effectiveness of blending learning. (Lai, W., & Pang, Q., & Zhang, S., 2022)

## Research Methodology

### 1. The Research Procedure Includes 5 steps which are:

- 1) Interview teachers' views on ICVE platform and teachers' needs for using ICVE platform, and sort out keywords
- 2) Sort out and analyze the text content obtained in step 1, and compare the text coding and coding reference points to get the most urgent demand points for teachers to change ICVE platform
- 3) Develop the prototype the ICVE platform.
- 4) Make a satisfaction survey on the function, interaction and beautiful interface before and after the design, and find out what can be improved
- 5) After perfecting the prototype design, compare the satisfaction before and after the revision again to determine whether the teachers are satisfied with the prototype design.

### 2. Research Instrument (s)

- 1) Interview question guideline
- 2) Questionnaire of Satisfaction

### 3. Target Group / Populations and Samples (Please choose one)

- 1) Population were teachers in Guangxi higher vocational colleges who use ICVE platform.
- 2) Samples were 15 teachers from Guangxi Modern Polytechnic college. Sampling method is random sampling.

**4. Statistics for Data Analysis** The statistics used for analyzing data were mean, percentage, standard deviation, t-test (Independent Sample), and Thematic analysis method.

## Results

### 1. The results of investigating teachers' demand for ICVE platform.

In this paper, the user experience and redesign of the ICVE platform are analyzed using interview and questionnaire survey methods, surveying 15 vocational college teachers who have used ICVE. In terms of the interview method, semi-structured interviews are applied. After organizing the interview content and text, NVivo12 software is used as a qualitative research analysis tool to draw corresponding conclusions based on the text analysis results. Considering the questionnaire survey method, two questionnaires are

used before and after comparison, and appropriate data analysis methods are selected for quantitative research.

**1.1 Interview Analysis - Thematic Analysis Method**

Before interviewing the 15 research subjects, the outline of the interview questions is first discussed with the interviewee. The interviewees are able to provide some opinions and suggestions on these questions to help the researchers further improve the interview questions. Finally, after revision and improvement, the final 19 questions are formed in the interview outline to explore the satisfaction and need for additional features of ICVE platform among 15 vocational teachers.

**1.2 Word cloud and tree structure diagram**

After the interview, the responses of the 15 interviewees are organized, summarizing and compiling the textual information, and importing the organized text data into NVivo12 software. The word frequency analysis is performed on the text content of the interview, filtering out invalid words, and deleting irrelevant points such as numbers and emotional words. Finally, a word cloud (Figure 1) and a tree structure diagram (Figure 2) are generated.

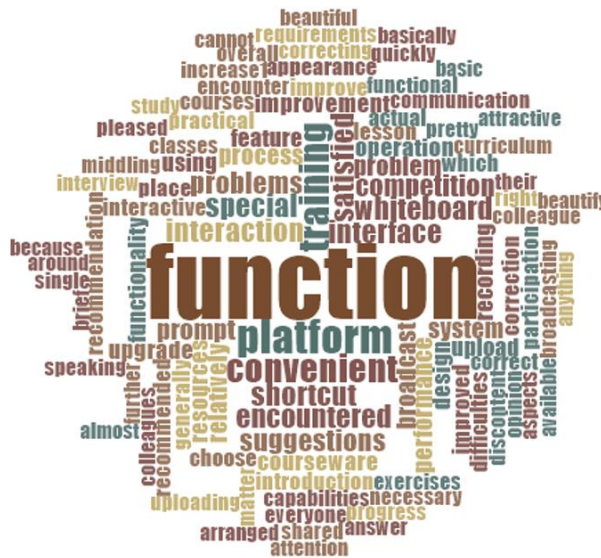


Figure 1: Word cloud of teachers' opinion

function	training	interface	encountered	competition	relatively	system	courseware	design	improvement	operation		
		convenient	satisfied	whiteboard	prompt	resources	using	correction	generally	improve	improved	interactive
			platform	interaction	special	suggestions	upgrade	introduction	recommendation	recommended	which	actual
	feature	lesson					correct	classes	discontent	encounter	everyone	exercises
	performance	functionality	participation	courses	colleagues	increase	pretty	right	shared	single	speaking	
problem	recording	difficulties	communication	interview	progress	study	almost	answer	anything	around		
process	upload	broadcasting	correcting	matter	quickly	their	aspects	basically	beautiful	beauty		
		practical	capabilities	curriculum	middle	requirements	uploading	attention	because	brief	classify	

Figure 2: Tree structure diagram of teacher interview word cloud

Through the analysis of word cloud and tree structure, it can be clearly seen that words such as "function", "interaction", "competition", "live streaming", "interface", "shortcut keys", "information", and "appearance" appear more frequently. The word frequency analysis shows that 15 vocational teachers have a greater demand for the improvement of ICVE platform functions. They are more concerned about the platform's interactive features. In the meantime, the word frequency analysis results reveal that the platform lacks competition information, shortcut key functions, and course live streaming functions, etc. In order to further explore the increasing demand for features from the 15 respondents, the interview texts are processed with structural coding and data analysis. The textual materials are repeatedly read and marked to identify important themes and patterns, and to discuss the additional functionalities that the platform needs to add.

### 1.3 Text encoding

In this paper, the textual content answered by 15 vocational teachers is encoded into five levels. Firstly, the original interview text is read and summarized word by word, marking, naming and classifying the information in the interview text, and forming the most basic conceptual elements. Through the coding of interview data from 15 vocational teachers, a total of 3 primary nodes, 5 secondary nodes, and 61 reference points are formed (Table 1).

**Table 1:** Text encoding

Primary node	Secondary node	Reference point	Reference point example
Overall evaluation	Advantages of the main features	16	Better grasp the classroom situation and students' progress.
	Issues in use	10	Sometimes the system may get stuck and the interaction is not easy enough.
	Satisfaction	6	I think the aesthetics of the user interface can be further improved.
The need for increased functionality	Features that need improvement	23	It is available to add job information and job training functions; add shortcut key prompt function; upgrade the whiteboard function; add competition information and competition training functions; and add 1+X certificate learning function.
Appearance design and user interface	Satisfaction	6	I think there is still room for improvement in terms of appearance design and user interface.

function					
playback function and	certificate lea...	function ...	whiteb...	recordi...	lesson pl...
not perfect functions	function to help	playba...	infor...	course ...	broa...
	training function and				
prompt function is		function will ...	white...	broa...	this ...
	function of other	playback fun...			
main functions	some functions to		key funct...	fu...	
		lesson recor...	function ...		

Figure 3: Comparison of platform function coding reference points

By comparing the above text encoding and encoding reference points, the text content answered by 15 vocational teachers (Figure 3) can be sorted out and analyzed. It can be found that: 15 teachers have a very low satisfaction with the functionality of the ICVE platform. For the missing functions of the platform, most teachers are more concerned about the job information function, job training function, whiteboard function, shortcut key prompt function, classroom live broadcast and playback function, competition information and training function, etc. This provides us with ideas and directions for improving the platform. Meanwhile, teachers are not satisfied with the platform's interchangeability and interface aesthetics, and have also raised some improvement requirements.

**2. The comparison results of teachers' satisfaction with the platform function, platform interaction and beautiful interface before and after the revised design were investigated.**

For the functional improvement before and after the revision, we use descriptive analysis to compare the satisfaction scores of 15 respondents before and after the revision, and the results are shown in Table 2. The results of the analysis before and after the functions in Table 2 show that for the seven functions of the platform, the average satisfaction scores before the revision are all below 3.000, and the average satisfaction scores after the revision are all above 4.300. By comparison, it can be seen that the average satisfaction scores of 15 teachers for the seven functions have been significantly improved after the revision, and the functions have been greatly improved.

**Table 2:** Function description analysis before and after revision

project	Mean (Before design)	Std. Deviation (Before design)	Mean (After design)	Std. Deviation (After design)
Live and playback of the course	2.667	1.291	4.467	0.516
The diversified method of job evaluation	2.867	0.915	4.600	0.507
Diversified customer service channels	2.333	1.113	4.533	0.516
Competition topic module	3.000	1.195	4.467	0.516
Post thematic module	2.733	1.163	4.333	0.488
"1+X" Certificate Thematic Module	2.400	1.352	4.533	0.516
Personalized settings	2.800	1.014	4.733	0.458

For the questionnaire survey before and after the revision of the platform, we focus on analyzing the platform's interactive experience and interface beauty. In this regard, we conducted relevant description statistical analysis, as shown in Table 3 and 4, from the average analysis of the following table below, analysis below analysis below It can be seen that the average value of the interaction process of the ICVE platform before the revision is above 3.2, and the average value of the interface of the ICVE platform before the revision is above 2.6. Experience is greater than the beauty of the interface. After the revision, the average degree of use of the interaction process of the ICVE platform is above 4.3. After the revision, the average value of the interface of the ICVE platform is above 4.0. It can be seen that the interactive experience and interface of the ICVE platform after the revision will be seen. Satisfaction scores of beauty have improved significantly.

**Table 3:** Descriptive analysis of interactive experience before and after revision

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The usability of the interaction process for creating a new course in the ICVE platform.	3.40	0.507	4.60	0.507
The usability of the interactive process of constructing course syllabus in the ICVE platform.	3.67	0.488	4.40	0.507
The usability of adding interactive flow of course chapter content in the ICVE platform.	3.27	0.458	4.47	0.516
The usability of the interaction process for uploading course resources in the ICVE platform.	3.60	0.507	4.53	0.516

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The usability of the interactive process of creating a new class and importing a student list in the ICVE platform.	3.53	0.516	4.73	0.458
The usability of the interactive process of creating a new class and importing a student list in the ICVE platform.	3.73	0.458	4.33	0.488
The usability of the interaction process for deleting or modifying student lists in the ICVE platform.	3.47	0.516	4.73	0.458
The usability of the interaction process for publishing notifications or announcements in the ICVE platform.	3.40	0.507	4.47	0.516
The usability of the interactive process for publishing attendance on the ICVE platform.	3.20	0.414	4.40	0.507
The usability of the interactive process for posting assignments in the ICVE platform.	3.67	0.488	4.40	0.507
The usability of the interactive process for publishing discussions in the ICVE platform.	3.53	0.516	4.87	0.352
The usability of the interaction process for publishing group tasks in the ICVE platform.	3.40	0.507	4.53	0.516
The usability of the interactive process of releasing a quick response in the ICVE platform.	3.53	0.516	4.47	0.516
The usability of the interactive process for publishing polls in the ICVE platform.	3.27	0.458	4.53	0.516
The usability of the interactive process for editing exam papers in the ICVE platform.	3.40	0.507	4.60	0.507
The usability of the interactive process for publishing exams in the ICVE platform.	3.53	0.516	4.53	0.516
The usability of the interactive process for viewing courses from other vocational colleges in the ICVE platform.	3.47	0.516	4.47	0.516
The usability of the interaction process for importing course content from other teachers in the ICVE platform.	3.27	0.458	4.33	0.488



Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The usability of the interactive process for starting course live streaming in the ICVE platform.	3.47	0.516	4.73	0.458
The usability of the interactive process for publishing professional-related competition information in the ICVE platform.	3.47	0.516	4.53	0.516
The usability of the interactive process of the course feedback mechanism in the ICVE platform.	3.60	0.507	4.67	0.488

**Table 4:** Descriptive analysis of interface aesthetics before and after revision

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The aesthetic level of the interface design for creating a new course (excluding course content, only adding course name and cover) in the ICVE platform.	3.000	0.845	4.400	0.507
The aesthetic level of interface design for constructing course syllabus in the ICVE platform.	2.933	0.884	4.867	0.352
The aesthetic level of the interface design for adding course chapter content in the ICVE platform.	3.067	0.799	4.800	0.414
The aesthetic level of the interface design for uploading course resources in the ICVE platform.	2.800	0.775	4.600	0.507
The aesthetic level of the interface design for creating a new class and importing a student roster in the ICVE platform.	3.000	0.926	4.533	0.516
The aesthetic level of the interface design for creating a new class and importing a student roster in the ICVE platform.	3.200	0.862	4.267	0.458
The aesthetic level of the interface design for deleting or modifying the student list in the ICVE platform.	3.000	0.756	4.533	0.516
The aesthetic level of the interface design for publishing notifications or announcements in the ICVE platform.	3.067	0.704	4.533	0.516

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The aesthetic level of the interface design for publishing attendance in the ICVE platform.	2.933	0.799	4.467	0.516
The aesthetic level of the interface design for publishing assignments in the ICVE platform.	3.533	0.640	4.533	0.516
The aesthetic level of the interface design for publishing discussions in the ICVE platform.	2.600	0.737	4.533	0.516
The aesthetic level of the interface design for publishing group tasks in the ICVE platform.	2.733	0.799	4.333	0.488
The aesthetic level of the interface design for releasing the answering feature in the ICVE platform.	3.000	0.926	4.333	0.488
The aesthetic level of the interface design for publishing polls in the ICVE platform.	2.867	0.834	4.667	0.488
The aesthetic level of the interface design for editing exam papers in the ICVE platform.	3.067	0.799	4.800	0.414
The aesthetic level of the interface design for publishing exams in the ICVE platform.	3.000	0.756	4.400	0.507
The aesthetic level of the interface design for viewing courses of other vocational colleges in the ICVE platform.	2.800	0.775	4.600	0.507
The aesthetic level of the interface design for importing other teachers' course content in the ICVE platform.	2.867	0.743	4.533	0.516
The aesthetic level of the interface design for opening course live streaming in the ICVE platform.	3.133	0.834	4.467	0.516
The aesthetic level of the interface design for publishing professional-related competition information in the ICVE platform.	2.867	0.834	4.400	0.507
The aesthetic level of the interface design of the course feedback mechanism in the ICVE platform.	3.000	0.845	4.533	0.516
Personalized setting of interface font size	3.267	1.335	4.533	0.516
Personalization of interface icon size	3.400	1.183	4.667	0.488

### 3. Comparison of satisfaction results before and after revision design

In order to investigate the satisfaction of teachers with the revised design, we designed a questionnaire to investigate the satisfaction with three issues: function, interaction and aesthetic interface. From the analysis of the average satisfaction before the revision in Table 5, we can see that the average satisfaction of higher vocational teachers with the function, interactive design and aesthetic interface design of ICVE platform before the revision is between 3.4 and 4.0. From the average analysis of satisfaction after the revision of Table 6, it can be seen that the average satisfaction of higher vocational teachers with the function, interaction design and interface design of ICVE platform after the revision is between 4.2 and 4.4, and it can be seen that the overall satisfaction of teachers with the function, interaction and interface design has been improved after the revision.

**Table 5:** Descriptive analysis of satisfaction before revision

Items	Min	Max	Mean	Std. Deviation
Does the ICVE platform before the revision meet your functional needs?	2.000	5.000	3.867	1.060
Does the overall function of the ICVE platform before the revision meet your expected effect?	2.000	5.000	4.000	0.926
Is the interaction of ICVE platform more convenient before revision?	2.000	5.000	3.400	0.910
How beautiful is the interface design of the ICVE platform before the revision?	2.000	5.000	3.800	1.207

**Table 6:** Descriptive analysis of satisfaction after revision

Items	Min	Max	Mean	Std. Deviation
Does the upgraded ICVE platform meet your functional requirements?	4.000	5.000	4.267	0.458
Does the overall functionality of the revamped ICVE platform meet your expectations?	3.000	5.000	4.400	0.737
Is the interaction of the upgraded ICVE platform more convenient?	3.000	5.000	4.400	0.632
How aesthetically pleasing is the interface design of the revamped ICVE platform?	3.000	5.000	4.267	0.704

In order to investigate whether there is a significant improvement in the satisfaction of the functionality, interaction, and interface aesthetics after the revision, we conducted a comparative analysis and obtained the following results:

**Table 7:** Comparison analysis before and after the revision

Items	Paired (M±SD)		Mean difference	t	p
	Mean and SD. Before	Mean and SD. After			
Interaction experience before the redesign	3.47±0.09	4.93±0.26	-1.46	-20.567	0.000
Satisfaction with the functionality before the revision	3.42±0.56	4.03±0.42	-0.61	-6.850	0.000
The aesthetic level before the revision	3.03±0.22	4.27±0.70	-1.24	-6.698	0.000

The table 7 reveals that there is a significant difference at the 0.01 level between the interaction experience before the revision and the interaction experience after the revision ( $p=0.000$ ). The average value of the interaction experience before the revision (3.47) is significantly lower than the average value of the interaction experience after the revision (4.93). The significance level between the satisfaction with the functionality before the revision and the satisfaction with the functionality after the revision is 0.01 ( $p=0.000$ ). The average satisfaction with the functionality before the revision (3.42) is significantly lower than the average satisfaction with the functionality after the revision (4.03). The level of aesthetics before the revision and after the revision showed a significant difference at a level of 0.01 ( $p=0.000$ ). The average aesthetic level before the revision (3.03) was significantly lower than the average aesthetic level after the revision (4.27). Therefore, it can be seen that the satisfaction of teachers has significantly improved after the revision.

## Discussion

In this study, the requirements and user experience of teachers is analyzed using the ICVE platform's teacher end. Based on the perception of teachers using this platform, there is a strong desire for improvements to the ICVE platform's teacher end. The limitation of this study is that it only investigated 15 teachers. Although it has a positive impact on the revision of the ICVE platform for teachers, there is a lack of investigation on student learning outcomes. Therefore, this study has certain limitations.

## Suggestions

For the research on the improvement of blended learning platform such as ICVE platform, we should be fully aware of the positive significance of teachers' groups for the improvement of blended learning platform. On the other hand, schools should attach importance to the cultivation of teachers' groups and the investment support for educational platforms, and the state and society should create a good online and offline blended learning environment and play a positive guiding role.

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## A conceptual framework of the instructional model enhancing cognitive skills based on Thai qualifications framework for higher education for undergraduate students of Rajabhat Universities

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### Abstract

The purposes of this research were (1) to study a conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552; and (2) to evaluate the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552. The research process was divided into following seven steps: Step 1 was a study of documents and research literature related to cognitive skills and the state of instructional management based on Thai Qualification Framework for Higher Education; Step 2 was the drafting of the conceptual framework and the creation of a questionnaire on the conceptual framework; Step 3 was the submission of the draft of the conceptual framework to the dissertation committee members for consideration and then revised it based on their recommendations; Step 4 was the submission of the questionnaire on the conceptual framework to the experts for verification of its structural correctness, content validity, appropriateness, and language clarity; Step 5 was the taking of the revised questionnaire on the conceptual framework to be tried out with 32 administrators and instructors of general education courses in Rajabhat Universities throughout the country to determine its Cronbach  $\alpha$ -Coefficient, which was found to be 0.824; Step 6 was the analysis of the tried-out data, revision and improvement of the questionnaire, and then tried out the revised questionnaire with the research samples of 114 administrators and general education course instructors in 10 Rajabhat Universities selected as the representatives of Rajabhat Universities in the Northern Region, Central Region, Northeastern Region, and Rattanakosin area; Step 7 was the conclusion of the evaluation results of the conceptual framework of instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552. Regarding the results of studying the conceptual framework of the instructional model, it was found that the theories and models of instruction that were used to develop the conceptual framework of the instructional model to develop the cognitive skills of the learners were the collaborative learning theory, constructivism theory, multiple intelligence theory, active learning management model, and problem-based learning model, with rating means of 4.94, 4.93, 4.87, 4.43, and 4.19, respectively. Also, the cognitive skill learning outcome standards comprised the analytical thinking aspects of the analysis of principles, analysis of the relationship,

and analysis of contents, with rating means of 4.73, 4.69, and 4.44, respectively; while the problem-solving thinking comprised the problem identification, problem analysis, presentation of problem-solving methods, and verification of problem-solving outcomes, with a rating means of 4.97, 4.80, 4.90, and 4.97, respectively. Furthermore, evaluation results of the conceptual framework of the instructional model revealed that the research samples had opinions at the highest level toward the developed conceptual framework of the instructional model, with a rating means of 4.53 and a standard deviation of 0.47, which indicated that the conceptual framework of the instructional model synthesized by the researcher could be applied for the development of the instructional model enhancing cognitive skills of the learners based on Thai Qualifications Framework for Higher Education, B.E. 2552 for undergraduate students.

**Keywords:** Conceptual framework of the instructional model, Cognitive skill, Thai Qualifications Framework, Rajabhat University

## Introduction

At present, the learning management to enhance and develop cognitive skills is very important since cognitive skills have a direct impact on learning with quality and living one's life happily as well as being a good citizen of the country. The instructional management, therefore, should enable the learners to know how to think, how to do, and how to solve problems. The Committee on Higher Education of the Ministry of Education has determined that the higher education programs at the 4-year bachelor's degree level must have at least 120 credit hours, and have the three components of general education courses, specialized education courses, and elective courses of exploratory and enrichment education with the emphasis on production of graduates who have all-round knowledge in both the theory and the practice that can be applied appropriately, have both the systematic analytical thinking and synthesized thinking abilities, to be diligent in searching for knowledge by oneself, and to be able to communicate well with the other people (Office of the Higher Education Commission, 2552).

However, from the study of documents and research studies related to instructional management in general education courses, it is found that the instructional managements in general education courses in almost every university have not achieved the objectives or intention of learning general education courses (Uthai Dulkasem, 2558). The instructors face problems in designing instructional activities in accordance with abstract learning outcome standards making it difficult to measure the concrete behaviors; while the learners have opinions that the cognitive skill learning outcome standards are difficult to achieve and measure (Linda Kenma and others, 2558). The students want the instructors to improve their instructional models to be more student-centered with an emphasis on active learning activities (Bureau of Academic and Registration Work Promotion, Surat Thani Rajabhat University, 2562). The researcher, therefore, is interested in synthesizing the conceptual framework of the instructional model to enhance cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552 for undergraduate students in bachelor's degree programs in Rajabhat Universities throughout the country in order to be applied for the development of appropriate the instructional model in the future.

## Research Objectives

1. To study the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552.

2. To evaluate the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552.

## Review of Related Literatures

Joyce and Weil (1996, pp.1) mention that a teaching model means the description of the learning environment including the teacher's behaviors in using that teaching model. The teaching model can be used in the operation starting from the teaching plan, curriculum, and the designing of teaching media as well as various multiple media programs.

Saylor, et al. (1981) mention that a teaching model means a model or plan of teaching that has a number of behaviors that are different for the goal or the specific point of emphasis.

Tissana Khaemmani (2566, pp. 222) mentions that an instructional model means the condition or characteristics of the instructional management that have been organized systematically based on the philosophy, theory, principles, concepts, or various believes with the organization of the process or steps of the instruction using various teaching methods and teaching techniques to enable that instructional condition to be in accordance with the adhered principles.

Office of the Higher Education Commission (2552) mentions that Thai Qualifications Framework for Higher Education (TQF: H. Ed) means the framework that shows at least five learning outcome standards as follows: (1) Knowledge (2) Cognitive skills (3) Interpersonal skills and responsibility (4) Numerical analysis and (5) Ethics and moral

Office of the Higher Education Commission (2552, p. 10) has determined the learning and the learning outcome standards based on Thai Qualifications Framework for Higher Education on the aspect of cognitive skills as follows: Cognitive skills mean the ability to analyze the situation and use one's knowledge and understanding of the concepts, principles, theories and processes in analytical thinking and problem-solving when one has to face new situations that have not been expected before.

## Research Methodology

### 1. The Research Procedure Includes 7 Steps which are as follows:

1.1 The study of documents and research studies related to cognitive skills, learning management, desirable characteristics, concepts and theories concerning learning management that enhances cognitive skills, practice guidelines, learning outcomes, evaluation of learning outcomes in the general education courses based on Thai Qualifications Frameworks for Higher Education, B.E. 2552, and the condition of current learning management, i.e. learning management to develop cognitive skills based on Thai Qualifications Frameworks for Higher Education.



1.2 The drafting of a preliminary conceptual framework and the creation of a questionnaire on the conceptual framework of the instructional model that enhances cognitive skills. The questionnaire consists of following four parts: Part 1 Background Information of the Respondent; Part 2 The Current Condition and Problems of Instructional Management Based on Thai Qualifications Frameworks for Higher Education, and Cognitive Skills; Part 3 The Components of Enhancement of the Analytical Thinking Aspect and Problem-solving Aspect of Cognitive Skills of Undergraduate Students of Bachelor's Degree Programs of Rajabhat Universities; and Part 4 Additional Opinions and Suggestions.

1.3 The submission of the draft of the questionnaire on the conceptual framework of instructional model that enhances cognitive skills to the dissertation committee members for verification of its structural correctness, content validity, appropriateness, and clarity of language in each item; and then revising it based on their recommendations.

1.4 The submission of the questionnaire to the three experts on curriculum and instruction or the persons who have experience in instructional management of the general education courses to verify its structural correctness, content validity, appropriateness and clarity of language in each item. Their considerations are shown in accordance with the Index of Item Objective Congruence (IOC). The items with the IOC of .50 or higher are considered to be appropriate and feasible; while those with the IOC of lower than .50 must be revised or improved.

1.5 The questionnaire that has been revised and improved is taken to be tried out with 32 administrators and instructors of general education courses in Rajabhat Universities throughout the country to determine its reliability in the form of Cronbach  $\alpha$ -Coefficient (Cronbach, 1951; cited in Luan Saiyos and Angkhana Saiyos, 2538: p. 200). The try-out result shows that the questionnaire has a rather high reliability of 0.824 from the maximum level of 1.00.

1.6 The analysis of the tried out data, revision and improvement of the questionnaire, and then the try-out of the revised questionnaire with the research samples

1.7 The conclusion of the evaluation results of the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552.

## **2. Research Instrument**

The employed research instrument was a questionnaire on the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Frameworks for Higher Education, B.E. 2552.

## **3. Populations and Samples**

3.1 The research population were 2,600 administrators and instructors of general education courses in 38 Rajabhat Universities throughout the country.

3.2 The research samples were 114 administrators and instructors of general education courses from 10 Rajabhat Universities that are representatives of Rajabhat Universities in the Northern Region, Northeastern Region, Southern Region, and Central Region areas, obtained by simple random sampling.

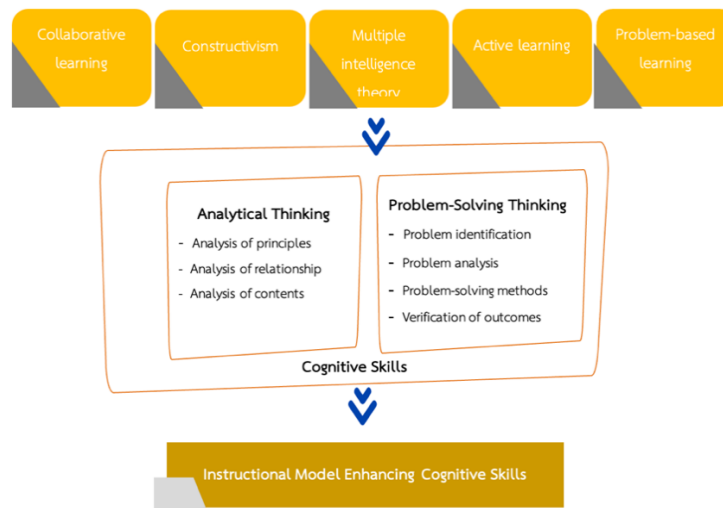
**4. Statistics for Data Analysis:** The statistics used for analyzing data were Cronbach  $\alpha$ -Coefficient, percentage, mean, and standard deviation. The obtained results will be compared with the assessment criteria of Thanin Siljaru (2017) as follows:

- The mean score of 4.50 – 5.00 refers to the highest appropriate
- The mean score of 3.50 – 3.49 refers to the high appropriate
- The mean score of 2.50 – 3.49 refers to the moderate appropriate
- The mean score of 1.50 – 2.49 refers to the little appropriate
- The mean score of 1.00 – 1.49 refers to the least appropriate

## Results/Research

### 1. The results of studying the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Frameworks for Higher Education, B.E. 2552

The results of studying and synthesizing the conceptual framework of the instructional model that enhances cognitive skills can lead to the conclusion that the basic theories and models that can be utilized as the conceptual framework in the development of the instructional model that enhances cognitive skills based on Thai Qualifications Frameworks for Higher Education, B.E. 2552 for undergraduate students of bachelor’s degree programs in Rajabhat Universities throughout the country comprise following five theories and models: (1) the collaborative learning theory; (2) the constructivism theory; (3) the multiple intelligence theory; (4) the active learning management; and (5) the problem-based learning model. All five learning theories and models are shown in Figure 1 below:



**Figure 1:** A conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education for undergraduate students of Rajabhat Universities

### 2. The evaluation results of the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Frameworks for Higher Education, B.E. 2552

The evaluation results are shown in Table 1 below:

**Table 1:** The evaluation results of the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education for undergraduate students of Rajabhat Universities

Details	( $\bar{x}$ )	(S.D.)	Level of opinions
1. Types of analytical thinking enhance the cognitive skills of undergraduate students			
1.1 Analysis of contents	4.44	.77	High
1.2 Analysis of relationship	4.69	.60	Highest
1.3 Analysis of principles	4.73	.52	Highest
2. Components of analytical thinking enhance the cognitive skills of undergraduate students			
2.1 Ability to interpret the meaning	4.89	.31	Highest
2.2 Knowledge and understanding of what to analyze	4.93	.26	Highest
2.3 Being keen to observe, suspect and ask questions	4.87	.43	Highest
2.4 Ability to find rational relationship	4.86	.35	Highest
3. Steps of problem-solving thinking enhance the cognitive skills of undergraduate students			
3.1 Problem identification	4.97	.16	Highest
3.2 Problem analysis	4.80	.40	Highest
3.3 Proposing problem-solving methods	4.90	.30	Highest
3.4 Verification of outcomes	4.97	.16	Highest
4. Concepts and theories that should be applied for development of the instructional models enhance the cognitive skills of the learners			
4.1 Multiple intelligence theory	4.87	.43	Highest
4.2 Constructivism theory	4.93	.26	Highest
4.3 Collaborative learning theory	4.94	.24	Highest
5. Learning management models that should be applied for development of the instructional models enhance the cognitive skills of the learners			
5.1 Active learning management	4.43	.72	High
5.2 Problem-based learning	4.19	.69	High
5.3 Research-based learning	2.31	.99	Little
5.4 Collaborative learning	4.14	.85	High
5.5 Inquiry process	4.12	.98	High
6. Instructional activities to enhance the cognitive skills of the learners			
6.1 Adhering to the principle that every learner is intelligent in all aspects and they can be developed if they have received good training	4.82	.38	Highest
6.2 The emphasis on allowing the learners to construct their own knowledge	2.46	.98	Little
6.3 The emphasis on allowing the learners to participate in learning and understand the meanings of what is learned	4.97	.16	Highest
6.4 Having the learners learn from the problems or real situations	4.91	.28	Highest
6.5 The activities should be designed so as to allow the learners to practice thinking, to participate in the practice, and to have freedom in learning	4.93	.26	Highest

7. Measurement and evaluation			
7.1 The measurement and evaluation must be consistent with the expected learning outcomes of the course	4.37	.60	High
7.2 There should be measurement and evaluation of both the individuals and the group	4.89	.31	Highest
7.3 There are diversified measurement and evaluation instruments that are appropriate for what to be measured	4.87	.34	Highest
7.4 Being able to give feedback information that enables the learners to know their own development level and indicating that the learners should develop on which knowledge and skills	4.25	.75	High
Total	4.53	0.47	Highest

From Table 1, it was found that the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552 gives importance to cognitive skills in the aspect of analytical thinking that consists of analysis of principles, analysis of relationship, and analysis of contents; while problem-solving thinking consists of problem identification, problem analysis, proposal of problem-solving methods, and verification of outcomes. The theories and learning models that can be applied are the collaborative learning theory, constructivism theory, multiple intelligence theory, active learning management model, and problem-based learning model for undergraduate students in bachelor's degree programs of Rajabhat Universities throughout the country, with the emphasis on enabling the learners to participate in learning, to understand the meanings of what is learned, and to learn from the problems or real situations through analytical thinking and problem solving, which are the matters close to themselves that the learners must learn with enthusiasm to search for the answers by themselves and to connect their previous experiences with the new knowledge resulting in meaningful learning. Also, there should be diversified measurement and evaluation instruments that are appropriate for what to be measured both for individual measurement and group measurement. These evaluation results indicate that the conceptual framework of the instructional model that has been synthesized by the researcher can be applied to the development of instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552 for undergraduate students in bachelor's degree programs.

## Discussion

From the study and evaluation of the conceptual framework of the instructional model enhancing for cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552, it was found that the theory that has been taken to be the framework for the development of the instructional model are the following theories: The multiple intelligence theory, which is based on the concept of Gardner believes that everybody has intelligence in all aspects each of which is not separated but integrated, and everybody can develop each aspect of he or she intelligence to be upgraded to the level of usefulness if he or she has been well trained (Gardner, 1983; cited in Tissanana Khaemmani, 2554, pp. 86-89). Another theory is the theory of constructivism. This is a learning theory that

is based on the belief that the learning process is a process that occurs internally within the learner. The learner is the constructor of knowledge from the relationships between what are perceived and he or she previous knowledge and understanding. The learner performs the roles in active learning. He or she is the processor of data and various experiences in order to create the meanings by himself or herself with the emphasis on the process of knowledge construction and the reflexive awareness of that process of the learner. The target of learning comes from authentic tasks (Tissana Khaemmani, 2554, pp. 90-96). The teacher has the roles of learning facilitator and helper of the learner in he or she learning, i.e. changing from provision of instruction to helping the learner construct he or she own knowledge (Devries,1992, pp.3-6). Meanwhile, there is the proactive learning management model, which puts emphasis on the learners having freedom in learning through being active participants (Charles C. Bonwell and Tracey E. Sutherland, 1996). They understand the meanings of what is learned, and connect their previous experiences with the new knowledge and the world of reality leading to the occurrence of meaningful learning via instructional activities that include the problem-solving process or various activities that motivate the learners to have fun, positive attitudes and the opportunity to exchange opinions among themselves (Tileston, 2007; cited in Watchara Laoriandee and others, 2560, pp. 67-68). Another learning model is the problem-based learning model, which puts emphasis on allowing the learners to learn from the problems or real situations leading to the development of quality of thinking and problem-solving (Barell, 2009; Dutch, 1995; Stepien and Gallagher, 1993; cited in Watchara Laoriandee and others, 2560, p. 127). Other models and concepts are the instructional model in the group of general education courses to develop the undergraduate students to achieve learning outcomes based on Thai Qualifications Framework for Higher Education, B.E. 2552 to develop cognitive skills of undergraduate students (Office of the Higher Education Commission, 2552); the concept of Joyce, Wells and Calhoun which mentions that the developer of the instructional model should use diverse development concepts without adhering to only one concept or theory; and the concept of Tissana Khaemmani (2566) which mentions that the development of the instructional model to achieve the highest efficiency must be done based on the philosophy, principles, concepts, and various theories concerning the objectives of those models.

## Suggestions

The purpose of this research is to study only the conceptual framework of the instructional model enhancing cognitive skills based on Thai Qualifications Framework for Higher Education, B.E. 2552 for undergraduate students in the component of general education courses of bachelor's degree programs at Rajabhat Universities throughout the country. It does not focus on the inclusion of the studies based on the standards of other aspects of learning outcomes such as the knowledge aspect, the virtues and ethics aspect, the aspect of interpersonal relationship and responsibility, and the aspects of numerical analysis, communications, and the use of technology. It also does not focus on learning outcomes based on Thai Qualifications Framework for Higher Education, B.E. 2565, that comprise four aspects, namely, knowledge, skills, ethics, and personal character. However, the results of this study can be applied to skills learning outcome standards.

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## Studying the importance of bamboo flutes in the primary school curriculum

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### Abstract

The purposes of the research were to study The Importance of bamboo flute in the Primary School Curriculum. The research findings from the interview and observations showed that The Importance of bamboo flute in the Primary School Curriculum, this is Learning to play the bamboo flute offers cognitive and academic benefits, including enhanced concentration, memory skills, cognitive abilities and logical thinking, Incorporating the bamboo flute into primary school curricula enhances students' appreciation for music and the arts by exposing them to a culturally significant form of expression, broadening their understanding of diverse musical traditions, fostering creativity and self-expression, and nurturing imagination and artistic expression.

**Keywords:** Bamboo flute, Primary School Curriculum, The Importance

### Introduction

This article is the incorporation of musical instruments into primary school curricula plays a vital role in enhancing students' educational experiences and fostering their overall development. One such instrument that holds great importance is the bamboo flute. The bamboo flute, with its rich cultural heritage and unique sound, offers numerous benefits to students, both cognitively and artistically. This introduction delves into the significance of integrating the bamboo flute into the primary school curriculum, exploring the cognitive and academic advantages it brings, its capacity to enhance students' appreciation for music and the arts, and examples of successful implementations from various regions. By recognizing the value of the bamboo flute in education, we can create an inclusive and enriching learning environment for young learners, nurturing their love for music, promoting cultural understanding, and unlocking their creative potential.

### Research Objectives

1. To study The Importance of bamboo flute in the Primary School Curriculum

## Review of Related Literatures

China has a long history and culture of 5,000 years, of which music culture occupies a very important position in the long history and culture. The development of national music has a long history, dating back to ancient times to the present, and the evolution of flute culture has undergone a long historical evolution. The vigorous development of folk music has led to the rapid development of Chinese national instrumental music, and the flute, as an important part of traditional Chinese national instrumental music, is also a musical instrument loved by people of all ethnic groups, and it is also one of the most representative musical instruments of traditional national musical instruments. The flute can be said to occupy a pivotal position in traditional Chinese musical instruments, and its unique timbre and strong expressiveness make the flute have an indispensable position in traditional Chinese musical instruments and always occupy the first place in the band. Our Chinese national music culture has a long history, as early as more than 8,000 years ago there was the earliest musical instrument "bone flute", in the Neolithic site of Henan Province, more than 20 bone flutes unearthed. The shape of these bone flutes is fine, standardized and unified. Each bone flute is about 20 centimeters long and has 7 holes in the body. In the process of studying the bone flute, the researchers used one of the most complete tests and found that this bone flute can blow out the seven-tone scale very accurately, and five of them can blow the pentatonic scale, which is the Neolithic heritage is the earliest historical relic found in China with musical culture, which has a history of more than 8,000 years. It is a precious cultural relic of the Neolithic period and a testimony to China's historical musical civilization (Yuan, B. & Mao, J, 2008).

Music education is an important part of primary school education and plays an important role in cultivating students' aesthetic ability, creativity and emotional expression. With the deepening of education reform, primary school music education policies are constantly updated and improved. This article will explore the current status, problems and improvement measures of current primary school music education policies. In recent years, my country's primary school music education policy has made significant progress. The Ministry of Education issued the "Opinions on Strengthening Art Education in Schools", which clearly proposed the goals, tasks and measures for strengthening art education in schools. In addition, various provinces and cities have also formulated corresponding primary school music education policies based on actual conditions. These policies have promoted the development of primary school music education to a certain extent, but there are still some problems.

Music education in primary schools is an important part of cultivating students' comprehensive quality, and the formulation and implementation of its policies are directly related to students' growth and development. At present, my country's primary school music education policy has achieved certain results, but there are still some problems that need to be solved. The government, education departments and all sectors of society should work together to strengthen policy implementation, improve policy pertinence, enhance policy sustainability, encourage social participation, strengthen the construction of teachers, and



promote primary school music education to be more scientific, standardized and sustainable. direction of development (Wiggins, R. A. & Wiggins, J.2008)

Ningbo Zhou (2021), Analysis on the Feasibility of Introducing the National Instrument Bamboo Flute into the Music Class of Primary and Secondary Schools, which found that the traditional music classroom has undergone changes and diversification since the introduction of the bamboo flute as an instrument. Students' excitement for learning has increased significantly as a result, and their music has improved as well. This has a significant impact on the advancement of national music and music education in elementary and secondary education. This article does a feasibility analysis of introducing the bamboo flute into elementary and secondary school music classrooms. It looks at the benefits of doing so, as well as potential issues, ideas for improvement, and the effect on students' social lives.

## Research Methodology

### 1. The Research Procedure Includes 6 Steps which are:

- 1.1 Collect and analyze literature
- 1.2 Concept definition and theoretical framework of research.
- 1.3 Create interview guideline for use in expert interviews.
- 1.4 Interview Teachers about the practical exercises approach for basic bamboo flute for primary school students majoring in music education in the People's Republic of China.
- 1.5 Data Collection and analyze
- 1.6 Conclusion

### 2. Research Instrument (s)

#### 2.1 Interviewing Forms

When conducting an interview with a bamboo flute teacher or researcher on "The practical exercises approach for basic bamboo flute for primary school students majoring in music education in the People's Republic of China," Researcher asking the important questions.

#### 2.2 Observation Forms

When observing a bamboo flute teacher implementing "The practical exercises approach for basic bamboo flute for primary school students majoring in music education in the People's Republic of China," some important topics to focus on include:

This step researcher will seek permission from the school, teacher, or relevant authorities before conducting any observations and adhere to ethical guidelines when collecting data for research purposes.

### 3. key informant for interview and Observation

3.1 Dai ya is a famous flute player, educator, professor and doctoral supervisor of the Central Conservatory of Music.

3.2 Li Chongbo, Director of the Activity Department of Changsha Children's Palace In 2008.

3.3 Wan Sulan, Yuhua Experimental Primary School, simple price personal information, Wan Shulan, Wan Shulan.

#### 4. Statistics for Data Analysis

The researchers divided the data analysis into four parts data collection, data organization, data summary analysis, and data interpretation. Data collection Literature Review Conduct a comprehensive review of existing literature and research studies related to bamboo flutes, music education, and teaching methods specifically for primary school students in China.

### Results

#### 1. The results of the interviewing

The researcher has analysis information according to the research process in Phase 1, data from the study and analysis results were as follow:

**The cognitive or academic benefits associated with learning to play the bamboo flute:** learning to play the bamboo flute has cognitive and academic benefits. Playing the flute requires reading sheet music, memorizing melodies, and coordinating finger movements, which enhances concentration, memory skills, and cognitive abilities. It also involves understanding musical notation, rhythm, and timing, which can improve mathematical and logical thinking. Moreover, learning an instrument like the bamboo flute has been linked to improved spatial-temporal skills, which are essential for tasks such as problem-solving and understanding complex concepts in subjects like math and science. These cognitive benefits can positively impact academic performance and overall cognitive development in students.

**Incorporating the bamboo flute into the primary school curriculum enhance students' appreciation for music and the arts:** Incorporating the bamboo flute into the primary school curriculum can greatly enhance students' appreciation for music and the arts. By introducing this traditional instrument, students are exposed to a unique and culturally significant form of musical expression. They learn about its history, cultural context, and the role it plays in different societies. This exposure broadens their understanding and appreciation for diverse musical traditions. Additionally, incorporating the bamboo flute provides an avenue for creativity and self-expression. Students can explore their own musical ideas, compose melodies, and collaborate with others to create ensemble performances. This process nurtures imagination, teamwork, and artistic expression.

**Provide examples of successful integration of the bamboo flute in primary school curricula from different regions or countries:** One successful example of integrating the bamboo flute into primary school curricula is found in Japan. The Shinobue, a type of bamboo flute, is commonly taught in Japanese schools as part of their music education programs. Students learn to play traditional melodies and participate in ensemble performances, showcasing their skills during school events and festivals. This integration allows students to develop a deep appreciation for Japanese musical traditions while promoting cultural preservation and fostering a sense of identity.

Another example comes from India, where the Bansuri, a bamboo flute, is widely taught and incorporated into primary school curricula. Indian classical music is deeply rooted in Indian culture, and

learning to play the Bansuri introduces students to its rich heritage. Schools often organize music competitions and performances where students demonstrate their mastery of the instrument, encouraging a lifelong passion for music and the arts.

In countries like Indonesia, gamelan ensembles, which include bamboo flutes called suling, are integrated into primary school curricula. Students not only learn to play the suling but also engage in collaborative ensemble performances with other traditional instruments. This integration fosters an appreciation for Indonesian music and culture while promoting teamwork, discipline, and cultural understanding among students.

These examples highlight how the integration of the bamboo flute in primary school curricula around the world serves to preserve cultural traditions, enhance musical education, and promote a deeper understanding and appreciation for diverse musical heritages.

**The primary schools ensure accessibility and inclusivity when introducing the bamboo flute to their students, considering individual differences and varying levels of musical background:** To ensure accessibility and inclusivity when introducing the bamboo flute in primary schools, several considerations can be taken into account. First, schools should provide a range of instruments suitable for different students, considering factors such as hand size and physical abilities. This allows every student to find an instrument that they can comfortably play and engage with.

Incorporating diverse teaching materials and musical repertoire is another crucial aspect of inclusivity. By exposing students to a wide range of musical styles, genres, and cultural traditions, teachers acknowledge and celebrate the diversity of their students' backgrounds and interests. This helps students connect with the music on a personal level and cultivates a sense of belonging.

Overall, ensuring accessibility and inclusivity when introducing the bamboo flute requires providing suitable instruments, differentiated instruction, fostering a supportive classroom culture, and embracing diverse musical experiences. By accommodating individual differences and creating an inclusive environment, primary schools can ensure that all students have the opportunity to engage and thrive in their musical education.

## 2. The results of Observation

The researcher conducted Observe bamboo flute in the primary school results were as follow:

**The inclusion of the bamboo flute important in the primary school curriculum:** The inclusion of the bamboo flute in the primary school curriculum is important as it preserves cultural heritage, enhances musical development, cultivates cognitive skills, fosters self-expression and creativity, promotes emotional well-being, develops social and collaborative abilities, and encourages multidisciplinary connections.

**The learning to play the bamboo flute benefit students' overall development:** Learning to play the bamboo flute benefits students' overall development in various ways. It enhances cognitive skills through reading sheet music and memorization, promotes emotional expression through music, improves fine motor skills and finger dexterity, develops breath control and lung capacity, instills discipline and perseverance, fosters cultural appreciation, and boosts confidence and self-esteem.

**The specific skills can students acquire through playing the bamboo flute:** Playing the bamboo flute helps students develop a range of specific skills. It enhances their musical abilities, including reading sheet music, understanding musical notation, and interpreting melodies. Students also acquire finger coordination and dexterity by manipulating the flute's keys to produce different notes. Additionally, they learn breath control techniques, improving their lung capacity and respiratory strength. Furthermore, playing the flute cultivates discipline, patience, and perseverance as students engage in regular practice to refine their skills. Overall, the bamboo flute provides an avenue for students to develop musical proficiency, fine motor skills, and discipline.

**The bamboo flute contributes to fostering creativity and self-expression among primary school students:** The bamboo flute serves as a powerful tool for fostering creativity and self-expression among primary school students. By playing the instrument, students can explore various musical techniques, tones, and melodies, encouraging them to think creatively and experiment with different musical ideas.



**Figure 1:** The bamboo flute classroom in the primary school

From picture 1, The flute's melodic tones allow students to express their emotions and feelings through music, providing an outlet for personal expression. As students gain proficiency, they can even compose their own melodies, further nurturing their creative abilities. The bamboo flute offers a platform for students to unleash their imagination, develop their unique musical style, and express themselves authentically, promoting creativity and self-expression in a dynamic and engaging way.

**The learning a traditional musical instrument like the bamboo flute help preserve cultural heritage:** Learning a traditional musical instrument like the bamboo flute plays a significant role in preserving cultural heritage. The bamboo flute is deeply rooted in various cultures and traditions, often associated with specific regions or communities. By learning to play this instrument, students not only acquire technical skills but also gain a deep understanding of the cultural significance and historical context behind it. They become custodians of the tradition, passing on the knowledge and practice to future generations. As students engage with the flute's repertoire and explore traditional melodies, they develop an appreciation for their cultural roots, fostering a sense of pride and connection to their heritage. Furthermore, performing traditional music on the bamboo flute allows cultural traditions to be shared and celebrated, promoting cultural diversity and preserving the richness of cultural heritage for generations to come.

## Discussion

The results showed that The Importance of bamboo flute in the Primary School Curriculum, this is Learning to play the bamboo flute offers cognitive and academic benefits, including enhanced concentration, memory skills, cognitive abilities and logical thinking, Incorporating the bamboo flute into primary school curricula enhances students' appreciation for music and the arts by exposing them to a culturally significant form of expression, broadening their understanding of diverse musical traditions, fostering creativity and self-expression, and nurturing imagination and artistic expression. This is consistent with Ningbo Zhou (2021) who studied about the Analysis on the Feasibility of Introducing the National Instrument Bamboo Flute into the Music Class of Primary and Secondary Schools, which found that the traditional music classroom has undergone changes and diversification since the introduction of the bamboo flute as an instrument. Students' excitement for learning has increased significantly as a result, and their music has improved as well. This has a significant impact on the advancement of national music and music education in elementary and secondary education. This article does a feasibility analysis of introducing the bamboo flute into elementary and secondary school music classrooms. It is can improve the memory skills, cognitive abilities and logical thinking and understanding of musical traditions culture.

## Suggestions

This study focuses on The Importance of bamboo flute in the Primary School Curriculum, the focuses on teaching bamboo flute in the Primary School in People's Republics of China, this research paper is a reference for those who want to study the use of ancient musical instruments in music subjects and can be used as a reference to understand the context of music teaching in China.

However, the scope of the research paper on the subject does not cover many issues such as problems and management in teaching. of bamboo flute in the Primary School Curriculum Teaching methods and techniques of bamboo flute in the Primary School Curriculum Therefore, researcher suggest that this is an interesting issue and should be studied further.

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## The Indonesian netizens' response to tiktok as english learning media

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### Abstract

This study examines the reactions and encounters of Indonesian internet users in employing TikTok as a medium to learn the English language. In recent times, TikTok has evolved as a popular social media network, distinguished by its concise video content. This study used a qualitative method with a netnography approach. The study's results show that there are two kinds of users. The first group of Internet users who agree with what the video content says. The fact that most of the comments on this type are people saying they want to learn on TikTok English learning content. Netizens who don't want to learn on TikTok are the second type. This is evident by netizen comments of this type, which generally comprise relaying personal information rather than discussing material..

**Keywords:** Netizen, TikTok, English, Learning Media

### Introduction

During the Covid-19 pandemic, the distance learning system in Indonesia was digital-based learning (digital learning), which is carried out via digital devices like as personal computers (PCs), laptops, or smartphones connected to an internet network. Learning activities can be carried out collaboratively with the installation of this distance learning system, using meeting groups and programs such as WhatsApp (WA), Telegram, Instagram, Zoom, and Google Meet as learning media. Both pupils and teachers required adaptations at the start of its deployment. This is because not all teachers have previously used Internet media for learning. Meanwhile, digital-based learning is becoming increasingly popular among students. Because it is simpler and can be done anywhere. This increases the importance of internet users from early 2021 to 2022. The Association of Indonesian Internet Service Providers (2022) said that the total number of individuals in Indonesia who had access to the Internet from 2021 to 2022 amounted to 210 million (Hasyim & Ali, 2022).

The accessibility of social media facilitates the potential for students to enhance their proficiency and discernment in utilizing these platforms. Social media is used not only for students in facilitating their learning but also for individuals across all age groups, ranging from the young to the elderly. This is due to the diverse array of image and video capabilities integrated inside social media platforms, rendering them engaging and resistant to user boredom. The advent of social media has revolutionized the landscape of

communication, displacing traditional forms of media like television and radio. Currently, there is an increased need for real-time audio-visual content on social media platforms. The proliferation of social media platforms has transcended its initial purpose as a mere tool for personal convenience. Gani (2020) asserts that social media plays a constructive role and offers advantages in advancing science and technology. For instance, it facilitates seamless communication, enables effortless information retrieval and access, fosters connection building, and facilitates the expansion of social networks. Learners find it more convenient to utilize social media platforms as opposed to books or other textual resources while seeking access to libraries and materials about the acquisition of foreign languages (Mukhtar & Latifa, 2019).

TikTok is one of the most widely used applications in the globe. Because of its appealing appearance and features, this short video application has captured the interest of many people, particularly young people. According to dataindonesia.id, TikTok has 1,4 billion monthly active users (MAU) worldwide as of the first quarter of 2022. This figure climbed by 15,34% over the previous quarter's total of 1,2 billion users. The United States (US) has the most active TikTok users by country. In April 2022, the population was estimated to be 136,4 million people. Indonesia comes in second position, with 99.1 million active TikTok users. In Indonesia, TikTok users spend an average of 23,1 hours per month using the app.

Using TikTok as a learning tool has a big effect on how well kids learn. A study by Ferstephanie Jenni and Pratiwi Theodesia Lady in 2021 called "The Effect of TikTok To Develop Students' Speaking Skill: A Classroom Action Research" found that the students' pre-test had an average value of 2.51 points. The student got a higher score on the test after using TikTok media, which was 4.65 points. This means that students are more likely to talk because TikTok gives them new ways to learn languages. There is strong evidence from this study that using TikTok can help students improve their speaking skills. The evidence is interactive, useful, and good. Because there are so many TikTok users, content creators and netizens connect a lot. People who are always on social media and can say what they want with the media they use are called netizens.

Everyone is indeed a netizen. Every account made by someone who likes to surf the web using media on the internet shows this (Ulfatun, 2021). Based on how many people follow and like TikTok (February 5, 2023), using the phrase #SamaSamaBelajar. The @eranitri account is the top educational content creator when it comes to material that helps people learn English. People like this account on TikTok the most. 17.4 million people have liked her videos on TikTok, and 1.1 million people follow her. The content made in the @eranitri account includes English Slang, English Common Mistakes, Grammar, Vocabulary, Basic English, Pronunciation, and more. Lots of information is presented interestingly, and it's told in a way that's both short and easy to understand. A "Lebih Prefer" content video was posted to the @eranitri account on January 2, 2021. The TikTok community has agreed that this video content is worth watching. 2.4 million people on TikTok have watched the video, and 362,900 have liked it, 44,500 have added it to their favorites, and 2,404 have shared it. While 1444 people said something about the video content.



Social media gives users the flexibility and chance to post comments based on their interests. There are several instances of internet users being free to post comments, many of which are foolish. This is the reason why academics are interested in finding out if users' interactions on TikTok when learning English are consistent with the content that the platform's developers have supplied.

## Methodology

This study employed a qualitative methodology with a netnography research strategy. Netnography, as defined by Kozinet (2019), is a qualitative research approach, the most recent form of ethnographic research, that investigates the unique behaviors of many sorts of communities and cultures that emerge in computer-mediated or online communication. Netizens and their activities and lives in the virtual world are the subject of netnography research. The researchers used netizen remarks from the @eranitri TikTok account in this investigation. This study makes use of both primary and secondary data. The basic data was gathered from netizens' reactions in the video comments "Lebih Prefer" by @eranitri TikTok account, which received 1444 comments. Secondary data was gathered from journals, theses, books, websites, and videos using the hashtag #SamaSamaBelajar, which can be utilized as a research data source.

Purposive sampling was utilized in this investigation to choose samples. According to the sampling criteria, the number of samples that are in compliance is 10 of 1444 comments from one of the videos by @eranitri with the highest engagement. The documents in this study take the form of videos. (Björk & Kauppinen-Räsänen, 2012) discuss how to make observations on netnography in Fadilah(2022) by categorizing observations into two types. First, determine whether the observation was direct or indirect. Second, researchers were present during the observations. Is the researcher merely an observer, or is he or she a participant in the actions of the person being studied? The researcher employed indirect observation in this study, with the researcher acting as the observer. The approach of qualitative descriptive analysis was utilized to analyze the data gathered. The data analysis technique employed consists of three stages: data reduction, data display, and data verification/conclusion.

## Finding(s) and Discussion

The @eranitri TikTok account has English learning content. Given the hashtag #SamaSamaBelajar, this account has the most likes and friends in the English learning group. However, the fact that TikTok is already linked to entertainment media makes it harder for netizens to be interested in learning on social media TikTok. This means that educational material isn't properly communicated, and many netizens don't understand what it means. Netizens, or people who use the internet, often react to things they see online in different ways. Based on what they are and why they were said, these answers can be put into different groups. Here are some common types of replies from netizens at the @eranitri Tiktok account, along with links to read more:



## Positive Feedback

Positive feedback is an important part of social media because it lets people know that their posts or ideas are appreciated and gives them confidence. It helps people feel like they are part of a group and can make your time online better. People who make content often find positive comments inspiring because it can push them to keep making content and interacting with their audience (Woerner et al., 2007). In @eranitri Tiktok account, it can be founded that netizens have most positive comments and reply from the video content.

[Data 1]

- @Chacaꣳ \* \*🌸☆☾+★° : "sering² fyp biar gua pinter 🤖👍" @Chacaꣳ ▪
- \*🌸☆☾+★° : "frequently past For Your Page (home page on Tiktok), so I can be clever"  
 (3040 likes 7 replies | 2021 - 02 - 20)
- Replies:
1. @dimassaha: "dpt ilmu dari tik tok// got knowledge from tiktok".
  2. @rbsyaldf\_ : "biar kalau mak blg hp mulu jd tinggal jwab noh Bahasa Inggris 😊//so, when mother say handphone as always, I just say that I still learning English".
  3. @BELLA: "tosss kita 🤖👍 // high five
  4. A: "iya woeee 🤖👍 // true guys"
  5. @call ma : "betul// right".
  6. @Yveva 🤖👩 : "Nitip mbakk biar pinter binggris scptnya gw// entrust sist, then I can mastered English as soon as possible".
  7. @bruhh: "nahh iyaa sklian blajar ye kan 🤖👍 // Well, we can learn at a time right".

The comment fits into the acceptance category as it was made by a netizen and got an emotional reaction. This type of netizen is willing to accept what is said. That is, the netizen got both the message and the picture that was shown in the content. Netizens then expect more of the same kind of content to show up on their screen, which will help them understand English material. This is backed up by the comments' answers. Seven replies say they agree with seeing more of the same kind of information on their homepage. However, the comments didn't show any words that explained how they understood what was said. This means that people who take part only accept the information that is given to them and don't understand what it means.

## Sharing Personal Stories

One way that people on the internet, who are often called "netizens," respond to online material or discussions is by sharing their own personal stories, experiences, or narratives (Vitak et al., 2011, pp. 107–144). This is called "netizen sharing personal stories."

Data [2] @24/7: "guru gw bhs ingris klo ngajar ngga ngasi perbandingan yg di pljri yg bnernya aja di KSI tau□//My English teacher never give the comparing when she/he teach, they only give the correct answer".

These comments can be categorized as sharing personal stories. The type of netizen in this type is to give a response by comparing with other things. In this case the engagement of netizens in learning English cannot be found because they tend to discuss personal experiences without discussing the material being presented.

### Fan Engagement

Fan engagement is when people talk to, work with, and feel connected to their favorite brands, celebrities, sports teams, or entertainment franchises. It means building and keeping a strong and positive relationship with the fan group, promoting a sense of community, and giving fans chances to be involved in things that are related to their interest (Jenkins, 2012). Fan involvement comes in many forms and is important for both fans and the causes they support.

[Data 3]

@Azizanr: "I prefer SUHO to SEOJIN, bener ga nih wkwk 😁".

@Azizanr: "I prefer SUHO (BTS member) to SEOJIN (BTS member), is it correct wkwk (laugh)".

227 likes 8 replies | 2021 - 01 - 03 Replies:

1. @lee 🌸: "emm aku suka dua duanya// well, I like both of them".
2. @user3394823204287: "yes i prefer Suho to Seojun!! 🎯 🎯 🎯 🎯 // yes, I prefer Suho (BTS member) to Seojun (BTS member)".
3. @Azizanr: "tp aku suka seojun jg kok 😁 // but I also like seojun (BTS member) tho".
4. @Pyoo👉: "me too ya knaww 🤔 // me too you know".
5. @Dew 😊: "Y'all why don't choose both 🤔 Seojun Suho sama sama oke.// You all why don't choose both 🤔 Seojun Suho are same, they are cool".
6. @y: "APENIII TIM SOEJUN SMKIN DIDEPAN BAI// what is this Soejun (Member BTS) team are getting ahead guys".
7. @recommend: "i prefer seojun to suho #timseojungariskeras 😁 // I prefer Seojun (member BTS) to Suho (member BTS) #seojungteamaddicted".
8. @piscokmeler 🌸 🌸: "both".

The comment can be put into the understanding category as a netizen with fan engagement. In this case, the type of netizen can understand what is being shown on the contnet video. In these comments, netizens are supposed to give examples of sentences that go with what is shown in the conten video. In the next sentence, "is it correct lmao" shows that the author of the commentary isn't sure about it. But if you look at the comments, you will see that people have replied. There were up to 8 replies from people

on the internet who linked these words to other things, like members of the South Korean boy band BTS. To put it another way, most TikTok users are just having fun and not trying to learn English, and there is no level of understanding that matches this.

## Conclusion(s)

In conclusion, netizens' comments and answers are not limited to the main content or topic at hand in the present day. Because online relationships are always changing, people can respond in a wide range of ways that are just as unique as the online community itself. Netizens are active in the digital world and often use the platform's versatility to share a wide range of feelings, thoughts, and views.

These responses can be anything from sharing personal stories and anecdotes to having discussions and debating, from sharing personal thoughts and feelings to sharing facts and experiences that aren't always connected to the main topic. The internet gives people a place to share their creativity, humour, empathy, support, and even constructive feedback. This makes online conversations more interesting and builds community.

This range of answers shows how online interactions are changing and becoming more complex. The fact that netizens are not just passive viewers of content is emphasised. They are also active participants in the ongoing conversation in the digital world. This variety of responses comes from the internet's natural ability to connect people from all walks of life and situations. This, in turn, makes the online world deeper and more complicated. The internet stays a lively and always-changing way for people around the world to talk to each other because of this constant flow of thoughts and ideas.

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## Populism sentiments in Indonesian higher education curriculum

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### Abstract

This article investigates the populism sentiments in the curriculum of Independent Campus (Kampus Merdeka) using a critical curriculum theory and discourse analysis approach. The research aims to reveal and analyse populist sentiments within this curriculum. The research findings indicate the presence of populist sentiments within the curriculum; they are: regarding lecturer and student as victim as 'ordinary people' facing bureaucrats as elites and university as mean of economic and technological development while limiting academic freedom by using Law of Electronic Information and Transactions (UU ITE). The implications of this research provide recommendations for more sustainable educational policies that accommodate macro educational policy and guaranty of academic freedom of campus.

**Keywords:** Populism sentiment, Independent Campus Curriculum, Critical curriculum theory, Discourse analysis

### Introduction

Research on the relationship between authoritarian populism and education in Indonesia remains relatively rare. While there have been numerous studies exploring the connection between populism and education, secondary or higher education, in other countries such as the Philippines, India, Singapore (Rizvi, 2021), Israel (Pinson, 2022), Turkey (Doğan & Selenica, 2022), Brazil (Azevedo & Robertson, 2022), Australia (Watson & Barnes, 2022), Norway (Lauglo, 1995), England (Robertson & Nestore, 2022) and the United States (Apple, 2003; Hidalgo-Tenorio & Benítez-Castro, 2022), research specifically focused on populism and its influence on the Indonesian education system is noticeably scarce. This disparity in research attention underscores the uniqueness and importance of addressing this topic within the Indonesian context.

The extensive body of research from other regions has highlighted the far-reaching implications of populist ideologies on educational policies, practices, and outcomes. These studies have often examined how populist sentiments, characterized by their appeal to the general populace, can impact curriculum design, pedagogical approaches, and the broader educational landscape (Nestore & Robertson, 2021). They have also delved into the socio-political dynamics that shape the relationship between populism and education.

In the Indonesian context, where populism and politics intersect in distinctive ways under Jokowi's second term characterized by democratic decline (Diprose et al., 2019; Fealy, 2020; Hadiz, 2017; Mietzner, 2020a), authoritarianism (Power, 2018), new developmentalism (Warburton, 2016, 2018), and social cleavages marked by hyper-nationalism and Islamism (Hadiz & Robison, 2017; Mietzner, 2020b), a comprehensive examination of the interplay between populism and education is not only timely but essential. Understanding how populist sentiments manifest within the "Merdeka Belajar" curriculum and how they reverberate throughout the educational system is crucial for informed policymaking and ensuring the quality of education within the Indonesian socio-political landscape. This research seeks to contribute to addressing this critical gap in the scholarship on populism and education in Indonesia.

The emergence of populism within the Independent Campus Curriculum has raised critical questions and concerns within the specific socio-political context of Jokowi's second term. Populism, characterized by an appeal to the needs and desires of the common people, often oversimplifies complex issues and may prioritize emotive rhetoric over evidence-based educational practices (Anselmi, 2017; Walgrave, 2015b). Understanding how and to what extent populism is embedded in educational curricula is crucial because it may have far-reaching implications for the quality of education, the formation of citizens, and the future of a nation, especially within the nuanced environment of Jokowi's second term.

This study seeks to shed light on the phenomenon of populism sentiment within the Independent Learning Curriculum in Indonesia, which was launched during Jokowi's second term characterized by democratic decline, new developmentalism, populist authoritarianism, and social cleavages dominated by hyper-nationalism and Islamism. The main objective is to uncover and critically analyse the populist sentiment present in the curriculum within this particular political and social milieu.

The significance of this research is manifold. Firstly, it contributes to a deeper understanding of the relationship between populism and education within the context of Jokowi's second term. Second, it provides insights into the potential consequences of populist influences on the curriculum and educational policies, taking into account the interplay of new developmentalism, populism, and social cleavages. Third, the findings of this study hold the potential to inform policymakers and stakeholders in education, enabling them to make informed decisions about curriculum development and the broader implications for the quality of education within this multifaceted political landscape. Finally, this research can serve as a basis for future investigations into populism's influence on education in other regions and countries with similar complex political environments.

## Literature Review

### Populism Sentiment

Populism sentiment, characterized by an appeal to the general populace, has been examined in a variety of global contexts, with its impact on education and society well-documented. It often manifests as a simplified, emotionally driven rhetoric, challenging established institutions and expertise in favour of popular opinion. Researchers in the Philippines, India, Singapore, Israel, Argentina, and the United States

have explored how populism influences education, focusing on its effects on curriculum design, pedagogy, and the development of critical thinking skills. This study extends this investigation into the Indonesian context, considering the unique characteristics of Indonesian populism and how it relates to the Independent Learning Curriculum.

There are some characteristics of populism according to experts. Fukuyama (2017) characterizes populism as: 1) Focus on socio-economic issues, 2) Utilization of anti-elite sentiments, and 3) Use of simplistic political rhetoric that relies more on emotion than logic. While Anselmi (2017) characterizes populism as: 1) Emphasis on the concept of the people versus the elite, 2) Promotion of strong and charismatic leaders, 3) Portrayal of society in crisis, and 4) Adoption of a simple and essentialist approach to complex issues.

Muller (2017) characterizes populism as: 1) Claims about the value of "ordinary people, 2) Criticism of political elites, 3) Offering simple and easily understood solutions to complex problems, and 4) Additionally, populism often highlights an authoritarian leadership style and anti-pluralism.

Canovan in Walgrave (2015a) summarizes populism sentiments into three core elements of populism, namely 1) Hostility towards elites, 2) Belief in the wisdom of the people, and 3) Emphasis on the unity of the people. Additional elements often associated with populism include anti-elite rhetoric, claims to represent ordinary people, the use of easily understandable language, and a dislike of established political culture.

From the definition and elements of populism above, we can characterize populism sentiment is characterized by a focus on socio-economic issues, anti-elite sentiments, and the use of emotionally charged and simplified political rhetoric. It emphasizes the concept of the "people" versus the elite, promotes strong and charismatic leaders, portrays society as being in crisis, and offers straightforward and essentialist solutions to complex problems. Populism also often claims to champion the value of "ordinary people," criticizes political elites, and adopts an authoritarian leadership style, alongside an anti-pluralist stance. Core elements of populism include hostility towards elites, a belief in the wisdom of the people, and an emphasis on the unity of the people. Additional elements associated with populism include anti-elite rhetoric, claims to represent ordinary citizens, the use of easily understandable language, and a rejection of established political norms and practices.

### **Characterization of Indonesian Populism**

#### **1) Decline of Democracy**

One key characteristic of Indonesian populism is the erosion of democratic norms. In a context marked by the consolidation of power and a narrowing of political discourse, populism often thrives by marginalizing opposition voices and curtailing democratic institutions. This decline in democratic values can have profound implications for the formulation of educational policies and the degree of participatory decision-making within the education system.

- a. Restrictions on Freedom of Speech: Increased limitations on freedom of expression, including restrictions on media and online platforms, and the stifling of dissenting voices in public discourse.

- b. **Weakened Checks and Balances:** A decrease in the effectiveness and independence of democratic institutions, such as the judiciary and legislature, leading to a concentration of power in the executive branch.

**Undermining Civil Society:** Efforts to curtail the influence and activism of civil society organizations and non-governmental entities, reducing their capacity to hold government accountable.

## 2) New Developmentalism

Jokowi's second term in office has seen the emergence of what scholars have termed "new developmentalism and tend to imitate Indonesian New Order regime (Warburton, 2016, 2018)." This approach emphasizes economic growth, infrastructure development, and national self-reliance. Within this paradigm, education is often positioned as a tool for economic progress, raising questions about the curriculum's role in promoting workforce development and economic nationalism. This developmentalist agenda is interwoven with populism's rhetoric, impacting educational policy decisions.

- a. **Emphasis on Economic Growth:** A prioritization of economic development and infrastructure projects in educational policy, often with a focus on preparing students for specific workforce needs.
- b. **Nationalism in Curriculum:** Promotion of nationalistic and self-reliance narratives within the curriculum, which can manifest in the selection of content and pedagogical approaches that emphasize national identity and economic self-sufficiency.

## 3) Sharp Religious-Based Divisions (Pluralist vs. Islamist)

Populism in Indonesia also takes on a distinct character due to its association with sharp religious-based divisions, specifically the divide between pluralist and Islamist ideologies. These divisions can influence educational policies, with implications for issues such as religious instruction, cultural identity, and social cohesion within the curriculum. The tensions between pluralism and Islamism can affect the curriculum's content, pedagogy, and its ability to foster inclusivity and social cohesion in a diverse society.

- a. **Religious Content in Curriculum:** Inclusion of religious content within the curriculum that reflects the dominant religious or cultural perspective, potentially marginalizing minority or alternative views.
- b. **Cultural Identity and Social Cohesion:** Policies and practices that may contribute to cultural and religious divisions within the education system, impacting social cohesion and inclusivity.

## Research Methodology

### Research Design

This study employs a qualitative research design to delve into the complex interplay between populism and the Independent Campus Curriculum (Kampus Merdeka) within the Indonesian context. Qualitative research allows for an in-depth exploration of the nuances and contextual factors that influence the relationship between populism and education. It provides a rich and holistic understanding of the



subject matter, enabling us to uncover the underlying dynamics of how populism sentiment manifests in the curriculum and its impact on educational policies.

### **Data Collection**

Data collection for this research is Document Analysis by conducting a comprehensive analysis of relevant documents, including official government documents outlining the Independent Learning Curriculum, policy statements, speeches by political leaders, and educational literature. Document analysis enables the identification of explicit and implicit expressions of populist sentiment in educational policies and content.

### **Data Analysis**

Data analysis in this study is driven by a critical discourse analysis approach. This methodology enables researchers to examine how language, rhetoric, and narratives shape and are shaped by the populism sentiment in the curriculum. The analysis aims to identify the discursive strategies used to convey populist ideologies within educational documents, speeches, and policies. Furthermore, it investigates how these discourses may impact educational practices, content, and policies.

The analysis process involves the identification of themes, patterns, and recurring motifs related to populism sentiment. Researchers critically assess the implications of these themes on education, considering the unique socio-political characteristics of Jokowi's second term, including the decline of democracy, new developmentalism, and religious-based divisions.

## **Discussion**

### **Kampus Merdeka Curriculum**

Kampus Merdeka, or "Independent Campus," is an educational initiative introduced by the Indonesian government to bring about transformative changes in the country's higher education landscape. It signifies a shift towards more student-centered learning and a greater emphasis on fostering independence, creativity, and critical thinking among students. The Independent Campus initiative aims to empower students with the skills and knowledge necessary to thrive in a rapidly evolving global environment.

Kampus Merdeka was officially launched in Indonesia in September 2019 as part of the government's commitment to revamp the higher education system. The initiative gained momentum in response to the changing demands of the job market and the need to align higher education with industry needs. The program seeks to create a dynamic learning environment that equips students with relevant skills and knowledge.

The primary goal of Kampus Merdeka is to enable students to become self-reliant, innovative, and adaptable individuals who are prepared for the challenges of the modern world. It strives to break away from traditional, rigid education models by promoting a curriculum that encourages students to take more control of their learning. By doing so, Kampus Merdeka aims to produce graduates who are not just academically accomplished but are also capable of critical thinking, problem-solving, and entrepreneurship.

In addition to the core components of Kampus Merdeka, there are four main curriculum programs introduced to further enhance the transformation of higher education in Indonesia:

1. Opening of New Study Programs

One of the primary initiatives under Kampus Merdeka is the facilitation of new study program openings. This step is driven by the recognition that many existing programs do not align with the needs of industries, often featuring theoretical and non-competitive curricula on a global scale. To address this, the government encourages the establishment of new programs, especially those in collaboration with world-class corporations, international non-profit organizations, state-owned and regional-owned enterprises, as well as universities ranked in the top 100 according to QS Ranking. This collaborative approach is considered essential, and it may allow programs to operate without the necessity of an "A" accreditation status.

2. Simplification of Accreditation

Accreditation has historically been an administrative burden for Higher Education Institutions (IPT) and Study Programs (APS), hindering the academic activities of educators who must balance teaching, research, and community engagement. The accreditation process, with its lengthy and complex requirements, can sometimes be counterproductive, as it obliges institutions or programs already accredited internationally to undergo national accreditation. To alleviate this burden, the government is simplifying the accreditation process by transitioning from a mandatory requirement to a voluntary one. Higher education institutions or study programs are now able to apply for accreditation based on their specific needs rather than obligatory compliance.

Furthermore, accreditation is no longer solely managed by the government but involves the active participation of the community and scholarly associations, both nationally and internationally. This approach has led to the establishment of Independent Accreditation Agencies (LAM), which can conduct accreditations independently from the National Accreditation Agency (BAN PT).

3. Simplification of the Establishment of State-Owned Legal Entity Higher Education Institutions (PTN BH)

The government aims to simplify the process of establishing State-Owned Legal Entity Higher Education Institutions (PTN BH). These institutions have a greater degree of autonomy in their administration and are not as reliant on the government as other state-owned institutions or public service units. The simplification is achieved through relaxed requirements, assistance, and the preservation of government subsidies, with no reduction in financial support.

4. Students' Right to Study for Three Semesters Off-Campus

A unique feature of Kampus Merdeka is the students' right to study for three semesters off-campus, while the higher education institutions are obligated to fulfil this right except in cases of health. This right to study off-campus serves multiple purposes. It aims to create a more relevant learning experience on campuses and aligns with industry demands, establishing a meaningful link and match between higher education and industry needs. Moreover, it offers students direct exposure to the professional world, enhances

multidisciplinary skills, and reinforces the idea that the responsibility for education is shared among higher education institutions, society, industry, and various other entities within the community.

### **Populist Sentiment On Curriculum Kampus Merdeka**

The study conducted a comprehensive investigation into the populist sentiments embedded within the Curriculum of Independent Campus (Kampus Merdeka) utilizing a critical curriculum theory and discourse analysis approach. The findings of this research offer valuable insights into the curriculum's underlying sentiments and their implications for the broader education landscape in Indonesia.

The research findings reveal the presence of distinct populist sentiments within the Kampus Merdeka curriculum. These sentiments are characterized by first, the portrayal of lecturers and students as 'ordinary people' who are presented as victims when confronted by bureaucratic elites. Second, the curriculum emphasizes the role of the university as a means of achieving economic and technological development. Finally, however, university also seen as threat to the regime since there are limitations on academic freedom, particularly through the employment of the Law of Electronic Information and Transactions (UU ITE).

#### **1. Lecturers and Students as 'Ordinary People' vs. Bureaucratic Elites**

The nomenclature of the curriculum, "Kampus Merdeka," inherently indicates a populist dichotomy between those who oppress and those who are oppressed. In the context of Indonesian higher education, the prevailing sentiment is that it remains under the control of oppressive forces. The Kampus Merdeka curriculum is positioned as a solution to the perceived subjugation within the Indonesian higher education system. In this narrative, the oppressors are identified by the regime as the bureaucratic elements, which align with the elites in the realm of populist sentiments.

In the populist discourse surrounding Kampus Merdeka, the oppressors are identified as the bureaucracy within the education system. This perception results from the bureaucratic processes that are viewed as burdensome and stifling by the regime and educational stakeholders. Consequently, the bureaucracy becomes synonymous with the elites in the context of populist sentiments.

On the other side of the dichotomy are the lecturers, students, and the educational institutions themselves. Lecturers are perceived as oppressed due to the overwhelming administrative tasks imposed on them, such as accreditation processes, which can impede their ability to fulfill the "Tri Dharma" (teaching, research, and community service). Students are seen as oppressed because of elitist policies in education, which are often oriented towards theoretical learning and do not align with the demands of the real world or the industrial sector. As a result, students' potential may not be fully realized. Additionally, the higher education institutions themselves are deemed oppressed, primarily due to the bureaucratic constraints imposed by government elites, including burdensome accreditation processes and the lack of autonomy in managing state universities.

This portrayal of 'ordinary people' versus bureaucratic elites within the Kampus Merdeka curriculum is reflective of populist sentiments that underscore the desire to shift the balance of power and equity

within the education system. It sets the stage for a critical examination of the power dynamics and equity issues that permeate higher education in Indonesia and positions Kampus Merdeka as a potential solution to address these concerns.

However, it is crucial to acknowledge that Kampus Merdeka is viewed by some as a narrow solution, considering that the educational challenges in Indonesia extend beyond the curriculum and cannot be resolved solely by curriculum changes. Macro-level issues, such as the disparity in the quality of higher education between Java and non-Java regions, the well-being of lecturers, the high cost of higher education, and unequal access to higher education for all Indonesian citizens, are complex problems that cannot be effectively addressed through curriculum adjustments alone.

In essence, the Kampus Merdeka curriculum policy is seen as a simplification of the broader and multifaceted issues within higher education, representing an instant solution that does not lead to the core challenges of higher education. This perspective contrasts with the populist mindset, which tends to favor straightforward and quick-fix solutions.

As a result, the need for holistic and comprehensive approaches to address the multifaceted issues in Indonesian higher education remains a significant consideration. The Kampus Merdeka curriculum, while embodying populist sentiments, may need to be complemented by broader systemic reforms to bring about enduring improvements in the higher education landscape of Indonesia.

## 2. University as a Driver of Economic and Technological Development

The curriculum's emphasis on the university as a catalyst for economic and technological development aligns with populist themes that highlight the pivotal role of education in propelling national progress. It underscores the significance attached to higher education as a fundamental tool for socio-economic growth and societal advancement.

The primary objective of Kampus Merdeka in its approach to education is apparent in its focus on preparing graduates to enter the workforce, rather than fostering them as intellectual thinkers or contributors. This is evident in the curriculum's core mission, which revolves around creating a link and match between educational content and the demands of the industrial sector. The prevalence of terms such as competence, output-based education, competency certification bodies, and the involvement of professional associations in defining competencies within the curriculum all signify a shift toward using higher education as a means to produce a skilled workforce.

The Kampus Merdeka program, which encourages learning experiences beyond the traditional classroom setting, signifies a departure from conventional semester credit systems. Learning is no longer confined to classroom-based instruction but is considered in terms of individual activities and units. This shift in the credit system further reinforces the paradigm of universities as institutions primarily geared toward producing skilled workers.

Despite this focus on the university as a driver of economic development, Indonesia faces challenges in realizing the desired economic outcomes. The low employment index in Indonesia and the

prevalence of unemployment among university graduates indicate that curriculum changes alone may not effectively address the overarching issues within Indonesian higher education.

While Kampus Merdeka places a strong emphasis on preparing students for the workforce, the disparity between educational qualifications and job opportunities remains significant. The mismatch between the skills developed through education and the demands of the job market continues to pose a substantial challenge, contributing to a substantial rate of underemployment among graduates.

The policy directive from the Ministry of Education and Culture (Kemendikbud) that encourages universities to produce entrepreneurs may be seen as overly simplistic. This approach does not fully consider the broader economic landscape in Indonesia, which includes a low entrepreneurial climate, regime favouritism toward oligarchic interests, and insufficient support for small-scale entrepreneurs. These issues are central to the ongoing economic challenges within the country.

In conclusion, while the Kampus Merdeka curriculum embraces the populist idea of universities as drivers of economic development, it is essential to recognize that addressing macro-level challenges in Indonesian higher education, such as job creation and reducing educated unemployment, requires a comprehensive and multi-faceted approach. Curriculum adjustments, although significant, must be accompanied by broader systemic reforms and a conducive economic environment to truly leverage the potential of higher education in Indonesia for sustainable socio-economic growth.

### 3. Limitations on Academic Freedom & Anti-Intellectualism

The research findings underscore the potential threats to academic freedom within the curriculum, particularly concerning the enforcement of the Law of Electronic Information and Transactions (UU ITE). These restrictions hold substantial significance, as they have the potential to hinder critical discourse and the free exchange of ideas, both of which are fundamental elements for fostering a vibrant and thriving academic environment.

The academic community faces a looming threat to its academic freedom due to the implementation of the Law of Electronic Information and Transactions (UU ITE). This legal framework, intended to govern electronic information and transactions, has, in practice, been used to curtail freedom of expression and academic inquiry. It poses a serious concern, as it gives authorities the tools to restrict and control the content and dissemination of information, including academic discourse.

The limitations on academic freedom take on various forms, including digital attacks or hacking attempts, threats, intimidation, criminalization, sanctions imposed by universities, detentions, or arrests. Such actions are directed at both lecturers and students who engage in critical discussions and critiques of government policies, thereby jeopardizing their freedom to express academic views and engage in research activities.

Scholars and researchers who have dared to criticize the government have faced a range of consequences, including expulsion, removal of academic titles, demotions, and even physical violence or persecution. These consequences not only curtail academic freedom but also cast a chilling effect on

intellectual pursuits and scholarly investigations, stifling the pursuit of knowledge and the expression of academic opinions.

The expulsion of foreign researchers who have criticized the government and the dissolution of seminars and scientific discussions that challenge government policies serve as further evidence of the regime's anti-science and anti-intellectual stance. This stance is in alignment with the behaviours exhibited by authoritarian populist regimes that tend to suppress dissenting voices and stifle intellectual discourse.

Anti intellectualism is also shown by the government's emphasis on nationalism, which sometimes leans towards hypernationalism or tribal nationalism in opposition to Islamism which is characterized by radicalism and an anti-cultural disposition. These tendencies have been observed in scholarly works (Hadiz & Robison, 2017; Lim, 2017; Mietzner, 2020b). The regime's approach reflects an alignment with authoritarian populism, which often employs nationalism as a tool to garner support and suppress perceived threats.

The regime has adopted illiberal and undemocratic policies, marked by identity politics, the arrest of opposition leaders, and the dissolution of Islamic community organizations. These actions contribute to a worsening state of democracy in Indonesia (Diprose et al., 2019; Fealy, 2020; Hadiz, 2017; Mietzner, 2020a). The regime's illiberal approach is consistent with the tendencies observed in authoritarian populist regimes worldwide.

Within the realm of education, political actions manifest in the form of stigmatizing state universities as potential breeding grounds for radicalism. This stigma primarily targets Islamic study activities conducted by students within schools and universities, particularly those affiliated with the Islamic Student Action Union (KAMMI) under the banner of the Prosperous Justice Party (PKS). PKS and its affiliated organizations are often stigmatized as successors of the Ikhwanul Muslimin and are, at times, labeled as transnational terrorist organizations, similar to Hizbut Tahrir Indonesia (HTI).

The intersection of anti-intellectualism, illiberalism, and political stigmatization within the educational context demonstrates the complex challenges faced by Indonesia's academic community. The actions of the regime suggest a trend that aligns with the behaviors typical of authoritarian populist governments, where intellectual discourse and dissent are often suppressed in the pursuit of a specific political agenda. These trends present substantial challenges to the principles of academic freedom and open intellectual inquiry.

In summary, the limitations imposed on academic freedom, notably through the enforcement of the Law of Electronic Information and Transactions (UU ITE), present a serious challenge to the academic environment within Indonesia. These restrictions come in various forms, and their implications extend beyond the academic community, affecting the broader societal and intellectual landscape. Upholding academic freedom is essential for the advancement of knowledge, critical thinking, and a thriving intellectual climate, which are all integral to a well-functioning society.

### **Implications and Recommendations**

The implications of this research extend beyond the mere identification of populist sentiments within Kampus Merdeka. They have the potential to shape educational policies and practices for the future.

The findings underline the importance of formulating sustainable educational policies that not only respond to populist sentiments but also address the needs and aspirations of the broader populace. This may involve fostering a sense of inclusivity and equity in education, ensuring that opportunities are accessible to all segments of society.

The limitations on academic freedom identified in the research necessitate a reconsideration of the regulatory framework governing higher education. Ensuring the safeguarding of academic freedom is critical for fostering critical thinking and intellectual exploration within university settings.

The research findings call for alignment between macro educational policies and the specific curricular goals and sentiments of programs like Kampus Merdeka. A harmonious balance should be sought that enables educational progress while addressing the broader societal needs and sentiments.

In conclusion, this study sheds light on the presence of populist sentiments within the Kampus Merdeka curriculum, emphasizing the portrayal of 'ordinary people,' economic development, and academic freedom. The implications underscore the need for thoughtful, inclusive, and balanced educational policies that take into account the macro educational landscape while guaranteeing the autonomy and academic freedom of institutions. These findings offer valuable insights for policymakers and educators as they navigate the ever-evolving terrain of Indonesian higher education.

## Conclusion

The research on the Kurikulum of Independent Campus (Kampus Merdeka) has revealed a complex interplay of populist sentiments within the curriculum. While the curriculum aligns with certain populist themes, it also faces limitations and complexities that reflect the multifaceted nature of educational challenges in Indonesia. This conclusion synthesizes the key findings and their broader implications:

1. Populist Sentiments within Kampus Merdeka

The Kampus Merdeka curriculum embodies populist sentiments by framing lecturers and students as 'ordinary people' pitted against bureaucratic elites. It emphasizes the university's role as a driver of economic and technological development, reflecting the populist belief in education's power to promote national progress.

2. Challenges in the Paradigm Shift

While Kampus Merdeka resonates with populist sentiments, it faces challenges in effecting meaningful change. The curriculum's emphasis on workforce preparation and entrepreneurship may not fully address macro-level issues, such as the gap between educational qualifications and employment opportunities and the broader economic climate.

3. Threats to Academic Freedom

The research highlights significant threats to academic freedom, primarily stemming from the enforcement of the Law of Electronic Information and Transactions (UU ITE). Academic freedom is further jeopardized by digital attacks, intimidation, criminalization, and other forms of repression. These actions have chilling effects on critical discourse and scholarly investigation.



4. Anti-Intellectual Stance:

The expulsion of foreign researchers and the dissolution of scientific discussions that challenge government policies reflect an anti-intellectual stance within the regime, consistent with behaviors seen in authoritarian populist regimes.

5. Limitations of a Simplistic Approach

While Kampus Merdeka aligns with certain populist sentiments, it is essential to recognize that it may represent a narrow and overly simplistic approach to addressing complex educational challenges. Curriculum adjustments alone may not effectively resolve macro-level issues, such as unemployment among graduates and the broader economic landscape.

In conclusion, the findings reveal the presence of populist sentiments within Kampus Merdeka but also highlight limitations and challenges. Addressing the multifaceted issues in Indonesian higher education requires a holistic approach that includes not only curriculum adjustments but also systemic reforms, economic considerations, and the protection of academic freedom. It is imperative to balance the pursuit of populist sentiments with the broader educational needs and aspirations of Indonesian society, all while safeguarding the fundamental principles of academic freedom and intellectual inquiry.

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## Digital skills development policy for a better quality of life for the elderly in Bangkok

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### Abstract

The purposes of the research were to investigate, to determine, and to find out ideas of the Conceptual Framework for Policy recommendations that would build digital skills to improve the quality of life for the elderly in Bangkok. The research findings showed that digital technologies that can enhance elderly citizens' quality of life in Bangkok by technological factors are people's everyday activities and habits, their physical and mental health, their cognitive performance, smart gadgets with the right software, and—most importantly—government-supported policies.

**Keywords:** Developing a digital skills policy, Digital skill, Elderly people, Quality of Life

### Introduction

At present, the elderly population has a large number, digital technology it is an important thing in everyday life. Thailand is entering a fully aging society. Preparation for an aging society has begun to appear continuously and seriously “Must prepare in every dimension promote the creation of technology and innovation, encourage the elderly to have activities continue to do so in terms of economics, society, and health, as well as maintaining its role in driving development society. From the strategic plan as such, it can be seen that the role of technology has been specified. To enable the elderly to have activities to drive the economy, society and health, which is in line with the opinions of Prof. Dr. Prawet Wasi said, “The solution to the problems of the elderly in the future The community must have strong, has the initiative to use innovation to be able to care for all the elderly and must be developed potential of the elderly to have skills in understanding and using digital technology tools, equipment, and technology. Digital devices that currently exist, such as computers, telephones, tablets, computer programs and online media to be used for maximum benefit in communication and work. and living together.

This research is an important part of a research plan that emphasizes principles, importance, and guidelines. Development of the elderly that emphasizes energy, quality, and productivity (Active and Productive Aging) aims to create an organization knowledge and lead to the development of the potential of the elderly in using digital technology to develop their potential of the elderly in the future. To promote and develop the abilities of the elderly in order to maintain their abilities in live a healthy, independent

life in the community and have a good quality of life by aiming to create knowledge that will help the elderly to get higher quality of life.

### Research Objectives

- 1) To Study to status of access, use, and level of usability Digital technology
- 2) Study to Digital media literacy in terms of accessing, evaluating, and making use of content  
News on digital media
- 3) Study to Using digital media to build relationships between the elderly and family members.

### Review of Related Literatures

According to the World Social Report 2023 by the UN Department for Economic and Social Affairs, population aging is a significant global phenomenon. Asia, including Hong Kong, South Korea, and Japan, is projected to lead this trend, with the highest proportion of individuals aged 65 and above anticipated by the year 2050. Japan is renowned for its aging population, a phenomenon that has positioned it at the forefront of global rankings in 2022. However, it is worth noting that several other Asian economies are currently undergoing a notable transformation. This transformation is primarily driven by substantial advancements in life expectancy over the past several decades, a trend that shows no signs of abating. One of the primary concerns faced by nations with aging populations is the imperative to ensure that the economy is capable of meeting the increasing consumption demands of a larger elderly demographic. This can be achieved through various means, such as raising the official retirement age, eliminating obstacles to voluntary labor force engagement among older individuals, and guaranteeing fair access to education, healthcare, and employment opportunities across the entire lifespan. These measures can contribute to enhancing economic stability during later stages of life.

In the year 2021, it may be observed that the ASEAN region has attributes indicative of a civilization experiencing the phenomenon of population aging. Seven member nations of the Association of Southeast Asian Nations (ASEAN) had attained the designation of an aging society, denoting a demographic in which 10% or more of the populace consists of adults aged 60 years or above. The nations encompassed in this analysis are Singapore, accounting for 22% of the total; Thailand, representing 19%; Viet Nam, contributing 13%; Malaysia, including 11%; Indonesia, comprising 10%; Myanmar, also comprising 10%; and Brunei, also comprising 10%. These attributes facilitate the development of digital literacy skills, namely in the domains of accessing, analyzing, evaluating, engaging, and taking action. During the upcoming study phase, this innovation will undergo further testing on senior adults with the aim of improving their digital skills. This will subsequently provide individuals with the necessary abilities to effectively adjust to Thailand's significant transition towards an aging society.

Technology has the potential to exert a beneficial influence on the well-being of elderly individuals, encompassing enhancements in cognitive functioning, physical and mental health, as well as the facilitation of everyday tasks and routines. The good impact technology may have on the lives of older

people included increasing cognitive performance, physical and mental health and people's daily activities and habits. Various barriers continue to impede the utilization of technology, including psychological factors such as motivation, attitudes, privacy, and trust, as well as social factors pertaining to the acquisition of technological proficiency. (2021, Hannah R. Marston, Charles B. A. Musselwhite,) Various barriers continue to impede the utilization of technology, including psychological factors such as motivation, attitudes, privacy, and trust, as well as social factors pertaining to the acquisition of technological proficiency. There is a suggestion that digital technology has the potential to enhance individuals' cognitive abilities. Wu et al. (2019). technology use can have positive effects on people's mental and physical health by enhancing cognitive abilities like thinking, memory, and executive functioning. Finally, it is important to note that learning how to use digital technology can protect people from cognitive decline, which is consistent with earlier research studies.

On the other hand, older individuals may encounter challenges and inconveniences when interacting with technology. These difficulties may include struggles with the graphic user interface, the need to press multiple buttons, and complications arising from the use of peripheral devices and screens, such as smartphones. These issues can be attributed to age-related health conditions, such as diminished dexterity, impaired eyesight, and cognitive changes. Additionally, individuals with disabilities may also face similar obstacles. (Marston, 2013).

In conclusion, Marston et al. (2020a) put up a set of recommendations for various entities, including as developers, governments, and public sector personnel (e.g., police), based on their comprehensive review. Ranieri et al. (2021) conducted a study on the effects of technology usage on individuals with moderate levels of cognitive reserve. Their findings suggest that active engagement in the digital world can enhance the quality of life for this particular population. Consequently, digital solutions merely constitute a single facet of their everyday experiences. This perspective highlights the essential comprehension of integrating technology into individuals' life, emphasizing its inseparability and absence of superfluousness.

The presence of individuals who endorse and facilitate the utilization of technology among older adults is crucial for promoting technology adoption and engagement (Freeman, et al., 2020; Marston, et al., 2019). the provision of social support by individuals perceived as technology specialists among older adults positively influenced their acquisition and utilization of technology. The significance of intergenerational learning opportunities is underscored within this particular setting, because older individuals have the potential to impart their life experiences to younger individuals who possess technological competence Briones & Meijering, 2021; Freeman et al., 2020).

Digital abilities were linked to self-rated mental health even after controlling for demographics, there was a substantial correlation between digital abilities and self-rated mental health. There is a growing recognition of the gray digital divide, which refers to the disparity in internet access and usage among older persons. The study revealed that a mere 76.5% of the participants have either home Internet access, a mobile phone data plan, or both. Conversely, 36.3% of the participants reported no prior usage of Internet services, while 18.2% lacked any form of digital devices. These factors include being of a younger age,

identifying as male, having a higher level of education, living with others, and perceiving oneself as belonging to a higher socioeconomic class. Individuals who engaged in daily Internet usage exhibited elevated levels of life satisfaction and self-assessed physical and mental well-being in comparison to individuals who infrequently or never utilized the Internet. (2023 Kwok-kin Fung, Shirley Suet-lin Hung, Daniel W. L. Lai, Michelle H. Y. Shum, Hong-wang Fung, Langjie He)

The government and the industry should continue digital education and training of digital skills. The Impact of Digital Skills on Intentionality within the Context of Smart Senior Care. Addressing the challenges associated with aging has emerged as a critically significant concern within governmental entities, academic institutions, and the senior care sector. The digital knowledge of the respondents had a significant impact on their attitude and behavioral intentions towards utilizing the smart senior care platform, when not taking into account their digital skills. Additionally, it was observed that respondents with low digital skills had a significant influence on the association between their digital knowledge and attitude, when considering digital skills. There is a recommendation for the government and industry to further enhance digital education and training in order to develop digital skills. Furthermore, it is recommended that families of senior adults prioritize the acquisition of digital skills and knowledge for their older members. (Tsai-Fa Yen, Runfa Li)

The issue of population aging poses a significant challenge for China same as others country. The emergence of new digital public services, such as online ticket purchase, smart medical care, online car-hailing, online tax payment, and online social insurance, has provided convenience to the general public in accessing public services. However, it has also given rise to a range of issues specifically affecting the elderly population. This research recommends governance solutions aimed at addressing these challenges to guarantee equitable access and opportunities for the senior population to enhance their quality of life within the context of the digital society. (2023 Shucen Yi)

The predominant focus among senior individuals participating in free courses pertains to the acquisition and refinement of various abilities. The notion of Smart cities necessitates computer literacy as an integral component of daily existence. The findings pertaining to the participants' computer skills acquisition histories indicate that self-education and support from family members play a significant role in this domain. Additionally, approximately one third of the respondents reported attending computer courses. Regarding the abilities that the elderly would prefer to acquire or enhance, photography and file management are prominent. The majority of participants were already acquainted with the concept of electronic mail (E-mail), nevertheless, they expressed greater appreciation for the educational value derived from acquiring proficiency in utilizing the Skype communication tool. The objective of this study is to ascertain the computer skills that older citizens participating in complimentary courses desire to possess or enhance, enabling them to actively engage in Smart City initiatives without experiencing a sense of exclusion. (2018 Miloslava Cerna, Petra Poulouva, Libuše Svobodová)

Enhancing the Quality of Life for Elderly Individuals via the Development of Intelligent Applications. The utilization of technology and smart applications has the potential to enhance the productivity and

overall quality of life for senior citizens. In Malaysia the government has prioritized its focus on older persons, making them one of the prominent segments within society. The government has implemented many programs aimed at assisting senior citizens. However, several challenges continue to arise concerning elderly citizens, encompassing financial and economic concerns, social issues, emotional and psychological well-being, religious and spiritual matters, education and knowledge, health-related matters, environmental factors, familial dynamics, and other related aspects. In contemporary society, the field of technology is seeing exponential growth and is being extensively employed across several domains such as education, healthcare, security, and everyday routines. This technological innovation or smart application has the potential to enhance the productivity and overall quality of life for senior citizens. (2021, Ammar Ihsan Nasution, J. Ibrahim)

The impact of digital literacy among the older population on the efficacy of platform promotional activities is relatively significant. The senior demographic can be categorized into two groups based on their proficiency in obtaining information: passive information receivers (PIRs) and active information searchers (AISs). The findings indicate that there is an inverse relationship between the proportion of PIRs in the target population and the market penetration of the platform. The impact of enhancing service quality on market penetration is more pronounced in situations where the proportion of potential industry rivals (PIRs) is lower. Strategies that are directly associated with the dissemination of information, such as the expansion of mass media coverage and the augmentation of seed quantities, exhibit greater efficacy in instances where the proportion of PIRs (Potential Information Receivers) is elevated. (2021, Xiaoyan Xu, Yi Mei, Yanhong Sun, Xiaoli Zhu)

It is crucial to improve the digital literacy of senior folks through various educational efforts and other measures in order to address the digital divide they may encounter in the future. In accordance with a recent data indicator from South Korea, it has been observed that the digital gap among elderly individuals is more pronounced in comparison to the overall population. Each local government provides various free information education programs for older people over the age of 50. The '50+ Campus' provides various programs for senior citizens, including information education. The problem of the digital divide among older people was the most serious, and also that the biggest cause of the digital divide was the lack of digital capacity. Therefore, in order to reduce the digital divide of old people in the future, it is necessary to improve digital capacity through various forms of education. (2020, Wochun Jun)

The utilization of digital technology among the elderly population in Thailand is essential issue. It is imperative for older individuals to cultivate their online media literacy in order to effectively traverse the Internet, while also harnessing the potential of material discovered within the virtual realm in a creative manner. They should be equipped with the necessary skills and mindset to lead a fulfilling life that not only benefits themselves, but also their families and society as a whole. Ensuring that the elderly population is provided with the opportunity to utilize and benefit from digital technologies is of paramount importance. Therefore, it is imperative to offer elderly individuals with proper education pertaining to the identification of acceptable digital technologies that can improve their overall well-being. Additionally, it is essential to

equip them with the requisite understanding to protect themselves against potential cyber threats. Therefore, it is imperative for older individuals to acquire online media literacy skills in order to effectively and securely surf the Internet, while also harnessing the potential of the information available in the virtual realm. (2022, Gan Chanyawudhiwan, Kemmanat Mingsiritham)

To maintain their quality of life, improve their cognitive involvement in daily tasks, and strengthen their relationships with loved ones, older persons require digital literacy and competency. Thailand is transitioning to a knowledge-based economy, and the country's government has indicated that it is interested in the growth of the digital ecosystem. Thus, it is imperative that focus be given to the elderly and other marginalized individuals residing in isolated regions. Nevertheless, there aren't many thorough research on older individuals' acceptance and usage of digital technologies, nor on their degrees of digital competency. Furthermore, the findings demonstrated the current competency gap. Information and data literacy, communication and teamwork, and safety were the top three desired digital competencies. Analyzing these results fosters the development of digital literacy skills based on senior citizens' need. (Suttisak Jantavongso, 2021)

Collaboration serves as the fundamental element that underpins government administration in the realm of public services. This presents a novel challenge wherein many sectors play distinct roles in advancing public services through the implementation of a foundational framework aimed at fostering collaborative digital policies for the senior population. This document outlines a concept for establishing a collaborative framework across several sections to facilitate the methodical adoption of a policy. Nevertheless, it is recommended that careful consideration be given to the essential variables that must be taken into account in order to ensure that the approved framework aligns with the prevailing public policy. (Phimlikid Kaewhanam\* Sukanya Aim-Im-Tham, 2021)

The participants' Internet literacy levels did not vary by profession, frequency of internet access, and amount of time spent online per day. The findings indicated that, on the whole, the participants possessed a moderate level of Internet literacy. The majority of senior individuals possess a strong foundation of knowledge and proficiency in utilizing digital technologies and employing effective techniques to access information from credible internet sources. (Watsatree Diteeyont, Heng-Yu Ku, 2021)

Chatbots are a type of intelligent conversational agent. Virtual assistants have been utilized as intelligent conversational agents in mobile applications in order to enhance user engagement and interaction, hence promoting optimal learning experiences. Furthermore, the senior population has effectively utilized these interventions to promote modifications in behavior aligned with their desired objectives. (Kanyarat Sriwisathiyakun, Chawaporn Dhamanitayakul, 2021.)

## Conclusion

There are numerous ways to use digital technology to improve the quality of life for the aging population. recognizing the constraints associated with using digital technology, having access to the proper



tools and software, and—above all—establishing sensible rules and encouraging older people to become less digitally literate. It is common knowledge that the aging process is a worldwide occurrence. Many people believe that there is no way to solve this issue, but when you consider the aspects of giving older adults who are still able to work opportunities and support, as well as helping them grow personally in the healthcare industry and acquire skills that will help them earn more money on the side, you would see otherwise. Not only has the quality of elder life improved for older people, but it has also contributed to the growing social understanding that older people are not a liability to society but rather an integral part of it till the end.

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## Guidelines for developing the international effectiveness of academic administration in higher education institutions

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### Abstract

The academic article is a study on the guidelines for developing the effectiveness of academic management towards international standards at higher education institutions. Its objective is to present strategies for enhancing the effectiveness of academic management at the international level of a university. To study the implementation of the ASEAN University Network-Quality Assurance (AUN-QA) curriculum network by using the principles of Outcome-Based Education, which consists of 11 criteria, the educational management of higher educational institutions in Thailand has been implemented. Additionally, self-reflection on one's roles and responsibilities is emphasized, starting with an understanding and awareness of the importance of tasks and the outcomes resulting from managing the mission. These outcomes are divided into four aspects: graduate production, research, academic service provision, art and cultural preservation, as well as education for understanding various environmental factors that affect the effectiveness of academic management, all encompass the presence of leadership qualities in administrators, management based on good governance principles, and the integration of modern information technology in educational management, synergized with contemporary organizational management for modernize the academic management system, maximize effectiveness, and achieve the highest efficiency in all four aspects, and also aims to propose a direction towards becoming a globally recognized university in Thailand in the future.

**Keywords:** development effectiveness, academic administration, international, higher education, institutions

### Introduction

Education is a fundamental cornerstone for individuals in a nation. The development and advancement of a nation depend on the quality and widespread access to good education for its people. Therefore, it is the primary responsibility of educational institutions, which function as knowledge-building entities, to produce high-quality graduates that align with the demands of employers, create innovative research works to develop educational services and utilize knowledge to enhance the community, as well

as preserving and nurturing arts, culture, and traditions to maintain a lasting identity. Extend acquired knowledge to advance individuals and when the people in the country receive quality education, it leads to national prosperity. This is considered a fundamental mission of the higher education institution. However, in order to achieve good effectiveness, educational institutions must have academic leaders with a broad vision, a modern management style, an efficient information technology and innovation management system that facilitates teaching and learning, academic management, and support staff management systems organization to become a world-class educational institution to respond to the government's development policies and meet the expectations of the people, educational institutions are considered crucial learning centers and vital catalysts for national development. It is hoped that the role of universities as prime drivers of the country's progress, particularly in terms of new growth engines, will support the implementation of the government's Thailand 4.0 policy as well as the mission in teaching, research, academic service, and preservation of arts and culture, to serving as a crucial link connecting all sectors to disseminate knowledge for the development of the country at the international level (Kanya Napapong, 2021) but from the UNESCO data of years 2013-2019, it was found that Thailand invested a considerable amount of budget in tertiary education, ranking 37th in the world out of 183 countries. This indicates a relatively high budget allocation, but when compared to the achieved outcomes, the performance level is relatively low. The employability of recent graduates is still lacking, and the budget allocated by the government to each institution of higher education is limited. (The Office of Policy and Planning for Higher Education, 2018) education system in Thailand remains inadequate. Therefore, universities, as the foundation for knowledge creation, play a crucial role in the country's development. Thus, they must strive to elevate their academic management to an international level in order to align with government policies and the needs of the people in the nation.

## Study Objectives

To present guidelines for developing effective academic management to an international level of educational institutions.

## Study Methodology

To study from literature review, theories, and relevant research works related to the effectiveness of academic management towards international standards of educational institutions.

## Review of Related Literatures

### 1. Guidelines for developing the effectiveness of academic administration to the international level of higher education institutions.

Currently, we often hear the terms “transformation of higher education institutions” or “restructuring of higher education institutions” towards becoming a SMART University or a Digital University, also known as University 4.0. The process of elevating the quality of higher education institutions to

international standards, as achieved in developed countries, requires thorough study to quality assurance system of the ASEAN University Network-Quality Assurance (AUN-QA) is being implemented in the academic management of Thai universities, Kanyada Anuwong and Atchari Supasutthikul (2018) explain to the important principles of AUN-QA at the curriculum level include promoting Outcome-Based Education (OBE), which is an educational approach that emphasizes planning and implementing any activities that lead to achieving learning outcomes (ASEAN University Network, 2015) which is an educational management that focuses on planning and implementing any actions that lead to achieving learning outcomes or what learners are expected to be able to do when the learning process ends, by following the guidelines of an educational management approach that uses learning outcomes as a starting point, starting from clearly defining the learning outcomes of learners in each curriculum, making it observable behaviors for learners and can be evaluated (observable and measurable behaviors) main principle of AUN-QA is to carry out educational management in order to achieve systematic learning outcomes, using the PDCA (Plan-Do-Check-Act) quality cycle. It starts with planning, which means setting clear goals to be achieved in each process and planning (plan) for design a process or procedure that will lead to achieving goals (Do), collecting data to track the outcomes of the operation, evaluating the outcomes against the predetermined goals in the planning stage, and analyzing the causes of whether the outcomes have achieved the desired goals (Check), in order to proceed with necessary development and improvement (Act) example of integrating educational management principles using Outcome-Based Education (OBE) and the systematic PDCA cycle at the curriculum level is to define clear learning objectives for each subject in the form of explicit learning outcomes. In order for the teachers to plan and design instructional activities that will help the learners achieve their goals, they need to also establish methods of measuring and evaluating the desired outcomes (Plan). Then, teaching and learning activities are conducted according to the designed plan. Additionally, learners' performance is assessed using methods and tools that reflect whether they demonstrate the desired learning outcomes (Do) analyze the results of student assessments and evaluate the learning outcomes of each subject to understand if the activities and teaching methods implemented have helped students achieve their learning goals, and identify the reasons for success or failure (Check). After that, make necessary improvements and developments in the areas needed, in order to help all students achieve the desired learning outcomes. (Act)

AUN-QA Criteria for Quality Assurance of ASEAN Network University Networks consists of a total of 11 criteria as follows:

Criterion 1: expected learning outcomes are the process of defining the learning outcomes expected of the curriculum to be developed in alignment with the vision and mission of the educational institution and the needs of stakeholders."

Criterion 2: programmer specification stipulates that the curriculum should communicate and disseminate information that is a requirement of the curriculum, such as degree names, curriculum learning outcomes, admission criteria, and student selection. The curriculum structure and number of credits are also part of the specification.

Criterion 3: programmer structure and content refers to the design of the curriculum, which includes the structure and content of the curriculum based on learning outcomes. The course curriculum, teaching methods, and assessment methods are consistent and supportive of achieving the expected learning outcomes (constructive alignment).

Criterion 4: teaching and learning approach, encompasses instructional and learning methods that align with the institution's education philosophy.

Criterion 5: student assessment, refers to evaluating learners, which includes assessment for selecting students into the curriculum, ongoing assessment while students study in the curriculum, and assessment for successful completion of education."

Criterion 6: academic staff quality, cover encompassing both short-term and long-term personnel planning, workload management, and defining the competencies of teachers.

Criterion 7: support staff quality, similar to criterion 6, but specifically addressing the management and development of personnel involved in educational management, student development, and curriculum delivery.

Criterion 8: student quality and support, refers to the policy for admitting students, admission criteria, and student selection.

Criterion 9: facilities and infrastructure, ensures that the curriculum has physical resources to facilitate education management and learning, including tools, materials, information technology, and venues.

Criterion 10: quality enhancement relates to crucial improvements in various processes, particularly the review and development of curriculum that requires feedback from learners, instructors, alumni, and stakeholders from the industry.

Criterion 11: outputs refer to the educational management outcomes, such as data reflecting the quality of learners, including graduation rates, average study duration, dropout rates, and work potential.

the production of quality graduates who can meet the labor market's expectations, support student and worker mobility, and consumer protection of educational institutions, while also creating opportunities for student exchange and cooperation among ASEAN countries. Developing research to create innovations through support from all sectors, enabling research to be patented and utilized in problem-solving or develop science, technology, academic service and cultural arts that are in line with the needs of the community for sustainable local development up to the national level, which has an impact on the effectiveness of academic management, which is the main mission in all 4 dimensions of the university to reach a global level. ASEAN Institute for Education, which has now begun to adopt the ASEAN University Network Quality Assurance (AUN-QA) system for higher education institutions, can be seen as a progressive era of scientific and technological advancements. This has resulted in increased competition on a global scale. situations of higher education must change their management approach to keep up with the rapidly changing external environment. Based on the analysis of external factors that occurred in the economy and society in the past year (2022), it was found that the significant advancement of digital technology has

transformed the world into a data-driven ecosystem (IOT) has an artificial intelligence (AI) impact on transforming the formats and practices of both public and private sector organizations in the country. This, in turn, affects the ways in which educational institutions need to adapt their management practices to align with the changes occurring in both public and private sectors. (Kanya Napapong, 2021)

## **2. Factors influencing the effective development of academic management towards the international level of educational institutions.**

Management of academic work at the institution of higher education towards internationalization, by using the ASEAN University Network-Quality Assurance (AUN-QA) system, through the promotion of outcome-based education (OBE) as the basis for learning outcomes. To achieve this effectiveness, it is necessary to review various internal and external factors institution of higher education be prepared to create a strong academic force to lead all sectors towards the same goal as the government's national development policy. The institution of higher education needs to review its roles and responsibilities and identify external and internal factors that affect the effectiveness of academic management must understanding and being aware of the importance of duties and the results obtained from managing operations in all 4 aspects as follows. (Rattapong Bunyanuwat, 2017)

1. Mission of education management is the main mission and the core of vital importance in sustaining the institution. The process of producing graduates involves the admission of students to tertiary level education, the management of quality teaching and learning. The effective education management aims to produce graduates with good performance. The characteristics of newly graduate professionals should possess knowledge and skills that meet the demands of the users. institution of higher education must have a modern and flexible curriculum that aligns with the diverse needs of society and the labor market. It emphasizes the development of the quality of learners by focusing on learner-centered approaches, learning and self-employment. It is based on research, training students to conduct innovative research and evaluating the learning outcomes of students and assessing teachers, improve and develop the teaching and curriculum management approach in line with the appropriate and modern needs of learners, the data obtained from the aforementioned evaluation will be utilized. (Office of the Higher Education Commission, 2019) utilizing the digital learning platform, we have created a blended learning approach by combining Coursera's curriculum development and interdisciplinary integration techniques. This approach aims to foster learner independence and adaptability in course management while aligning the curriculum with professional needs and ensuring its relevance in the workplace. The curriculum development is carried out in collaboration with employers and the labor market. Aborative teaching and learning management to enhance students' readiness for professional employment in the labor market. (Ruedeth Kerdwichai, 2022) Along with the development of work skills, knowledge in technology and information, communication, and having ethics, and professional integrity with honesty and integrity together. (Kritsada Kudtong, 2018)

2. Mission of Research. Institutes of higher education must have an efficient research management system, starting with the identification of potential young professors and researchers who have the capability, passion for research, and the desire to explore new discoveries for development. This system should enable and empower professors, academics, and students to conduct research that can help solve problems, as well as create intellectual innovations or intellectual property linked to the economy and contribute to social benefits for the advancement of the country (Office of the National Higher Education Science Research and Innovation Policy Council and the Office of the National Science, Research and Innovation Policy Committee, (2019) and the creation of research works must have quality, which means being accurate according to research methodology, being credible and accepted by academics and society, being creative and beneficial to society, capable of generating innovation or intellectual property linked to the economy, society, art and culture, and the environment, according to the potential and characteristics of each institution. A Research innovation must be able to address the national strategic objectives, societal needs, and the requirements of both the public and private sectors. The outcomes of research contribute to the development of learning capabilities of learners, the enhancement of quality of life, and the creation of opportunities for value-added benefits. Additionally, research results contribute to the country's competitive advantage, both nationally and internationally. (Announcement of the Ministry of Education, 2018)

3. Mission of academic service to society is the organization of activities or projects that utilize knowledge derived from research or academic work of the university's mission 2 professors to provide knowledge in problem-solving, creating professions, and generating income for the community. Effective academic service to society should align with the government's Industry 4.0 policy, extending into the local to enhance the quality of life and well-being of the local community, by meeting their developmental needs and promoting community resilience through collaborative efforts between academic institutions and community members. This is achieved by emphasizing community engagement as a fundamental principle and fostering a network of cooperation in providing academic services to various sectors, both public and private. (Rajamangala University of Technology Lanna, 2016) The academic service delivery model of the university must align with the genuine needs of the community. It requires collaborative work and cooperation among the university faculty, local government agencies, private organizations, and the local community. Starting from the initial public outreach and project communication, all the way to conducting needs assessments and identifying problems. The process involves assessing existing knowledge, promoting theoretical knowledge, engaging in practical training, and culminating in performance evaluation. It also entails managing projects that emphasize the provision of academic services in a manner that can create individuals, generate jobs, generate income, and benefit the community for sustainable local development. (Deuenpen Panaruk, 2015)

4. Mission of Art and Culture preservation is the responsibility of the educational institution to cultivate awareness and importance among students and the younger generation, as societal changes may cause the new generation to forget Thai culture. The educational institution should organize art and cultural



activities in innovative and creative forms, while still preserving local customs and traditions. This can be achieved through methods that promote learning among professors, staff, and students to see the value of Thai culture in a different dimension from the past. (Rattapong Bunyanuwat, 2017) The practice of preserving and promoting art and culture should have a collaborative approach with external organizations, supporting education and research. In the realm of art and cultural preservation, efforts should be made to enhance local knowledge and establish a network of activities for disseminating knowledge in art and cultural preservation at the local level. Budget allocation should be made to support activities and initiatives in the field of art and cultural preservation to emphasis is on promoting and supporting arts and culture, aiming to cultivate in students and staff an awareness and appreciation for the value of Thai art. Additionally, there is a consistent monitoring and evaluation of activities related to the preservation and promotion of arts and culture (Boondiem Panropb, Sompong Panhoun, Pachareeporn Worachark & Sadayu Teerawanichtragoun, 2017) There is a clearly defined framework and direction for operation that aligns with the vision. There is a systematic and comprehensive process in place, starting from policy setting, planning, plan implementation, and monitoring and evaluation. The vision, mission, and objectives serve as the framework for operations. (Faculty of Management Science, Silpakorn University, 2021)

Apart from this, driving the effective management of academic affairs in an educational institution towards an international level requires important factors including the following:

1. Leadership Qualities of Administrators

The role of leadership qualities in administrators is considered the most crucial factor as they have the authority to enforce laws, shape directions, manage operations, and make decisions. Leaders in academic institutions must possess knowledge in academic disciplines a leader in good governance, a leader in technology, and a leader in modern management with a broad vision recognize problems and obstacles along with solutions for future academic management. The management policies can be implemented, and have an innovative mindset in utilizing technology, a leader of change, equipped with excellent communication skills and the ability to negotiate with business partners, have good communication skills with the ability to negotiate with large business owners or stakeholders to establish relationships in creating collaborative networks for curriculum development, possess the ability to enhance teamwork and synergy among coworkers by stimulating creative thinking in academic projects and addition to promoting and supporting the development of teachers' potential, this aims to enhance their capabilities in generating creative academic works. (Sirinath Patamavilai, Anothai Prasarn and Weerawan Jongjit Sirijirakarn, 2019)

2. Good Governance of Higher Education Institution

In addition to the role of administrators exercising authority in managing operations through the laws, regulations, and rules of the educational institution, leaders must also possess moral governance in order to effectively manage. This should be conveyed to teachers and staff members, encouraging them to adhere to and practice these principles. The aim is to cultivate an organizational culture with a



governance framework that encompasses the following 10 aspects. (Office of the Public Sector Development Commission, 2012)

- 1) Manage operations with moral principles, utilizing laws for administration, adjudication, and decision-making with fairness.
- 2) Promote ethics and cultivate integrity among teachers and staff as good role models in serving students.
- 3) Administer operations with transparency and accountability that are subject to scrutiny.
- 4) Establish a power distribution system in line with democratic principles.
- 5) Every teacher and staff member actively contribute to driving the institution forward together with the administrators.
- 6) Taking responsibility for providing education.
- 7) Considering the efficient utilization of resources.
- 8) Managing operations with a focus on effectiveness mission all 4 dimensions.
- 9) Responsively meeting the needs of stakeholders appropriately.
- 10) Ensuring equal access to education for all citizens in the country.

Administering based on the principles of good governance will help establish a well-organized system in managing the operations of an educational institution. Employees will work in accordance with the law and in the same direction, fostering fairness and effectiveness for students. For example, students will successfully complete their studies within the specified curriculum, without dropping out or exceeding the designated timeframe. Producing graduates with skills aligned with the needs of employers and fostering a harmonious working environment within the organization, such as reducing student-teacher or teacher-teacher conflicts, complaints, or grievances. (karuna Mathulapharansan, 2022)

### 3. Information Technology Management

To elevate the academic management of the university to an international level, comparable to leading institutions in developed countries, the executives must possess a visionary mindset equipped with up-to-date knowledge and skills in information technology. They must integrate this knowledge into the institution's management system, incorporating modern information technology tools for teaching and learning purposes. There is an artificial intelligence (AI) system or technology that helps facilitate the convenience of rapidly evaluating teaching and learning outcomes. For instance, it assists in developing exams that adapt to the test-takers' abilities, as well as monitoring and tracking progress in the learning process of students. Moreover, it incorporates a data information system to enhance research retrieval and organization of book data efficiently in library and modern media equipment are used to grade exams, reflecting students' learning outcomes through the ZipGrade application. ZipGrade is an instant result-displaying tool for multiple-choice exams, which works in conjunction with specially-designed answer sheets. This application processes each sheet in less than 5 seconds and provides the average, minimum, and maximum scores, as well as statistical information for each exam question. With such advanced technology, it helps reduce the workload of teachers. Teachers will have more time to engage in other

academic activities, pursue higher academic positions, or conduct more research. This improves the efficiency of academic management, which ultimately leads to better outcomes in academic administration. (Thawatchai Pongsanam, (2021)

#### 4. Modern Organization Management

The application of modern management principles in managing organizations with flexible and adaptable hierarchical structures, decentralized decision-making authority, will help drive efficient and responsive operations of educational institutions. This approach enables institutions to be agile, swift, and able to promptly meet the needs of their stakeholders. It involves a planned and adaptable management system that can adjust according to changing circumstances emphasis is on the results of the work rather than the process. There is a clear policy, strategy, and goals that align with the objectives and missions in response to the current globalization. It should be clear and achievable. The important thing is that managers should instill values and a work culture that benefits the employees. They should cultivate a working environment based on good governance principles. Promoting the development of knowledge and skills in information technology to transform into a digital university (Kanya Napapang, 2021) Additionally, fostering teamwork and assigning tasks according to individuals' abilities to cultivate a sense of responsibility and understanding of one's own importance. Employees will have love and commitment to the organization, and will be motivated to dedicate their work to the organization its aims to create a positive atmosphere for the organization, as the implementation of the new era organizational management system results in improved efficiency and increased effectiveness in personnel performance. Consequently, it significantly enhances the level of academic management outcomes. (Kanistha Homchan, Phongsak Phetsathid and Viyada Waranonwanich, 2021)

## Results

The study it was found that the various factors mentioned, it can be seen that each factor is important for managing academic affairs to elevate educational institutions to an international level. Based on research studies conducted both domestically and internationally, it has been found that the leadership qualities of administrators are crucial and have an impact on every factor, as well as the effectiveness of managing academic affairs at the international level of educational institutions. This conclusion is drawn from research conducted within the country of Kanya Napapang (2021) study the research to strategies for development guidelines for the effectiveness of the administration of higher education institutions in the digital disruption era, it was found that the leadership qualities of top-level managers in the digital disruption era have an impact on the effectiveness of educational institution management. The most significant impact lies in their communication abilities. This signifies the need to adapt educational institution management methods to align with the modern era, which is characterized by technological advancements and educational competition. High-level executives must have the ability to effectively communicate in order to make the institution's personnel aware of the ideas regarding changes in the management of the university using by digital technology. They must have a shared understanding, belief, and feeling that aligns

with the organization. This applies to both the management of the institution in the modern era, which affects the effectiveness of university administration. It was found that in terms of vision, strategy, goals, values, and culture, they have the greatest impact, which can be explained by the development of an innovative vision that is implemented by driving innovation at the university. This serves as a tool to facilitate organizational management, creating a learning organization and encouraging employees to constantly seek new ways of working in order to adapt globalization. Managers must have networks and cooperation with entrepreneurs and stakeholders to develop a balanced and interconnected learning environment between theory and practice. This is to produce quality graduates with the knowledge and skills that meet the needs of entrepreneurs, in line with international research of Liu, L., Hong, X., Wen, W., Xie, Z., & Coates, H. (2020) study the research to the characteristics and qualities of a university president at the global level are explored through an analysis of in-depth interviews with university presidents and a study. It has been found that university presidents worldwide possess expertise in participatory leadership that engages both internal and external stakeholders in organizational management in a diverse range of situations, from the increasingly complex global context influenced by social and technological advancements, universities worldwide empower their presidents with discretionary authority to actively engage in leveraging their communication and persuasion skills to sway politically influential individuals and large-scale business entrepreneurs in support of their own initiatives which is crucial for the ability to manage diverse and uncertain external factors exceptionally well, whether it is coordinating collaborative efforts, establishing mutual agreements such as Memoranda of Understanding (MOU) between universities and businesses, or participating in co-designing strategic management with enterprises. A regarding internal management, the president will utilize participatory communication with professors, staff, and stakeholders, working towards maintaining stability by assigning tasks and responsibilities in controlling the internal system. Additionally, they will provide consultation and advisory roles, which are closely related to the president position, stemming from their experience and expertise, had previously held high-level administrative positions, despite the varying contexts and changes within each university. However, there are essential qualities that a university president must possess, including having a broad vision, the ability to identify problems and find solutions, inspiring others, effective communication skills with the team, providing guidance and convenience to the staff, and the ability to select suitable individuals for specific roles. Creating a capable team that can effectively perform tasks is crucial for self-improvement. Delegating tasks to the Vice President of Operations to act on behalf of the President is an important factor that significantly influences the university's administrative effectiveness. This is because the President holds the highest authority in legally managing operations and drives the direction, mechanisms, and ultimate decision-making process, leading to optimal outcomes. Therefore, the main essence in determining the direction of the institution of higher education towards achieving its objectives successfully lies in following the policies and strategies laid out through various means. Consequently, the leadership qualities of the management play a vital role in influencing every factor and affecting the course of the institution of higher education to the greatest extent.

## Discussion

The goal is to elevate Thailand's higher education institutions to an international level that is on par with developed countries. To achieve this, universities need to undergo a transformation and adopt a new approach to management, becoming full-fledged digital or SMART universities. Additionally, they should implement the quality assurance system of the ASEAN University Network at the curriculum level (AUN-QA) by implementing Outcome-Based Education (OBE), utilizing learning outcomes as a foundation, and adhering to the 11 main criteria of the ASEAN University Network-Quality Assurance (AUN-QA), universities aim to promote quality assurance. This includes reflecting on the effectiveness of the 4 mission in domains: educational management/graduate production, research, academic service, and cultural and artistic preservation, including the importance of various factors that affect the effectiveness of academic administration in all 4 aspects mentioned, particularly the leadership qualities of high-level executives who determine the direction of the educational institution. They must have a broad vision, language skills in persuasive communication, in order to build networks with large-scale business entrepreneurs or other organizations, or stakeholders to collaborate in the development of an educational curriculum to produce quality graduates in line with the needs of employers. To establish a modernized management system by adopting a new organizational management model for the administration of higher education institutions. This includes determining the organizational structure, setting policies, strategies, and goals that align with the principles of elevating the institution to an international level, and to be consistent with the 4 mission areas by utilizing modern information technology as a tool for administration and management, as well as adopting innovative teaching and learning methods that meet the needs of learners, there is a large-scale database (big data) that assists in information retrieval and analysis, serving as a useful decision-making tool for administrators. There are also an adequate amount of media and materials available for personnel to carry out their tasks efficiently and give importance to the creation of values and culture in good work practices, based on the principles of good governance consisting of 10 guidelines, in order to ensure that the work performance of personnel is conducted with effectiveness and efficiency, resulting in maximum benefits for the educational institution. Moreover, develop the curriculum in the form of International Abroad and International at Home, which is used by foreign educational institutions that have already been developed to elevate Thai educational institutions to become fully-fledged international academic institutions in the future.

## Suggestions

### **The Direction towards becoming an international higher education institution of Thailand in the future**

Chadaporn Chotiradaporn (2020) Explain the comparison of characteristics of higher education institutions at the global level, between developed countries such as Canada, Europe, and North America, based on the study of Jane (2003) academics in Canada have stated that the internationalization of higher education institutions is a process that incorporates a blend of global perspectives and cultural diversity,

as outlined in the objectives, mission, and educational management of the institutions, while Han De Wit (2015) European academics say that the internationalization of higher education institutions is a process aimed at blending various dimensions of internationalism in order to enhance the quality of education and research for both students and professors overall. The goal is to empower graduates and faculty members to contribute to society. The internationalization of higher education institutions in Europe and North America is divided into 2 things as follows

1. International Abroad is a form of education management that encompasses various activities, including student and faculty exchange, academic collaborations, and international curriculum development.

2. International at Home is the development of curriculum, teaching methods, activities, or projects within an educational institution, with the insertion of international context. The main objective is to provide students who are unable to travel abroad with access to global knowledge and understanding of cultural diversity and differences.

For Thailand, the Office of the Higher Education Commission, under the International Institute for Higher Education Development, has defined the internationalization of Thai higher education institutions as a process of development through integrated missions that aim to cultivate personnel and students at all levels with the quality to adapt meaningfully and culturally in a changing global society. This institution can develop its own definition of internationalization based on the aforementioned concept, in order to align and suit the contexts of different institutions. (Office of Policy and Planning for Higher Education, 2018)

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## Study and find patterns to prevent problems from expanding the NEET group in the northeast of Thailand

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### Abstract

Like many other nations around the globe, Thailand is seeing a continuing rise in the NEET (Not in Education, Employment, or Training) problem. The younger generation is dealing with social welfare, economic regression, and competitive conditions. They tend to be NEETs, and in the near future, they will have a detrimental impact on population skills and the economy. This issue will continue if we don't understand why it's occurring and develop appropriate governmental policies that cater to young people. Additionally, the major issue of low-skilled labor will persist in the future. To study the problems of NEETs, develop patterns and guidelines to prevent the expansion of NEETs, and come up with policy-setting protection guidelines for state agencies and other related agencies to help them put these guidelines into action will help reduce the NEET phenomenon in Thailand.

**Keywords:** NEET, Youth population, Northeastern of Thailand

### Introduction

If a young person between the ages of 15 and 24 is not in school, work, or training, they are considered to be "NEET." This term comes from the International Labour Organization (ILO). The NEETs can be broken down into four groups: 1) Working from home, 2) Working between jobs, 3) Working with kids, and 4) Working without a job.

The NEET issue has been going on for ten years in many countries around the world. Their bad results have been seen in Latin America, the United States, Asia, and most of all, Europe. It was linked to poverty, social spending, and the number of kids not in school who were not of school age. Perceived Barriers (PB) and Professional Expectations (PE) are connected to how rural, under-qualified kids feel about their own abilities. Believed Barriers are things that people think might stop their present or future career growth. Most public policies that aren't open enough won't help lower the number of NEETs.

In Thailand, the number of NEETs has steadily grown. There were 12.87 percent, or about 1.2 million, in 2562 and 14.17 percent, or about 1.3 million, in 2563. There were 1500 of them in 2564, which is about 1.400.000. The growth rate of the NEET group was 1% per year on average. The number of young



Thai people has, in fact, gone down by 1.2% over the last ten years. One big reason for this is that 65% of these people are women, which is a problem. And there are the most Neet kids in the northeastern part of Thailand.

NEET youths have a negative effect on Thailand because they lack skills and aren't valued for their work. This hurts their long-term economic and social status, especially in poor families, and causes a longer-term labor shortage due to structural changes in Thailand's population, such as an aging society and a low birth rate. There is also the risk that these young people will lose skills that aren't useful anymore.

The north-eastern region in Thailand is the largest in area and population. Its average income per capita is the lowest in Thailand. People who live in the northeastern part have been poor for a long time, so these kinds of troubles are likely to happen. It is appropriate for educational purposes to study and analyze the problems of NEETs in the Southeast in order to come up with models and guidelines to stop the growth of NEET and to help state agencies and other relevant agencies make policy that will help them carry out future plans to stop the growth of NEET.

## Research Objectives

1. To study and analyze the problems and needs of NEETs in northeastern Thailand.
2. To develop patterns and guidelines to prevent the expansion of NEETs in northeastern Thailand
3. To come up with policy-setting protection guidelines for state agencies and other related agencies, to help them put these guidelines into action.

## Review of Related Literatures

Young people around the world who aren't in school or working have caught the attention of policymakers in recent years, and there are high political hopes for a wide range of intervention measures. Systematic understanding of the factors that enable policymaking is currently lacking, despite the focus on the whole world. The five areas that policymakers should think about: the concept of "NEET," the differences between the target group, how policies affect youth, possible answers, and factors that affect how youth deal with problems. The holistic concept (seeing youth as unique individuals whose involvement in the creation of the service makes it more likely to meet their real needs) must be applied to this group. Supporting youth means thinking about how different people in the same social group are, how different site-specific policies affect each other, how the youth see themselves and their freedom when using support services, possible ways for them to deal with stress, and the need for multidisciplinary teams to offer support in a caring, flexible, and time- and place-based setting. (Heidi Paabort, Paul Flynn, Mai Beilmann, Claudia Petrescu, 2023).

In United states Teenagers and young people who are not working, going to school, or training (NEET) may be more likely to have health problems. A little over fourteen percent of people between the ages of sixteen and twenty-five are not working or in school or training (NEET). The health of NEETs is worse

than that of non-NEETs. If successful efforts are made to get this group of people back into either school or work, their health may get better. (Raeven Faye Chandler, Alexis R. Santos Lozada, 2021)

Neet rates are high in the Mediterranean European Economic Area (MED EEA). So, to deal with the NEET problem, the European Union and state governments have come up with and put into place different policies. There are societal and contextual factors that NEET policies don't take into account, like being a mother, not having many friends, or not knowing the language. As a result of the need for (i) making policies more flexible by tailoring them to the specific problems NEETs face, (ii) making policies more focused, and (iii) taking regional factors into account when making policies, policies alone will not be able to solve the NEET problem. (Athina Avagianou, Nikos Kapitsinis, Ioannis Papageorgiou, A. H. Strand, Stelios Gialis, 2022)

Neet's group, which is part of generation Z, based on European statistics, there have been 14% of NEETs every year since 2020. Russian statistics show that the number of NEETs has gone up sharply (28%), which is likely because the coronavirus pandemic has made the job and school markets less stable. Neet's most common actions in Russia are basic, demonstrative, and symbolic consumption, which is mostly backed by parents, the government, and charity groups. (M. Bulanova, E. Artamonova, 2022.)

The best way to meet the many service needs of teens and young adults who are at risk is to communicate, work together, and organize the different services better and more often. Teachers (who help students with their careers and refer NEETs) and career advice service providers (who get NEET recommendations from teachers) are thinking about how well schools currently help students with their careers and how well they refer NEETs. Improving and keeping in touch with young people at risk, working together, and organizing different services seem to be the best ways to meet their many service needs. (Holliman, I. Schoon, J. Hurry, D. Waldeck, 2023.)

In Jambi, Indonesia, NEET youth are older, more likely to be female, have higher levels of education, are married, are mostly not migrants, and have fewer siblings or step-siblings than non-NEET youth; and the parents of NEET youth in Jambi tend to have higher incomes and are mostly not Malay. Gender, level of schooling, marital status, and parental income are all big factors that affect whether a young person is considered NEET. (Hardiani Hardiani, Yulmardi Yulmardi, Nyimas Dian Maisyarah, 2023.)

The rate of non-school-age youth not in school was linked to social spending, social injustice, and poverty. At the country level, more money spent on education might be a safety net. Getting rid of inequality, creating more jobs, and spending more on schooling (for example, through school-to-work programs) could help keep the NEET rate low or even bring it down. (S. Amendola, 2022)

To provide better services for NEET youth, we need to learn more about how to make policies that are linked to multidisciplinary methods. In Estonia, the current cross-sectoral and multi-level public policy system for NEETs doesn't fully understand the main goals. This is because it is affected by factors that make it harder to reach policy goals. The support strategy is meant to be used within a single structure and doesn't have a single value across the whole system. At the start of making policies, state-level coordinating parties need to agree on the system's long-term goals, how information flows and how well it works, as well as on roles that span sectors and how to handle processes across structures. This change

would make it easier for services to reach out to and work with kids from a variety of backgrounds at the local level. It would also make sure that barriers don't come up at the case level. (Raeven Faye Chandler, Alexis R. Santos Lozada, 2021.)

Spain has one of the highest rates of young people who are not in school or working in the European Union. Spain and the EU's youth policies are stuck because they look at the lives of young people negatively, focusing on their flaws instead of their unique backgrounds and structural reasons. The way public policies are made is based on this negative view. These policies won't work if they don't look at structural problems, different types of people, and young people as active citizens who are ready to (and already are) help make the future better, instead of seeing them as victims of policies that "invisibilize" or shame them. (Tanja Strecker, Joffre López, M. Àngels Cabasés, 2021.)

The number of NEETs is high in the Mediterranean Economic Area (MED EEA). So, to deal with the NEET problem, the European Union and state governments have come up with and put into place different policies. There are societal and contextual factors that NEET policies don't take into account, like being a mother, not having many friends, or not knowing the language. The rules of NEET can make things better, but they can't fix the issue if the underlying causes aren't fixed. This means that the policies should be more relevant to the person, which means that they should also take into account the regional and local views. (Carlos Pesquera Alonso, Almudena Iniesta Martínez, Práxedes Muñoz Sánchez, 2022.)

Perceived Barriers (PB) and Professional Expectations (PE) are linked to self-efficacy perceptions among rural, under-qualified youth. Perceived Barriers are beliefs about things that might stop current or future vocational growth. After taking into account the benefits of training offers and income, higher self-efficacy was linked to stronger PB. Also, men who had higher levels of self-efficacy had higher levels of PB, while men who had lower levels of self-efficacy had lower levels of PB compared to women in the same situations. These NEETs had stronger ideas about professional barriers after being given more training chances. So, rural NEETs who aren't qualified need person-centered methods from employment services to help them get jobs or training. (Amanda Nunes de Almeida, Francisco Simões, 2020.)

A study was done in junior high schools in five areas in Thailand to help students improve their higher-order thinking skills. There are ways to design and improve learning innovations based on what students think about them. 1) The material is easy for students to understand, fits their level of knowledge, and helps them make connections between what they learn in science and their everyday lives. 2) Multimedia makes it easy for students to find what they need and get it. The icon symbols could give you hints about the meaning of different sources of information and have links to these sources. Could also help students learn better by giving a lot of information about how science works. 3) In addition, using movies as a way to learn could help students understand the scientific method and work together to solve problems better. (Parama Kwangmuang, Suwisa Jarutkamolpong, Watcharee Sangboonraung, Srisuda Daungtod, 2021)

The north-eastern region in Thailand is the largest in area and population. Its average income per capita is the lowest in Thailand. This phenomenon leads to migration to big cities, which are considered

economic centers. The greatest population density is located within the Mueang district in one of the provinces with most service sources, as these places attract people and consequently industrial factories and service trades. (S. R. Suwanlee, J. Som-ard)

The disruption of education is now affecting learning settings, and the changes it brings about are reforming education. In this day and age, learning skills should focus on improving thinking abilities and coming up with new ideas for society. Different kinds of teaching materials, like 3D pop-ups, paper mache, slide cards, diagrams, digital books, and modeling clay. The best score went to creative thinking for learning in a big group. Pop-ups worked best for learning in a small group, and digital media was best for learning on your own. (Chanarong Wisetsat, P. Nuangchalerm, 2019.)

It is crucial to take into account longer-term priorities while nations work to address the several urgent issues that the youth in the region are currently facing. Targeted investment in the green, blue (ocean), digital, creative, and care economies holds great potential to provide decent jobs for young people while setting economies on a path towards greater sustainability, inclusivity, and resilience, as the ILO Global Employment Trends for Youth 2022 (ILO 2022b) analysis shows. To encourage decent work for youth in the Asia-Pacific region's recovery process, adolescents must be involved in the development and execution of policies and programs pertaining to employment. (Generalao, Ian Nicole, 2022.)

## Conclusion

Not in Education, Employment, or Training, or NEET, is a problem that has been seen as persistent and global in scope. Particularly in industrialized, wealthy nations like the US, Europe, Russia, and other Eastern European nations; also, in Asian nations like China, Korea, Japan, and India. However, the NEET generation is the same in developing nations with low average per capita income since communication in today's globe makes it easy for everyone to acquire the same information. It also frequently has a negative effect on nations that are experiencing a labor force shortfall when they enter an advanced age. Planning and developing suitable policies is therefore necessary to stop NEETs from happening or to encourage the new generation of NEETs to return to the workforce as soon as feasible.

All of the data indicates that the unique traits of NEETs differ from place to place, including motivation, surroundings, social and economic circumstances, and—most significantly—the State Department's approach to addressing these issues. The purpose of this study is to better understand the needs of northeastern NEETs in Thailand and the variables influencing their decision-making as NEETs. The goal is to propose a policy proposal for the State that will prevent and facilitate a proper and sustainable return to regular life.

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## Analysis of village owned enterprises (bumdes) development: efforts to create a developed and independent tourism village

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### Abstract

Village is the smallest unit of the country closest to the community that will be prosperous. Hopefully, developing village economic potential through Village-Owned Enterprises (BUMDes) will reduce dependence on government assistance and create an independent village. The village's economic potential reaches its optimal point by using right development strategy which will be discussed in this research. The objectives of this research it to know the description of BUMDes TIRTA ARUM. Second, to understand the internal factors that are the strengths and weaknesses of BUMDes TIRTA ARUM as well as the external factors that are opportunities and threats for BUMDes TIRTA ARUM. The last, to know possible alternative strategies to be implemented in the development of BUMDes TIRTA ARUM. This research is a qualitative descriptive type of research conducted in Pekalongan Regency, Central Java. The SWOT ( Strength, Weakness, Opportunity, Threat ) analysis method is used to determine BUMDes development strategy planning in optimizing the utilization of village economic potential as an alternative BUMDes strategy in order to increase community income and Village Original Income (PADes). Data collection techniques were carried out using questionnaires and interviews. Data was analyzed inductively and quantitatively. The research results show that BUMDes Tirta Arum needs business unit development. The new business units that need to be developed are (1) the microfinance institution (LKM) business unit in partnership with BRI Bank which has been the main partner of BUMDes Tirta Arum, (2) Development of the clean water business unit (PAMSIMAS) by producing bottled mineral water

**Keywords:** Economic Potential Development, BUMDes, and SWOT analysis

### Introduction

Village economic growth can be carried out by developing rural areas which can be achieved through community empowerment with the aim of increasing the productivity and diversity of existing businesses, providing facilities to support the improvement of the village economy, building and strengthening institutions that support the production and marketing chain, and optimizing human Resources. Village-Owned Enterprises (BUMDes) are village business institutions managed by the community and village government to strengthen the village economy formed based on village needs and potential.

BUMDes is a business entity whose capital is wholly or largely owned by the village through direct participation originating from village assets which are separated to manage assets, services and other businesses for the greatest welfare of the village community. The establishment of BUMDes is intended as an effort to accommodate all activities in the economic sector and/or public services managed by the village with the aim of improving the village economy, optimizing village assets so that they are useful for village welfare, increasing community efforts in managing the village's economic potential, opening employment opportunities and improving community welfare as well as increasing village community income and village original income.

It is hoped that the formation of BUMDes will be able to stimulate and drive the economy in rural areas. Economic assets in the village must be fully managed by the village community. The substance and philosophy of BUMDes must be imbued with a spirit of togetherness and *self-help* as an effort to strengthen the economic aspects of the institution. At this stage, BUMDes will move in line with efforts to increase the village's original sources of income, mobilize community economic activities where the role of BUMDes is shelter provider institution. This effort is also important in the framework of reducing the role of *free-riders* which often increase transaction costs in community economic activities through the practice of *rent-seeking* (Nurcholis, 2011).

SumurJomblangBogo Village, as one of the villages in Pekalongan Regency, has implemented the SumurJomblangBogo Village regulations regarding the formation of Village-Owned Enterprises, abbreviated as BUMDes, with the following BUMDes objectives:

Empowering village communities

Improving the village economy

Opening job opportunities.

Optimizing village assets to be useful for village welfare.

Develop business cooperation plans between villages or third parties.

Creating opportunities and market networks that support the public service needs of the communities.

Improving community welfare through improving public services, growth and equalization of the village economy.

Increasing Village Original Income (PADes).

BUMDes in SumurJomblangBogo Village, which is named BUMDes TIRTA ARUM has three business units consist of a tourism business unit in the form of a swimming pool, a food sufficiency business unit on 14.3 hectares of land, and a clean water supply business unit which is usually called community-based drinking water and sanitation provision (PAMSIMAS).

BUMDes TIRTA ARUM is categorized as developing BUMDes in the Pekalongan Regency area. In running its business, BUMDes TIRTA ARUM captures business opportunities needed by the community. The presence of BUMDes contributes to improving the local community's economy and village development. The most important thing in strengthening the village economy is strengthening *cooperative cooperation*



and building togetherness or establishing cohesion at all levels of village society so they become a driving force in efforts to eradicate poverty, unemployment and open market access.

Based on the explanation above, it is necessary to conduct research on "Analysis of the Development of Village-Owned Enterprises (BUMDes) TIRTA ARUM, SumurJomblangBogo Village, Bojong District, Pekalongan Regency". The research objectives are to know the description of BUMDes TIRTA ARUM, to understand the internal factors that are the strengths and weaknesses of BUMDes TIRTA ARUM as well as the external factors that are opportunities and threats for BUMDes TIRTA ARUM, and to know possible alternative strategies to be implemented in the development of BUMDes TIRTA ARUM.

## Literature review

### SWOT analysis

(Purwanti & Suyanto, 2021) say that SWOT analysis is the systematic identification of various factors to formulate company strategy. The strategic decision making process is always related to the development of the company's mission, goals, strategies and policies. This analysis is based on logic that can maximize strengths *and* opportunities, but simultaneously maximize *weaknesses* and *threats*. According to (Kurniawan & Haryati, 2017) all organizations have strengths and weaknesses in functional areas of business. No company is equally strong or weak in all business areas. Internal strengths or weaknesses are combined with external opportunities or threats and a clear mission statement, with the intent of exploiting internal strengths and overcoming weaknesses. The following is an explanation of the SWOT analysis (Irawan, 2017), namely:

Strengths are resources, skills, or other advantages related to a company's competitors and the market needs that the company hopes to serve. Strengths are specific competencies that provide a company with a competitive advantage in the market. Meanwhile, Weaknesses are limitations or deficiencies in resources, skills and capacity that effectively hinder company performance. These limitations in the form of facilities, financial resources, management capabilities and marketing skills can be a source of company weaknesses.

Opportunities are important favorable situations in a corporate environment. Important trends are one source of opportunity, such as technology companies and improving relationships between companies and buyers or suppliers is a kind of opportunities for companies. Meanwhile, threats are important unfavorable situations in the company environment. Threats are the main disruption to a company's current or desired position. The existence of new or revised government regulations can pose a threat to a company's success.

The fundamental objective of SWOT analysis is to identify trends, forces and conditions that have potential impacts on the formulation and implementation of a company's marketing strategy. This is an important step for two reasons. First, any change in the external environment can have a serious impact on a company's markets. Second, this step can provide an opportunity to organize the most important aspects to evaluate.



## SWOT Analysis as a Strategy Formulation Tool

SWOT analysis is the systematic identification of factors for formulating company strategy. This analysis is based on logic in maximizing strengths *and* opportunities, but simultaneously maximizing weaknesses and threats. The strategic decision making process is always related to the development of the company's mission, goals, strategies and policies. Thus, strategic planners must analyze the company's strategic factors in the current conditions. This is called situation analysis. The most popular model for analyzing this situation is SWOT analysis. Research shows that company performance can be determined by a combination of internal and external factors. Both factors must be considered in the SWOT analysis.

### Internal Environmental Analysis

According to (Desky, 2019) there are six main internal forces that influence a company's internal environment, namely: (1) *Functions of Management*, (2) Marketing, (3) Finance, (4) Product/operations function, (5) Research and development and information link all business functions and provide the basis for all managerial decisions.

### External Environmental Analysis

According to (Juliet, 2018), there are five main external forces that influence a company: (1) Economic factors have a direct impact on the potential attractiveness of various strategies, (2) Social, cultural, demographic and environmental forces have large impact on almost all products, services, markets, and consumers, (3) Government regulators, deregulators, subsidizers, employers, and primary consumers of organizations, (4) Technological forces present major opportunities and threats that must be considered in strategy formulation, and (5) Collecting and evaluating information about competitors

According to (Hamdi, 2016), a SWOT matrix is needed to carry out a SWOT analysis easier. The SWOT matrix according to (Driantoro, 2019), is an important matching tool that helps managers develop four types of strategies: strengths-opportunities (SO) strategies, weaknesses-opportunities (WO) strategies. Strength-threat (ST) strategy and weakness-threat (WT) strategy. The SO strategy uses the company's internal strengths to take advantage of external opportunities. The WO strategy aims to improve internal weaknesses by taking advantage of external opportunities. ST strategy uses company strengths to avoid the impact of external threats. WT strategy is a defensive tactic carried out to reduce internal weaknesses and avoid external threats.

### State of the art

Several previous studies have been carried out regarding the development strategy for Village-Owned Enterprises, including Dewi and Lutfiyah (2018) who revealed that there are three very important factors in developing BUMDes, including water sources which are an important asset for villages, physical infrastructure. support, and positive support from village residents. Apart from that, another key to the success of BUMDes organizational development is social, family and professionalism. An important factor

in developing Village-Owned Enterprises (BUMDes) is determining the type of business. The business that BUMDes wants to develop must be linked to the type of business. Alternative development of BUMDes can be done through Village Banks. Based on the research results, it shows that the development of Village Banks can provide a fairly good contribution to Village Original Income (PADes). Apart from that, Village Banks can increase community participation in village development. This is done through community participation as Village Bank customers. Through the Village Bank, it turns out that not only can people borrow, but people are also taught to save, because the Village Bank system requires customers to save a small portion of their loans. Based on the research results, it can be seen that the main factors that determine the success of implementing the BUMDes development strategy are village policy support, community participation, and also the ability of managers.

Meanwhile, research conducted by Muhammad and Aeko (2019) revealed several factors that could hinder the development and growth of village-owned companies, including (a) lack of administrator knowledge in understanding the meaning of leadership, managerial and governance of village-owned companies due to lack of experience as a director in entrepreneurship to manage business organizations; (b) lack of established contractual relationships with any parties and lack of owned business units; (c) lacking the strength based on the spirit of local emancipation; (d) the absence of strong village traditions due to a lack of solidarity, cooperation and mutual cooperation between village residents; (e) does not receive full support from the village supra. The driving factors for village development include village potentials, such as economic and environmental potential. Apart from that, the supporting capacity of village communities and village government is also very important for village development. Meanwhile, conflict of interest between community members and the village government can hinder village development result in village development programs being abandoned or failing.

The results of research conducted by Niswatu (2019) explain that transportation conditions and infrastructure are important points that can become strengths in the development of BUMDes. Meanwhile, lack of socialization in the community can be an obstacle to the development of BUMDes. This results in the development of village businesses being less than optimal. Every region or village certainly has its own characteristics, both in terms of geography and social conditions. This means that the factors that support or hinder the development of BUMDes may vary according to the characteristics of each region.

Therefore, the aim of this research is to identify supporting and inhibiting factors in the development of TIRTA ARUM Village-Owned Enterprises (BUMDes) in SumurJomblangBogo Village, Bojong District, Pekalongan Regency. Then this research also wants to know the strategy for developing TIRTA ARUM Village-Owned Enterprises (BUMDes) in managing and utilizing the wealth that becomes assets of SumurJomblangBogo Village in Bojong District, Pekaongan Regency.

## RESEARCH ROADMAP

Village-Owned Enterprises (BUMDes) are quite important supporting activities can encourage the economy of a village. In running a business there are obstacles faced, these problems involve external

factors and internal factors, namely strengths, weaknesses, opportunities and threats in managing BUMDes so that in development analysis SWOT analysis can be used. This analysis uses a SWOT matrix and position matrix to determine strategies for developing BUMDes.

Figure 1 Research Roadmap

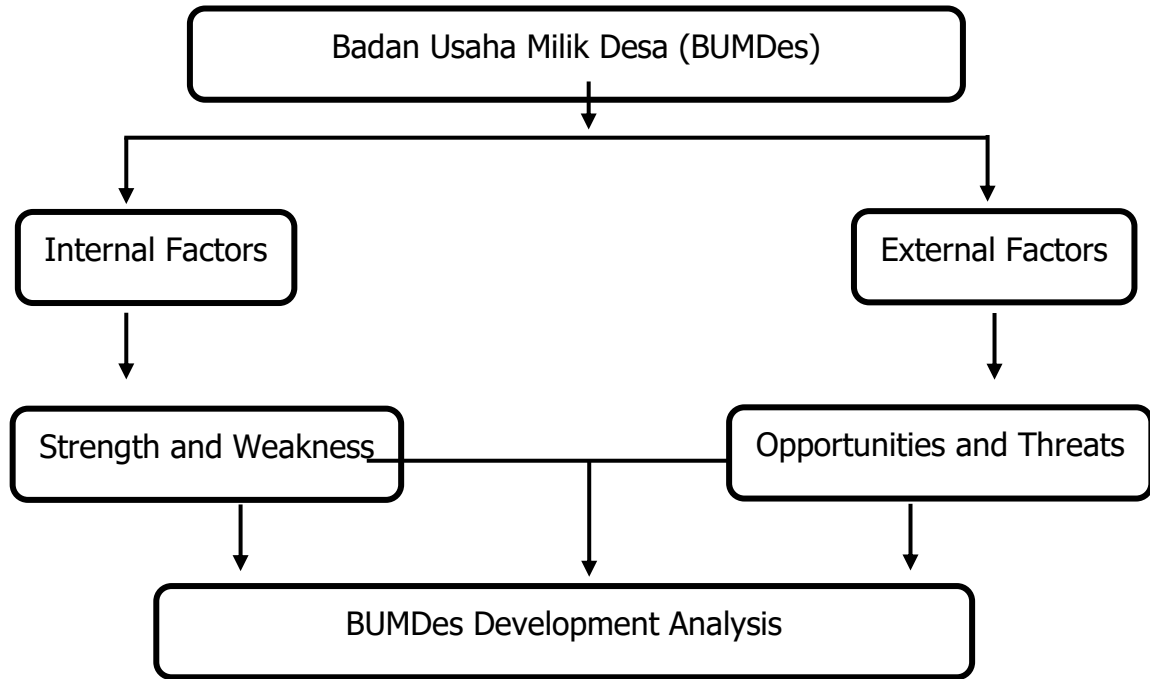


Figure 1: Research Roadmap

### Research methods

This research uses a qualitative approach with descriptive research type. The qualitative approach in this research was used to analyze the strategy for developing Village-Owned Enterprises (BUMDes) in SumurJomblang Bogo Village, Sragi District, Pekalongan Regency by describing the state of the research object based on facts obtained from interviews, documentation and observations related to the strategy. Development of BUMDes TIRTA ARUM located in SumurJomblang Bogo Village, Sragi District, Pekalongan Regency. Data sources are divided into two, namely primary data and secondary data. The primary data is in the form of interview results, while the secondary data is in the form of documents related to the research.

Data was collected through interviews, observation and documentation. Interview process with informants. The informants interviewed were people directly related to the focus of this research. Among them are the Secretary of SumurJomblang Bogo Village, Sragi District, Pekalongan Regency, the TIRTA ARUM BUMDes Apparatus, as well as the Head of Village Economics at the Pekalongan Regency PMD Service. Observations are carried out to see and observe directly the conditions in the field and obtain a broader picture of the topic being studied. The observation used is passive observation by observing without having

to participate in the activities carried out by the object being studied. Documentation data was obtained through legal and regulatory documents, financial reports, activities and photos related to the research focus.

The data analysis techniques used in this research are reduction, data presentation and drawing conclusions. Alternative development strategies for BUMDes TIRTA ARUM were formulated using the SWOT matrix. QSPM ( *Quantitative Strategic Planning Matrix* ) is used to determine strategic priorities selected in BUMDes development. Data was analyzed using SWOT; analysis of strengths, weaknesses, opportunities and threats ( *Strengths, Weakness, Opportunities and Threats* ). According to Rangkuti (2018), SWOT is an analysis tool to identify various factors systematically by looking at the relationship or interaction between internal factors in the form of strengths and weaknesses and external factors in the form of opportunities and threats so that a strategy can be formulated for the company or organization.

The results of the internal and external environmental analysis will be translated into internal advantages and disadvantages (strengths and weaknesses) as well as external advantages and disadvantages (opportunities and threats) contained in the SWOT analysis. The conditions of this system are grouped by Rangkuti (2018) into four quadrants.

After the SWOT analysis is made, a SWOT matrix is then carried out to formulate strategic alternatives for the company by producing four sets of possible strategic alternatives as follows:

- SO Strategy : A strategy that utilizes all strengths to seize and exploit maximum opportunities.
- ST Strategy : Strategy for using the company's strengths to overcome threats.
- WO Strategy : This strategy is implemented based on exploiting existing opportunities by minimizing existing weaknesses.
- WT Strategy : This strategy is based on defensive activities and tries to minimize existing weaknesses and avoid threats.

To determine the most appropriate and main strategic priorities, a QSPM Matrix analysis is carried out for decision making. The QSPM matrix provides an overview of the relative advantages of each strategy which then provides an objective basis for selecting one or several specific strategies of choice.

## Results and discussion

### BUMDes Organizational Structure

The organizational structure of BUMDes Tirta Arum management consists of:

- a. Deliberative Board: Headman, Chairman and members of the Village Advisory Board (BPD), Community Representatives (RW, RT, Community Leaders, and Village Community Institutions)
- b. Supervisory or Inspection Board (BPD)
- c. Advisor or Commissioner (Headman)
- d. Operational Executive or Director

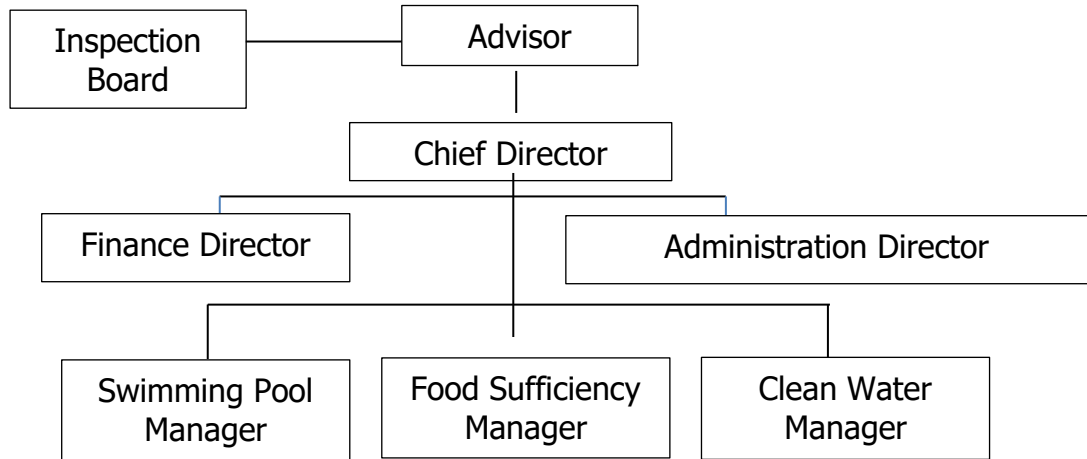


Figure 2: Organizational Structure of BUMDes Tirta Arum

## 2. BUMDes Capital

Tirta Arum BUMDes capital comes from:

- a. Sumur Jomblang Bogo Village Government
- b. Community savings
- c. Government assistance, provincial government and district government
- d. Soft loans
- e. Business collaboration with other parties

## 3. Type of Business

The Tirta Arum BUMDes has three types of business, namely

- a. Tourism business units in form of swimming pools,
- b. Food sufficiency business units on 14.3 hectares of land, and
- c. The clean water business unit in form of clean water procurement which is usually called community-based drinking water and sanitation provision (PAMSIMAS).

## Internal Factors and External Factors of BUMDes Tirta Arum

Analysis of external and internal factors was carried out by knowing the factors outside and inside BUMDes Tirta Arum, Sumur Jomblang Bogo Village, Bojong District, Pekalongan Regency which could influence the development of BUMDes Tirta Arum. Internal factor analysis is used to analyze internal factors which will certainly influence the development of BUMDes Tirta Arum. These internal factors can be identified as strengths and weaknesses for the development of BUMDes Tirta Arum, while external factor analysis is carried out by looking at factors outside BUMDes Tirta Arum to identify and evaluate trends that are beyond control. This analysis focuses on obtaining key factors that are opportunities and threats for the

development of BUMDes Tirta Arum makes it easier to determine strategies for seizing opportunities and avoiding threats.

1. Identifying Internal Factors

Through identifying internal factors, the strengths and weaknesses of BUMDes Tirta Arum will be known. The internal environmental conditions observed are management, finance, human resources, facilities and infrastructure, as well as legal protection.

**Table 1:** Identification of Internal Factors for the Development of BUMDes Tirta Arum

Internal factors	Strength	Weakness
Management	Good management of BUMDes Tirta Arum	-
Finance	<ul style="list-style-type: none"> <li>• Sufficient business capital</li> <li>• The financial turnover of the business sector is running well</li> </ul>	<ul style="list-style-type: none"> <li>• Requires funds for the development of BUMDes Tirta Arum</li> <li>• Funding requirements for shop tenants</li> </ul>
Human Resources	<ul style="list-style-type: none"> <li>• The level of education and human resource capabilities are quite good</li> <li>• HR is experienced and appropriate to their expertise</li> </ul>	Lack of human resources
Infrastructure	Utilization of facilities and infrastructure is good	Infrastructure facilities belong to the village and community of Sumur Jomblang Bogo
Legal protection	Has a Legal protection	

Source: Primary Data Processed in 2023

2. Identifying External Factors

Through identifying external factors, opportunities and threats for BUMDes Tirta Arum can be identified. The external environmental conditions observed are technology, business partners, government, village potential, community participation and competitors.

**Table 2:** Identification of External Factors for the Development of BUMDes Tirta Arum

External Factors	Opportunity	Threat
Technology	Technological developments are increasingly advanced.	<ul style="list-style-type: none"> <li>• Not yet able to use technology optimally.</li> <li>• Poor internet network in Sumur Jomblang Bogo Village.</li> </ul>
Business partner	Establishing good cooperation with business partners.	
Government	Support from local government	

Village Potential	Has excellent village potential for development.	
Competitor	More complete attractions	<ul style="list-style-type: none"> <li>• There are two competitors with the same type of business. In Karanganyar and Kedungwuni</li> <li>• Complaints from competitors.</li> </ul>
Society participation	<ul style="list-style-type: none"> <li>• The participation of the Sumur Jomblang Bogo Village community was quite good.</li> <li>• The perception of the people of Sumur Jomblang Bogo Village towards BUMDes Tirta Arum is Good</li> </ul>	

Source: Primary Data Processed in 2023

### Formulation of Alternative Development Strategies for BUMDes Tirta Arum

The formulation of Alternative Development Strategies for BUMDes Tirta Arum was carried out using the SWOT matrix, then selecting several of the best strategies and then determining strategic priorities using QSPM.

#### a. SWOT Matrix

The SWOT matrix is used to formulate alternative business development strategies. This method can clearly illustrate how the external opportunities and threats faced by the company can be adjusted to its strengths and weaknesses. This matrix produces four cells of possible alternative strategies, namely SO strategy, WO strategy, WT strategy and ST strategy

**Table 3:** Formulation of Alternative Development Strategies for BUMDes Tirta Arum

IFAS	Strengths (S)	Weakness (W)
/	a. Very good management of BUMDes Tirta Arum. b. The company's capital to carry out its activities is sufficient. c. The financial turnover of the business sector is running well. d. The level of human resource capability and education is quite good. e. HR is experienced and appropriate to their expertise. f. Utilization of facilities and infrastructure belonging to the Village or the community of Sumur Jomblang Bogo Village g. Already has a legal protection	a. Requires funds for the development of BUMDes Tirta Arum b. Funding requirements for shop tenants c. Just use a little human resources. d. Facilities and infrastructure are still inadequate/modest.

<p>EFAS</p>		
<p><b>Opportunities (O)</b></p> <ul style="list-style-type: none"> <li>a. Technological developments are increasingly advanced.</li> <li>b. Establish good cooperation with business partners.</li> <li>c. Support from local government.</li> <li>d. Has excellent village potential for development.</li> <li>e. More complete attractions.</li> <li>f. The participation of the Sumur Jomblang Bogo village community is quite good and the perception of the village community is good</li> </ul>	<p><b>So strategy</b></p> <ul style="list-style-type: none"> <li>a. Performance optimization with technology development.</li> <li>b. Utilizing the Village's potential by forming new business fields.</li> <li>c. Increase sales by adding more complete attractions</li> </ul>	<p><b>Wo strategy</b></p> <ul style="list-style-type: none"> <li>a. Collaboration with the Government and local banks for access to capital</li> <li>b. Forming a group of agricultural culinary craftsmen</li> <li>c. Submit a business establishment to the relevant authorities to get easy loans</li> <li>d. Utilize marketing networks both online <i>and</i> offline <i>in</i> introducing and marketing service products</li> </ul>
<p><b>Threat</b></p> <ul style="list-style-type: none"> <li>a. Not yet able to use technology optimally</li> <li>b. The poor internet network in Sumur Jomblang Bogo Village</li> <li>c. There are two competitors in Karanganyar and Kedungwuni with the same type of business.</li> <li>d. Complaints from competitors</li> </ul>	<p><b>Strategy st</b></p> <ul style="list-style-type: none"> <li>a. Create a BUMDes website</li> <li>b. Adding business types</li> <li>c. Make the best use of available technology for the development of BUMDes</li> </ul>	<p><b>Wo strategy</b></p> <ul style="list-style-type: none"> <li>a. Develop and optimize service functions</li> <li>b. Development of financing institutions</li> </ul>

Source: Primary Data Processed in 2023

### Determining Strategic Priorities for the Development of BUMDes Tirta Arum

Strategic decisions must always be made to select the most appropriate activities and allocate organizational resources. Determining strategic priorities is the final stage to determine which strategy is prioritized to be implemented. It is a big mistake for managers to implement too many strategies at the same time. Because it will drain company resources for every strategy becomes suboptimal and vulnerable (David, 2006).

Based on the results of the SWOT matrix analysis, eleven alternative strategies have been obtained that can be applied for the development of BUMDes Tirta Arum, Sumur Jomblang Bogo village, Bojong District, Pekalongan Regency. To determine the most appropriate strategic priorities, a QSPM ( *Quantitative Strategic Planning Matrix* ) Matrix analysis is carried out for decision making. The QSPM matrix provides an overview of the relative advantages of each strategy by providing an objective basis for selecting one or



several specific strategies of choice. The next step is to look for alternative strategies that can be implemented so that three strategies are selected consist of the following:

1. Optimize the use of available technology for the development of BUMDes
2. Adding more qualified human resources.
3. Utilizing village potential by creating new types of business, for example microfinance institutions and the production of bottled mineral water

**Table 4:** QSPM ( *Quantitative Strategic Planning Matrix* ) Development of BUMDes Tirta Arum

Key Factors		Bobot	Alternative Strategy					
			Strategy I		Strategy II		Strategy III	
			US	BAG	US	BAG	US	BAG
Internal Key Factors								
1.	BUMDes management is good	0.13	4	0.52	3	0.39	4	0.52
2.	Capital to carry out activities is sufficient	0.06	3	0.18	2	0.12	3	0.18
3.	The financial turnover of the business sector is running well	0.09	3	0.27	3	0.27	3	0.27
4.	The level of human resource capability and education is quite good	0.09	4	0.36	2	0.18	4	0.36
5.	HR is experienced and appropriate to their expertise	0.13	3	0.39	2	0.26	4	0.52
6.	Utilization of facilities and infrastructure belonging to the Village or the community of Sumur Jomblang Bogo Village	0.06	2	0.12	2	0.12	2	0.12
7.	Has a legal protection	0.13	4	0.52	4	1.52	4	0.52
8.	Requires funds for the development of BUMDes Tirta Arum	0.13	4	0.52	4	0.52	4	0.52
9.	Lack of human resources	0.09	3	0.27	4	0.36	3	0.27
10.	Facilities and infrastructure are still inadequate/modest	0.09	2	0.18	2	0.18	1	0.09
Total Weight 1								
External Key Factors								
11.	Technological developments are increasingly advanced	0.12	4	0.48	4	0.48	4	0.48
12.	Establish collaboration with business partners	0.09	4	0.36	3	0.27	4	0.36
13.	Support from local government	0.09	4	0.36	3	0.27	4	0.36
14.	Has good village potential for development	0.12	4	0.48	4	0.48	3	0.36
15.	More complete attractions	0.09	2	0.18	2	0.18	4	0.36
16.	Good community participation	0.09	3	0.27	2	0.18	4	0.36
17.	Public perception of BUMDes Tirta Arum is good	0.09	3	0.27	2	0.18	3	0.27
18.	Not yet able to use technology optimally	0.09	2	0.18	3	0.27	2	0.18

19.	The poor internet network in Sumur Jomblang Bogo Village	0.09	2	0.18	2	0.18	2	0.18
20	There are two competitors in Karanganyar and Kedungwuni	0.06	1	0.06	1	0.06	4	0.24
21.	Complaints from competitors	0.06	1	0.06	1	0.06	4	0.24
Total Weight 1								
Total Attractiveness Value 6.21 5.53 6.76								

Based on this ranking, it is known that the QSPM matrix analysis considers the internal key factors and external key factors that have been previously identified. Implementation of alternative strategies based on the TAS (*Total Attractive Score*) value in the QSPM matrix can be carried out from the highest strategic TAS value. From the three alternative development strategies of Tirta Arum BUMDes, the main priority for development is strategy III, that is utilizing village potential by creating new type of business with a TAS value of 6.76. The alternative strategy for the second development priority is strategy I, that is optimizing the use of available technology for the development of BUMDes, with a TAS (*Total Attractive Score*) value of 6.21. And the third priority alternative strategy is strategy II, that adding qualified human resources with a TAS (*Total Attractive Score*) value of 5.53.

## Conclusions and suggestions

The results of the research and discussion conclude the following:

1. BUMDes Tirta Arum, Sumur Jomblang Bogo village, Bojong subdistrict, Pekalongan district, was established in 2022, has a microfinance institution business unit and the development of a clean water business unit (PAMSIMAS) with a bottled mineral water production.
2. The main priority strategies for developing BUMDes Tirta Arum, Sumur Jomblang Bogo village, Bojong sub-district, Pekalongan district is strategy III that is utilizing the village's potential by creating new types of businesses with a TAS value of 6.76. The alternative strategy for the second development priority is strategy I, that is optimizing the use of available technology for the development of BUMDes, with a TAS (*Total Attractive Score*) value of 6.21. and the third priority alternative strategy is strategy II, that is adding qualified human resources with a TAS (*Total Attractive Score*) value of 5.53.

Based on the results of research and analysis related to BUMDes development strategies, the following recommendations are suggested:

1. In developing BUMDes Tirta Arum, Sumur Jomblang Bogo village, Bojong sub-district, Pekalongan regency, it is best for managers or administrators to choose strategy III that is exploiting the village's potential by creating new types of businesses.
  - a. The microfinance institution (LKM) business unit in partnership with BRI Bank. BRI Bank is the main partner of BUMDes Arum Tirta
  - b. Development of a clean water business unit (PAMSIMAS), with a bottled mineral water production.

2. In developing BUMDes Tirta Arum, Sumur Jomblang Bogo village, Bojong sub-district, Pekalongan district, guidance and direction from the Pekalongan district and Bojong sub-district governments is needed.

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## Purchase decision of green product "batik with natural dyes"

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### Abstract

Now batik is switching to using synthetic materials to increase efficiency and pursue market demand regardless of the impact on nature. This study aims to test and analyze environmental awareness, product knowledge, and willingness to pay more on purchasing decisions for green batik products with natural dyes. This type of research is correlational. The population in this study is consumers who have bought batik with natural dyes purchased in Pekalongan City. The sampling method used is purposive sampling and taking samples totaling 100 people. The analytical tools used in this study are multiple linear regression analysis and t test as a model feasibility test, using SPSS software. Based on the results of hypothesis testing, it is known that all variables, namely environmental awareness, product knowledge, and willingness to pay more for consumer purchasing decisions. Now batik is switching to using synthetic materials to increase efficiency and pursue market demand regardless of the impact on nature. This study aims to test and analyze environmental awareness, product knowledge, and willingness to pay more on purchasing decisions for green batik products with natural dyes. This type of research is correlational. The population in this study is consumers who have bought batik with natural dyes purchased in Pekalongan City. The sampling method used is purposive sampling and taking samples totaling 100 people. The analytical tools used in this study are multiple linear regression analysis and t test as a model feasibility test, using SPSS software. Based on the results of hypothesis testing, it is known that all variables, namely environmental awareness, product knowledge, and willingness to pay more for consumer purchasing decisions

**Keywords:** Environmental Awareness, Product Knowledge, Purchase Decision, Batik

### Introduction

Businesses and consumers are now starting to move against one of the biggest challenges, which is to protect and conserve natural resources and the environment. We must pay more attention to whether the way we produce and our behavior in consuming products has an impact on nature (Laroche, Bergeron, & Barbo-Forelo, 2001). Public awareness of the importance of quality of life and good health will open up great opportunities for green product and green consumerism businesses. Green products are products that are not harmful to humans and the environment, as well as resources that are managed not wasteful, waste that is not excessive and there is no cruelty to animals (Kasali, 2005), while green consumerism itself

is a consumerism movement that demands their rights to get decent, safe, and environmentally friendly products.

Now batik is switching to using synthetic materials to increase efficiency and pursue market demand regardless of the impact on nature. In the above concerns, researchers want to understand whether there is a motive for environmental violence, and have knowledge of the goods consumers buy, and whether they are willing to pay more to buy batik with natural dyes. One of the main problems with the environment that occurs in the city of Pekalongan is the widespread use of batik production methods and raw materials that are not environmentally friendly, this is done to reduce production costs and increase efficiency in producing batik.

According to Sumarwan (2008), it is important for marketers to understand consumer knowledge, because what is bought, how much is bought, where to buy, and when to buy will depend on consumer knowledge about these things. In Shirin and Kambez (2011), consumer behavior research and product knowledge play an important role. During the buying process, the amount of knowledge the consumer has about the product he has, will not only affect his information retrieval behavior, but also at the same time, influence the processing of decision making.

The use of conscious and proactive methods that do not harm nature is increasing for consumers, organizations, governments, and policies around the world. However, understanding of environmentally friendly consumption is still an issue for business ethics, marketing and psychology literature, and others (Aguinis & Glavas, 2012; Esperanza Villa Castaño et al. 2016). Product knowledge contributes or influences consumer purchasing decisions, this is evidenced in the research of Shirin et al (2011) and Lin Long-Yi et al (2006). Not only that, according to Aron O'Cass (2010) that subjective product knowledge influences purchasing decisions.

**Research method**

The sampling method in this study uses purposive sampling techniques, which is a way of sampling by setting characteristics that are in accordance with the objectives. This research was conducted by taking data from respondents. The data taken is from a sample that is representative of the entire population. Then the sample taken from the population must be truly representative (representative). The sample of this study uses criteria that have purchased batik with natural dyes in the city of Pekalongan at least once and the questionnaire will be distributed via google form. This study examines the relationship between environmental awareness, product knowledge, and willingness to pay more for purchasing decisions. The operational and measurement definitions of the two variables are as follows:

**Table 1:** Variable definition and operationalization

No	Variable	Definition	Indicator
1.	Environmental awareness	Environmental awareness is an attitude towards biophysical impacts that occur on the	1.Ignorance 2.Poverty

No	Variable	Definition	Indicator
		environment as a result of individual and organizational activities referred to as consumer concern for the environment (Suki, 2013).	3.Kemanusaiaan 4.Lifestyle
2.	Product knowledge	Product knowledge is an intrinsic clue that is very important for consumers to consider when evaluating products before making a purchase. (Zeithaml (1998) in Roslina (2009))	1. Security 2. Ingredients 3. Functional.
3.	Willingness to pay more	Willingness to pay more (WTP) is used as a proxy measure of environmental behavior for eco-friendly products and is measured as the stated "willingness to pay more" that consumers express more money (expressed as a percentage) for eco-friendly products compared to conventional alternatives (products that do not place importance on environmental impact). (Bray et al. 2011; Carrington et al. 2014).	1.Economic conditions 2.Health conditions 3.Family conditions
4.	Purchase decision	Purchasing decision is a purchase decision making process that includes determining what to buy or not to make a purchase and the decision is obtained from previous activities (Assauri, 2002).	1.Steadiness in a product 2.Habits in Buying Products 3.Provide recommendations to others 4.Make a repurchase

## Results and discussions

In testing this data description, researchers try to find out the picture or condition of respondents who are sampled in this study. From the collection of questionnaire data on the results of respondents' answers, with the number of samples, namely as many as 100 consumers purchasing green products "Batik with natural dyes". The results of processing data on the characteristics of respondents that have been carried out by researchers can be seen in the tables below:

**Tabel 2:** Characteristics of respondents by hometown

No.	Hometown	Frequency (People)	Percentage
1.	Bogor	10	10%
2.	Jakarta	35	35%
3.	Depok	8	8%
4.	Tangerang	2	2%
5.	Bekasi	4	4%
6.	Pekalongan	10	10%
7.	Makasar	2	2%
8.	Bali	2	2%
9.	Semarang	3	3%
10	Surabaya	20	20%
11	Medan	4	4%
Sum		100	100%

**1. Hypothesis Testing**

The t-test is performed to determine whether the free variable partially has an influence on the free variable on the dependent variable. If the regression coefficient is significant at t-significant < 0.05 or 5%, it means that the independent variable has a significant influence on the dependent variable and vice versa. Test the hypothesis with the following output results:

**Tabel 3:** Hypothesis Testing

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.708	.969		5.892	.000
1 Environmental Awareness (X1)	.328	.076	.521	4.313	.000
Product Knowledge (X2)	.143	.049	.304	2.292	.008
Willingness to Pay More (X3)	.232	.068	.321	3.396	.001

a. Dependent Variable: Purchasing Decision



**Tabel 4:** Hypothesis Testing Summary

Variable	t <sub>count</sub>	t <sub>table</sub>	Sig.	Reference Value	Research Results	Conclusion
Environmental Awareness (X1)	4,313	1,980	0,000	0,05	Environmental awareness has a positive and significant influence on Purchasing Decisions	H1 accepted
Product Knowledge (X2)	2,292	1,980	0,008	0,05	Product Knowledge has a positive and significant influence on Purchasing Decisions	H2 accepted
Willingness to Pay More (X3)	3,396	1,980	0,000	0,05	Willingness to pay has a more positive and significant influence on Purchasing Decisions	H3 rejected

Based on the results in table 4 above which is a table of statistical test results t, it can be concluded as follows:

1. The Influence of Environmental Awareness on Purchasing Decisions

Based on the calculation results of the Coefficients table above, a calculated number of 4.313 was obtained. Based on the level of significance used with an error level of  $\alpha = 0.05$ , the results above are known that the significance value is  $0.000 < 0.05$ . Thus, hypothesis one (H1) is accepted, meaning that there is a positive influence of Environmental Awareness on Purchasing Decisions.

2. The Influence of Product Knowledge on Purchasing Decisions

Based on the calculation results of the Coefficients table above, a calculated number of 2.292 was obtained. Based on the level of significance used with an error level of  $\alpha = 0.05$ , the results above are known that the significance value is  $0.008 < 0.05$ . Thus, hypothesis two (H2) is accepted, meaning that there is a positive influence of Product Knowledge on Purchasing Decisions.

3. The Effect of Willingness to Pay More on Purchasing Decisions

Based on the calculation results of the Coefficients table above, a calculated number of 3.396 was obtained. Based on the level of significance used with an error level of  $\alpha = 0.05$ , the results above are known that the significance value is  $0.000 < 0.05$ . Thus, hypothesis three (H3) is rejected, meaning that there is a positive influence of Product Knowledge on Purchasing Decisions.

## 2. The Influence of Environmental Awareness on Purchasing Decisions

The results of the first hypothesis testing have met the test criteria. This means that environmental awareness has a significant positive effect on green product purchasing decisions. It is shown statistically that the environmental awareness variable has a significance value of  $0.000 < 0.05$ , this means that the better the environmental awareness of batik green products with natural dyes, the greater the chance of attracting consumers to make purchasing decisions. Based on the theory, Chen suggests that ecological consciousness, which controls ecological behavior, is a basic understanding and attitude towards the ecological environment, when investigating ecological awareness and behavioral characteristics of consumers (Chen and Yu, 2011).

This finding proves that the higher consumer awareness of the environment, the more it will have an impact on increasing purchasing decisions for green batik products with natural dyes. Consumers who have environmental awareness will consider environmental factors when buying batik. So when going to buy batik, environmentally conscious consumers will tend to choose batik green products such as batik with natural dyes. Thus, it can be stated that the presence of green products such as batik with natural dyes that tend to have minimal environmental impact can affect purchasing decisions.

This is relevant to the answer data of respondents in the field who answered in the affirmative and strongly agreed with the positive perception so that environmental awareness has a significant positive effect on purchasing decisions. Consumers who are environmentally conscious tend to buy products that have less negative impact on the environment. This result is in line with the results of research conducted by Sari (2014) and Ending tri margayanti (2013) which states that environmental awareness has a positive and significant effect on purchasing decisions.

## 3. The Influence of Product Knowledge on Purchasing Decisions

The results of the second hypothesis test have met the test criteria. This means that product knowledge has a significant positive effect on green product purchasing decisions. It is shown statistically that the product knowledge variable has a significance value of  $0.008 < 0.05$ , this means that the better the product knowledge about batik green products with natural dyes, the greater the chance of attracting consumers to make purchasing decisions. The influence of product knowledge related to purchasing decisions has been proven by Wang and Hwang's previous research in the journal Tommy Setiawan Ruslim et al., (2012), concluded that consumers with high product knowledge will evaluate products based on quality because consumers feel confident with their product knowledge. Thus, consumers will become aware of the value of the product and consequently develop purchase intensity.

The results of the study show that product knowledge has a positive and significant effect on purchasing decisions. This means that knowledge about green products that are safe for making batik and safe for health can make consumers confident to buy batik with natural dyes. Then also, the existence of good knowledge about green products as products that help preserve the environment and nature is also able to make consumers prioritize buying these green products.

Thus, it can be stated that the phenomenon of knowledge about safety, content and good and correct functionality owned by consumers can affect the purchase decision of green batik products with natural dyes. This is relevant to the answer data of respondents in the field who answer in the affirmative and strongly agree with these positive perceptions so that product knowledge has a positive and significant effect on purchasing decisions. This result is in line with the results of research conducted by Rusniati & Rahmawati (2019) and Indarto Candra Yoesmanam (2015) which states that product knowledge has a positive and significant effect on purchasing decisions.

#### 4. Effect of Willingness to Pay on Purchase Decision

The results of testing the third hypothesis have not met the test criteria. This means that the product knowledge hypothesis has a significant negative effect on the purchase decision of green products, is rejected. It is shown statistically that the product knowledge variable has a significance value of  $0.000 < 0.05$ , this means that the higher the willingness to pay more about batik green products with natural dyes, the greater the opportunity to attract consumers to make purchase decisions.

The results of the study show that willingness to pay has a more positive and significant effect on purchasing decisions. This means that empirical facts in the field show that the majority of respondents know that environmentally friendly products usually have high prices, therefore for health reasons consumers are willing to pay higher for the purchase of these products.

This is relevant to the answer data of respondents in the field who answered in agreement and strongly agreed with the perception that with a more expensive price, natural dye green products have a better impact on health in the future and respondents are willing to pay more expensive because they have more monthly income to want to buy environmentally friendly batik products with natural dyes that have been used before and indeed have advantages that are in accordance with the quality that Desired. This is also supported by the theory that indicators or perceptions of willingness to pay are more visible than economic conditions, health conditions and family conditions. Based on this theory, it is concluded that the perception of willingness to pay more for each individual is relative, thus the determination of prices in accordance with batik green products with natural colors can be the right reference for consumers. This result is in line with the results of research conducted by Aqmal and Novianti (2017) which states that willingness to pay has a positive and significant effect on purchasing decisions.

## Conclusion

This study aims to test and analyze the influence of environmental awareness, product knowledge, and willingness to pay more on the decision to buy batik with natural dyes in the city of Pekalongan. Based on the results of the analysis and discussion that has been carried out, the following conclusions can be drawn: 1. there is a positive influence of Environmental Awareness on Purchasing Decisions. 2. there is a positive influence of Product Knowledge on Purchasing Decisions. 3. there is a positive influence of willingness to pay more on the Purchase Decision. The limitation in this study lies in the number of research

variables, this study examines the influence of environmental awareness, product knowledge, willingness to pay more on Purchasing Decisions while there are many other research variables that may affect Purchasing Decisions that have not been included in this study. Further researchers are expected to be able to examine with other variables outside the variables that have been studied in order to obtain more varied results that can affect Purchasing Decisions. For example, variables, ecological knowledge innovations, prices, and so on. and researchers should also increase the number of samples so that the accuracy of the data is better

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## Program music on “the expression” song for big band jazz: eventful

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### Abstract

The purposes of the research were (1) to compose a music “The Expression” song for big band jazz, and (2) to perform a “The Expression” song for big band jazz to the public. The research findings showed that “The expression” song for big band jazz: “Eventful” The researchers were inspired to create the music by the philosophy of the Faculty of Music at Bangkokthonburi University and from the analysis of data from interviews with experts, which is a place for education and learning in music, making the atmosphere within the study place filled with melodies and accents in the characteristics of folk music, Thai music, jazz music, and other music. Sometimes the melodies are played together until they blend and form a new musical accent. The researchers imagined that the audience was walking inside a real place and experienced the atmosphere of diverse music making at the same time. The researcher composed this music by using a many types of composition techniques, such as Augmentation, Diminution Melodic repetition, Melodic sequence Quantal harmony and Dissonant interval, etc., including the use of music form in a ternary form (AABA'), with part A starting from the C major pentatonic scale as the key to this section and turning into an A minor pentatonic scale in the second section. In this way, they reconciled with the C major pentatonic scale and came back to the last section, liked taking the listener on a walk through this place from the first section until the last section. Therefore, composed “The expression” song for big band jazz: “Eventful” makes the listener experience the musical accent and melodies of the music that is different from what the listener has ever heard

**Keywords:** Expression, Program Music, Jazz, Big band

### Introduction

Contemporary music is a combination of social, cultural, artistic, and musical aspects. or even musical culture until it creates harmonious sounds and melodies. It is like an exchange of musical cultures, often with harmonious compositions in the form of melodies. This combination is more widespread. And now it is known as contemporary music (Sriwiset, 2011). It can be said to be the development of musical melodies in each era from the past to the present, which may be mixed in various music genres such as pop music, rock, jazz, and others. In the present era, contemporary songs are popularly written as contemporary music for jazz bands or Big Band Jazz, which consists of musical instruments, musical

instruments, woodwind and brass instruments, percussion instruments, and other types of musical instruments, because they are a band that can perform music in a many of styles, whether it be jazz, pop, rock, or even contemporary songs. Therefore, making this type of band more popular nowadays. (Charoensloong, 2021)

“Music makes people. People build the nation” is the philosophy of the Faculty of Music. Bangkok Thonburi University has been established since the academic year 2011 until the present. The Faculty of Music is like a source of music learning. and create professional musicians. Therefore, each day you will hear the sound of different musical melodies. Whether it is the accent of folk music from Thailand or China, The sound of rock music The sounds of Thai music and others sometimes create sounds that are mixed together to the point of feeling different from the original music melodies (Roongruang, 2023). From this point, the researcher was inspired to compose songs for a jazz big band that combine various melodies.

Therefore, the introduction provides a broad overview of contemporary music, emphasizing its combination of social, cultural, artistic, and musical aspects. It introduces the concept of contemporary music as the development of melodies across different eras and various genres, particularly in the context of jazz and big band jazz. The philosophy of the Faculty of Music at Bangkokthonburi University is also mentioned as a driving force behind the creation of diverse musical melodies.

## Research Objectives

1. To compose a music “The Expression” song for big band jazz: Eventful.
2. To perform a “The Expression” song for big band jazz to the public

## Review of Related Literatures

Folk songs are songs of the people that have been passed down in oral form. used to sing for fun and festivities. This creates a melody from spoken words that is easily remembered. The emphasis is placed on the perfect touch and rhythm. Folk songs have specific characteristics. That is, it is a song that people rely on listening to and remembering. Use clapping or musical instruments to accompany the simple rhythm of singing and dancing. It is worth noting that there must be a chorus of voices. To have more fun in the style of folk songs (Roongruang, 2022)

The Harmony of Chimes was written by Prof. Dr. Narongrit Dhammabutra. This song is the sixth symphony composed by Prof. Dr. Narongrit. prowess This song, composed by the sound of bells, is a link between the cultures of Southeast Asia. The sound of bells (Chimes) is a sound that exists in all cultures and peoples. Therefore, the composer used the sound of bells in the southeastern region to mix them with Western instruments that sound like bells, such as Vibraphone, glockenspiel, and other folk instruments The composer uses the technique of composition of the main melodic transformation (thematic transformation) to create connections between each piece and each region together (Dhamabutra, 2014).

The Water Concerto for Water Percussion and Orchestra is a composition in the style of organic music by Chinese composer Tan Dun. Hailed as a leader of emerging composers in China (Chen, 2016), he

is famous for his compositions that combine traditional and Western instruments, from which his songs are inspired. From childhood memories the sound of the water flowing through the city the sound of living together with the river The sound of various activities, such as washing clothes, creates a variety of sounds and rhythms. (Adam, 2008) The sound of the air created by children swimming and playing in the water and the sound of the water flowing over the bodies of the villagers Activities related to water

## Research Methodology

### 1. The Research Procedure Includes 5 Steps which are:

1.1 Study the composition of songs from documents, books, textbooks, and related research. and interviewed three experts about the composition of each part of the song.

1.2 Analyze problems in orchestral playing techniques and the playing techniques of big bands jazz to bring out aspects of problems in playing that arise and consult with experts in music composition and big band jazz composition.

1.3 Compose a song for playing with a “The Expression” song for big band jazz using composition techniques and special techniques for combos such as high-speed slides for trombone, multi-phonic for trombone, etc.

1.4 Developed by practicing the song “The Expression” song for big band using an observation method recording the progress of the practice musical instruments by expert.

1.5 Collect data, analyze it, and summarize the research results.

### 2. Research Instrument (s)

2.1 Interview form for music composition expert

2.2 Observation form for recording the progress of the performers.

2.3 Music score “The Expression” song for big band jazz.

### 3. Key informant

3.1 Key informant

3.1.1 Associate Professor Dr. Panya Roongruang, expert in Thai music and folk music, Dean of the Faculty of Music, Bangkokthonburi University

3.1.2 Dr. Nithi Chanchomchey, Lecturer, Department of Western Music composition department, Faculty of Music, Silpakorn University

3.1.3 Dr. Suphakit Supatchaiwong Lecturer, Department of Western Music composition department, Faculty of Fine and Applied Arts, Thaksin University

## Results

### 1. A Creative Work

In this section, the researcher talks about the inspiration and presented an analysis of the arrangement and various elements of the music, "Eventful," the first movement in "The Expression," for

playing with a big band, based on ideas, inspiration, and information from interviews with songwriting experts, which can be divided into the following points:

1. Inspired for composition
2. The concept of organizing the sounds of composition
3. Ideas for developing the melody of composition
4. Ideas for creating musical texture, rhythm, and sound intensity

## 2. Inspired for composed movement “Eventful”

composition of the song Eventful, first movement of the song The Expression, the researcher got the idea for creating the composition from the philosophy of the Faculty of Music, Bangkokthonburi University that “Music makes people. People build the nation” is the philosophy of the Faculty of Music. Bangkok Thonburi University This place is like a source of music learning and creating professional musicians. Therefore, each day you will hear different musical melodies. whether it is the sound of folk music. The sound of rock music the sound of Thai music and other musical melodies sometimes create sounds that are mixed together to the point of feeling strange compared to the original musical melodies. The researcher therefore wants the listener to experience the atmosphere of the loud musical melodies. It is also like the listener himself walking and exploring the source of the melodies within this place.

## 3. The concept of organizing the sounds of composition

From the idea of creating the song mentioned above. The researcher therefore organized the sound system of “Eventful” in a format that mainly focused on the use of Tonic chord and Dominant chord so that the listener could hear the familiar sound of the musical melody that mostly has Dominant chords. Nan is always included in the song. The researcher therefore chose to use the C Major pentatonic scale to create the folk song sound of the melody in the presentation part and part A and move it to the minor key in part B, which is a relative key to show the melody that has begun to develop. Clearer and clearer and finally moved back to the original key in the section A' (Ternary form). Therefore, the researcher used a very simple chord progression to give listeners a simpler understanding of the song in the form of I-vi-IV chords. -V is the main (Pancharoen, 2017)

**The Expression: Eventful**

Dr. Thitinun Charoensloong

♩ = 120 Swing

Alto Saxophone 1

Alto Saxophone 2

Tenor Saxophone 1

Tenor Saxophone 2

Baritone Saxophone

C Major pentatonic scale

Motif

Figure 1: The concept of organizing the sounds of composition.



From figure 1, it shows the sound system arrangement in Step 1, Eventful, of the song The Expression, which shows the use of the major pentatonic scale at the beginning of the song in order to make the listener familiar with the correct sound accent. Built from this ladder Starting with the playing of the saxophone instrument group. This will focus on the E D C note group which is an important note because it is a note group that has tonic notes mixed in with it.

#### 4. Ideas for developing the melody of composition

“Eventful” of the song The Expression, the researcher uses a three-part syntax (Ternary form) which is the structure of the song which has three important parts, namely part 1 and part 3, namely part A and part 2, namely Part B is the part that shows the development of the important melodic theme of “Eventful,” where the researcher chose important compositional techniques to develop the main melody of Part A (Melodic motif) to be more complex. Until it became the main melody of section B, which the researcher chose to use techniques such as Augmentation, Diminution Melodic repetition Melodic sequence Quantal harmony and Dissonant interval, etc.

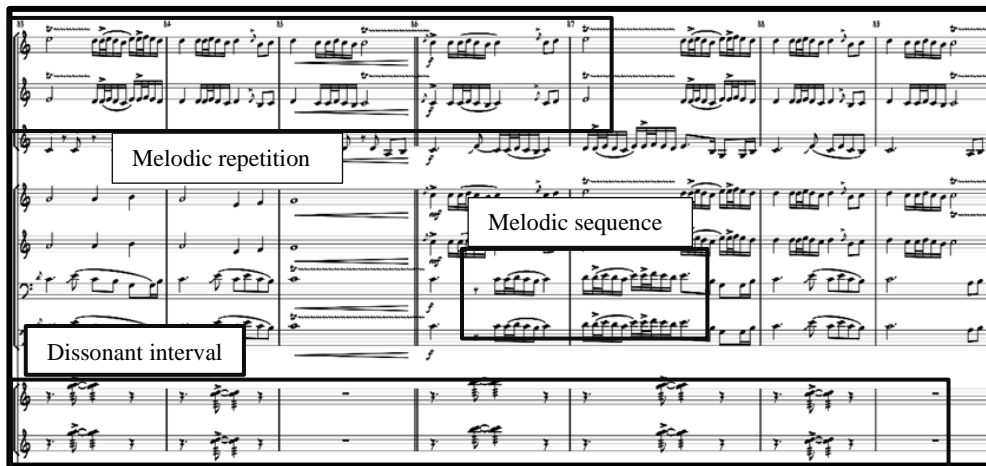


Figure 2: Ideas for developing the melody of composition.

From figure 2, it shows the development of the melodic line of the composition, Stage 1, Eventful, of the song The Expression, in which the composer has used various composition techniques in order to enjoy the pleasure of listening to various forms of music. The development of the melodic line in This time the main melody from section A will be developed in section B, so the sound that will be produced will not be much different from section A to make it easier for listeners to remember the main melody.

#### 5. Ideas for creating musical texture, rhythm, and sound intensity

The creation of musical texture, rhythm, and intensity of sound in “Eventful” of the song The Expression The researcher arranged the harmony by grading the density of the melody from less dense to denser adjust the emotions of the listeners to be more in line with the songs that the researcher has composed, the density will gradually decrease as the end of each section is approached. It is like taking the listener into the Faculty of Music, Bangkokthonburi University. And there will be various rhythm changes of the drum set, similar to folk music from the northeastern region. And for the sound intensity of this

process, the researcher wants to present it in a form that has a gradient of sound intensity from least to highest in order to show the highest point of the song (Climax).



**Figure 3:** Ideas for creating musical texture, rhythm, and sound intensity.

From Figure 3, it shows the creation of the density of the music before reaching the climax of first movement. The researcher used a method to gradient the sound density in each group of low-pitched instruments and then gradually increase it to bring out the emotion. of the listener to reach the climax of the song.

Therefore, “Eventful” song “The expression song for big band jazz” The researcher creates a composition based on the philosophy of the Faculty of Music. Bangkok Thonburi University This place is like a source of music learning. and create professional musicians Therefore, each day you will hear the sound of different musical melodies. whether it is the sound of folk music The sound of rock music The sound of Thai music and other musical melodies sometimes result in sounds that are mixed together to the point of feeling strange from the original musical melodies. The researcher therefore assumes that the listener is walking inside a real place. and experience the atmosphere of various musical melodies at the same time by the researcher used the C Major pentatonic scale as the main tone of this process and changed it to the A Minor pentatonic scale in the B section, combined with various composition techniques. which is like developing the main theme of the piece and finally, it is the return of part A in the key of C Major pentatonic scale again, as if to remind of the melody that has been heard before, and the second objective in this research is still in the research phase, so the results have not yet been analyzed.

	First movement "Eventful"				
Part	Introduction	A	B	A'	Coda
Bar	1-11	12-20	21-36	36-51	51-63

## Discussion

Musical composed "Eventful", the song "The expression song for big band jazz" was inspired by the atmosphere within the Faculty of Music. Bangkokthonburi University, the researcher has interpreted from the study of music literature. and interviews with music composition experts This results in the creation of musical works that can clearly express emotions and feelings that are influenced by the interpretation of them, in line with the professor's research on music creation. Dr. Narongrit Dhambutra (2018) The Harmony of Chimes song describes the use of sound to convey the emotions of the song.

It is also in line with Dr. Thitinan Charoensloong's research into song creation (2021), Symphonic Poem for Trombone Band: Himaphan, which states: The sound of various music can significantly carry the listener's feelings along with the song from beginning to end. It also corresponds to the song Water Concerto for Water Percussion and Orchestra, a work composed in the style of Organic Music by Tan Dun, a Chinese composer.

## Suggestions

1. The concepts or learning theories of other educational scholars should be applied to other songs in the future.
2. This song should be improved to be modern by creating self-learning media in the form of E-Music Learning or E- music book, etc.
3. The compositions should be developed to be more diverse and interesting. For those interested in other levels You can study and gain additional knowledge.

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## Creation of rongngen “gunung selatan”

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### Abstract

The purposes of the research were to study the Rongngen music culture, and to create the Rongngen song in "Gunung Selatan ". The research findings showed that the first, the research found Rongngen music culture performed in the southern region of Thailand and Malaysia. It is a combination of Eastern music culture and Western music culture and the Rongngen performance divided into 2 types: Rongngen in the southern border provinces at the eastern seaboard is characterized focus on the beauty of dance and for Rongngen in the western coastal region, it has the characteristics of a Patiphat. There is singing and dancing. The second, to create the Rongngen "Gunung Selatan", the researcher was inspired by living in the 3 southern border provinces and saw the cultural connection of Thai Buddhists and Thai Muslims in helping to take care of natural features and want to invite you to travel and visit the perfect nature the researcher therefore created the song "Gunung Selatan" which means "Mountains of the South".

**Keywords:** Rongngen, Rongngen music, Gunung Selata, Thai Muslims music culture

### Introduction

Southern Thailand is an ancient civilization. In the past, the southern region was a territory used as a trading route various peoples such as China, India, Portugal, Spain, and Holland. These peoples came to set up bases to trade in various port cities. Relationships between these peoples led to mixing of cultural.

The southern region of Thailand has many ethnic, cultural and ethnic groups clustered together. there are the both important groups of people with a culture based on Buddhism and people with a culture based on Islam. The two main cultures in the South are Buddhist and Islamic cultures that have come to the South and giving rise to social and cultural characteristics.

Islamic culture has entered Malaya. In the 13th century, Arab traders spread it to the islands of Indonesia, the Philippines, and Malay. Later, Islam came to Thailand. The southern border provinces are Songkhla, Pattani, Yala, Narathiwat, and Satun, and are scattered in the seaside provinces of the southern region such as Trang, Krabi, Phang Nga, Phuket, and Nakhon Si Thammarat.

From the southern part of Thailand. It has a border with the northern region of Malaysia. on the journey of trade coming to spread religion or that culture dye must pass through the southern border of Thailand that borders the provinces of Songkhla, Pattani, Yala, Narathiwat and Satun, with the Sankalakiri

mountain range serving as the border between Thailand and Malaysia. Even though there was a barrier between the Sankalakiri mountain range, it could not stop the trade and coming to spread religion or arts and culture.

As a result, Thai Muslims have received and exchanged each other's culture with Malaysia and Indonesia, especially the performance culture, which is the Rong Ngen performance which is a folk performance with a mix cultures. It is popularly played in the eastern coastal provinces of the South and the western coastal provinces of the South (Prapas Kwanpradab, 1999)

Rongngen is a performance that consists of three main parts: dancing, music, and singing. As for the music of Rongngeng (Sukree Charoensuk, 1993), it is explained that

" Mixed characteristics of Rongngen music. It is a performance of many different cultures. There is a violin and a mandorin. Acting as a representative of western culture Some of the Rongngen songs are based on Renaissance western songs. (Renasissance 15–17) Especially the voyages of Spanish, Portuguese, and Dutch traders, the maracas, a rhythmic instrument, was also a European musical instrument. This tambourine is widely popular among Arabs. As for the gong, it is a musical instrument of the Southeast Asian region."

From the importance above, to create the Rongngen "Gunung Selatan", the researcher was inspired by living in the 3 southern border provinces and saw the cultural connection of Thai Buddhists and Thai Muslims in helping to take care of natural features and want to invite you to travel and visit the perfect nature the researcher therefore created the song "Gunung Selatan" which means "Mountains of the South"

## Research Objectives

- 1.1 To study the Rongngen music culture.
- 1.2 To create the Rongngen song in "Gunung Selatan ".

## Review of Related Literatures

In creating the creation of Thai Muslim folk songs, "Gunung Selatan" the researcher studied documents and related research, which are presented in the following order

- 2.1 Documents and research on cultural elements related to Rongngen performance
- 2.2 Documents and research related to the Mountains of the South.
- 2.3 The idea of creating Rongngen songs
- 2.4 Documents and research on cultural elements related to Rongngen performance

The history of Rongngen in the southern region and concluded that Rongngen evolved from Spanish or Portuguese folk dances. which were displayed in the Malaya Peninsula when they had business contacts Later, the native Malays adapted it into a performance called Rongngen. As for where it will start first in the Malay Peninsula, it cannot be concluded but there is clear evidence in the southern border provinces that The Rongngen dance has been performed for a long time, since before the abolition of the administration of the seven southern provinces. It is popularly danced only in the palace of the governor.

Male guests invited to the palace festivities are paired with women who were servants in the palace and were responsible for dancing the Rongngen Later, Rongngen spread to the villagers by using it as an interlude to the Ma-yong performance. After that, the performance of Rongngen came to the southern region around the former cities around Pattani, Yala, Narathiwat and Satun provinces, passing through the high palace of Chao Nan. Later it spread to the villagers and spread to other areas. (Supha Watcharasukhum, 1987)

The story of Yaring: traces of the continuation of the Rongngen art. It was concluded that Rongngen is a performing art that combines the East and the West. According to the history, scholars have assumed that when Westerners traveled to new lands on other continents, they traveled to explore these new lands until they changed from initial exploration to dealing with trade and religion, beliefs, arts and culture. Especially the Southeast Asian region in the south, namely the Java Malay cultural group, including Indonesia, Malaysia, and the southern provinces of Thailand. Most of these ethnic groups practice Islam. Have similar lifestyles When Westerners who came to trade with these peoples set up houses together. Westerners who traveled here, such as Portugal, Holland, Spain, etc., all have different cultures and backgrounds from the natives. Their contacts and relationships have seen various stories, causing the popularity and acceptance of Western culture, such as the culture of celebrations. On important days or festivals, Westerners bring musical instruments, songs, and dance moves, especially dances paired with the rhythm and style, to receive special attention. Native people brought melodies and musical instruments to mix with the folk music that they were skilled. Musical instruments are therefore combined for the basic dance moves using the hands and body, it is influenced by Indonesian dance. The footsteps and steps - dancing are Western-style. Some songs stand in place, using the body to move to match the melody. Some songs in the Pattani area include flirting and forming a band in the style of Thai dance. This type of performing art for a long time is called Rongngen. (Narongchai Pitdokrat, 1995)

#### 2.5 Documents and research related to the Mountains of the South.

The southern mountain range is the Sankalakiri mountain. complex mountains. It is the border between Thailand and Malaysia. This forest is located in Saba Yoi District, Songkhla Province. It has outstanding natural beauty. It is the upstream forest of Thepha River and has a climate with a lot of rain. There is a long rainy season between May - January and a hot season between February - April. Sankalagiri National Park A nature study route has been prepared. and has beautiful natural tourist attractions

#### 2.6 The idea of creating Rongngen songs

The composition of Khaday Wedeng has said that the composition of the song It is a beginning by using old things as a guideline for thinking. Creating new songs using ancient songs as a guideline for thinking. When there is a precedent Creating new songs There must be a goal in conveying emotion. the feeling of the song what type of song it is, using the rhythm as a control.

The composition of the Asleemala group by Apichat Kanthacha has said that the composition will be in the nature of describing nature. Impressive place people's way of life or expressing the mood of the author at that time, such as a sad mood or a joyful mood.

## Research Methodology

### 1. The Research Procedure Includes 5 Steps which are:

1.1 To study the Rongngen music culture:

**Data scope:** Study documents and research cultural elements related to Rongngen performance; Study documents related to the Mountains at Sankalakiri National Park.

**Scope of content:** Rongngen musical elements: Musical instruments, Band format, Original Rongngen Songs, Present the idea of composing of song, Compose and decorate the melody of song and note.

1.2 To analyze the data obtained from the 1 step through the analysis was performed according to the following content areas: Rongngen musical composition, Musical instruments, Band format, Original Rongngen Songs, Present the idea of composing the "Gunung Selatan", Compose the Gunung Selatan and decorate the melody.

1.3 To creating the Rongngen song in "Gunung Selatan".

Rhythm: 4/4

Tempo: 80

Melody: In the diatonic sound system

Scale: C Major

Melody movement: Repetition, sound movement, jumping movement

Harmony: Monophony

Tone color: Musical instruments play a melody namely violin and mandolin

Percussion: the large timbrels and small timbrels, maracas, and gongs.

Form Section: Intro, Part A and Part B

1.4 To develop the original idea for the creation of the Rongngen songs and develop it further from fieldwork data.

1.5 To collect fieldwork data: The interview, Record images and sound, set a date and time for additional interviews and record the interview for provide information to use an idea for composing music.

### 2. Research Instrument

2.1 Interview form: Ideas for creating, The structure of songs and Pattern of Rongngen songs.

### 3. Target Group

3.1 Populations were General public who are interested in Rongngen music

## Results of Research

### 1. The results of the to study the Rongngen music culture

The researcher has Rongngen music is the music of the folk culture of the southern Thai people. The Most of Muslim. When looking at the way of life, culture and traditions Beliefs, religions, etc. It seems that each group is different, but music is the medium that connects them together without any barriers.



Everyone had fun enjoying the music. Respect for different craftsmanship and music cultures. Everyone is friendly by using music as a connector for friendly relationships.

Rongngen music is the music that accompanies the dance performances of Muslims in southern Thailand. it's in the same style as the old Portuguese European folk songs. and the Dutch have the same rhythm The melody of the song may be slightly different but the Western is still fully present in the song and both the music and the style of playing are European so it has also been passed down to the present day.

The musical instruments used to play Rongngen's music include the main instruments: the violin, the mandolin, the large and small tambourines, the maracas and the gongs sometimes with the accordion as well. If you look at the mix of bands. It is a mix of music along seafaring routes and trade routes. namely, musical instruments, violin, mandolin, and accordion and both foreigners are Portuguese and Dutch. There is a gong a Chinese and Asian folk instrument, and a tambourine, an Arab but it is a perfect harmony in the song.

The instruments in the Rongngen are a combination of Western and Eastern instruments.



**Figure 1:** The Rongngen band

Source: Researcher

## 2. The results of the creation the Rongngen song in "Gunung Selatan ".

The Rongngen song in "Gunung Selatan " has form of song.

Rhythm: 4/4

Tempo: 80

Melody: In the diatonic sound system

Scale: C Major

Melody movement: Repetition, sound movement, jumping movement

Harmony: Monophony

Tone color: Musical instruments play a melody namely violin and mandolin

Percussion: the large timbrels and small timbrels, maracas, and gongs.

Form Section: Intro, Part A and Part B



Intro: Talk about the journey from the beginning to the destination and when you arrive you will feel refreshed and clear air and cool breeze and various types of green trees found.

Part A: We continued our journey and experienced the beauty of the water flowing through the valleys and rocky rapids. Along the route you will encounter the shady beauty of nature. and the cries of various birds.

Part B: Referring to complex mountains rich forest It has a highlight in terms of beautiful nature. in the local area in southern Thailand.

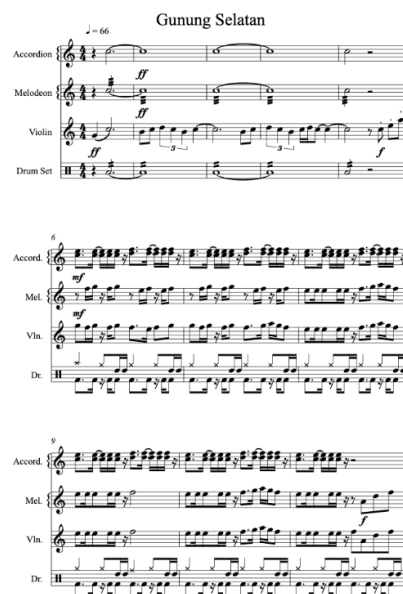


Figure 2: "Gunung Selatan "

Source: Researcher

## Discussion

The results showed that the Rongngen song in "Gunung Selatan " are Intro of song Talk about the journey from the beginning to the destination and Part A: We continued our journey and experienced the beauty of the water flowing and Part B: Referring to complex mountains rich forest It has a highlight in terms of beautiful nature.

## Suggestions

This study the research can serve as a guideline for creating and promoting the creation of Rongngen for those interested, they can bring their songs to study the creative style and use them for further performances by studying musical concepts and music theories and interviews into fieldwork and analyzing them which led to the creation of Rongngen song in "Gunung Selatan"

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## Chao phraya's lightning suite

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### Abstract

The purposes of the research were to 1) study the related of Loy Krathong Tradition Information 2) and to create the Chao Phraya's Lightning suite. The research findings showed that Loy Krathong Tradition is a ceremony to honor the Goddess of the River. In Thailand, it is annually held on full moon day in November. It is an expression of worship in Buddhism and have symbols that's called Krathongs, made from tree and leaf of banana with incense candles and flowers, are used to ask forgiveness from Phra Mae Kong Ka. In present day, there are large-scale activities organized throughout in four regions. Loy Krathong song's Suntharaporn band which is a popular song long time ago. 2) The creation of the Chao Phraya's Lightning suite was using the principle of Montri Tramote in Thai Music Composition and Naming the songs after the reminiscence of important events. The inspiration for the music composition including 4 songs with decorative indigenous rhythmic patterns and syncopation: Yi Peng (Northern), Kuen Peng Seng Pratheep (Isan), Loy Ruea (Southern), and Loy Krathong Thamnong Thum, represent the original Loy Krathong song in ram-wong style and showed the advance skill for Ranat Thum solo. This creative were used melodic characteristics such as folk melodies and folk musical instruments to show the identity.

**Keywords:** Creation song, Loy Krathong, Chao Phraya, Four Regions

### Introduction

Humans and water are important in the creation of Thai culture. Thai people depend on water for their daily life. Chao Phraya River is the main river of Thailand and branches go to different regions, resulting in the location of various city groups along the river, such as the Ping, Wang, Yom and Nan rivers which is the location of the northern group, the Mekhong, Chi, Mun rivers which is the source of Isan civilization. Branches of most rivers flow together at Pak Nam Pho, Nakhonsawan and flow in to Bangkok, the location of the capital and important kingdom of Thailand. The floodways that flow down to the Gulf of Thailand, serving as the location of communities and trading routes of the southern provinces. This created a settlement and reflected the way of life with the river until it became a culture and tradition that has been passed down and practiced. (Fine Arts Department, 2011).

The Loy Krathong Tradition is a famous tradition that honors the goddess of the river and is annually held on the full moon in November in Thailand. Rooted in Buddhist beliefs, it serves as a means to seek forgiveness from the Goddess Phra Mae Kong Ka for our use of water in daily life.

So, that traditional holds significant importance in social, economic, and cultural dimensions, representing a valuable practice passed down through generations. The crafting of krathongs embodies a beautiful form of wisdom, fostering equality in society and acting as a catalyst for sustainable development.

The Loy Krathong tradition involves various activities organized in different locations, including paying homage to the city's sacred objects, hosting krathong-making contests, and floating krathongs along rivers and canals. It also includes the Noppamas contest, processions, and various light and sound performances, accompanied by folk dances and songs. One well-known song associated with the Loy Krathong tradition is Loy Krathong song by the Suntharaporn band, which has been popular for over 70 years. This song symbolizes the night of happiness for Thai people, inviting everyone to participate in Loy Krathong.

In this research, we create the Chao Phraya's Lightning suite by using the musical Thai song composition theory and Naming the songs after the reminiscence of important events by Montri Tramote, along with the principles of intonation by Phichit Chaiseri. This creation created from the root Loy Krathong song, to create new melody based on Thai intonation from the four regions. It's can be reflect the cultural sustainability of the Loy Krathong tradition. The goal is to provide a guide for composing Thai songs with various local dialects, accessible for artists, students, or anyone interested in studying and understanding the rich tradition of Loy Krathong.

## Research Objectives

1. To study the related context of Loy Krathong tradition.
2. To create the Chao Phraya's Lightning suite.

## Review of Related Literatures

Loy Krathong Tradition is a ceremony to honor the Goddess of the river. In Thailand, it is annually held on full moon day in November. Krathongs made from a cut of banana tree, leaf, flowers, candles, and incense, they will be released into rivers. When releasing the Krathongs, people ask for forgiveness to the Goddess of the river for polluting her. It is one of the religious customs in Thailand. During this period, at the end of the rain season, most areas around rivers and canals are flooded. This occurrence sparked an old Thai saying; in the 11th lunar month there is flooding and, in the 12th, lunar month the waters flood is retreating. This period is a time for rejoicing as the weather is changing for the better. The rain season is more or less over and the winter or cool season is beginning. The moon is also at its brightest this time of the year. At present, Loy Krathong Tradition is a major celebration in Thailand. (Department of Cultural Promotion, 2014)

Eua Sunthornsan and Kaew Atcharyakul, both music teachers, composed this song at Thammasat University. Kru Eua are whistles and composes a melody and Kru Kaew listened and write the lyrics. It only takes half an hour and then play immediately. In 1949, Loy Krathong Song were used in the movie "Thai Tiger Gentlemen" as the soundtrack. (Samian Naree, 2022)

Montri Tramote said Thai music composition must know the basic elements of composing a song: determining the song's form. 2. Determining the rhythm. 3. The importance of the sound of the last drop 4. The division of melodic punctuation 5. Volume and group of sounds 6. Accent and mood of the song 7. Naming the song (Montri Tramote, 1995)

## Research Methodology

### 1. The Research Procedure Includes 5 Steps which are:

1.1 Study the related of Loy Krathong tradition information, Creative Theory of Taylor, Cultural Theory of Anuman Rajadhon, Thai Music Composition and song naming by Montri Tramote, Principle of Thai intonation by Phichit Chaiseri..

1.2 Culture and Thai music experts were interviewed about Thai culture, Thai Music theories, including Thai music elements, Thai Music Composition, Thai Ensemble, and using the Interview form for collect data.

1.3 Created song and give to experts for evaluate and revise according to the advice's experts.

1.4 Write the Notation, Practice and Performance for recording.

1.5 Conclusion and discussion that using by Selective Approach.

### 2. Research Instruments

2.1 Index of item objective congruence Form

2.2 Interview Form

2.3 Music Creation Evaluate Form

### 3. Key informants

3.1 Associate Professor Dr. Panya Roongruang, expert in Thai music and folk music, Dean of the Faculty of Music, Bangkokthonburi University.

3.2 Dr. Manus Kaewbucha, expert in Cultural and Thai music knowledge, instructor of the Faculty of Music, Bangkokthonburi University.

3.3 Associate Professor Dr. Pattara Komkam, Music head Department, Faculty of Fine and Applied Arts, Chulalongkorn University.

3.4 Assistant Professor Dr. Santi Udomsri, Faculty of Music and Performing Arts, Burapha University

## Results

### 1. The Result of the related context of Loy Krathong tradition.

Loy Krathong Tradition is a ceremony to honor the Goddess of the river. In Thailand, it is annually held on full moon day in November. This is a reflection of the beliefs of early humans who had beliefs related to ghosts, that believed in earth ghosts and water ghosts. which take advantage of nature to live and make a living Especially the relationship between way of life and water. Humans believe and gratitude in the Phra Mae Kongkha. Therefore, this ceremony asking for forgiveness for wrongdoing. it. Later, human

beliefs and rituals were changed to adapt to the religion that was adopted, mainly from Buddhism-Brahminism, thus causing belief in this tradition to become Loy Krathong to worship the Lord Buddha.

Chong Preang Lot Shoot Loy Khom ceremony that the royal ceremony in the twelfth month. In which the lantern is raised up on the pole throughout the month until the end of the day and then the lantern is lowered. Lifting this lamp means raising it to worship the three gods: Shiva, Narayana and Brahma. Later, when Buddhism was adopted, it meant worshipping the relics of the Lord Buddha and Phra Chulamanee in the planet Earth. There is also information from the royal writings on the texts of Thao Sri Chulalak or Nang Noppamas. It is said that there was an idea to create a banana leaf krathong in the shape of a Kamut lotus. This is a special lotus that blooms only once a year at night. Therefore, it is appropriate to make a krathong and use it to float the lantern to pay homage to Buddhism and to express gratitude to the river.

Loy Krathong Tradition's that developed from the above, it depends on the believes traditions in each locality for worship the Buddha and pay homage buddha's footprint. Worship Phra Ketkaew Chulamanee express your gratitude for the water that has been used in your life. And remember the virtues of ancestors who have passed away, these things reflect beliefs. Human faith in the highest expression of worship. It also shows the value of family, community, society, and the things that hold the spirit together pricelessly.

Loy Krathong Tradition's Popularly held throughout 4 regions of Thailand. It has a different name according to each area as follows. Northern region: Yi Peng tradition in Chiang Mai province, Tradition of burning candles and playing firework in Sukhothai Province, Sa-pao festival in Lampang Province. Krathong Sai Festival in Tak Province etc. Northeastern Region: Somma Nam Kuen Peng Seng Pratheep tradition in Roi Et Province. Royal Lantern Loy Festival Sakon Nakhon Province, etc. Southern Region: The tradition of floating Chao Le boats among villagers on the Andaman Sea. Loy Krathong festival in each province, etc. Central Region: Loy Krathong Kaab Kluay festival, Mae Klong City, Samut Songkhram Province. In each region, various activities are held on a grand scale, such as paying homage to the sacred objects of the city. The Noppamas contest. Krathong contest. And processions and various light and sound performances, accompanied by folk dances and songs. An important song in the Loy Krathong Tradition that is often heard. Ran Wong Loy Krathong song was composed by Eua Sunthornsan and the lyrics were composed by Kaew Atcharyakul. It is a timeless song that has been popular for over 70 years. The lyrics and melody give a fun and cheerful mood. It is also the shortest song because it takes time to compose the lyrics and melody quickly.

The researcher has uncovered that the 'Ram Wong Loy Krathong' song is a timeless and internationally popular composition, widely embraced in the Loy Krathong tradition for many years. Currently, available renditions include soundtracks such as the Loy Krathong Lanna version by Soontaree Vecharont and the Loy Krathong song performed by the Pong Lang ensemble. Additionally, there are newly arranged Loy Krathong songs in folk instruments.

However, there is still no Loy Krathong song found in Thai music that reflects the Thai intonation of 4 region.



**Figure 1:** Loy Krathong at Ratcha Woradit Pier. The Stucco in Buddhist Temple of Wat Senasarama Rajvaravihara, Phra Nakorn Si Ayuttaya Province

## 2. The result of the creation of Chao Phraya’s Lightning suite.

The creation of Chao Phraya’s Lightning suite was reflected the relationship between human life and water and cultural sustainability of traditions. That’s show the value of music creation songs with local accents, that’s called “Samniang” ( Intonation) in each region. It will be explained as follows:

**2.1 Determining the theme of the song and naming the song** Inspired by the relationship of the way of life with the water that sustains life. Presented in a storytelling format with music playing according to each region. “Chao Phraya’s Lightning suite” refers to the light of candle from many Krathong that shines from the Chao Phraya River, which is the main river of Thailand. Each song using the principle of Montri Tramote in naming the songs after the reminiscence of important events, including 4 songs: as follows Yi Peng, Kuen Peng Pratheep, Loy Ruea, and Loy Krathong Thamnong Thum.

**2.2 Music creations** was using the principle of Pichit Chaiseri, Kanobpak Sobsamai style, in Characteristics of the Composer. Using the Loy Krathong original song for extended pillar tones and independent decorative musical patterns follows as Thai Music Composition’s Theory of Montri Tramote. Syncopation and decorative indigenous rhythmic patterns.

**Table 1: Summary of Chao Phraya’s Lightening suite**

Name of Song	Meaning and Concept	Detail
1. Chao Phraya’s Lightening suite	The name of suite	Loy Krathong Festival in Four Region and Chao Phraya River is the main river of Thailand.
2. Yi peng Northern Thai intonation	Yi peng Lantern Festival in Chaing Mai	Using the Piang O Pentatonic scale (C D E G A)
		Song Chan in Northern Style (Andante) Using the northern folk instruments: Saw Lo, Sung, Klong Pong Pong (Northern drum)
3. Kuenpeng Pratheep North-Eastern Thai intonation	Som ma naam Kuen peng seng pratheep Festival in Roi-et	Using the Piang O Pentatonic scale (C D E G A)
		Song Chan (Moderato)
		Special Introduction like Pong Lang playing Using the Isan folk instruments: Pin, Vot, Chap Yai, Klong Hang (Isan drum)
4. Loy Ruea Southern Thai intonation	Loy Ruea Tradition of Chao-Le in Andaman	Using the Piang O Pentatonic scale (C D E G A) and using outside Piang O Pentatonic scale in B
		Chan Diew (Allegro)
		Using the southern folk instruments: Pi Nok, Klong Tab (Nora), Ching
5. Loy Krathong Thamnong Thum Central Thai intonation	Loy Krathong song of the Suntaraporn band by Aue Suntornsanan	Using the Piang O Pentatonic scale (C D E G A)
		Ram Wong style (Moderato)
		Using the folk Instrument: Ton Cha Tri, Chap Lek and using only Ranat Thum Khlui, Saw-U Creating the Ranat Thum solo

From Table 1, the results of Chao Phraya’s Lightening suite showed that including 4 song , Yi peng (Northern Thai intonation), Kuenpeng Pratheep (Northeastern Thai intonation), Loy Ruea (Southern Thai intonation), Loy Krathong Thamnong Thum (Central Thai intonation). The creation songs as follows:



**Figure 2: Northern Thai intonation in Yi Peng Song**

According to figure 2, Yi Peng Song was created to the northern indigenous rhythmic patterns. Emphasis in SOL and use melody in Piang O scale in G A C D E. Using the *wan sa ton* technique of



Saw Lo playing, grace note, that shows the identity of the northern indigenous rhythmic. use a high-pitched tone and avoid note. For combination of instrument, Saw-Lo, that showed identity of Lanna’s song style.



**Figure 3:** Introduction that new extended for Ranat Ek solo.

According to figure 3, the melody of introduction for Ranat Ek solo in Kuenpeng Pratheep song. It’s created from lyrics “*Wan Pen Duen Sib Song*” with extended pillar tones from Loy Krathong song. In addition, that’s show respect of Buddhism and reflecting the value of ISAN Music culture. The melody was independent decorated musical patterns and determine Ranat Ek using method like the Pong Lang. And the Rhythm is similar to FON in ISAN dance. For combination of instrument using Pin and Vot for showed identity of northeast.



**Figure 4:** Perfect fourth in Southern Thai intonation

According to figure 4, use the note that perfect fourth, G – C and A - D. That’s showed the identity of southern Thai intonation. and first 2 Bars, determined playing by *Pii Nok*, after that played together. And then, The melody was created using the “*Yak Yueang Luk Tok*” method. From the above, that showed the dialect melody like imitate the shadow puppet style (Nung Ta Lung). In this song, will be used *Tub and Ching* for playing, that clearly showed Southern.



**Figure 5:** Ranat Thum Solo in Loy Krathong Thamnong Thum

According to figure 5, showed that Ranat Thum Solo. It's using the Advance Thai Music Theory. For special technique called *ti tang mue*, *ti doot*, *pra kob mue*. and emphasis using on left hand. were used in Ranat Thum Solo, that using the perfect fourth in both high and low pitch. It's showing a joyful mood. Show that a three-note melody by emphasis on using the right hand that called *Khok* and use the melody for separated between left and right hand by using the close note. The Ranat Thum Solo has a fun style. It's like having fun at night on Loy Krathong festival.

## Discussion

Loy Krathong is a famous tradition in Thailand and have the song for immortal more than 70 years. Chao Phraya's Lightening were created by using melodic characteristics to show the identity according to Montree Tramote (1995) in Duriyasam of Montree Tramote said about using the Thai composition theory was composed of new melodies but holding old version and decorated by changing the melody to intonation melody. Using the High – Low for intonation of each region consistent with Phichit Chaiseri (2013) said, composers often express their musical expressions by using the high and low tones of melodies called *sam niang* to know what kind of song it is and what language it is. Intonation, according to Poonpit Amatyakul (1984) in Dontriwijak said, that accents can be compared to spoken sound or language, many accents, many languages.

Music Instrument, were using the folk instrument for unique musical identity was consistent with the saying of Sarayut Chotirat (2018) in The Musical Creation of The Buddhist Pagodas of Dhavaravati Kingdom in Nakhonpathom said using to create for lively melodies and to convey the implicit meanings of the lyrics. That were used to create specific music moods and concrete performing styles. Element of music, according to Rangsan Buathong (2019) in A composition of Glong ASEAN said, melodic structures, lyrical expressions, and the cadence of the song. These components collectively reflect the unique musical identity of different style. Additionally, the Intonation creative song was related to choose the instrument, ensemble, sound system and cultural identities

music creation, according to Narongrit Dhmbutra (2018) in Method in Blending ASEAN Cultures in Contemporary Composition said, cultural identities can be presented in a modern way that could attract the audience and the right perspective in understanding culture identity can be created. The solo technique in Ranat Thum were using in this creation corresponds of Kitti Attaphol (2021) in Instructional Skill Training For Ranat Thum said, emphasizing to practice various playing techniques of the Ranat Thum including developing skills were using hands in various forms, creating sounds unique to the xylophone, such as prakhob mue and ti doot, and emphasis using on left hand.

This creation is an example and guide to composing melodies that draw from the cultural uniqueness of each region. It is the creation of melodies and combinations of folk instruments and Thai ensemble to express cultural identity and clearly reflect the characteristics of each region. It is also easy to use as an exercise for students and music enthusiasts.

### Suggestions

1. This research can be used to cultivate for understanding good traditions and culture of Thailand for next generation that feel of love and Maintain identity for cultural sustainability.
2. It is a guideline for studying in Thai music composition for easy recognition and understanding.
3. Loy Krathong have still in the culture of ASEAN countries such as Cambodia, Burma, China, and Laos. Therefore, it can be used as an idea for creating intonation songs with difference style.

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## Didgeridoo: creating traditional aboriginal musical instruments from alternative materials

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### Abstract

The purposes of the research were to study the music culture, playing techniques, and the craft of making didgeridoos using alternative materials, to craft a didgeridoo from alternative materials, enhancing its appeal and interest, to produce a didgeridoo with reduced manufacturing costs, facilitating easier practice in blowing, and ensuring convenient portability. Crafted from PVC pipe, this didgeridoo boasts a lightweight design, ensuring effortless portability. With a length of from 1 to 3 m (3 to 10 ft) long. Most are around 1.2 m (4 ft) long. The length is directly related to the 1/2 sound wavelength of the keynote. Generally, the longer the instrument, the lower the pitch or key of the instrument. What sets it apart is the unique crafting process, allowing for personalization through techniques such as painting, spray painting, or incorporating drawings of various pictures and patterns. This not only enhances its visual appeal but also adds an artistic dimension to the instrument, making each one a distinctive and aesthetically pleasing creation. The research findings showed that acquire knowledge and techniques for crafting a didgeridoo. obtain a traditional musical instrument from the Aboriginal tribe, specifically the "Didgeridoo." Create a didgeridoo using a lighter alternative material, enhancing portability and ease of play. And more convenient portability to make access to this musical instrument more widespread and more interesting as well. You will also learn about the lifestyle of the tribe and enhance your understanding of their culture and music. This research is important in preserving and passing on the unique culture and music of Australia's mountain tribes.

**Keywords:** Musical creativity, Didgeridoo, Alternative Instruments

### Introduction

When discussing various tribes and ethnic groups from around the world, it becomes evident that culture, encompassing ways of life, music, and human rituals, plays a pivotal role with lasting impact today and in the future. The researcher recognizes the significance of sustaining these elements, particularly the musical culture of tribes, which serves as both the root and cornerstone of music, beautifully crafting the unique identity of each area. The researcher, being adept at playing the trumpet, acknowledges the necessity of studying the "Didgeridoo" a musical instrument from the Aboriginal tribe in the northern part of Australia.

This creative research was inspired by reading studies confirming the importance of playing music, which helps increase efficiency. An article published in the British Medical Journal stated that regularly playing a musical instrument, such as the didgeridoo, can help reduce snoring and sleep apnea in individuals. Snoring is a symptom indicating the narrowing of the upper airway, extending from the nose, throat, base of the tongue, to the larynx. Regular snoring is one of the signs suggesting the presence of sleep apnea, where obstruction of the upper airway can occur. Playing the didgeridoo, a specific musical instrument, can strengthen the upper respiratory muscles, thereby keeping the respiratory tract open during sleep. However, increasing the strength of these muscles can only occur if players learn a technique called "circular breathing" (Puhan MA., Suarez A., Lo Cascio C., Zahn A., Heitz M., Braendli O., 2005).

"Circular breathing involves inhaling through the nose while keeping some air in the cheeks. Simultaneously, the air stored in the cheeks must be blown out through the lips during exhalation. This method ensures a continuous and consistent flow of breath."

Thai musical instruments, such as bagpipes and flutes in our country, employ a similar blowing technique. This involves using air blown from the cheek continuously for an extended period, without pausing to breathe. This method of blowing is referred to as "ventilation."

The researcher recognizes the value and importance of the didgeridoo, a musical instrument indigenous to the Aboriginal people. Choosing alternative materials to replace traditional ones is aimed at reducing costs and facilitating easier blowing, as well as enhancing portability. This approach seeks to make the didgeridoo more accessible and interesting to a broader audience. Additionally, this research delves into the lifestyle of the tribe, contributing to a better understanding of their culture and music. It is crucial in preserving and passing on the unique culture and music of Australia's mountain tribes.

## Research Objectives

1. To study the music culture, playing techniques, and the craft of making didgeridoos using alternative materials.
2. To craft a didgeridoo from alternative materials, enhancing its appeal and interest.
3. To produce a didgeridoo with reduced manufacturing costs, facilitating easier practice in blowing, and ensuring convenient portability.

## Review of Related Literatures

### 1. Didgeridoo

The didgeridoo (also known as a didjeridu or didge) is a wind instrument developed by Indigenous Australians of northern Australia around 1,500 years ago and still in widespread usage today both in Australia and around the world. It is sometimes described as a natural wooden trumpet or "drone pipe". Musicologists classify it as a brass aerophone. There are no reliable sources stating the didgeridoo's exact age. Archaeological studies of rock art in Northern Australia suggest that the people of the Kakadu region of the Northern Territory have been using the didgeridoo for less than 1,000 years, based on the dating of paintings

on cave walls and shelters from this period. A clear rock painting in Ginga Wardelirrhmeng, on the northern edge of the Arnhem Land plateau, from the freshwater period shows a didgeridoo player and two songmen participating in an Ubarr Ceremony (Lindner, D., 2005).

A modern didgeridoo is usually cylindrical or conical and can measure anywhere from 1 to 3 m (3 to 10 ft) long. Most are around 1.2 m (4 ft) long. The length is directly related to the 1/2 sound wavelength of the keynote. Generally, the longer the instrument, the lower the pitch or key of the instrument.

### **History and Culture**

The didgeridoo is one of the most well-known Aboriginal instruments and, undoubtedly, an Australian icon. It is the sound of the red-earth or mother nature, or the sound of Australia as its characteristic drone is identified worldwide (Nicholls, 2017). Even though nowadays the instrument is widely used by many different Aboriginal groups across the country, there is much misinformation or ignorance about its origins and authentic use prior to colonization. The didgeridoo, an aerophone rhythm instrument indigenous to Northern Australia, is crafted from termite-hollowed eucalyptus trees, local bamboo, or other suitable materials (Moyle, 1981). Its distinctive drone is shaped by intricate lip, tongue, and diaphragm movements, producing sounds rooted in local languages, as exemplified by M. Mununggurr's presentation (Graves, 2017). Traditionally, the playing of the didgeridoo has been predominantly associated with men, although instances of women players exist (Barwick, 1997).

### **Construction and play**

Authentic Aboriginal didgeridoos are crafted in traditionally oriented communities in Northern Australia or by artisans who travel to Central and Northern Australia to source raw materials. Typically constructed from hardwoods, especially various eucalyptus species endemic to the region, these instruments may also incorporate native bamboo like *Bambusa arnhemica* or pandanus. Craftsmen primarily harvest the main trunk of living trees, although substantial branches may suffice. The search for suitable trees involves expertise in landscape and termite activity patterns, alongside techniques like a tap or knock test, wherein the bark is peeled back, and a tool is knocked against the wood to assess the resonance of the hollow. Once a suitable hollow tree is identified, it is felled, cleaned, bark removed, ends trimmed, and exterior shaped, resulting in a finished instrument. Aboriginal didgeridoos from Arnhem Land may feature a 'sugarbag' mouthpiece, using black beeswax from wild bees with a distinctive aroma. The finished instrument may be painted or left undecorated, and a rim of beeswax may be applied to the mouthpiece (Taylor R., Cloake J, and Forner J., 2002).

### **Decoration**

Many didgeridoos are painted using traditional or modern paints by either their maker or a dedicated artist, however it is not essential that the instrument be decorated. It is also common to retain the natural wood grain with minimal or no decoration. Some modern makers deliberately avoid decoration if they are not of Indigenous Australian descent or leave the instrument blank for an Indigenous Australian artist to decorate it at a later stage.

## Physics and operation

The termite-bored didgeridoo exhibits an irregular shape, typically increasing in diameter towards the lower end, resulting in resonances at frequencies that lack harmonic spacing. In contrast to the harmonically spaced resonances of a cylindrical plastic pipe, the didgeridoo's resonant frequencies do not conform to a fixed ratio, with the second resonance generally occurring approximately an 11th higher than the fundamental frequency (a frequency ratio slightly less than 3:1).

The player's lip vibrations produce harmonics with frequency components falling in the ratio 1:2:3, but the non-harmonic spacing of the didgeridoo's resonances means that the harmonics of the fundamental note are not systematically reinforced by the instrument's resonances, unlike Western wind instruments where resonances of the bore assist specific harmonics.

The timbre of the didgeridoo is significantly influenced by strong resonances of the vocal tract. Frequencies, determined by the position of the player's tongue, can inhibit the oscillatory flow of air into the instrument, producing formants in the output sound. These formants, particularly their variation during circular breathing, contribute to the distinctive sound of the instrument.

Furthermore, the didgeridoo's sound can be varied by incorporating vocalizations into the drone. These vocalizations often mimic sounds of Australian animals like dingos or kookaburras. By using their vocal cords to emulate these animal sounds while continuing to blow air through the instrument, players generate a spectrum of results, ranging from high-pitched tones to deep guttural vibrations. The addition of vocalizations enhances the complexity of the playing, further contributing to the richness and diversity of the instrument's sonic possibilities.

### 2. Circular breathing

Circular breathing is a technique used by wind instrument players, particularly in woodwind and brass instruments, to produce a continuous and uninterrupted stream of sound. The method allows musicians to maintain a constant flow of air while still being able to inhale fresh air. This is achieved by using the cheeks as a reservoir for storing air, allowing the musician to inhale through their nose while simultaneously using the stored air to continue playing (Moschner, 2009)

There are 8 ways to practice circular breathing:

#### 1. Build Cheek Reservoir

Begin by taking a deep breath and filling your lungs. Puff out your cheeks and use them as a reservoir to store the air. Imagine the cheeks as a container holding a reserve of air.

#### 2. Exhale from Cheek Reservoir

While playing the instrument, use the air stored in your cheeks to continue the sound. Simultaneously, exhale from your lungs as you normally would while playing.

#### 3. Inhale through Nose

As the air in your cheek reservoir begins to deplete, quickly inhale through your nose. Keep the air flowing from your lungs to the instrument during this brief nasal inhalation.

#### 4. Coordinate Movements



The key to circular breathing is the coordination of cheek puffing, exhalation, and nasal inhalation. Practice the timing and coordination to maintain a continuous and seamless sound.

#### 5. Start Slowly

When first learning circular breathing, start with short bursts of continuous sound and gradually increase the duration as you become more comfortable with the technique.

#### 6. Use a Metronome

Practice with a metronome to help you maintain a steady rhythm and gradually increase the tempo.

#### 7. Patience and Persistence

Circular breathing can be challenging to master, so be patient and persistent in your practice. Regular and focused practice sessions will help you develop the muscle memory and control needed for successful circular breathing.

#### 8. Seek Guidance

If possible, seek guidance from a skilled teacher or experienced musician who can provide personalized tips and feedback.

It's important to note that circular breathing is not limited to a specific type of wind instrument, and musicians can use variations of this technique on various instruments such as the didgeridoo, bagpipes, and certain types of flutes. Mastery of circular breathing enhances a musician's ability to sustain long notes and play complex passages without interruption.

## Research Methodology

The study experimented with only PVC, not with any other material. So, it would be more accurate to specify that the study explored the alternative didgeridoo-makings with varied lengths, shapes and sizes of PVC. The study should underline how each newly experimented PVC- didgeridoo was tested in terms of playing methods, sound quality, health-oriented benefits, cost, and visual attraction, for instance, compared with original didgeridoos.

### 1. The Research Procedure Includes 6 Steps which are:

- 1.1 Research and collect information from books, textbooks, and websites.
- 1.2 Study the construction of a didgeridoo through interviews with expert technicians.
- 1.3 Learn how to play the didgeridoo from professional didgeridoo players.
- 1.4 Try making a didgeridoo out of PVC pipe and decorate it with paint.
- 1.5 Test and adjust with the guidance of researchers, expert technicians, and professional didgeridoo players.
- 1.6 Obtain an expert's evaluation by testing it out and receiving supplementary advice.

### 2. Research Instrument (s)

- 2.1 PVC pipe
- 2.2 Picnic gas stove



2.3 Equipment and tools used in didgeridoo production

2.4 Tuner.

2.5 Epoxy Glue

2.6 Acrylic paint, spray paint, paintbrush.

### 3. Key informant

3.1 Mr. Visit Koturama, expert in didgeridoo making, professional didgeridoo players and was also didgeridoo players of The Voodoo Band

3.2 Mr. Thinnawat Thaitae, expert in ethnic musical instruments and professional didgeridoo players

## Results/Research

### 1. A creative Alternative Instruments

The process of crafting a didgeridoo from PVC pipe involves multiple steps. Initially, select a PVC pipe of the desired length and size. Heat the mouthpiece using a fire to gently bend and shape it, allowing the pipe to soften and curve naturally. Gradually narrow the mouthpiece to approximately 3 centimeters in width. Next, use heat to widen the tip of the PVC pipe, giving it a trumpet-like or speaker mouth appearance. Then, employ epoxy glue to shape and secure the mouthpiece for a comfortable fit, allowing it to set for about 2-3 hours. Finally, decorate the didgeridoo with acrylic paint to achieve the desired design.

Upon completion, it was discovered that the production costs for this method were remarkably low. PVC pipes are easily accessible and cost-effective compared to traditional wooden materials. Additionally, PVC offers a lighter weight alternative, making it particularly appealing for beginners interested in purchasing and practicing with a didgeridoo. This affordability in production consequently leads to a reasonable sale price.

Upon evaluation by experts, it was found that PVC didgeridoos are easier to play compared to their wooden counterparts. The ability to mold the mouthpiece using epoxy glue to fit an individual's mouth shape enhances comfort and adaptability. Moreover, the PVC pipe's thinner texture, compared to wood, facilitates easier handling and practice, especially for beginners."

The researcher has developed the didgeridoo from PVC pipe until the results were satisfactory and accepted by experts, with three works as follows:

1. PVC Digeridoo in the key of A
2. PVC Digeridoo in the key of C
3. PVC Digeridoo in the key of D

### 1.1 PVC Digeridoo in the key of A



**Figure 1:** Steps to create PVC digeridoo in the key of A

From picture 1, the researcher took a PVC pipe with a length of 1.50 centimeters and diameter of around 3 centimeters. Bent it using heat from a picnic gas stove to achieve the desired shape. Next, they decorated and painted it according to the specified pattern. The final step involved applying Epoxy Glue to mold and shape the mouthpiece area, leaving it to dry. Afterward, the researcher experimented with blowing into it using a tuner and obtained the sound 'A.'

### 1.2 PVC Digeridoo in the key of C



**Figure 2:** Steps to create PVC digeridoo in the key of C

From picture 2, the researcher took a PVC pipe with a length of 1.30 centimeters and diameter of around 3 centimeters. Bent the cone by using heat from a picnic gas stove to achieve the desired shape. Next, they decorated and painted it according to the specified pattern. The final step involved applying Epoxy Glue to mold and shape the mouthpiece area, leaving it to dry. Afterward, the researcher experimented with blowing into it using a tuner and obtained the sound 'C.'

### 1.3 PVC Digeridoo in the key of D



**Figure 3:** Steps to create PVC digeridoo in the key of D

From picture 3, the researcher took a PVC pipe with a length of 1.20 centimeters and diameter of around 3 centimeters. Bent cone by using heat from a picnic gas stove to achieve the desired shape. Next, they decorated and painted it according to the specified pattern. The final step involved applying Epoxy Glue to mold and shape the mouthpiece area, leaving it to dry. Afterward, the researcher experimented with blowing into it using a tuner and obtained the sound 'D.'

### Discussion

The research conducted on "Creating Traditional Aboriginal Musical Instruments from Alternative Materials" has shown promising outcomes in meeting the expectations of the researchers. The utilization of alternative materials has led to a reduced cost of ownership while retaining the desired sound and key of these instruments. Particularly noteworthy is the significant progress made in crafting the didgeridoo, an iconic musical instrument from Aboriginal tribes, using lighter materials. This innovation has resulted in enhanced portability and ease of play, making the instrument more accessible and appealing to a wider audience.

Moreover, studies affirm the therapeutic benefits of playing musical instruments, with a notable example being the didgeridoo. The British Medical Journal published a randomized controlled trial titled "Didgeridoo playing as an alternative treatment for obstructive sleep apnoea syndrome." This study highlights that regular practice of playing the didgeridoo can effectively alleviate snoring and sleep apnea. Snoring often signifies the narrowing of the upper airway, which can lead to sleep apnea. Strengthening the upper respiratory muscles through didgeridoo playing helps keep the airway open during sleep, reducing these symptoms. However, mastering a technique called circular breathing is essential to strengthen these muscles, facilitating continuous and consistent breathing patterns during both inhalation and exhalation.

Last year, the Nobel Peace Prize was awarded to Milo Puhon, Alex Suarez, Christian Lo Cascio, Alfred Zahn, Markus Heitz, and Otto Braendli, researchers from Switzerland, Canada, the Netherlands, and the United States. Their groundbreaking work demonstrated the efficacy of regular didgeridoo playing as an effective treatment for sleep apnea and snoring, offering invaluable insights into the potential therapeutic benefits of this musical practice.

## Suggestions

1. Content, ideas, and topics from this research article should be utilized to develop educational material, including textbooks and documents tailored for undergraduate students, to meet their specific needs.
2. This musical instrument is recommended for practice sessions related to wind and ventilation, catering to wind instrument musicians, singers, and the general public.
3. Knowledge about creating and modifying didgeridoos using alternative materials should be developed to make it applicable across various musical genres, and for groups of players of all genders and ages. This musical instrument is expected to gain broader popularity as a result.

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KSUC-OI-042

## A creative work Prasad Wai for trumpet quartet

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### Abstract

The purposes of the research were to study about northern folk music Prasad Wai, to compose music form northern folk music Prasad Wai for trumpet quartet, and to publish Prasad Wai for trumpet quartet. The research findings showed that the creative work Prasad Wai for the trumpet quartet involves guidance on composing the melody and new harmonies, using only the trumpet as the instrument. This is achieved by incorporating both the original melody of the song and techniques from various musical eras to give the song a unique color and a melody distinct from the original. Additionally, important trumpet techniques are blended into the composition, making it a versatile piece suitable for both solo and accompaniment performances.

**Keywords:** Prasad Wai, Trumpet Quartet.

### Introduction

The introduction provides a comprehensive overview of the researcher's objectives and the cultural context of the Prasad Wai song. It effectively sets the stage for the fusion of traditional northern folk music with classical trumpet performance.

The researcher aims to incorporate traditional music from the northern region as a component in creating a composition inspired by the Prasad Wai melody, which is a song that originated during the Chiang Saen Kingdom era. Chiang Saen, currently a district in Chiang Rai province, was part of the Lanna Thai Kingdom, which covered various northern provinces such as Chiang Rai, Chiang Mai, Lampang, Lamphun, Phrae, and Nan.

The Prasad Wai song is a traditional folk song of the northern region, and the term Prasad comes from the word Prasad Ratchawong (castle), referring to the joyous folk dance that took place in the royal palaces during the Chiang Saen Kingdom. The dance involved people in the palace getting up and dancing together joyfully, not a funeral ritual as commonly understood. However, various beliefs have led to the misconception that this music is only suitable for funeral ceremonies. In contemporary settings, musicians have found different ways to play the music to convey joy in festive events and sadness in funeral ceremonies, using traditional instruments to evoke different emotions.

Classical music is a fundamental form of music with a long history in world civilization. One of the oldest and widely distributed musical instruments in the world is the Horn, or trumpet. Evidence of trumpets made of bronze and silver, the first of their kind globally, dates back around 1500 BCE in the pyramids of Pharaoh Tutankhamun. With the ancient origins of both types of music, there has been a fusion of these two genres by studying the melody of the Prasad Wai song and exploring the performance of traditional folk music using the trumpet.

Given that the researcher had hometown in Chiang Rai province and has had the opportunity to learn traditional music from family and study folk music during adolescence, there is a conceptualization to create compositions from northern folk songs in the classical music format. The chosen instrument for performance is the trumpet quartet, and the intention is to compose songs with a new harmonic arrangement style while preserving the melody of the original Prasad Wai song. Additionally, there will be the incorporation of chords to align with classical music principles, considering the harmonic arrangement style of the classical era.

### Research Objectives

1. To conduct a comprehensive study of the northern folk music Prasad Wai.
2. To compose music inspired by the northern folk music Prasad Wai for a trumpet quartet.
3. To publish the resulting composition, "Prasad Wai for Trumpet Quartet."

### Review of Related Literatures

1. History of Chiang Saen and Prasad Wai

In earlier times, musical diversity was not as extensive as it is today, and performances were typically live within the confines of palace walls. In rural areas, folk songs gained popularity among the local communities, seamlessly integrated into their daily routines.

The compositions resonating within palace walls held an elevated status, with particular emphasis on the Prasad Wai song originating from the Lanna region. Legend has it that the absence of sound amplification devices led to the compelling allure of this song, drawing in listeners from beyond the palace. The animated movements of these external spectators caused the palace to reverberate, showcasing the profound impact and enchanting nature of the music. Consequently, the song acquired the moniker Prasad Wai signifying its enchantment and vibrancy.

Subsequently, as the prominence of Lanna rulers diminished, musicians relocated to reside among the general populace. Nevertheless, they persisted in performing the Prasad Wai song at various occasions, particularly during funerals. The music, believed to bring solace and alleviate grief, became closely associated with funeral ceremonies. With the passage of time, it transformed into a widely recognized funeral composition, with the belief that its inclusion in charitable or auspicious events would be inauspicious.

This belief still exists today, so it can be stated that indeed, the Prasad Wai song is a quintessential Lanna folk song. Everyone who wishes to play traditional Lanna folk music must play this song, and even in competitive events, every ensemble is required to perform this song.

### 1.1 Chiang Saen history

The flat and fertile area of Chiang Saen and its surrounding regions has been inhabited by humans for a long time. This goes back to ancient times when humans lived in a hunter-gatherer society, continuing through the agricultural era, approximately 1,500 to 3,000 years ago. Evidence of tools and utensils used by humans has been found scattered throughout the region, including on hillsides and along riverbanks.

In the 17th to 18th centuries, people in this area began to gather more densely, forming communities on hillsides or along riverbanks. As Buddhism began to spread, significant changes occurred, and these communities embraced the cultural aspects of Buddhism, marking a historical transition.

In the late 14th century, King Saen Phu established the town of Chiang Saen in a small village along the Mekong River to control the surrounding area's agricultural produce and trade routes. This town served as the original base for the rulers of the region in the year 1871.

The status of Chiang Saen was initially of high importance as the regional capital of the Lanna Kingdom. Various kings from the Mangrai Dynasty, such as Phaya Payu, Phaya Kham Fu, and Phaya Kuan Na, ruled over Chiang Saen before ascending to the throne in Chiang Mai.

Between the 22nd and 24th centuries, Chiang Saen regained significance strategically, controlling the upper region of the capital. Forces from Burma invaded and held the city in 2101 B.E. The city's status was reduced to a religious center and a regional city under the control of the rulers' descendants and local leaders.

During the 20th century until the beginning of the 21st century, the city once again became crucial for military strategies, controlling the northern upper region. Burmese forces invaded, and Chiang Saen was captured multiple times by the northern alliance from Ayutthaya and Thonburi. In 2347 B.E., King Rama III, in the reign of King Rama IV, ordered the expulsion of Burmese residents and set the city ablaze, causing the people to disperse to various cities in the northern region and sending troops to Bangkok.

In 2424 B.E., King Chulalongkorn granted control of Nakhon Lampang to Prince Intha, who led the city's residents from Lampang, Chiang Mai, and Lamphun to establish a base in Chiang Saen. He bestowed various honors and appointed him as the governor of Chiang Saen in 2438 B.E. Finally, in 2442 B.E., Chiang Saen was dissolved as a city and became a sub-district of Chiang Saen Luang in 2438 B.E. The status was elevated to become Chiang Saen District in Chiang Rai Province on April 9, 2500 B.E.

If contemporary individuals fail to delve into the wisdom and heritage of the ancestors, it will undoubtedly have detrimental effects on the cultural value and heritage of the community.

### 1.2 Trumpet History

The trumpet has a history dating back to ancient times when people first discovered the resonant sounds produced by blowing into hollow objects like animal horns and conch shells. Around



1500 BC, craftsmen began crafting trumpets from wood, metal, and ceramic. These ancient trumpets have been unearthed worldwide, from China and South America to Scandinavia, Asia, and Egypt.

In its earliest forms, the trumpet wasn't considered a musical instrument but rather a signaling device for civic, religious, or military purposes. Due to its high, clear tones, ancient trumpeters employed short melodies or "calls" to convey messages over long distances. The biblical book of Numbers extensively describes these trumpet uses, indicating their role in summoning people and breaking camp, sounding alarms during times of war, and participating in religious ceremonies. While the trumpet continued its signaling role for thousands of years, the late Middle Ages witnessed a design transformation, turning the trumpet into a musical instrument.

In the late 18th century, Austrian trumpeter Anton Weidinger introduced a groundbreaking trumpet design shortly before 1800. This innovative design incorporated holes and keys like a clarinet or flute, allowing for changes in the trumpet's pitch and unlocking its full chromatic range of notes. This invention revolutionized trumpet playing, prompting composers to create works showcasing the trumpet as a solo instrument. One notable piece from this period is Haydn's renowned Trumpet Concerto in E-flat Major (1796), originally intended for performance on the keyed trumpet.

While the keyed trumpet marked a significant breakthrough, its design had flaws that led to notable tuning issues. In 1818, German horn players Heinrich David Stölzel and Friedrich Blühmel addressed these challenges by introducing the valved horn. This innovation replaced keys with valves, redirecting air into different lengths of tubing. Building on this success, Stölzel and Blühmel collaborated with instrument builder C. F. Sattler to apply valved technology to the trumpet, resulting in the invention of the first valved trumpet in 1820.

## Research Methodology

### 1. The Research Procedure Includes 4 Steps which are:

1.1 To conduct a historical study of Chiang Saen and the Prasad Wai melody, including an exploration of its origins, cultural significance, and historical context.

1.2 To harmonize the Prasad Wai melody for a trumpet quartet, involving the adaptation of traditional elements into a musical arrangement suitable for the chosen instrumentation.

1.3 To conduct a detailed analysis of the harmonized Prasad Wai for a trumpet quartet, examining the structural, harmonic, and melodic components, as well as the incorporation of trumpet techniques.

1.4 To publish the composition "Prasad Wai for Trumpet Quartet," including documentation of the research process, musical notations, and any relevant findings or insights.

### 2. Research Instrument (s)

2.1 Score of original Prasad Wai music.

2.2 Score of Prasad Wai for orchestra.



**Results**

**1. The analysis study about northern folk music Prasad Wai.**

The researcher has studied the lyrics of the song "Prasad Wai" it is observed that the original instrumental rendition of the song, believed to be from the Chiang Saen era, consisted of a single section without key changes. However, due to the evolution of musical techniques from the past to the present, musicians have enhanced their abilities, leading to renditions that involve changing keys. In contemporary performances, the song is played with all four keys: Sol, La, Re, and Mi.

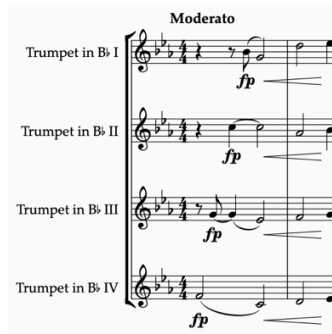
**Table 1:** The Original Prasad Wai melody

- - - ซ	- ซ ซ ซ	พ ม พ ซ	ด ซ ท ด	- - ร ด	ท ซ ท ด	ซ ด ท ซ	ท ซ พ ม
- - - ฟ	ม ร ด ท	พ ซ ด ท	พ ซ ท ด	- - - ซ	- - - ฟ	ม ฟ ด ร	ซ ด ท ซ

From Table 1, This is Original Prasad Wai Melody Can replace the Solfège system as follows ด=Do ร=Re ม=Mi พ=Fa ซ=Sol ล=La ท=Ti)

**2. The results of create music form northern folk music Prasad Wai for trumpet quartet.**

The researcher creates Harmony and slightly modified Melody, researchers want to keep the main melody of the song. They are adding chords to make the single tune more interesting and pleasant. The song will start with the Bell Tone technique, playing the brass instrument with a focus on the first sound and increase to loud dynamics.



**Figure 1:** The Score of Prasad Wai for trumpet quartet

From picture 1, Bell tone technique

Rehearsal mark A will follow the original melody pattern and add chords to make the melody more colorful. Chord progression will be done in the classical style.

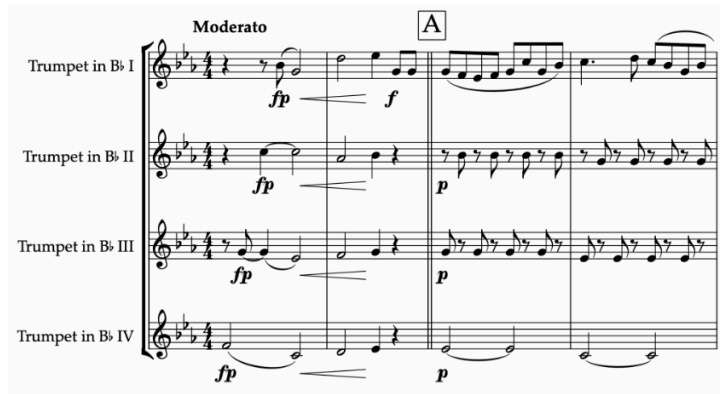


Figure 2: The Score of Prasad Wai for trumpet quartet rehearsal mark A

From picture 2, This rehearsal mark A with original melody pattern and add chords

Rehearsal mark B, the researcher will enhance the playing pattern by introducing a continuous note-playing style, creating a dimensional sound using two trumpets playing consecutive notes. Additionally, at the 18th bar, modulation will be applied, transitioning from the key c minor to the key d minor.

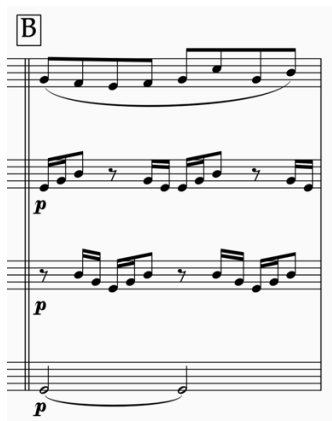


Figure 3: The Score of Prasad Wai for trumpet quartet rehearsal mark B

From picture 3, This rehearsal mark B with introducing a continuous note-playing style



Figure 4: The Score of Prasad Wai for trumpet quartet rehearsal mark B

From picture 4, This rehearsal mark B the 18th bar, modulation will be applied, transitioning from the key c minor to the key d minor.

Rehearsal mark C, the researcher wants a melody played in a canon style with two trumpets, where trumpet 4 starts playing first, followed by trumpet 2. There will be accompaniment by trumpets 1 and 3, and the section concludes with modulation from the key d minor to the key g minor.



Figure 5: The Score of Prasad Wai for trumpet quartet rehearsal mark c

From picture 5, This rehearsal mark C with canon style by trumpet 2 and 3

Rehearsal mark D, the researcher reduces the melody and adds lively rhythms to create a more vibrant atmosphere in the song. This imparts energy and facilitates the key change from g minor to a minor.



Figure 6: The Score of Prasad Wai for trumpet quartet rehearsal mark D

From picture 6, This rehearsal mark D with reduces the melody and adds lively rhythms to create a more vibrant atmosphere in the song

Rehearsal mark E, which serves as the final part of the song, the researcher uses A minor as the concluding key for the entire performance. The accompaniment pattern remains the same as in section C, but the chords are altered from section C. In the last 3 measure, the chords are sustained to create a sense of closure for the song. A Picardy third is added to the final chord, giving the song a major chord ending, which is a technique commonly used in the Baroque era.



Figure 7: The Score of Prasad Wai for trumpet quartet rehearsal mark D

From picture 7, This rehearsal mark E In the last 3 measure, the chords are sustained to create a sense of closure for the song. A Picardy third is added to the final chord

### 3. The results of publish Prasad Wai for trumpet quartet.

The results of publish Prasad Wai for trumpet quartet was published on YouTube on December 13, 2023. And will have perform at Faculty of Music Bangkokthonburi University on January 12, 2024. This song will record and perform by Kueakool Jaisom, Wasawat Payakkakul, Pariphon Dinlansagoon, Suchol Nintawong.

### Discussion

The results showed that composing this song based on the melody of Prasad Wai for trumpet quartet the researcher gained knowledge in melody techniques from both the classical and baroque eras. This involved revisiting the learning of music history and literature of classical music. The resulting song exhibits a blend of various styles, creating a harmonious combination. There is a connection between the sections, and modulation is used in a classical format.

### Suggestions

This presentation of Prasad Wai for trumpet quartet can be further developed in arrangements that allow other musical instruments to perform, such as a string quartet or a woodwind quartet. Both can use this musical notation, adapting the notes to suit the characteristics of each instrument. However, the musical color may vary depending on the instrument used for the performance.

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KSUC-OI-043

## Neo-hanuman for flute, violin, cello and piano: the burning of Longka

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### Abstract

The purposes of the research were to compose a classical piece based on “new music” concepts, to find out the new interpretation towards the story of Hanuman, and to publish the composition. The research methodology was qualitative research. The researchers studied mainly from literature reviews. The research findings were new music concepts can be classified into two meaning: in contemporary music, it is any idea that can show the possibility of creating new sound; and in research, it is the aspects of musicology toward experience, new ideas, and research; and the result also showed that the composition had been creatively done according to the purposes of the research, which it consisted of new music concepts, and the composer had interpreted new aspects of the story of Hanuman. The performance will be premiered online via Youtube channel namely “Thanyawat Sondhiratna” on 8 December 2023.

**Keywords:** Hanuman, Composition, New Music

### Introduction

Neo-Hanuman for Flute, Violin, Cello and Piano: The Burning of Longka is a continuation creative work, with an approximately 7 minutes of length, from the previous research; Neo-Hanuman for Clarinet, Violin, Cello and Piano. The classical composition concept of the 20th Century period is mainly used in this creative work, which it consists of the combination of traditional songs and “new music” concepts. To describe, the new music concepts are the findings from any idea that can show the possibility of creating new sound like the idea of “noise and silence” from John Cage. Mostly, composers will study and find any way to produce the extended techniques of each music instrument (Epperson, 2023). In research, new music concepts are the results of experience, new ideas, and research regarding all aspects of musicology.

From Thailand’s epic novel called ‘Ramakien’, “Hanuman”, as one of the main characters, was chosen to be used in research, because Hanuman has got many interesting storylines, and his character represented the believes, culture, and the aesthetics of Thai society very well, which it is worth studying. The researchers had been studying in both fields. From the Khon performance and classical music, as well as, the literature that is related to the study. In music, there are some fundamentals that has been focused on such as the rhythm, melody lines, harmonies, etc. While on the performance section, the portraits of the dance were used to study to interpret about Hanuman into new music concepts.

## Research Objectives

1. To compose a classical piece based on “new music” concepts.
2. To find out the new interpretation towards the story of Hanuman.
3. To publish the composition.

## Review of Related Literatures

### 1. Royal Khon of *Suebmaraga* part

The story began with the meeting of the Rama, who ordered Hanuman and the monkey army to march to Longka city to find Sita. As stated by Matichon (2019), Dr.Surat Jongda, the Khon Performance writer, said that *Suebmaraga* means finding the way. After the army arrived at the place close to Longka, Hanuman, then, went by himself to find Sita. He met many demons and had a fight with each of them. After Hanuman won every fight, he found Sita and told the story to her. As an impetuous monkey, before Hanuman went back to his army, he disturbed the *yaks* by destroying the garden and other things, which the story led to the point when Hanuman tricked the *yaks* and Ravana, to put fire on him. After he got fire, he ran all over the city, Longka, thus, burned (Thana-Boom, 2020).

### 2. New Music Concepts

From the previous research, the instruments used in the composition were clarinet, violin, cello, and piano, which their extended techniques have been already studied and summarized. Therefore, to study the extended techniques in this research will be focused on flute which it is the new instrument joining the trio. According to Mars (2019), flute can create six different techniques which are flutter tongue, key clicks, jet whistle, aeolian sound (air), tongue ram, and harmonics. However, the researchers chose some of these extended techniques to be used appropriately in this research. The researchers also found that these interesting techniques of flute can produce the ‘wind’ sound very well, which it is a good represent towards Hanuman’s character.

Another part which is concerned by the researchers is music form. In the 20th Century period, there are many music form being used in composition, however, the results from the study can be concluded that many 20th Century composers used free form to compose, and mostly, it is kind of storytelling, therefore, the melodies and harmonies will be changed by the expression or other elements rather than a certain form like in Classical or Romantic period. Bachani (2017) referred to Bartók’s Fourth String Quartet that Bartók composed by using ‘macrostructural symmetry’ idea within five movements. To explain, Bartók often used the mathematic ideas along with his compositions. Moreover, he described the structure of movement IV from the Fourth String Quartet that the first two parts has their own theme with the symmetry of the bars (around 42-44 bars) while part three has its own free form before ending with the coda.

## Research Methodology

### 1. The Research Procedure Includes 5 Steps which are:

1.1 To study the classical pieces based on “new music” concepts. This part is included music analysis on music context, structure, harmonies, etc. The classical pieces are such as Bartok’s String Quartet No. IV (1928), Takemitsu’s Air for flute solo (1995), Pan’s Kaidan (2013), etc.

1.2 To study Hanuman story, the Burning of Longka part.

1.3 To compose a classical piece based on “new music” concepts. The results of literature reviews from 1.1 and 1.2 were used in this composition, especially the extended techniques of each music instruments that related to new music concepts.

1.4 To find out the new interpretation towards the story of Hanuman.

1.5 To publish the composition.

## Results

### 1. The results of the composing the classical piece based on “new music” concepts

According to the research process in Phase 1, data from the study and analysis were used to compose the piece. There are many new music concepts used in this research, the researchers, thus, may have to describe briefly for the results in this article. First, the twelve-tone system from Schoenberg, it was the very first concepts in music in the 20th Century period, and it is still helpful for the composer to come up with some melodies. In Neo-Hanuman for Flute, Violin, Cello and Piano: The Burning of Longka (Neo-Hanuman 2), the researchers chose two rows from the twelve-tone system which are PI4 and RI6, and these rows were used relatively with other keywords, in which the set of motives had been derived (see table 1).

**Table 1:** The set of motives for Neo-Hanuman 2

		1	2	3	4	5	6	7	8	9	10	11	12
Hanuman	P0	Bb	Ab	Db	A	Ab	Db						
	RI4	Gb	D	E	Eb	D	E						
Longka	P0	Db	B	Db	C	E	Ab						
	RI4	E	F	E	Db	G	D						
The Monkey Army	P0	Bb	D	Ab	B	Db	E	D	Ab	G	Ab		
	RI4	Gb	Bb	D	F	E	G	Bb	D	Ab	D		
Yaks	P0	Ab	Db	Ab	C								
	RI4	D	E	D	Db								

From table 1, the set of motives were all modified; therefore, the notes were not covered with twelve- tone.



Figure 1: Set of motives used in violin and cello (bar 10-23)

From picture 1, the notes in the boxes, in part 1, are the set of motives from the monkey army used in violin and cello (bar 10-23). However, the set motives for Sita’s concept were different. The researchers used only four tonic notes and modified into chord progression rather than using as melodies. The results for Sita’s theme are Bbm7 (add9), Gb7, Ab7 and Db7.

Figure 2: Chord Progression of Sita’s Theme

From picture 2, the chord progression was created from the twelve-tone system of Sita’s theme. Then, the theme was chosen to be the main structure used in the whole part of part three.

Another significant point from this composition is the uses of ‘extended techniques’, which all instruments express their own techniques according to the characters of Hanuman, the monkey army, yaks, etc. These extended techniques can be found mainly in part two and part four (see figure 3).

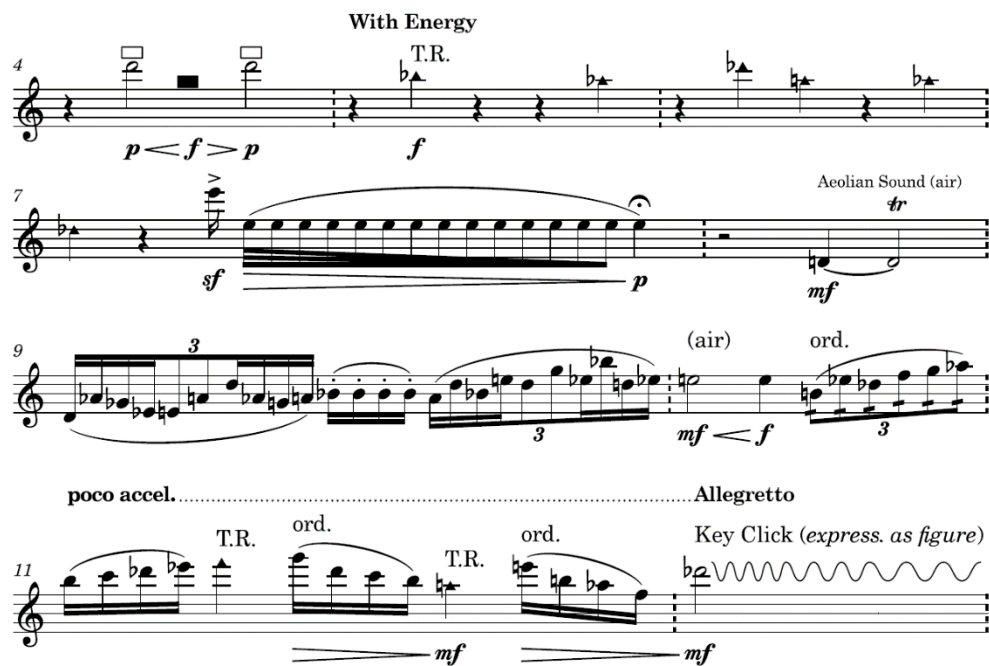


Figure 3: Some extended techniques for flute solo in Part 4

From picture 3, the extended techniques represented Hanuman's characteristic when he was disturbing the yaks in the garden. As an impetuous monkey, the notes in bar 7 represented the scratch of monkey's personality. The air sound from bar 4 and the aeolian sound were used to mention that Hanuman is *Vayubutra* (the son of God of the wind). It can be seen that these extended techniques were used frequently, and each of them changed rapidly; this idea gives the picture of Hanuman very well.

## 2. The results of the new interpretation towards the story of Hanuman

The researchers conducted the composition of part four into four sections. Apart from the flute solo (figure 3), the other three sections were about the burning of Longka, which began with the flames grew larger, and Hanuman, who was on fire, was about to ran all over the place. The fire normally has got a fast pace feeling, the tempo thus going fast as Allegro (with a quarter note equal 126 bpm), and when the flames were growing larger, the interpretation of this was the tremolo on dissonant intervals rolling and glissando to a higher pitch (see figure 4).

Figure 4: The first section of the burning of Longka (bar 17-22)

From figure 4, the dynamics were also playing on human’s emotion. On strings, they played loud and suddenly soft (*fp*) dynamics which made the listeners to be more thrilling.

Figure 5: The tragic incident from the burning of Longka (bar 35-38)

From figure 5, the researchers’ opinion was to show the yaks’s point of view when they found that their own city was burned. This section turned to slow pace suddenly, and the harmonies played the tragic sound such as tritone and the minor second, while the cello was the solo to present the yaks’ expression.

**Con fuoco** ♩ = 140

3 bars

Express the tonic by the figure

Express the tonic by the figure

Express the tonic by the figure

Express the tonic by the figure

*ff* Distort. *f*

*ff* Distort. *f*

*ff* *f*

*ff* *f*

Figure 6: The flames (bar 39-44)

From figure 6, the last section of the piece has got the fastest tempo, and the harmonies presented with the dissonant intervals. The strings gave the unpleasant sound from the distortion technique which represented the dread of the incident. In addition, the researchers put on the artistic figure of flames in the score (bar 39-41) for the musicians to express their feeling toward the piece by themselves.

### The results of the performance

After the performance recording, the researchers have found that this composition reflected the purposes of study very well. It contains with many emotions from the monkey army part which each instrument can bring out the monkey's characteristic directly, to the very lovely part when Hanuman met Sita, and the last grievous emotional part of the burning of Longka.

In addition, there were two part (part 2 and 3) which needed the musicians, themselves, to interpret by their emotions toward the piece, even with intention or not, the results led to produce new sound of the harmonies which sometimes got many dissonant sounds, and sometimes it was beautiful harmonies.

It can be concluded that the Hanuman's story along with the new music concepts, especially the extended techniques used in the composition that reflect to the characteristic of the monkey army, yaks, Sita, and Hanuman very well, gave a clear and exact interpretation to the composition.

## Discussion

From the results mentioned above, this composition showed the clear and exact interpretation about Hanuman's story together with the new music concepts as the purposes of the study. According to Pan's Kaidan (2013), the composition for flute and piano, he explained that there was a piano part using fingernails to scratch on piano strings to reflect to the name of his composition, as Kaidan in Japanese means a horror story. While in Neo-Hanuman: The Burning of Longka, the researchers used quite similar technique by using the left hand to slap on the piano strings to interpret to the horror from the flames when Longka city was burning. The researchers, thus, combined many new music aspects in the composition which led to Hanuman's story new interpretation, in which many extended techniques were used deliberately, and also the new composition method by using visual perspective in the score to show the musicians' own expressions.

## Suggestions

As the researchers stated from above, Neo-Hanuman for Flute, Violin, Cello and Piano: The Burning of Longka is a continuation creative work from the first one; Neo-Hanuman for Clarinet, Violin, Cello and Piano. The suggestions in this second work would be that the next research can be a continuation or another story, but more or less, the new music concepts give unlimited of new aspects, and can be used appropriately to the music performance in Present. Furthermore, the composers can also find their own ways to bring out new knowledge to the humanity.

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KSUC-OI-044

## A creative work: Sor Pamar song for wind quartet

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### Abstract

This creative music composition is designed for performing the 'Sor Pamar' song with a Woodwind Quartet. The song consists of two parts: the melody parts, the refrain parts and the band parts. The performance style of the Thai brass band combines Western musical harmonies while incorporating tones similar to traditional Northern Thai music (Lanna). Use research principles to ask questions and collect requests in the traditional way, which is currently not used anymore. In this research, the lyrics of old (Idiom) 'Sor Pamar' songs were collected, to be adapted into the main melody

**Keywords:** Sor Pamar Song, Woodwind Quartet, Four-part harmony

### Introduction

From the song Lanna Akhayan, year 1991, artist Charan Manopet, who is a folk musician. The melody of the Sor Pamar was used, which is the melody of a folk song to adapt and present to listeners in the world of modern music. And received a great welcome from music fans. It was considered one of the records of the folk music industry of that era. And there are also other artists who have used this melody to play solo with musical instruments such as pi, seung, salo.

From the study, the researcher found that there are numerous songs that used the Sor Pamar melody for vocal melody and significant modifications in musical. For instance, in the works of folk singer from the northern region, Charan Manopetch, For example 'Sor Khong Paeng' song from the album 'Luk Khao Nung' year 1981 (B.E. 2524) by Charan Manopetch and Sunthorn Vechanont. 'Yin Dee Ton Rup' song from the album 'Chan Mee Khwam Rak Ma Hai' year 1988 (B.E. 2531) also by Charan Manopetch, and Sunthorn Vechanont, and 'Ao Sao' song from the album 'Folk Song Kam Meuang,' year 1990 (B.E.2533) by Charan Manopetch and It's composed by 'sueng' (Thai northern fiddle)

Charan Manopet was the first person to uniquely transform Lanna music into modern music by using a simple singing method. Use simple chord progressions. The use of language in the lyrics is easy to listen to and remember which allowed Lanna music to spread to other regions by presenting a new presentation. As a result, people know more about Lanna music and are accepted by people all over the country.

The Sor Pamar melody is considered a basic in Thai Lanna folk music tone. There are various lyrics composed by this melody, included 'Sor Reung Jao Suwat,' song 'Nang Bua Kam' song 'Sor Tam Ra Yai' (funny

fiddle song), 'Sor Lao Nithan' song 'Sor Suma Khraw Tan' song and very short fiddle song call 'Sor Kom' and replay tunes song call 'Sor Wong' etc. especially 'Sor Reung Jao Suwat' and 'Nang Bua Kam' are particularly popular and are frequently performed at various events.

A group called Arwusodhayalai from Mae Soon sub-district has gathered information stating that the Sor Pamar song is a traditional folk song of the Lanna region in Chiang Mai province. The Sor Pamar song originated from Myanmar and was brought to the Lanna region by the Myanmar immigrants approximately 200 years ago.

Sorpama is considered traditional folk music in the northern region that locals are familiar with, especially the melody of 'Chao Suwat Nang Buakam, from the literature of Thao Sunthon Pojanakit, who was an important poet in the court of Prince Dararasami.

Mr. Ong-arj Inthaniwet (2007/B.E. 2550) stated that the origin of the Sor Pamar melody is not confirmed. It is believed to have been influenced by the people of Myanmar during the period when Chiang Mai was occupied by Myanmar. Additionally, Mr. Saknarin Chaongiew (2011/B.E. 2554) mentioned that the Sor Pamar melody might have been influenced by Central Thai music, during Princess Dara Rasamee returned to Chiang Mai permanently, bringing music teachers to instruct local musicians and they adapted the Burmese-toned into unique melodies of the Lanna region.

The Sor Pamar melody consists of a single part, with a medium beat and 6 beats Rhythmic Pattern. It is a section of the melody with 4 beats, and the band section or refrain section with 2 beats. Considering following the international music, the melody section comprises 8 bars, and the band or refrain section consists of 4 bars, totaling 12 bars. It is characterized by the northern region tone. Apart from being used as a vocal song (Sor), it is also commonly performed with traditional musical ensembles such as Paat Khong, (Thai local steel bells band), Salor Sor, Seung (Thai local fiddle band), and Phee Chum (Thai local woodwind band), with a local rhythmic pattern accompaniment.

Another interesting part of the Sor Pamar melody is its lively and entertaining mood, with its short duration and its often to repeated and looped, making it easy for beginners to play. Therefore, it is categorized as a 'Standard song,' of the northern region.

Due to the importance of the aforementioned Sor Pamar song, the researchers have conceived the idea of re-arranging this song in a wind quartet, representing the cultural music heritage of northern Thailand on the international stage. Simultaneously, this serves as a tribute to our esteemed music teachers in the field of music culture, individuals who have been deeply immersed in the world of music or are part of the Western musical culture.

## Research Objectives

To create a Sor Pamar song for musical performance with a wind quartet.

## Review of Related Literatures

The concept used for writing harmonies in four-part harmony.



In arranging harmonies or designing the music instrumental for Sor Pamar song in the format of a wind quartet or saxophone quartet, the concept of arranging harmonies is as follows:

#### **1st. Alto Saxophone**

Playing as the counter melody in the song. Sometimes switch to backing harmony when other saxophones play the melody. Sometimes tasked with playing intricate melodies on the main melody.

#### **2nd. Alto Saxophone**

Playing as the main melody with the alto saxophone. It involves changing tones or introducing new tone and playing as a harmony.

#### **3rd. Tenor Saxophone**

Playing as the melody in a spaced-out manner, similar to a traditional Thai bells band. In addition, this session will be playing as a harmony with the lower 3rd descending from the 2nd alto saxophone.

#### **4th. Baritone Saxophone**

Playing as the lowest harmony in the song and emphasizes the counter melody sometime to add variety to the music. In this arrangement, the baritone saxophone is designated to play the counter melody at sometimes. In addition to playing string bass. of popular music that emphasizes the use of notes that are the root chords Especially the 1st and 3rd beat of each bar.

## **Research Methodology**

In order to widely publish the Sor Pamar melodies to a larger audience, researchers have conceptualized arrangements for a Woodwind Quartet. The concept includes the following ideas

**1. Appropriateness and readiness of musical instruments.** The researchers have designed or arrangement the harmonization for the saxophone quartet in the format A(S)+A+T+B. This means they can be performed in both A+A+T+B and S+A+T+B format. This is done to be compatible with the instruments available in the band or educational institute where there is often a shortage of performers or a lack of the Soprano Saxophone instrument.

### **2. Classification of musical instrument roles.**

5.2.1 1<sup>st</sup> Alto Saxophone and 2<sup>nd</sup> Alto Saxophone take turns playing the melody, mimicking the alternating singing between male and female voices. By if 1<sup>st</sup> Alto Saxophone is playing the melody, 2<sup>nd</sup> Alto Saxophone will accompany by providing support and response. Conversely, if 2<sup>nd</sup> Alto Saxophone is playing the melody, 1<sup>st</sup> Alto Saxophone will switch to providing support and response.

5.2.2 The Tenor Saxophone plays a fundamental role in carrying the main melody, repeat note, bridge and band part, and following to the heavy beats. It helps maintain the song's structure and imitates the round bells in a traditional Thai pi-phat band. There is a consistent rhythmic pattern throughout the song.

5.2.3 The Baritone Saxophone playing as the melody in the low pitch range or acts as the bass in a modern musical style to create excitement and a lively atmosphere. By using a rhythmic pattern like playing bass guitar, which will be clearly evident in the refrain part. Some parts might have repeated

melodies to emphasize and clarify the tune, creating a more intense and profound emotional impact. In addition to the 4<sup>th</sup> part, the baritone saxophone, or 'Barry,' also playing on the main melody, enhancing the Sor Pamar song in the wind quartet, making uniquely and colorful.

**3. The harmony** will use 5<sup>th</sup> or 4<sup>th</sup> perfect intervals. Harmonization in 3<sup>rd</sup> both major and minor will be used to a lesser extent especially in major 3rds. If there is a lot or often the mood of the song will lack the accent of a folk song. It becomes too Western-accented music. Especially the harmony that falls on the main rhythm or the heavy rhythm of the song or the song's sentences

**4. Percussion instruments and saxophone quartet work** the general display of sor there will be no percussion instruments. Such as cymbals, and drums mixed together. Therefore, research "Musical Creativity: Sor Pama Songs" Saxophone quartet music research The researcher aims to maintain the original style of playing. Therefore, there are no musical instruments to accompany the rhythm. The researcher has the following points of support

- In the past, when there were no amplifier or electrical devices, percussion instruments such as cymbals, clappers, and drums would louder than voice and fiddle sounds. Particularly, they would overshadow the narratives presented by the storytellers. In those times, education was not widespread as it is today. Therefore, the stories presented by the storytellers were considered valuable knowledge and a window to the world for the villagers or audiences. These stories included teachings of moral values, ways of life, religious ceremonies, agricultural practices, and even aspects of sex education. Etc.

- The lively and captivating sounds of cymbals, clappers, and drums might distract the audience's attention from the presented narratives. They could overshadow the eloquence of the language and the melodiousness of the storyteller's voice, as well as the harmony of the musical sounds.

- In ceremonies like the Naga celebration (the performing a ceremony for praise parent before the man will make ordination ceremony). House blessing ceremonies, and major merit-making rituals (dedicating merits to the deceased), a serene atmosphere is required without loud noises. The gentle sounds of rituals and soft musical tones contribute to the solemnity of the ceremony, filling it with melodious sounds, the essence of sacredness of the attendees. Therefore, the use of cymbals, clappers, and drums is not found in traditional Thai musical performances, whether it's in the Chiang Mai or Nan style.

For the reasons mentioned above, in this creative research project, the musical arrangement is not combined with percussion instruments. This is in order to make the sound of all 4 saxophones blend together beautifully.

## Results

'Sor Pama presents a full score note layout, and in order to distinguish the harmonic distances, the Sal key is used in the baritone tone. as Figure 1-4.

## Sor Pamar

Saksit Samithitam

1st Alsolo

Alto Saxophone 1 *mf*

Alto Saxophone 2 *mf*

Tenor Saxophone *mf*

Baritone Saxophone *mf*

6

Alto Sax. *mf*

Alto Sax. *mp*

Ten. Sax. *mp*

Bari. Sax. *mp*

12

Alto Sax. *mp*

Alto Sax. *mp*

Ten. Sax. *mp*

Bari. Sax. *mp*

2nd Alsolo

Figure 1: Sor Pamar performing by Wind Quartet on the 1-17 Bars

2

Musical score for measures 18-23. The score is for a Wind Quartet with four parts: Alto Sax. (top), Ten. Sax., Bari. Sax., and another Alto Sax. (bottom). The key signature is two flats (B-flat and E-flat). The time signature is 4/4. The first Alto Sax. part starts at measure 18 with a *mp* dynamic. The second Alto Sax. part starts at measure 19 with a *mf* dynamic. The Ten. Sax. part starts at measure 18 with a *mp* dynamic. The Bari. Sax. part starts at measure 18 with a *mp* dynamic.

Musical score for measures 24-29. The score is for a Wind Quartet with four parts: Alto Sax. (top), Ten. Sax., Bari. Sax., and another Alto Sax. (bottom). The key signature is two flats (B-flat and E-flat). The time signature is 4/4. The first Alto Sax. part starts at measure 24 with a *mp* dynamic. The second Alto Sax. part starts at measure 24 with a *mf* dynamic. The Ten. Sax. part starts at measure 24 with a *mp* dynamic. The Bari. Sax. part starts at measure 24 with a *mp* dynamic. A "1stAlSolo" marking is present above the first Alto Sax. part at measure 27.

Musical score for measures 30-35. The score is for a Wind Quartet with four parts: Alto Sax. (top), Ten. Sax., Bari. Sax., and another Alto Sax. (bottom). The key signature is two flats (B-flat and E-flat). The time signature is 4/4. The first Alto Sax. part starts at measure 30 with a *mp* dynamic. The second Alto Sax. part starts at measure 30 with a *mf* dynamic. The Ten. Sax. part starts at measure 30 with a *mp* dynamic. The Bari. Sax. part starts at measure 30 with a *mp* dynamic.

Figure 2: Sor Pamar performing by Wind Quartet on the 18-35 Bars

The image displays a musical score for a wind quartet performance of 'Sor Pamar' across three systems of staves. The first system (measures 36-41) features four staves: two Alto Saxophones, a Tenor Saxophone, and a Bari. Saxophone. The second system (measures 42-47) includes dynamic markings: *mp* for the top two Alto Saxophones, *mp* for the Tenor Saxophone, and *mf* for the Bari. Saxophone. The third system (measures 48-52) includes a first ending bracket labeled '1.' above the first Alto Saxophone staff. The key signature is one flat (B-flat major or D minor), and the time signature is 4/4.

Figure 3: Sor Pamar performing by Wind Quartet on the 36-52 Bars



Figure 4: Sor Pamar performing by Wind Quartet on the 53-58 Bars

Discussion

The song Analysis

Analysis of the melody of Sor pama song tunes, the researcher considers that to make it easier to present. Therefore, the method of writing a melody with both Thai notes was used. And the western music note is the C major scale. Which is convenient for reading aloud incidentally, this is a melody that comes from a song (lyrics), not a melody that comes from the playing of a musical instrument.

For example, the melody of 'เม โส ลา' (Me So La) comes from the lyrics Koy fung Ter etc. (Please see Figure 6 for reference)

From Figure 6, we can see that the melody for the first part and the second part, even though the melody may change but the heavy beat at the beginning of the song remains the same (except for the first part and the 13th bar; otherwise, they are identical).

_ _ _ E	_ G _ A	_ E _ G	_ D _ E	_ _ E A	_ _ E D	_ C A C	D E D C
_ _ A C	_ _ D E	_ E G D	_ C _ D	_ D _ G	_ _ A B	_ B A D	_ B _ A
_ B A G	A B A E	_ _ A D	C B G A	_ B A G	A B A D	_ _ A D	C B G A

Figure 5: the original Sor Pamar music notes writing by traditional Thai music notes

## SOR PAMAR

Saksit Smithitam

♩ = 120

4

koi fang ter mu jum pe nong ja kai tamong lung nang bu—

9

kam te tam ra bum ook ni tam pa ju tid tor bud kud jul su vad tour ma

14

17

ta tong tang ja sor pang pa mar ja nan dong ka lue ja nan dongking ja mine au

22

king ma aing zone kang mang bai na kung ja au b au

26

Figure 6: Samples of Sor Pamar Music and Lyrics

### Suggestions

1. In academic and cultural field, it is advisable to bring other traditional Thai folk songs to rearrange music and harmony more.
2. In public field, it should be disseminated in the form of musical performances.

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KSUC-OI-045

## A confirmatory factor analysis of factors influencing the job performance of royal Thai army personnel

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### Abstract

The objectives of this research were (1) to develop the component of factor influence the job performance of royal Thai army personnel. (2) to examine the congruence of model of factors influencing the job performance of royal Thai army personnel with empirical data. This research is quantitative analysis using a questionnaire as a tool to collect data from a sample of 280 royal Thai army personnel. Data were used to analyze and verify the consistency of confirmatory factor analysis. The results showed that factors influencing royal Thai army performance are: (1) transformational leadership consists of 4 observable variables: idealized influence, inspirational motivation, intellectual stimulation and individualized consideration (2) strategic thinking consists of 4 observable variables: visionary thinking, reflection, creativity and systems thinking (3) management innovation consists of 4 observable variables: vision and strategic, process management, resources management and technology management. Then validating of CFA models for consistency was found to be valid and consistent with the empirical data.

**Keywords:** Transformational leadership, Strategic Thinking, Management Innovation

### Introduction

The development of the country in the future requires preparedness and the establishment of the country's resilience under the principles of a self-sufficient economy, in order to adapt and withstand the impacts of future changes securely. The National Economic and Social Development Plan No. 13 (BE 2566-2570) has therefore outlined a strategy to restructure the economy towards quality and sustainable growth, placing importance on the development of science, technology, research, and innovation as driving forces for the qualitative and sustainable development of the economy and society. (Office of the National Economic and Social Development, 2023).

The government, through the Ministry of Defense, has established a strategy for safeguarding the country for the Ministry of Defense for the years 2560-2579. The strategy consists of 6 focal points, each with specific objectives. These are as follows: 1) cooperation in national security with foreign countries. The strategy emphasizes building cooperation in the realm of security with other nations. 2) defense,

preservation, and reverence for the monarchy Institution. This point focuses on safeguarding and honoring the institution of the monarchy 3) maintaining the security of the state. The strategy aims to uphold the security of the state. 4) country development and assistance to the people: This point highlights the development of the country and providing assistance to the people 5) empowering the civilian sector. The strategy aims to strengthen the civilian sector 6) military operations to uphold democracy and National Interests: This point underscores military operations to maintain democracy and national interests. (Ministry of defense, 2017). Additionally, a vision for the year B.E. 2579 has been outlined to serve as a long-term goal and framework for the development and mission execution of the ministry of Defense. This vision envisions the army as a modern, capable force that instills confidence in the public and is a leading ground force in the region. To achieve the strategy and vision, there is a need to develop the operational performance of the army by considering factors such as transformational leadership, strategic thinking, and Management innovation. The influence of these factors on the operational performance of military personnel has been studied to a limited extent, with a scarcity of research on the context of these variables influencing the army's operations. The researcher want to study component of three factors that influence royal Thai army personnel's performance. This result use for development Thai army personnel in future.

### **Research Objectives**

1. To develop the component of factor influence the job performance of royal Thai army personnel.
2. To examine the congruence of model of factors influencing the job performance of royal Thai army personnel with empirical data.

### **Review of Related Literatures**

Transformational leadership: Military leaders are appointed within the scope of their designation as commanding officers in each unit, aiming to execute command and control operations appropriately, with emphasis on morale, discipline, esprit de corps, and proficiency. Military leaders must excel both in their duties and interpersonal skills, demonstrating abilities in communication, information technology utilization, and team building. They serve as inspirational figures, harnessing the potential of individuals within the organization, considering diversity, and setting a positive example. They exhibit responsibility, honesty, and a trustworthy person.(Wanasida,Bernarto, Sudibjo & Pramono, 2021).

Strategic thinking is the ability to find the best ways or alternatives amidst situations that may present challenges and uncertainties, leading toward predetermined objectives. For managers seeking success in today's highly competitive and dynamic global landscape, learning about various aspects related to business is crucial. However, acquiring peripheral knowledge alone may not guarantee true success. The indispensable skill for managers is the best possible strategic thinking to become strategic thinkers. This involves leveraging knowledge and experience, problem-solving, and finding the optimal direction for the

organization. Strategic thinking is essential for navigating the complexities of the business world and devising the most effective approaches for the future. (Muriithi, Louw, & Radloff, 2018).

Management Innovation involves the improvement and transformation of thought processes and the adoption of new working methodologies to create something novel that has not existed before or to enhance and modify existing practices, making them more effective when implemented. (Tidd & Bessant, 2018).

## Research Methodology

### 1. The Research Procedure.

This research is quantitative research. The study adopts a quantitative research design, collecting data from cavalry personnel in Royal Thai army, analyze the data by package software and discussion. In this research use sample from cavalry personnel because cavalry is the main fighting force of royal Thai army.

### 2. Research Instrument (s)

The data collection tool utilized in this research was a questionnaire. The questionnaire was divided into 4 sections: Section 1 demographic information about the sample population, Section 2 transformational leadership, Section 3 strategic thinking, Section 4 management innovation. The questionnaire employed a Likert-type scale. The rating scale comprises; 5 =Strongly agree, 4=Agree, 3= Neither agree nor Disagree, 2=Disagree and 1= Strongly disagree. Reliability is the ability of a measure to obtain the internal consistency of a set of variables. High reliability of a construct exhibits high opportunity that all variables in a construct measure the same thing (Churchill and Brown, 2007). To estimate reliability, reliability of all 12 observed variables are tested by using Cronbach's alpha ( $\alpha$ ) (Cronbach, 1951). Eisinga et al.(2012) has indicated Cronbach's alpha 0.8 to be satisfactory reliability coefficient. For test reliability in this research, we separate questionnaire for 30 samples, All 12 observed variables have reliability indices range from 0.946 to 0.964 which indicate high reliabilities of all variables.

### 3. Populations and Samples

3.1 Populations were 25,546 cavalry personnel in royal Thai army.

3.2 Samples :The sample is this research use criteria that the structural equation modeling with mediate latent variables and the relationship between exogenous latent variables were at moderate and high level, the appropriate sample size was not less than 20 subjects per observed variables (Hair et al, 2010).In this research, there are 12 observed variables ,so the sample is 240 (20×12). And the researcher prevent data error, so collect data from 280 sample.

**4. Statistics for Data Analysis**

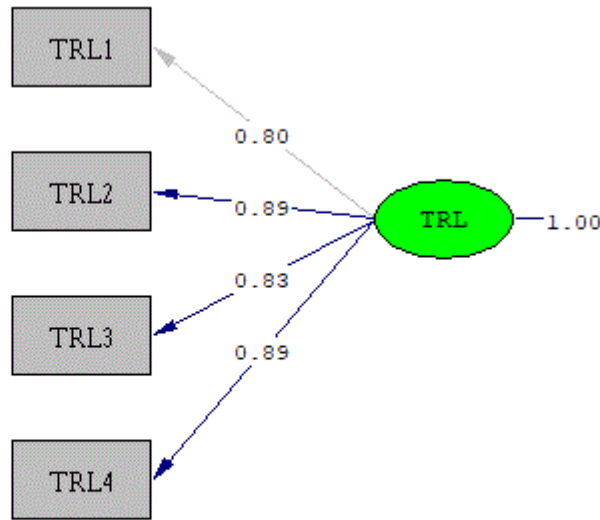
The researcher use confirmatory factor analysis (CFA) by package software for analysis the data. The rule for decide the consistency with the empirical data as follow :  $\chi^2 / df$  (chi-square/degree of freedom)  $\leq 2.00$ , P-value  $> 0.05$ , CFI (comparative fit index)  $> 0.95$ , GFI (goodness of fit index)  $> 0.95$ , AGFI (adjusted goodness of fit index)  $> 0.95$ , RMSEA (root mean square of error approximation)  $< 0.05$ , RMR (root mean squared residual)  $< 0.05$ , RMR  $> 0.05$ , CN (critical N)  $> 200$ , (Diamantopoulos & Sigauw, 2000).

**The Results**

The Researcher present the results based in the research objectives,

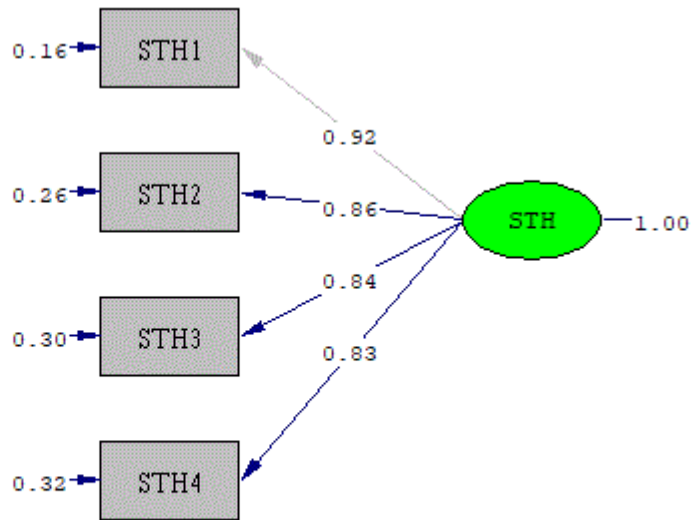
**1. The results of the development component of factor influence royal Thai army performance**

The results shown in Figure 1-3.



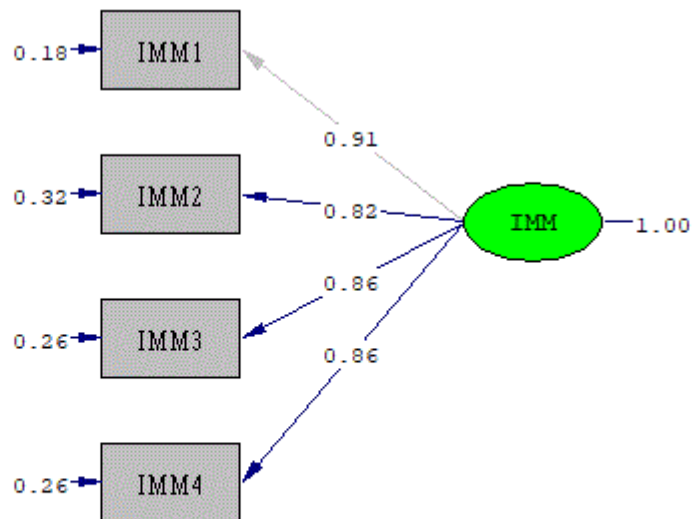
Chi-Square=1.50, df=1, P-value=0.22130, RMSEA=0.035

**Figure 1:** CFA of Transformational leadership



Chi-Square=3.67, df=2, P-value=0.15946, RMSEA=0.046

Figure 2: CFA of Strategic thinking



Chi-Square=0.30, df=2, P-value=0.86076, RMSEA=0.000

Figure 3: CFA of Management innovation

The researcher developed component of factors influence royal Thai army performance. There are 3 factor influence royal Thai army performance. First factor, transformational leadership comprise of Idealized Influence (TRL1), Inspirational Motivation (TRL2), Intellectual Stimulation (TRL3) and Individualized consideration (TRL4). Second factor, Strategic thinking comprise of Visionary thinking (STH1), Reflection (STH2), Creativity (STH3) and Systems thinking (STH4). Third factor, Management innovation comprise of Management innovation Vision and Strategic (INM1), Process Management (INM2), Resources Management (INM3) and Technology Management (INM4). And each component has factor loading more than 0.50.

## 2. The results of the examine the congruence of model of factors influencing royal Thai army performance with empirical data

The results of examining the congruence of confirmatory factor model of factors influencing royal Thai army performance found that model of factors influencing royal Thai army performance exhibited consistency with the empirical data as follow:  $\chi^2 / df \leq 2.00$ , P-value > 0.05, CFI >0.95, GFI >0.95, AGFI >0.95, RMSEA <0.05, RMR <0.05, RMR > 200 (Hair *et al*, 2010). And all of variables, AVE (average variance extracted) scores exceeded 0.50, while the resulting CR (composite reliability) scores were greater than 0.70. (Fornell & Larcker, 1981). The result show in table 1.

From figure 1 and table 1, The model fit statistics of Transformational leadership construct were:  $\chi^2 / df = 1.50$  with a p-value of 0.221; Root Mean Square Error of Approximation (RMSEA) = 0.036, Root of Mean square Residual (RMR) = 0.002, Goodness-of-Fit Index (GFI) = 0.99, Adjusted Goodness-of-Fit Index (AGFI) = 0.98. All of these values indicate a good fit in this construct.

From figure 2 and table 1, The model fit statistics of Strategic thinking construct were:  $\chi^2 / df = 1.84$  with a p-value of 0.160; Root Mean Square Error of Approximation (RMSEA) = 0.046, Root of Mean square Residual (RMR) = 0.003, Goodness-of-Fit Index (GFI) = 1.00, Adjusted Goodness-of-Fit Index (AGFI) = 0.99. All of these values indicate a good fit in this construct.

From figure 3 and table 1, The model fit statistics of Management innovation construct were:  $\chi^2 / df = 0.15$  with a p-value of 0.861; Root Mean Square Error of Approximation (RMSEA) = 0.000, Root of Mean square Residual (RMR) = 0.001, Goodness-of-Fit Index (GFI) = 1.00, Adjusted Goodness-of-Fit Index (AGFI) = 0.99. All of these values indicate a good fit in this construct.

**Table 1:** The results of the examine the congruence of model of factors influencing royal Thai army performance

Component	$\chi^2/df$	P-value	CFI	GFI	AGFI	RMSEA	RMR	CN	CR	AVE
1. Transformational leadership	1.50	0.221	1.00	0.99	0.98	0.035	0.002	767.43	0.78	0.67
2. Strategic thinking	1.84	0.160	1.00	1.00	0.99	0.046	0.003	827.70	0.81	0.62
3. Management innovation	0.15	0.861	1.00	1.00	0.99	0.000	0.001	849.34	0.85	0.61

## Discussion

The result from this research can be discuss follow the research objectives:

1. To develop the component of factor influence the job performance of royal Thai army personnel.

The result show that there are 3 factors influence royal Thai army personnel ' performance:

1.1 Transformational leadership. Transformational leadership have 4 component: Idealized Influence, Inspirational Motivation, Intellectual Stimulation and Individualized consideration. It is

said that leaders in organizations with a higher degree of change leadership are likely to elevate the performance of their subordinates. This finding is consistent with previous research by Ludwikowska & Tworek(2022) and Zaw & Takahashi (2022).

1.2 Strategic thinking have 4 component: Visionary thinking, Reflection, Creativity and Systems thinking. Strategic thinking is characterized by specialized knowledge and capabilities, enabling the creation of innovative operational approaches, fostering alignment in practices, preparing the organization, and enhancing competitiveness. This finding is consistent with previous research by Alatailat, Elrehail, & Emeagwali (2019) and Shahul Hameed, Salamzadeh, Abdul Rahim, & Salamzadeh (2022).

1.3 Management innovation have 4 component: Vision and Strategic, Process Management, Resources Management and Technology Management. Management innovation involves the application of new ideas, practices, and actions in a practical context, leading to the attainment of new, valuable outcomes, contributing to the success of the organization. This finding is consistent with previous research by Hoai, Hung, & Nguyen (2022) and Mai, Do, & Ho Nguyen (2022).

2. To examine the congruence of model of factors influencing the job performance of royal Thai army personnel with empirical data. The research findings indicate that there is a high level of consistency with the observational data within each factor, suggesting that these factors exhibit a comprehensive interrelation. This is attributed to the model's adjustments through the utilization of correction indices, aligning with the criteria for assessing the model's consistency with observational data (Modification Index:: MI) and adhering to established principles of Hair et al (2010). This finding is consistent with previous research by Chen, Sharma, Zhan & Liu (2019) and Khan, Ali, Olya, Zulqarnain & Khan (2018).

## Suggestions

1.The research results shed light on the significance of each dimension of the variables influencing the job performance of royal Thai army personnel. This insight is instrumental in developing strategies to enhance the performance efficiency of royal Thai army's personnel.

2.This research study adopts a quantitative approach. For future research, it is recommended to supplement this quantitative approach with qualitative research to obtain insights from commanding officers.

3. For future research, It is recommended to study the influence of transformational leadership on the job performance of royal Thai army personnel by roles of management innovation as a mediators and another study, the influence of strategic thinking on job performance of royal Thai army personnel by roles of management innovation as a mediators.

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## The effect of local governance on subjective well-being evidence from household survey

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### Abstract

The purpose of the research was to investigate the effect of changes in local government quality and point out which dimensions of local government have significant impacts on the subjective well-being of households. The study used the Vietnam Household Living Standard Survey (VHLSS) from 2016 -2020 which was conducted in all provinces in Vietnam with more than 40,000 households. Using both ordered logit and OLS regressions, the results showed that the improvement in government performance induces a higher level of self-reported well-being. Specifically, the enhancement in participation at the local level, vertical accountability, control of corruption, public administration procedures, environment governance, and E-governance have a significantly positive impact. The study also highlights the need for local government to address transparency in local decision-making and public service delivery.

**Keywords:** Subjective well-being, government quality, Vietnam, households.

### Introduction

Subjective well-being (SWB) is the domain within the behavioral sciences that examines individuals' assessments of their own life experiences. Numerous studies have demonstrated the relationship between SWB and economic circumstances. (Diener et al. 1993; Veenhoven 1994; Zavisca and Hout 2005). Increasingly, governments recognize the importance of creating an environment that will help their citizens achieve long-term economic mobility. Not only changes in economic but also political, and institutional conditions have affected the well-being of people.

Vietnam has an interesting background to study subjective upward mobility due to the remarkable achievement in economic growth. However, the improvement in absolute income does not always mean increasing subjective well-being (Easterlin 1974). The Vietnamese government has shown a commitment to enhancing and refining local institutions and governance systems, all with the ultimate objective of elevating the quality of governance. This study utilizing the unique data from the Vietnam Households Living Standard survey and uses various governance quality and performance indicators to estimate the improvement of local governance. This research focuses on the impacts of changes in governance performance on subjective

well-being. The empirical models control for both provincial and individual-level factors to address the bias in self-reported mobility. The data is highly representative because it was conducted on all provinces of Vietnam. The findings will contribute to the ongoing discussions of the influence of local governance on subjective well-being and decision-making processes regarding institutional improvement in Vietnam and other similar countries.

### **Research objective:**

- 1) Investigate the relationship between improvement in local governance quality and subjective well-being of households.
- 2) Find out which dimensions have a significant effect and how they impact.

### **Literature review:**

Previous studies have shown that the average happiness of the national population is significantly influenced by the quality of government (Helliwell and Huang 2008; Ott 2010). The shortcomings of existing studies are first, most focus on developed countries, and second, study across nation. Specifically, some studies using the European Quality of Governance Index – EQGI (2017) measuring institutional quality available at the regional level in the European Union (Arampatzi et al. 2018) use data on subjective well-being based on individuals' perceptions of it up to 2010 for 11 Middle East and North Africa countries. They investigate the impact of governance on the subjective well-being or happiness level of citizens at the national level while each country will have different economic, political, and institutional contexts. There is currently very little study on how the performance of governance will have a causal relationship with the subjective well-being of local people under the same political and institutional conditions. This study will fill that gap.

Besides that, previous studies have limited choice of indicators to estimate the performance of the government and do not directly mention subjective well-being concepts as the outcome. They usually investigate the impact of one or several aspects of governance such as the role of voting and political participation (Graham 2001, Dorn et al 2007, Bjornskov, Dreher, and Fischer 2010, Orviska, Caplanova and Hudson 2011, Weitz-Shapiro and Winters 2011, Han et al 2013, the effect of control corruption (Tavits 2008, Heukamp and Arino 2011, Welsch 2011, Arvin and Lew 2012, rule of law (Bjornskov, Fischer, and Dreher 2010, Jiminez 2011, Graafland and Compen 2012), the importance of trust (Helliwell, Huang, and Wang 2013), government effectiveness (Whiteley et al. 2010, Ott 2011, Kim and Kim 2011), freedom (Belasen and Hafer 2012), environment (Halla et al. 2013), public service and welfare (Ifcher 2011). Most studies use proxies such as the current level of happiness, and level of satisfaction and ask the respondents about the present feeling of their life instead of comparing the difference with the past. Existing papers only study the relationship between subject well-being and quality of governance at the same time. This research approach did not allow such papers to investigate the impact of changes in governance on self-perceived well-being. This research will fill that gap by focusing on the impacts of changes in governance performance

on subjective well-being. The empirical models control for both provincial and individual-level factors to address the bias in self-reported mobility.

## Research Methodology

### 1. The baseline model

To investigate the relationship between changes in governance performance and subjective upward mobility, we use the model:

$$SM_{ipt} = \text{prePAPI}_{pt} + d\_PAPI_{pt} + \sum \text{Households}_{ipt} + \sum \text{Province}_{ipt} + \delta_p + \theta_t + \varepsilon_{ipt} \quad (1)$$

Where  $S_{mipt}$  is the subjective upward mobility reported by household  $i$  at province  $p$  at time  $t$ .  $\text{PrePAPI}_{pt}$  is the Provincial administration performance index of the province  $p$  5 years ago.  $d\_PAPI_{pt}$  is the difference between  $\text{PAPI}_{index}$  at time  $t$  and  $\text{PAPI}_{index}$  5 years ago.  $\text{Households}$  is a vector of household characteristics  $i$  at province  $p$  at time  $t$  including race, resident, income per capita, the value of a fixed asset, living area, type of toilet, type of using water, age of head, marital status of the head, education level of the head, type of occupation of the head, size of household.  $\text{Province}$  is a vector of the provincial characteristic of province  $p$  at time  $t$  including GDP per capita, and population density.  $\delta_p$  and  $\theta_t$  respectively are provinces and year-fixed effects to capture any unobservable factors which can be affect subjective mobility at the province and each year.  $\varepsilon_{ipt}$  is the error term for households and uses robust error. The model is clustered at the province level.

The dependent variable in this study, subjective upward mobility is a categorized variable, we use ordered logit estimation but also report the coefficients from OLS regression.

### 2. Composition model

To clarify the impact of governance quality on subjective upward mobility, we also include seven variables that measure different aspects of provincial governance quality.

The composition model is :

$$SM_{ipt} = \text{prePAPI}_{pt} + d\_D1 + d\_D2 + d\_D3 + d\_D4 + d\_D5 + d\_D6 + \text{other\_d} + \sum \text{Households}_{ipt} + \sum \text{Province}_{ipt} + \delta_p + \theta_t + \varepsilon_{ipt} \quad (2)$$

Where  $d\_D1$ ,  $d\_D2$ ,  $d\_D3$ ,  $d\_D4$ ,  $d\_D5$ ,  $d\_D6$ ,  $\text{other\_d}$  is the change in dimension 1 (participation at the local level), dimension 2 (transparency in local decision-making), dimension 3 (vertical accountability toward citizens), dimension 4 control of corruption in the public sector, dimension 5 (public administration procedures), dimension 6 (public service deliver) and other dimensions respectively. Other variables in regression 2 are similar to regression 1.

### 3. Data

This study utilizes two data sets. Measures of subjective upward mobility and household characteristics are collected from the Vietnam Household Living Standard Survey (VHLSS) from 2012, 2014, 2016, 2018, and 2020. Proxies for quality of governance are from The Vietnam Provincial Governance and Public Administration Performance Index (PAPI) Index Report. Other information related to province

characteristics such as GDP per capita or province population is manually extracted from the Statistical Yearbook of General Statistics Offices of Vietnam.

Data on the local governance of each province are extracted from The Vietnam Provincial Governance and Public Administration Performance Index (PAPI) Report. This is a collaboration between the Centre for Community Support Development Studies (CECODES) under the Viet Nam Union of Science and Technology Associations (VUSTA), and the United Nations Development Programme (UNDP) in Viet Nam since 2009. The first available data was reported in 2011. The PAPI research program is the largest external annual nationwide policy monitoring tool in Vietnam that prioritizes the views of citizens. The data is surveyed by face-to-face interviews and conducted in all provinces in Vietnam. The questionnaire includes 500 substantive questions about Vietnam's policy matters used in the compilation of 120 indicators. Depending on the results of the survey, the PAPI index is a comprehensive indicator compiled from 8 dimensions including participation at the local level, transparency in local decision-making, vertical accountability toward citizens, control of corruption in the public sector, public administration procedures, public service deliver, environment governance and E-governance. The following two criteria have only been added to the survey since 2018.

**Table 1:** Variable definitions

Variables	Type	Definition
SM	Categorical	Subjective upward mobility(1 Worsen, 2 No change, 3 Improve a little, 4 Improve a lot)
pre_PAPI	Continuous	Provincial administration and Performance index 5 years ago
d_PAPI	Continuous	Difference between present PAPI and PAPI 5 years ago
age_head	Continuous	Age of head
head_no_degree	Dummy	Head does not have any educational degree
head_primany		Head finishes primary school
head_lower_secondary		Head finishes lower secondary
head-upper_secondary		Head finishes upper secondary
head_high_edu		Head finish college or university or higher education
married_head	Dummy	Head got married
male_head	Dummy	Head of family is male
a_income	Continuous	Income per capita (adjusted according to inflation rate)
hhsiz	Continuous	Household size
rural	Dummy	Household lives in rural
fixed_asset	Continuous	Value of fixed asset of household
tap_water	Dummy	The main source of drinking water come from tap
toilet	Dummy	Family have seperate toilet

Variables	Type	Definition
living_area	Continuous	Area of the living house
high_edu	Dummy	Family has at least a person graduating college or university or higher education
majority	Dummy	Household belongs majority race (KINH)
garbage	Dummy	Household using collecting garbage service
Area	Catagorical	Red River Delta (1) Midlands and Northern mountainous Area (2) Northern and Coastal Central Region (3) Central Highlands (4) Southeastern Area (5) Mekong Delta (6)
GDP_per_fix	Continuous	Provincial GDP per capita (adjusted by inflation rate)
Population	Continuous	Number of population at province

**Table 2:** Descriptive statistics

Variables	N	Mean	SD	Min	Max
SM	63420	3.083	.795	1	4
pre_PAPI	63550	36.221	3.164	0	40.62
d_PAPI	63238	1.734	4.507	-4.898	46.834
age_head	63550	51.586	13.759	14	106
head_no_degree	63550	.168	.374	0	1
head_primany	63550	.254	.435	0	1
head_lower_secondary	63550	.294	.455	0	1
head-upper_secondary	63550	.152	.359	0	1
head_high_edu	63550	.073	.261	0	1
married_head	63550	.802	.397	0	1
male_head	63550	.749	.432	0	1
a_income	62986	3080.239	2313.71	148.472	52252.5
hhsiz	63550	3.785	1.6	1	16
rural	63550	.698	.459	0	1
fixed_asset	63550	49743.97	109010.95	-16	9021250
tap_water	63550	.385	.486	0	1
toilet	63550	.748	.433	0	1
living_area	63550	84.889	53.566	5	2010
high_edu	63550	.17	.375	0	1

Variables	N	Mean	SD	Min	Max
majority	63550	.823	.382	0	1
garbage	63550	.518	.499	0	1
Area	63550	3.332	1.809	1	6
gdp_per_fix	63550	.088	.153	.014	1.344
Population	63550	1915.777	1904.062	307.7	9227.6

## Results

This section presents the estimated results for the impacts of changes in governance performance on subjective upward mobility.

First, we examine the effect of changes in local governance on the subjective well-being of households. The results are presented in column 1 and column 2 of table 4. The coefficient of the Pre\_PAPI shows that the quality of local governance 5 years ago still has a positive effect on the self-estimated well-being of households at the current time. For one unit increase in pre\_PAPI, we expect a 0.082 increase in the log odd of being in a higher level of subjective well-being, given all the other variables in the model are held constant. Similarly, the result with OLS confirms the result where the increase of 1 unit in pre\_PAPI will increase 0.032 points of subjective well-being. All coefficients are significant at a 99% confidence interval.

The coefficient of the d\_PAPI variable in column 1 and column 2 captures the aggregate impact of changes in all dimensions of PAPI on the subjective upward mobility reported by households. For one unit increase in d\_PAPI, we expect a 0.08 increase in the log odd of being in a higher level of subjective well-being or 0.029 points of subjective well-being in the OLS model. This result gives evidence that the improvement in the quality of governance strongly correlates with the subjective well-being of local citizens. Enhancements made to the quality of local governance have been demonstrated to significantly enhance the overall subjective well-being of the community's residents.

**Table 3:** The reduced empirical result

Subjective upward mobility	Model 1 Ordered logit	Model 2 OLS	Model 3 Ordered logit	Model 4 OLS
Pre_PAPI (PAPI 5 yrs ago)	.082*** (.007)	.032*** (.003)	.066*** (.009)	.026*** (.003)
Changes in PAPI	.080*** (.006)	.029*** (.002)		
Change in Dimension 1			.222*** (.021)	.088*** (.001)
Change in Dimension 2			.029 (.026)	.001 (.01)

Subjective upward mobility	Model 1 Ordered logit	Model 2 OLS	Model 3 Ordered logit	Model 4 OLS
Change in Dimension 3			0.056** (.024)	.021** (.009)
Change in Dimension 4			.088*** (.019)	.015** (.006)
Change in Dimension 5			.073** (.036)	.031*** (.008)
Change in Dimension 6			.001 (.031)	.001 (.012)
Change in other dimension			.059 (.041)	.026* (.016)
N	40,914	40,914	40,750	40,750

Standard errors in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Dimension 1: participation at the local level, dimension 2 (transparency in local decision-making), dimension 3 (vertical accountability toward citizens), dimension 4 control of corruption in the public sector, dimension 5 (public administration procedures), dimension 6 (public service delivery) and other dimensions (environment governance and E-governance)

Second, we use regression 2 to investigate which dimension has a significant impact on self-perceived well-being. The results are presented in column 3 and column 4 of table 4. The full empirical result is presented in the Appendix. Although all coefficients of dimensions are positive however there are only 5 dimensions that have a significant effect. That is dimensions 2, 3, 4, 5, and others which means participation at the local level, control of corruption, public service delivery, environment governance, and E-governance.

The result shows that an increase in one unit in participation at the local level increases 0.222 increase in the log odd of being in a higher level of subjective well-being. A similar result in column 4 supports this with a slightly lower magnitude but still significant at a 99% confidence interval. The major factor in improving citizens' perceptions of social welfare is increased participation in local politics. People develop a stronger sense of ownership and responsibility for the welfare of their society as they actively participate in local governance and decision-making processes. Increased citizen participation empowers people and increases their comprehension of the relationship between their involvement and the enhancement of social welfare as a whole.

Improvement in control of corruption also positively correlates with subjective well-being. The result shows that if local governance improves one unit in control of the corruption dimension the household in the local area will increase by 0.088 log odd of self-reported welfare. When efforts are made to reduce corrupt practices, the benefits ripple through society, resulting in better living conditions, improved access to essential services, and an overall increase in the well-being of the population. As corruption diminishes, resources are more efficiently allocated to public projects and services, fostering a fairer and more equitable society where citizens can enjoy a higher quality of life and greater social welfare.



Enhancements in Public administration significantly impact the subjective well-being of the population. The result shows that when local governance improves one unit in Public administration procedure, the household in the local area will increase by 0.088 log odd of self-reported welfare. The coefficient of this dimension in the OLS model is 0.031 at a 99% confidence interval. When administration procedures are improved, it saves time for citizens and helps reduce bureaucratic hurdles. Waiting time and queuing usually annoy people so quicker access to essential services improves the mood, increases the sense of satisfaction, and decreases the stress and frustration.

We also find evidence showing the positive effect of vertical accountability of local government on the subjective well-being of households. For one unit increase in dimension 5, we expect a 0.073 increase in the log odd of being in a higher level of subjective well-being, given all the other variables in the model are held constant. Improved interactions foster trust between citizens and local government. When citizens feel heard and acknowledged, they are more likely to participate in civic activities. Access to justice promotes a sense of security and equality. Citizens feel protected and empowered, which positively influences mental health and overall societal harmony. Trust and participation create a sense of community and belonging, positively influencing mental well-being. The combined impact on the subjective well-being of environmental governance and E-governance is positive. For one unit increase in other\_d, we expect a 0.059 increase in the log odd of being in a higher level of subjective well-being or 0.026 points of subjective well-being in the OLS model. However, this dimension is only significant at a 90% confidence interval in the OLS model. Maybe because two dimensions has just been added in 2018, so there is not strong evidence to estimate its impact. Environmental management improvements are closely tied to enhancing corporate environmental responsibility and improving air quality, and water quality, and these changes have a significant impact on the well-being of the population. When local authorities manage corporate environmental responsibility, this not only benefits the environment but also generates goodwill among the local population, enhancing their sense of well-being. The collective efforts to enhance environmental responsibility, air quality, and water quality create a more favorable living environment for the community. This, in turn, can lead to reduced stress, improved mental health, and an overall sense of well-being among the population.

In general, when local governments prioritize effective governance, it leads to better public services, reduced corruption, and increased public participation. As a result, communities experience reduced stress, improved access to vital resources, and enhanced trust in institutions. All of these factors collectively contribute to an elevated sense of well-being among the population, creating the foundation for thriving and resilient communities. The result of this empirical research confirms these hypotheses. It also highlights the significance of state management for social welfare. This result also demonstrates that the Vietnamese government has made significant improvements in local management, and these improvements have had a positive impact on subjective well-being. The study did not find a significant impact of dimension 2 and dimension 6 on the subjective well-being of households. This suggests that local government should pay more attention to these dimension to improve the local governance quality.

## Discussion

This study is the first in Vietnam to assess the impact of improving local governance on households' self-assessed well-being. The study makes three contributions: first, it employs the PAPI index, synthesized from eight different dimensions, as a measure of local governance quality. Second, it disentangles the influence of each dimension and evaluates the extent to which each dimension affects the outcome variable. Third, instead of assessing the impact of state management quality as an immediate factor, the research examines the effect of changes. The results show that enhancing governance quality has a positive impact on subjective well-being. These results are confirmed for both the ordered logit model and the OLS model.

The composition analysis shows that improvement in participation at the local level, vertical accountability, control of corruption, public administration procedure, environment governance, and E-governance has a significantly positive impact on the subjective well-being of households. Within 8 dimensions, we do not find a significant impact of Dimension 2 and Dimension 6 on subjective well-being. It seems that the transparency in local decision-making and public service delivery at the local level is not strong enough and the local government in Vietnam needs to consider improving two of these dimensions.

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## The role of employee performance on organizational cohesiveness mediated by employee trust

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### Abstract

Cohesiveness is very important for organizations and industries to keep teamwork performance to achieve predetermined organizational goals. This study aims to see linkages between group performance toward organizational cohesiveness mediated by employees trust. Method used in study is quantitative approach and correlational study. Sample of this reserach is employees at Islamic Hospital (RSI) PKU Muhammadiyah Pekajangan, Pekalongan, Indonesia. The instruments used are employee performance instruments, employee trust instruments in the organization and organizational cohesiveness instruments. The results of the research showed that there is positive significant influence of employee performance on organizational cohesiveness, there is positive significant influence of employee performance on employee trust, and positive significant influence of employee trust on organizational cohesiveness. There is also direct influence of employee performance on organizational cohesiveness and indirect influence of employee performance on organizational cohesiveness which is mediated by employee trust.

**Keywords:** Cohesiveness organization, Performance employees, Trust employees

### Introduction

RSI PKU Muhammadiyah Pekajangan is a private hospital belonging to Persyarikatan Muhammadiyah that provides comprehensive individual health services providing inpatient, outpatient and emergency services. In carrying out its operations, the hospital has human resources which include medical and medical support personnel, nursing personnel, pharmaceutical personnel, hospital management personnel and non-health personnel. They together provide services to patients according to their respective professions to achieve the hospital's goals as outlined in the hospital's vision and mission.

Group cohesiveness relates to which group members are attracted to each other and feel part of the group. A group that has high cohesiveness means that each group member will also have high commitment (Trihapsari and Nashori, 2022). Cohesiveness is very important in the world of organizations and industry to maintain the teamwork performance to achieve predetermined organizational goals. The role of leaders in this case is very important, especially to maintain and accommodate their subordinates so that they reach

a level where cohesiveness between members is closely established (Nataria, 2018). Previous research found that cohesiveness is closely related to performance. Achieving good cohesiveness needed to achieve good performance has been carried out by Yoandra, et al., (2022); Harun & Mahmood (2012); Banwo, et., al (2015). Likewise, Zulhfi (2016) in his research showed that there was a fairly close or moderate relationship between group cohesiveness and employee performance. The higher the group cohesiveness, the higher the employee performance of the group members.

Performance influences how much members contribute to the organization. Improving performance for both individuals and groups is the main of attention in improving organizational performance, as stated by Maltis in (Rafiq, 2019). There is a reciprocal relationship between cohesiveness and performance, that cohesiveness and performance are two variables that have a positive and negative impact on each other, with the level of significance found in the relationship between cohesiveness and performance. This contradiction was also found by Carron, et al., (2002) that there is no difference between the relationship between cohesiveness and performance and performance with cohesiveness, all of which contribute to the formation of better performance. Indra, et al., (2019) stated that cohesiveness had an impact on several group studies which ultimately concluded that cohesiveness moderates employee performance. Meanwhile, Mach, et al., (2010) found that cohesiveness was a mediator between team trust and team performance.

From several studies presented above, it is concluded that cohesiveness is related to several variables as predictor variable, moderator, mediator and as an outcome variable. Researcher highlighted that it has an impact on performance achievement. From several previous studies it was stated that the cohesiveness achievement benchmarks is examined, and each study presents several aspects that become a benchmark for the success of his research. However, research used employee performance within the scope of the organization is limited, and researchers have the assumption that employee performance can have an impact on realizing cohesiveness in the organization.

A good performance will have an impact on trust among group members, and vice versa. Previous research revealed that employee trust is closely related to the performance of the organization (Berraies, et al., 2014; Sanyoto, et al., 2022), because with the existence of trust, members of the organization believe that the organization can provide their potential (integrity), good interaction with fellow members of the organization, thus having an impact on performance.

In organizations, cooperative relationships between employees, and dependence on each other, efforts to create cohesiveness in the organization, and faith play important role, such as perceptions between employees and superiors, relationships between members of the organization, and the

organization in general. So it can be concluded that trust between group members, both employees and co-op management, is a predictor of group cohesiveness (Nataria, 2018).

In employee performance research, not many researchers include the element of trust as a mediator for the relationship between employee performance and organizational cohesiveness. Some research only focuses on the function of employee trust as an antecedent of cohesiveness itself. Apart from that, there is a gap in the results of previous research, that poor performance can have an impact on trust, on the other hand, good trust will have an impact on performance. So researcher have the assumption that employee trust is believed to mediate the relationship between employee performance and organizational cohesiveness, and is an important element in efforts to increase cohesiveness in the organization. Employee performance is proposed by researchers to be a predictor of achieving organizational cohesiveness.

The aim of this research is to find out how employee performance is related to organizational cohesiveness and how employee trust in the organization is able to mediate the relationship between employee performance and organizational cohesiveness.

The framework of this research can be explained as follows:

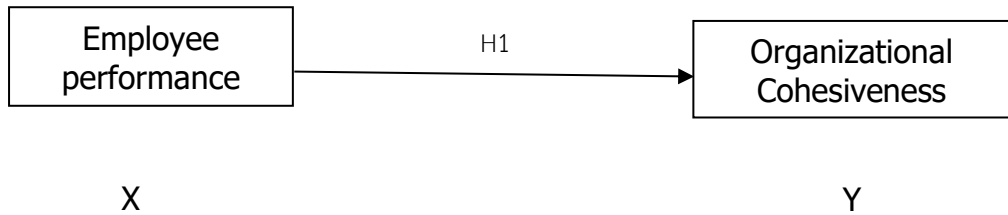


Figure 2. Influence Mediation

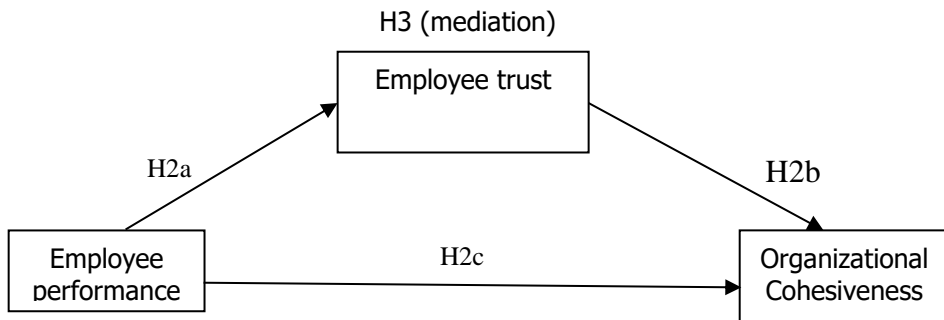


Figure 1: Influence of variables X and Y



The picture above explains the framework of this paper is that (H1) there is an influence of employee performance on organizational cohesiveness, (H2a) there is an influence of employee performance on employee trust, (H2b) influence of employee trust on organizational cohesiveness, (H2c) influence of employee performance directly on organizational cohesiveness, and (H3) indirect relationship between employee performance and organizational cohesiveness mediated by employee trust.

## Method

### Study Approach

This research uses a quantitative approach with questionnaire distribution as the basis for data collection. As a correlational research, this research wants to see the relationship between between the dependent variable and the independent variable, as well as testing the contribution of mediating variable on the relationship between the independent variable and the dependent variable.

### Research Subject

The research population was all employees of RSI PKU Muhammadiyah Pekajangan. The sampling technique used a purposive sampling technique that is selection technique by determining certain characteristics in accordance with the research objectives so that the results obtained can be representative.

The criteria used are employees of RSI PKU Muhammadiyah Pekajangan who have experience of being involved in special work teams that have good performance such as hospital accreditation teams, national program teams and quality assurance teams. These teams are work teams formed to achieve specific tasks and have greater ability to perform effectively and efficiently. Based on these criteria, a sample size of 59 people was obtained from various types of positions, professions, work team involvement, gender, age and length of service. Researchers conducted trials on 59 people who had filled out the questionnaire. From the test results, valid results were obtained from the first distribution of data.

### Research Instrument

In this study, organizational cohesiveness was measured using an organizational cohesiveness scale measuring tool, the Organizational Cohesion Scale (OCS) from Ruga (2014) which consists of 8 question items. Example item: I feel unity among colleagues in this organization. This study used a Likert scale with answer choices from 1 to 5 (5 = strongly agree, 4 = agree, 3 = sometimes, 2 = disagree, 1 = strongly disagree). The highest scale describes a high level of cohesiveness in an organization. After testing on 59 subjects, a Cronbach's alpha value of 0.804 was obtained with 8 valid items.

Researchers measure employee performance using an employee performance scale, Group Effectiveness, which was developed by Jung & Sosik (2002) in the form of a self-assessment that measures

perceived performance, which consists of 5 statement items with an average value of  $rwg = 0.94$  which was then developed by researchers into 15 items. Example item: My employees are very effective in getting the job done to completion. Likert scale was also used with answer choices from 1 to 5 (5 = strongly agree, 4 = agree, 3 = sometimes, 2 = disagree, 1 = strongly disagree). The highest scale describes a high level of employee performance. After testing on 59 subjects, a Cronbach's alpha value of 0.945 was obtained with 15 valid items.

Researcher measured trust in organizations using the Organizational Trust scale (Paliszkievicz, 2010 in Paliszkievicz & Koohang, 2013) which consists of 15 statement items, with Cronbach's alpha of 0.87. Example item: There is alignment between the organization's expectations and the work goals of all employees. Here Likert scale was used with answer choices from 1 to 5 (5 = strongly agree, 4 = agree, 3 = sometimes, 2 = disagree, 1 = strongly disagree). The highest scale indicates a high level of trust in the organization. After testing on 59 subjects, a Cronbach's alpha value was obtained 0.918 with 15 valid items.

## Data analysis

Researchers carried out the data analysis process using Mediated Multiple Regression techniques which tested the influence of mediating variables in mediating the relationship between variable X and variable Y (Hayes, et al., 2013). This research uses data analysis with SPSS Ver 21 software.

## Research result

### 1. Description of variable data

The result of the research can be described in terms of mean value (M), standard deviation (SD), and intercorrelation matrix between variables which are presented in table 1.

**Table 1:** Mean, Standard Deviations and Matrices Intercorrelation

Variable	m	elementary school	1	2	3
Organizational Cohesiveness	4.14	0.57	1	,612**	,670**
Employee Performance	4.26	0.57	--	1	,719**
Employee trust	4.29	0.58	--	--	1

Source data: Data processed , 2022

The organizational cohesiveness variable has a mean value of 4.14; standard deviation 0.57, employee performance variable has a mean value of 4.26; the standard deviation is 0.57, and the employee trust variable has a mean value of 4.29; standard deviation 0.58. The results of the intercorrelation test above show that each of these variables has a positive and significant relationship.

**2. Hypothesis testing**

The results of the hypothesis can be presented as follows:

**Table 2:** Regression Results of Beta Coefficient

Influence	B	t	Sig
Work performance on organizational cohesiveness	0.61	7.89	0.00
Employee performance on employee trust	0.73	10.56	0.00
Employee confidence in organizational cohesiveness	0.47	4.68	0.00
Employee performance on organizational cohesiveness (direct influence)	0.27	2.64	0.01
Employee performance on organizational cohesiveness is mediated by employee trust (indirect influence)	0.34	--	0.00

Source data: Data processed , 2022

The influence of variable X on variable Y can be depicted as following :

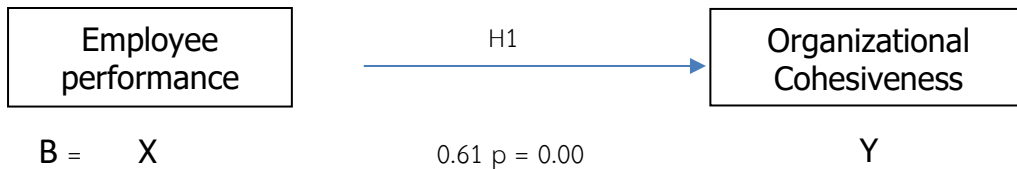


Figure 4. Influence Mediation ( results research )

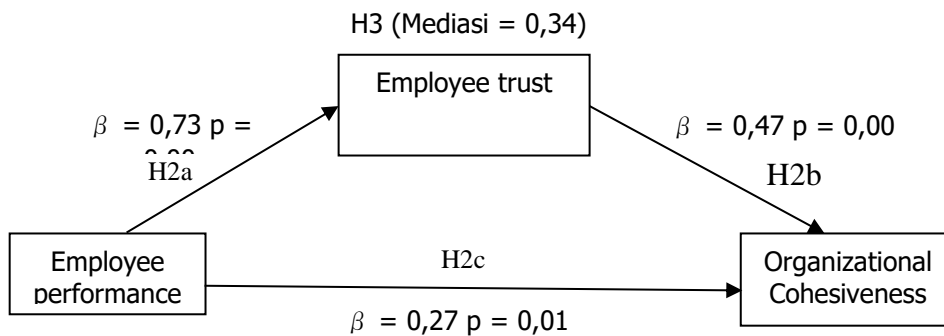


Figure 3: Influence between Variable

## Description

**Hypothesis 1**, there is influence of employee performance on organizational cohesiveness.

Based on the analysis results, it was found that employee performance has a positive and significant influence on organizational cohesiveness ( $\beta = 0.61$ ,  $p = 0.00$ ). It means that H1 was accepted. This showed that good employee performance will have an impact on organizational cohesiveness, namely the better the employee's performance, the higher the organizational cohesiveness.

**Hypothesis 2a**, there is influence of employee performance on employee trust.

Based on the results of the analysis, there is a positive and significant influence between employee performance and employee trust ( $\beta = 0.73$ ,  $p = 0.00$ ). It means that H2a is accepted. This shows that the better the employee's performance, the higher the impact on trust in the organization.

**Hypothesis 2b**, there is influence of employee trust on organizational cohesiveness. Based on the results of data analysis, it was found that there was a positive and significant influence between employee trust and organizational cohesiveness ( $\beta = 0.47$ ,  $p = 0.00$ ). It means that H2b was accepted. This shows that the higher an individual's positive trust in their organization, the more cohesiveness the organization will increase.

**Hypothesis 2c**, there is a direct influence on employee performance on organizational cohesiveness. Based on the results of data analysis, it was found that there was a positive and significant influence between employee performance on organizational cohesiveness ( $\beta = 0.27$ ,  $p = 0.01$ ). It means that H2c was accepted. This shows that the better the employee's performance, the more cohesiveness the organization will increase. The obtained value of R<sup>2</sup> is 0.47 shows that employee performance and employee trust contribute 47% to organizational cohesiveness.

**Hypothesis 3**, there is indirect relationship between employee performance and organizational cohesiveness which is mediated by employee trust, with a mediation value of  $\beta = 0.34$  (product of pathab) and significance level of 0.00. Meanwhile, the results of the Sobel test (z) show that there is a significant indirect influence between employee performance on organizational cohesiveness through employee trust ( $\beta = 0.34$ ,  $z = 4.27$ ;  $p = 0.00$ ). So that there is an influence between employee performance on organizational cohesiveness ( $\beta = 0.61$ ), but after entering the mediating variable, that is employee trust, there is a decrease of ( $\beta = 0.27$ ), and it can be concluded that there is a mediating effect in the relationship between the variables. employee performance on organizational cohesiveness.

## Conclusion

The conclusion of this research are :

1. Employee performance has positive and significant influence on organizational cohesiveness. It means that good employee performance will have impact on organizational cohesiveness, the better employee performance will have positive impact on organizational cohesiveness.
2. Employee performance has positive and significant effect on employee trust. It means that the better the employee's performance, the greater the individual's trust in the organization.
3. Employee trust has positive and significant effect on organizational cohesiveness. It means that the higher the level of individual trust in the organization, the higher the level of organizational cohesiveness.
4. There is direct positive and significant relationship between employee performance and organizational cohesiveness.
5. There is indirect relationship between employee performance and organizational cohesiveness, but there is mediating effect in the relationship between employee performance variables and organizational cohesiveness. It means that employee performance will influence organizational cohesiveness through the level of individual trust in the organization.

## Suggestion

There are still many opportunities for mediating factors between employee performance and organizational cohesiveness other than the level of organizational trust that need further research.

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KSUC-OI-048

## The influence of job satisfaction quality of work life and organizational commitment on intention to stay

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### Abstract

This paper aims to analyze and explain the influence of job satisfaction, quality of work life, organizational commitment on intention to stay. The method used is a descriptive method by reviewing the results of previous research. Based on research results related to the topic studied, various researchers found various factors that influence intention to stay. The conclusion of this paper is that both job satisfaction, quality of work life, organizational commitment have a positive influence on intention to stay.

**Keywords:** job satisfaction, quality of work life, organizational commitment, intention to stay

### Introduction

The termination of an employee from a company, organizationally, causes psychological pain for both the company and the employee concerned. This is not only a setback in professional ranks but also creates scars in organizational life. The team experienced disruption, the relationship between superiors and subordinates also became chaotic and informal groups that had existed also disbanded. Apart from the loss of experienced and skilled employees, the dismissal of an employee will also have a negative effect on the company's relationship with other organizations, and the company's relationship with external stakeholders, especially if the departing employee has been in contact with other organizations (Ghosh et al 2021).

The negative impact of an employee leaving fosters an understanding that employees are the main asset and driving force in determining the success of an organization in a challenging environment and their commitment is very important for any organization (Agus and Selvaraj, 2020). If employee maintenance is managed well, employees will be more motivated and committed to their work. This will ultimately bring positive changes to employees in terms of their job satisfaction, workplace engagement and agency capacity, which could potentially help in reducing absenteeism and turnover rates (De Simone et al., 2018 in Agus and Selvaraj 2020).

Companies need to manage employees who have joined the company, especially those who have good performance, to be able to stay for a long time. Another thing that makes it important to retain

employees is due to limited human resources as a result of the imbalance in the growth of human resources in the market for quality labor which causes the emergence of some competition in getting professional workers. In the end, companies that want to get quality human resources are forced to pay a certain amount of money to get professional workers to meet organizational requirements.

By considering all the costs that arise from the recruitment, selection, training and costs that arise if there is employee turnover, companies finally realize how important it is to retain employees and create a stable workforce, and focus on formulating and implementing a strong retention strategy to effectively reduce employee turnover. Thus, employee retention strategies are gradually becoming an important part of the company's overall business strategy.

Several studies conducted by researchers suggest that the following factors can encourage employees to have the intention or desire to stay or survive in the company (intention to stay), namely job satisfaction (Fasbender, Van der Heijden, & Grimshaw, 2019 in Xiaoyu Li, 2019), perceived organizational support, job control and job satisfaction (Li, Xiaoyu et al., 2020), career development (Lohana Juariyah et al, 2020), organizational commitment (Mary Bell and Ann Sheridan, 2020 and Hazrina Ghazali, et al, 2018), work-life balance and total reward system (Christian and Widhianto, 2021) work values and quality of work life (Kassem and Ahmed, 2021).

This article will explain the influence of job satisfaction, quality of work life and organizational commitment on the intention to stay at the company.

### **Theoretical Framework and Hypotheses Development**

Human resources are one of the most important assets in an organization or company, therefore they must be managed carefully and in line with the needs of the organization. Mandy and Noe in Larasati, 2018 define human resource management as the utilization of human resources to achieve organizational goals. Meanwhile Malayu S.P. Hasibuan stated that HRM is the science and art of managing the relationships and roles of the workforce so that they are effective and efficient in helping to realize the goals of the company, employees and society.

Hani Handoko in Larasati (2018) said that HRM is the attraction, selection, development, maintenance and use of human resources to achieve individual and organizational/company goals. Boone & Kurtz say that human resource management is the function of attracting, developing and retaining employees who have the qualifications to carry out the activities needed to achieve organizational goals.

Meanwhile, Henry Simamora in Larasati (2018) defines that human resource management is the utilization, development, assessment and management of individual members of an organization or group of employees. According to A.F. Stoner, human resource management is an ongoing procedure that aims to supply an organization or company with the right people to be placed in the right positions and positions when the organization needs them (Larasati, 2018).



### **Intention to Stay**

Intention to stay is the employee's tendency to continue working with their current organization (Naim & Lenka, 2017). This is the relationship between psychological procedures and the organization (Hunjra, 2010 in Noer, 2018). The intention or desire for employees to stay (intention to stay) has become a major discourse in the field of management and requires urgent attention regarding how best to make talented employees remain as employees in a particular organization (Noer, 2018). According to Rissanen, 2017 in Noer, 2018), intention to stay reflects employee loyalty to their work and organization to continue working in the long term. There are several predictors of intention to stay which are categorized as individual-related, work-related, organization-related, and external environment-related (Woon et al, 2017 in Noer, 2018).

Employees who intend to stay generally do not think about leaving the organization, rather they are aware and show a desire to stay with the organization (Tett and Meyer, 1993).

### **Relationship between Intention to Stay and Intention to Leave or Turnover Intention**

Intention to leave or turnover intention is the opposite of intention to stay. Meanwhile, intention to leave is defined by Dessler (2020) as the level or number of employees who quit and leave the company. Dessler (2020) suggests that there are at least 8 main reasons why employees leave their jobs, and the top 5 reasons are work-life balance, compensation (remuneration), career development, fairness in the company and health insurance for employees. Companies must pay attention to these factors if they want to create intention to stay in their workers. Usually employee retention is studied in the form of an "intention to leave" perspective, which is negatively correlated with "intention to stay" (Black and Stevens, 1989 in Shanker, 2018).

### **Job Satisfaction**

Hoppock defines job satisfaction as a combination of psychological, physiological and environmental factors that cause someone to honestly say I am satisfied with my job (Hoppock, 1935 in Aziri, 2021). Based on this approach, although job satisfaction is influenced by many external factors, there is still the influence of internal factors related to employee feelings. This means that job satisfaction presents a series of factors that give rise to feelings of satisfaction.

Vroom in his definition of job satisfaction focuses on the employee's role in the workplace. So he defined job satisfaction as an affective orientation on the part of individuals towards the work roles they undertake in their current position (Vroom, 1964 in Aziri, 2021).

Job satisfaction is a combination of positive or negative feelings that workers have towards their work. Meanwhile, when a worker is employed in a business organization, he brings with him needs, desires and experiences that determine expectations that he has neglected. Job satisfaction represents the extent to which existing expectations correspond to actual rewards. Job satisfaction is closely related to individual behavior in the workplace (Davis et al., 1985 in Aziri, 2021).

### The Influence of Job Satisfaction on Intention to Stay

Several studies have been conducted to examine the influence of job satisfaction on intention to stay, including: Tantrianto and Meilani (2021) who conducted research on airline cabin crew x; Monica and Prasetyo (2021) conducted research on teachers at Muhammadiyah 1 Gombong Middle School; Santoso and Yuliantika (2022) conducted research on Gojek drivers in the city of Bandung. From the results of this research, it was found that Job Satisfaction had a significant influence on employees' intention to stay, which was also in line with the results of Igbaria et al's research. stated that job satisfaction and organizational commitment significantly influence employees' intentions to stay in their organization (Igbaria et al., 1994 in Ghosh, 2021). Therefore, the hypothesis formed for this research is:

H1: Job satisfaction has an influence on employees' intention to stay in the company/organization

### Quality of Work Life

The concept of quality of work life expresses the importance of respect for humans in the work environment, thus the fundamental role of work quality is to improve and change the work climate so that the organization technically and humanly leads to a better quality of work life (Arifin, 1999 in Soetjipto, 2017).

Luthans (1995) in Soetjipto (2017) put forward the concept of quality of work life as the importance of respect for humans in the work environment, thus the important role of work quality is to change the work climate so that the organization can technically and ethically bring all its members to a quality work life and more prosperous. A similar opinion was expressed by Hackman and Oldham (1980), who described a quality work life projected in conducive environmental conditions, providing guarantees of health and safety, providing satisfaction, providing opportunities for self-development and career advancement, as well as adequate remuneration. Likewise, the opinion of Chan & Einstein (1990), quality work life is an illustration of the company's concern and experience for its workforce, work environment, relationships with other people, effective communication and collaboration with employees.

Dessler (2020), explains quality work life as a condition of employees' ability to fulfill their needs through the work they do, and is seen as an important thing that must be paid attention to by companies. In this case, the intended need is fair, fair treatment, and employees are given the opportunity to utilize their expertise and skills optimally, can play an active role in managing their duties and place of work, and are involved in the decision-making process.

QWL is a multidimensional variable that displays employees' sensations about several scopes in relation to their work (Kassem and Ahmed, 2021). These include job satisfaction, adequate working conditions and equitable compensation, job advancement opportunities, assumption of responsibility, participation in decision-making procedures, job protection, work-related tensions, organizational safety at work as well as personal relationships, in addition to the consistency of work life (Gurdogan & Uslusoy, 2019 in Kassem and Ahmed, 2021).

### **The Influence of Quality of Work Life on Intention to Stay**

Several researchers have conducted research on the relationship between quality of work life and intention to stay, including Agus and Selvaraj (2020) who conducted research at four private hospitals in Kuala Lumpur Malaysia, Al Zamel (2020) who also conducted research on nurses at a hospital in Malaysia, Kassem and Ahmed (2021) who conducted research on head nurses at the Oncology Center in Egypt. From these studies, it was concluded that the quality of work life influences the intention to stay. Therefore, the hypothesis formed for this research is:

H2: Quality of work life (QWL) has an influence on employees' intention to stay in the company/organization

### **Organizational Commitment**

Steers and Porter (1983) in Yusuf and Syarif (2018) explain that organizational commitment is "loyalty to the organization" characterized by the intention to remain in it; identify with the values and goals of the organization. Equally important is the willingness to use extra effort on behalf of the organization. Individuals consider the extent to which their values and goals relate to the organization as part of organizational commitment, therefore it is considered a relationship between each employee and the organization.

Damri, et al. (2017) defines organizational commitment as the psychological relationship of an employee to the industry which includes employee contribution, loyalty and trust from employees with the values of the pharmaceutical industry. Committed employees will show less motivation to change their jobs, because they have a desire to stay with their company (Thatcher et al., 2002 in Ghosh, 2021).

### **The Influence of Organizational Commitment on Intention to Stay**

Several researchers who have conducted research on the influence of organizational commitment on intention to stay include: Tantrianto and Meilani (2020) who conducted research on the influence of organizational commitment on intention to stay in airline cabin crew x, Li et al (2020) who conducted research on nurses in one hospital in China; Azzuhri, who conducted research on Turun Tangan volunteers in Malang, from all the research, the results showed that organizational commitment had a significant effect on intention to stay. Therefore, the hypothesis formed for this research is:

H3: Organizational commitment has an influence on employees' intention to stay in the company/organization.

### **Research Method**

This article was written using a descriptive method with the objective to examine the influence of job satisfaction, quality of work life (QWL) or quality of work life and organizational commitment on intention to stay (ITS) in a company or company. In this case, intention to stay is the dependent variable with the independent variables job satisfaction, quality of work life and organizational commitment

The data used for this article is secondary data which is the result of research from previous researchers, which was accessed via Google Scholar with samples from several journals that are related to

the writing topic that will be discussed. Which are then analyzed as factors that support the hypotheses that have been proposed. In this research, statistical analysis is not used, considering that this article uses historical studies from previous research.

## Result and Discussion

### The influence of job satisfaction on intention to stay

Several results of previous research cited by Ghosh (2021) related to job satisfaction in relation to intention to stay, including: Reed et al. (1994) who found that dissatisfaction with work and/or lack of commitment to the organization can cause employees to look for alternative positions, then Lee (2000) found that the need for challenge and achievement, and components of job satisfaction play an important role in influencing turnover intentions between IT professionals, and finally Ghiselli et al. (2001, p. 36) where the authors examined the role that job satisfaction and life satisfaction have on turnover decisions, and found that “managers who are more satisfied with the intrinsic components of their jobs, more satisfied with their lives and older tend to be less likely to leave leaving their positions in the near future.”

Li Xiaoyu et al (2020) in their research involving nurses in tertiary hospitals in China found that job satisfaction had a positive predictive effect on intent to stay. Monica and Prasetyo (2021) in their research concluded that the job satisfaction variable influences the intention to stay. This means that if a teacher has high job satisfaction, it can increase the intention to stay for every teacher at Muhammadiyah 1 Gombong Middle School.

Ghosh (2021) in his research found that an employee who has high affective and NC (normative commitment as a dimension of organizational commitment) towards his organization will have a lower intention to leave.

Santoso and Yuliantikan (2022), who conducted research on Gojek drivers in Bandung City, concluded that the job satisfaction variable had a positive and significant influence on intention to stay. This shows that the greater the job satisfaction, the greater the value of intention to stay, and vice versa.

Azzuhri, in his research on the volunteers of Turun Tangan Malang, found that (1) organizational commitment and job satisfaction had a simultaneous influence on the intention to stay of volunteers in TurunTangan Malang; (2) organizational commitment has a significant effect on intention to stay; (3) job satisfaction has no significant effect on intention to stay; (4) compared to job satisfaction, organizational commitment is the dominant variable in the intention to stay of volunteers in TurunTangan Malang.

From the study of several research results above which span sectors, geography and time, conclusions are in line and mutually reinforcing that job satisfaction has a positive influence on employees' desire or intention to stay at the company. And the more an employee has job satisfaction, the stronger the intention to stay. Thus, these results prove that the first hypothesis (H1), that job satisfaction has an influence on employees' intention to stay in the company/organization, can be proven true.

### **The influence of quality of work life on intention to stay**

Agus and Selvaraj (2019) who conducted research on nurses from four private hospitals representing the States of Selangor and Kuala Lumpur concluded that QWL has a positive structural effect on intention to stay, meaning that employees with high QWL have the intention to stay with their organization.

Kasseem and Ahmed (2021) in the conclusion of their research stated that there is a statistically significant positive relationship between the head nurse's intention to continue working and work values and quality of work life. So, from the above we can conclude that nurses' intention to stay on the job increases when the organization pays more attention and considers their work values and improves the quality of their work life.

Andreas Triwani (2021) in his research found that the quality of work life has a positive and significant effect on intention to stay.

Although there are not many research results that can be presented as study material to analyze the truth of the second hypothesis (H2) that the quality of work life or Quality of work life (QWL) has an influence on employees' intention to stay in the company/organization, However, the results of existing literature studies can be said to support this hypothesis. These three studies have the same conclusion, that QWL has a positive effect on intention to stay

### **The influence of organizational commitment on intention to stay**

Tantrianto and Meilani (2020) in their research found that organizational commitment has an influence on the intention to stay in the cabin crew of airline X.

Cabin crew who are willing to accept all duties given by the company, feel loyal to the company, proud and willing to recommend the company as a good place to work will have an influence on the intention to stay cabin crew of airline X.

Bell (2020) concluded that organizational commitment is the strongest predictor of ITSN (intention to stay in nurses) highlighting that this concept can reduce the weathering of job dissatisfaction storms

Monica and Prasetyo (2021) in their research concluded that the organizational commitment variable influences the intention to stay. This means that if a teacher has organizational commitment, it can increase the intention to stay at SMP Muhammadiyah 1 Gombong.

Andreas Triwani (2021) based on the results of his research concluded that organizational commitment has a positive and significant effect on intention to stay.

Several previous studies cited by Ghosh (2021) related to organizational commitment include: Cohen and Hudecek (1993) found a negative relationship between organizational commitment and turnover, and it was found to be stronger in higher status jobs than in lower status jobs, then Meyer et al (2002) found a negative relationship between employee commitment and absenteeism, quitting, stress, work-family conflict and intention to leave the organization,

Overall, the results of the studies from several of the studies mentioned above make conclusions that are in line and mutually reinforcing that organizational commitment has a positive influence on intention to stay. This

confirms the truth of the third hypothesis (H3) that organizational commitment (Organizational Commitment) has an influence on employees' intention to stay in the company/organization.

## Conclusions and Suggestions

From the study of several research results as presented in the results and discussion section, it can be concluded that:

1. Job satisfaction has a positive influence on employees' intention to stay in the company.
2. Quality of work life has a positive influence on employees' intention to stay in the company.
3. Organizational commitment has a positive influence on employees' intention to stay in the company.

Bearing in mind that this article only comes from a review of previous research results, this article needs to be strengthened with primary data and statistical tests, so as to strengthen the validity of the results presented. The author suggests that in the future more in-depth research can be carried out using primary data sourced directly from respondents.

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## Analysis of factors influencing organizational citizenship behaviors :a case study of members of the Pekalongan city resort police office

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### Abstract

This study examines organizational citizenship behavior through the influence of servant leadership, empowerment and organizational commitment. Members of the police at the Pekalongan Kota Resort Police Office need to improve police service and performance properly in serving the public in a fair and independent manner. Appropriate leadership characteristics can increase good work behaviors such as leadership that protects all members of the police so that the police feel cared for and they can work sincerely and have optimal work behavior. In addition, a strong organizational commitment in realizing the agency's vision and mission needs to be strengthened and empowered to all members of the police so that members are enthusiastic at work and behave in a fair and independent manner. Strong organizational commitment is also balanced with the psychological empowerment of the institution to members so that members feel that they are given the opportunity to initiate properly and work independently. This type of research is correlational research with multiple linear regression analysis. 83 samples were determined using the slovin method from 464 populations. Based on the partial test, it states that the significant value of servant leadership is  $0.270 > 0.05$  and the t value is 1.109, so servant leadership has a positive but not significant effect on organizational citizenship behavior and the significant value of empowerment is  $0.015 < 0.05$  and the t value is 2.483, so empowerment has significant positive effect on organizational citizenship behavior. Meanwhile, the significant value of organizational commitment is  $0.009 < 0.05$  and the t-value is 2.723, so organizational commitment has a significant positive effect on organizational citizenship behavior.

**Keywords:** Servant Leadership, Empowerment, Organizational Commitment, Organizational Citizenship Behavior

### Introduction

According to Almahdali et al., (2021), Organizational Citizenship Behavior (OCB) is an individual behavior that is discretionary, meaning it is not explicitly tied to reward systems. Overall, this behavior assists the organization in improving the efficiency and effectiveness of its functions. OCB is characterized by its voluntary nature, and there is no obligation associated with it. This is because OCB is not required



behavior; instead, it is a personal choice made by employees. OCB represents a positive behavior within an organization, expressed through a conscious and voluntary willingness to work.

The increase in OCB is closely linked to the role of human resources, namely employees, within the organization. According to Aprilida et al., (2019), the occurrence of OCB may seem simple or even trivial, but research indicates that OCB generally benefits organizations substantially. Regardless of this evidence, it depends on how employees perceive the benefits of OCB as a means to enhance the functions and effectiveness of the organization. The decisions and policies made by a leader are expected to impact not only the success of the organization but also influence the actions and behaviors of all team members within it.

In an effort to motivate employees, a leader must play a role in ensuring that their employees feel inspired. Leaders have the authority to direct various activities of employees and the organization. According to Novita, (2021), leaders play a crucial role in shaping the work environment of an organization. This is due to the fact that in most organizations, essential aspects of work such as rewards, deadlines, workload allocation, and performance evaluations are under the direct control of the leader. One type of leadership that has a strong relationship with employee job satisfaction is servant leadership. The core characteristics of a serving leader include going beyond personal interests and solely focusing on meeting the needs of their subordinates (Suhardi et al., 2022). Unlike other leadership styles where the ultimate goal is the well-being of the organization, a servant leader genuinely cares about serving their subordinates. Due to this people-oriented approach, a serving leader is expected to have a profound impact on the health and well-being of their employees (Aminah et al., 2022). Improving performance can be achieved through human resource management activities that involve workforce development to enhance productivity (Nurhalimah et al., 2023).

Research conducted by Aprilida et al. (2019) and Almahdali et al. (2021) found a strong positive correlation between servant leadership and Organizational Citizenship Behavior (OCB). The research results indicate a significant influence in the relationship between dimensions such as Agapao Love (Moral Love), Seal of Approval (Empowerment), Vision, Humility, Trust, and Service.

The main principle of the servant leadership theory is to prioritize the interests of employees or subordinates over the personal interests of the leader. According to Almahdali et al. (2021), some researchers argue that the suggested leadership may be more conducive to Organizational Citizenship Behavior (OCB) due to its focus on employee development, community building, authentic leadership, and shared leadership. Wulandari et al. (2021) propose that servant leadership towards subordinates results in reciprocal service from subordinates to the leader. Kumar (2021) argues that the influence motive of a serving leader is not to direct others but to motivate and facilitate service and support by the employees themselves. Employee service to others and organizational resource management can be interpreted as Organizational Citizenship Behavior.

As for the concept of organizational commitment according to Argi Rulijaji, Tri (2016), there are three forms of commitment, namely: affective commitment, normative commitment, and continuous (sustained)

commitment. Employees who are strongly committed to the organization will make maximum efforts to develop the organization because they have belief and trust in the work environment they are in (Bayu Putra Mahardika & Wibawa, 2018). When employees have a high commitment to the company, they wholeheartedly experience job satisfaction and are willing to take actions aimed at advancing the company. This is supported by Aprilida et al. (2019), whose research found that organizational commitment has a positive and significant impact on Organizational Citizenship Behavior (OCB).

#### METHOD

This research is a correlational study aimed at investigating the extent of variations and relationships in one or more variables based on correlation coefficients.

The research analysis techniques include testing the instruments through validity tests, reliability tests, and classical assumption tests, which encompass normality tests, multicollinearity tests, as well as heteroscedasticity tests. To examine whether there is an influence between variables X1, X2, and X3 on Y, multiple regression analysis is employed. To test whether variables X1, X2, and X3 have a partial effect, the t-test is utilized, and the F-test is employed to examine whether variables X1, X2, and X3 have a simultaneous effect on the variable Y.

The population in this study consists of the total members of the Pekalongan City Police Resort, amounting to 464. By using the calculation method of Slovin, the sample size is determined to be 83 individuals. The sampling method employed in this study is a non-probability sampling type, specifically the Stratified Random Sampling technique, where the sample is drawn with a predetermined proportion. In this research, the selected sample consists of 83 police officers.

#### RESULT

Based on the results of the validity test, all the data obtained are valid. In terms of the reliability test, all the data are deemed reliable. According to the significance value of the Kolmogorov-Smirnov test with a 1-Sample result of 0.200, or a significance value greater than 0.05, it is concluded that the data in this study are normally distributed.

Regarding the multicollinearity test, the results indicate that the tolerance values for servant leadership, empowerment, and organizational commitment are 0.376, 0.920, and 0.376, respectively—all variables exceeding 0.10. Additionally, the VIF values for servant leadership, empowerment, and organizational commitment are 2.662, 1.000, and 2.661, respectively—all less than 10. Therefore, it can be concluded that there is no multicollinearity among the independent variables in this study.

The results of the heteroscedasticity test show significance values for servant leadership, empowerment, and organizational commitment as 0.101, 0.201, and 0.291, respectively. Since the significance values for all independent variables are greater than 0.05, it can be concluded that the data in this study do not experience heteroscedasticity disturbance.

Based on the partial test, the calculated t-value for the servant leadership variable (X1) is 1.109, with a significance value of 0.27. Since the significance value of the t-test is greater than 0.05 ( $0.27 > 0.05$ ) and the calculated t-value is less than the tabulated t-value ( $1.109 < 1.98609$ ), it can be concluded that there is a

positive but not significant influence. Therefore, it can be inferred that servant leadership (X1) has a positive but not substantial or strong impact on organizational citizenship behavior. This indicates that as servant leadership increases, it may not significantly contribute to organizational citizenship behavior.

The obtained t-value for the empowerment variable (X2) is 2.483, with a significance value of 0.015. Since the significance value of the t-test is less than 0.05 ( $0.015 < 0.05$ ) and the calculated t-value is greater than the tabulated t-value ( $2.483 > 1.98609$ ), it can be concluded that there is a significant positive influence. Therefore, it can be inferred that empowerment (X2) has a strong positive impact on organizational citizenship behavior.

### **The Influence of Organizational Commitment on Organizational Citizenship Behavior**

Based on the calculation results, the calculated t-value for the organizational commitment variable (X3) is 2.723, with a significance value of 0.009. Since the significance value of the t-test is less than 0.05 ( $0.009 < 0.05$ ) and the calculated t-value is greater than the tabulated t-value ( $2.723 > 1.98609$ ), it can be concluded that there is a significant positive influence. Therefore, it can be inferred that organizational commitment (X3) significantly and positively affects organizational citizenship behavior.

### **The Influence of Servant Leadership on Organizational Citizenship Behavior**

The research results above indicate that there is a positive but not significant influence between servant leadership and organizational citizenship behavior. This is evidenced by the significance value for the influence of X1 on Y, which is  $0.270 > 0.05$ , and the calculated t-value of  $1.109 < 1.98609$ . Therefore, it can be concluded that there is a positive but not strong influence. Meanwhile, the first hypothesis (H1) stating that servant leadership has a strong positive influence on organizational citizenship behavior is rejected.

This is due to the leadership attitude demonstrated by caring for members (personnel), assisting each other in facing difficulties, thus creating a good relationship among members (personnel). Leaders look far into the future in the long term and prepare for the future persuasively (Vision). This will encourage members (personnel) to be tolerant of the organizational situation (Sportsmanship). This is because the leader serves as a role model, emphasizing that organizational interests should take precedence over personal interests. However, the caring attitude of the leadership of the Pekalongan City Police Resort has not been fully realized by members (personnel), so the servant leadership attitude of the leadership has not influenced the organizational citizenship behavior of members (personnel). Members (personnel) only realize that the leadership attitude is something common for superiors to subordinates and do not provide feedback beyond initiating and being more cooperative.

Servant leadership has a positive but not significant effect on organizational citizenship behavior because members (personnel) feel that the leadership's service to members (personnel) is not based on the leader's responsibility but on other factors such as specific interests. This is evidenced by the responses of members (personnel) to the questionnaire's question, 'My leader believes that serving is a mission of responsibility to others,' which shows that many members (personnel) still disagree, accounting for 5%. This indicates that members (personnel) perceive the servant leadership attitude not solely based on the leader's

responsibility but on other motives or desires. The servant leadership attitude can be perceived negatively by members (personnel) because they sense insincerity from the leadership.

The results of this study contradict the findings of research by Almahdali et al., (2021), Aprilda et al., (2019), Kumar (2021), Manora et al., (2021), Baety and Rojuaniah (2022), Pratama Sandra and Suwandana (2017), Suhardi et al., (2022), Wulandari et al., (2021), and Wahyu et al., (2020), which state that servant leadership has a significant positive effect on OCB. The results of this study are consistent with the research conducted by Aminah et al., (2022) and Novita, (2021), which state that servant leadership has a positive but not significant effect on OCB.

### **The Influence of Empowerment on Organizational Citizenship Behavior**

Based on the results of the above study, it is evident that there is a significant positive influence of empowerment on organizational citizenship behavior. This is indicated by the significant value for the influence of X2 on Y, which is  $0.015 < 0.05$ , and the calculated t-value of  $2.483 > 1.98609$ . Therefore, it can be concluded that there is a significant positive influence. Meanwhile, the second hypothesis (H2) stating that empowerment has a significant positive effect on organizational citizenship behavior is accepted.

This is due to the understanding of members (personnel) regarding empowerment, where individuals with high cognitive levels are believed to generate greater commitment and involvement in performing their roles and tasks. Members (personnel) tend to work harder if they believe that the work is meaningful. There is alignment between individual requirements, job roles, behaviors, and individual beliefs. The competence of members (personnel) comes from empowerment. In other words, when members (personnel) are empowered by their leaders, they feel qualified in carrying out their tasks. With confidence in their ability to perform activities/tasks skillfully, members (personnel) will deliver more performance, regardless of whether the task is within the job description they hold.

Furthermore, the self-determination of members (personnel) given the opportunity to make decisions related to their work will make them more creative, thus helping to provide solutions to organizational problems. Providing members (personnel) with the opportunity to decide for themselves will enhance the employees' ability to manage their work, where members (personnel) will be motivated to contribute more to the organization. The impact of psychological empowerment is evident when members (personnel) have the confidence to make a difference by exerting significant influence within the organization. The ability of members (personnel) to contribute and have a significant impact on strategic, administrative, or operational outcomes in the workplace will motivate them to work beyond task requirements, thereby enhancing organizational functions.

The results of this study are in line with the research presented by Aprilda et al., (2019), Argi Ruliaji, Tri, (2016), Christy et al., (2018), Coopertino et al., (2021), Ismaillah and Prasetyono, (2021), Kurniawan, (2020), Mangindaan et al., (2020), Dewi and Riana, (2019), Handika & P, (2018), Adi et al., (2018), Bayu Putra Mahardika and Wibawa, (2018), and Sudarmo and Wibowo (2018), stating that empowerment has a significant positive influence on OCB.

### **The Influence of Organizational Commitment on Organizational Citizenship Behavior**

Based on the results of the above study, it is shown that there is a significant influence of organizational commitment on organizational citizenship behavior. This is indicated by the significant value for the influence of X3

on Y, which is  $0.009 < 0.05$ , and the calculated t-value of  $2.723 > 1.98609$ . Therefore, it can be concluded that there is a significant positive influence. Meanwhile, the third hypothesis (H3) stating that organizational commitment has a significant positive influence on organizational citizenship behavior is accepted.

This is because Organizational Citizenship Behavior can arise from the commitment of members. When members of the organization are satisfied with the conditions within it, they will provide optimal and best performance. A similar situation occurs with members who have high commitment to the organization; they will strive to the best of their ability for the progress of the company due to their belief and trust in the organization where they work. When members of the organization have a strong commitment to the company, they will wholeheartedly devote themselves to their work and be willing to take actions aimed at advancing the company.

The results of this study are in line with research presented by Aprilda et al., (2019), Argi Rulijaji, Tri, (2016), Christy et al., (2018), Coopertino et al., (2021), Ismailah and Prasetyono, (2021), Kurniawan (2020), Mangindaan et al., (2020), Dewi and Riana (2019), Handika and P (2018), Adi et al., (2018), Bayu Putra Mahardika and Wibawa (2018), Sakti and Handoyo (2019), and Sudarmo and Wibowo (2018), stating that organizational commitment has a significant positive effect on OCB.

## Conclusion

1. Based on the goodness of fit test, it is known that the significance value is 0.000; thus, regression is considered suitable for use in the study or the model fits.
2. Based on the partial testing, it is known that:
  - a. Servant leadership variable (X1) is 1.109 with a significance value of 0.270, indicating that servant leadership has a positive but not significant effect on organizational citizenship behavior
  - b. Empowerment variable (X2) is 2.483 with a significance value of 0.015, showing that empowerment has a positive and significant effect on organizational citizenship behavior.

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## The impact of female chairs on firm risk : evidence from Vietnam

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### Abstract

This paper examines how female chairs affect firm risk in Vietnam. Using ordinary least squares regression and the System GMM estimation method, the study's results provide strong evidence that female chairs have a negative impact on firm risk and tend to pursue lower debt ratios in their firms more than their counterparts. In addition, the study examines whether this result remains stable when additionally controlling for stock ownership held by the Chairwoman. Interestingly, the empirical results show that the risk aversion of female chairs will decrease significantly with the higher ownership rate of female chairs. These results suggest some policies and management strategies related to female chairs and the ownership rate in Vietnamese firms.

**Keywords:** female chair, leverage, ownership, risk, Vietnam

### Introduction

The relationship between the nature of corporate leadership and risk has been a subject of much discussion in recent academic literature. Although socioeconomic forces have dramatically changed the structure of the workplace, gender inequality continues to exist in organizations. These inequities include pay gaps, glass ceilings, and others that affect the productivity, advancement, well-being, and contributions of men and women in the business world (Prime, 2013). Overall, the review of research mostly shows that female corporate leaders are less likely to make risk management decisions. For example, research by Faccio et al. (2016) and Huang & Kisgen (2013) found that female CEOs limit the risk of profit fluctuations and reduce company debt ratios; Palvia et al. (2014) showed that female CEOs in small-sized banks will reduce the likelihood of bank bankruptcy during periods of economic crisis; Cid-Aranda & López-Iturriaga (2023) found a negative impact of female CEOs on firm risk-taking hand-collected sample of 369 Latin American listed companies. Although the above studies have helped improve the general understanding of the impact of gender on corporate performance. However, these studies only focus on the gender of the CEO, who is responsible for operating and making the company's daily decisions, and have not focused on studying the gender of the Chairman. The Chairman and CEO are the company's most critical top managers. The Chairman wields considerable power at a firm, as the person holding that role appoints,



evaluates, and can even fire the CEO. At the same time, the Chairman plays a vital role in setting the agenda on strategic issues as well as promoting the company's operations. Therefore, the Chairman is expected to have a more direct and substantial influence on the company's decisions than other directors.

In addition, several previous studies have focused on the impact of female directors on company performance (Adams & Ferreira, 2009; Bennouri et al., 2018; Yang et al., 2019). Some other authors show female directors' influence on companies' risks, such as Cabo et al. (2012), showing that higher gender diversity on the board of directors will reduce operational risk and financial risk. Jizi & Nehme (2017) indicate that the presence of female directors will have a negative impact on the risk of non-financial companies in the FTSE 350. Perryman et al. (2016) show that a higher proportion of women in top management leads to reduced market risk in a company in the United States. Wang et al. (2022) argue that the representation of female corporate leaders increases the likelihood of detecting fraud, thereby reducing the propensity of firms to engage in fraud. This finding confirms that women are more risk-averse and committed to ethical practices than men in corporate leadership positions. The authors' above research results may suggest that male board chairpersons and female company chairmen tend to make lower-risk decisions. Jiang et al. (2018), using a large sample of 20,741 company-year observations in China, found that female chairs increase firm performance and that firms with female chairs perform differently than companies with male presidents. In another aspect, the study of Alloui et al. (2021) examines the impact of Chairman gender on the financial performance of family firms in Arab countries. In general, current research on the impact of gender on company performance and risk primarily focuses on the roles of female CEOs and female members of the board of directors, paying little attention to the roles of female chairs. As a result, the impact of female chairs on corporate governance has yet to be demonstrated in academic research. And existing studies on female board chairs only consider their impact on company performance.

In Vietnam, very little literature focuses on investigating the relationship between the gender of the Chairman and firm risk. Typically, Vo et al. (2023), in their study on the influence of female leaders on risk-taking and company performance, considered the relationship between the gender of the CEO and the Chairman on risk and performance of firms in Vietnam. However, the study only concluded the negative influence of female CEOs on the risk but did not find the impact of female chairs.

This research differs from the above studies in three essential points: the author only focuses on examining the role of female chairs in the risks of companies, not all female directors. The second difference is that the author considers the impact of the Chairwoman's ownership ratio on the relationship between the female chairs and firm risk. Finally, unlike other countries, Vietnam still has gender stereotypes that are deeply ingrained in society's thinking, meaning that people still think that women cannot have the same role as men in the firm's management. Thus, Vietnam becomes a suitable country to test the impact of the gender of the Chairman on firm risk.



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## Literature review and Hypothesis development

### *1. Female chairs and firm risk*

Contingency theories of leadership posit that leadership effectiveness is related to the leader's characteristics or behaviors and situational factors (Brown, 1979). These studies show that leadership styles have gender differences. Male leaders use a task-oriented leadership style, while female leaders use an interpersonal-oriented leadership style (Rigg & Sparrow, 1994), they are willing to help subordinates and care about their subordinates' welfare. Eagly & Johnson (1990) argue that the differences between male and female leaders are in their leadership styles, with women having a more democratic or participative leadership style and a less autocratic or commanding style than men. All aspects of leadership style in which women outperform men are positively related to leadership effectiveness. (McGuinness et al., 2015) applied the contingent leadership style theory to show that having a high proportion of women on the board of directors would reduce dividend distributions.

Upper echelons theory (UET) suggests that studying the characteristics of top managers can predict a part of strategic choices and organizational performance (Hambrick & Mason, 1984). A company's performance is influenced by the perceptions, experiences, values, and personalities of decision-makers shaped by their upbringing. The differential upbringing of men and women from childhood has led to reduced participation in risky behaviors by women (Byrnes et al., 1999). Many studies have been conducted on UET, examining the relationship between leadership gender characteristics and firm risk (Li & Zeng, 2019; Perryman et al., 2016; Zhou et al., 2019), and female CEOs and other female members of the senior leadership team could reduce risks in firms (Jeong & Harrison, 2017).

Empirical studies have also revealed some preliminary results on the influence of female chairs on risk, such as Palvia et al. (2014) showing that female chairs could reduce bankruptcy risk in the banking sector; Mínguez-Vera & Martín (2011) argue that the presence of women on the board of directors reduces the operational risk of companies in Spain. Kayani et al. (2021) present empirical results implying that senior presidents are risk averse and will tend to implement a strategy to diversify their firms. The authors find this effect more substantial than in companies with female chairs.

Based on research that has been conducted on the gender of leaders and leadership style, combining arguments from the results of the above studies, the author believes that women are leaders. Effectively, they will reduce risks to the company thanks to their unique leadership style. On that basis, the author proposes the following hypothesis:

H1: There is a negative impact between female chairs and the risk of Vietnamese listed firms.

### *2. The female chair's ownership ratio affects the relationship between female chairs and firm risk*

Many studies have mentioned the ownership ratio of managers and owners in companies; Jensen, M. C., & Meckling (1976) suggest that the ownership ratio of management and owners will increase firm value and minimize agency problems. Aghdas Zargar (2016) points out that increased managerial ownership may not be a positive sign, as managers are always perceived to protect their assets rather than

the company's. Sanders & Hambrick (2007) investigate the impact of managers' stock selection on strategic behavior and firm performance, and the results show that managers' ownership motivates them to engage in hazardous activities. Morck et al. (1988) argue that the interests of managers and shareholders become more aligned as managerial ownership increases. The above studies suggest that board chairs have a stronger incentive to take actions that benefit shareholders if they hold higher equity ownership in the company. Therefore, they may be more likely to accept higher risk.

From the above analysis, the author believes an increase in the female chair's ownership ratio will reduce the female chair's inherent risk aversion. Therefore, the author proposes hypotheses H2 and H3 as follows:

H2: The ownership ratio of the Chairman positively impacts the risk of Vietnamese listed firms.

H3: The ownership ratio of female chairs weakens the negative relationship between female chairs and the risk of Vietnamese listed firms.

## Methods

### 1. Data

Data used in this study includes accounting data on financial statements collected from FiinPro, a company specializing in collecting and providing reliable financial data in Vietnam. Besides that, the study used data sets collected manually from annual and management reports on company characteristics and leader characteristics of companies listed on the Vietnam Stock Exchange from 2010 to 2020. The sample does not include financial institutions such as finance companies, banks, and insurance because their business characteristics differ from other industries. Additionally, the final sample size excludes some non-financial firms for which data are unavailable, data are not continuous, and more years of observation need to be done. Therefore, the final sample includes only 587 firm observations during the sample period and 5,005 firm-year observations usable in the regression models.

### 2. Research model and measurement of variables

The author analyzes the impact of female chairs on firm risk and also examines the impact of the hairwoman's ownership ratio on the relationship between female chairs and the risk of firms based on a regression model with panel data as follows:

$$\text{Model (a): } RISK_{it} = \beta_0 + \beta_1 fchair_{it} + \beta_2 chairman\_owns_{it} + \beta_3 fchair * chairman\_owns_{it} + \beta_4 controls_{it} + \gamma_i + \theta_i + \varepsilon_{it}$$

$$\text{Model (b): } Leverage_{it} = \beta_0 + \beta_1 fchair_{it} + \beta_2 chairman\_owns_{it} + \beta_3 fchair * chairman\_owns_{it} + \beta_4 controls_{it} + \gamma_i + \theta_i + \varepsilon_{it}$$

where,

#### Dependent variable

This study has two variables representing firm risk. The first dependent variable is RISK, measured through the company's profit fluctuations. Return volatility is the standard proxy for risk in the financial sector because it represents the riskiness of investment decisions.  $RISK_{it}$  is the risk of the firm  $i$  in time  $t$  at the end of the year. Based on the research of Faccio et al. (2016), this study constructs the dependent

variable RISK measured by the standard deviation of the deviation between EBITDA to Total Assets ratio compared to the mean value of the country for the respective year within the overlapping five-year period for each firm. This indicator is measured over overlapping five-year periods to consider the impact of this year's decision-making on subsequent years' performance. T is the total number of years of observation of company i in year t, and T must be greater than 5.

$$RISK_{it} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T \left( \frac{EBITDA_{it}}{Total\ assets_{it}} - \frac{1}{T} \sum_{t=1}^T \frac{EBITDA_{it}}{Total\ assets_{it}} \right)^2}$$

Where  $EBITDA_{it}$  is Earnings Before Interest, Tax, Depreciation and Amortization of firm i in year t.

The second dependent variable is Leverage, which is also based on the study of Faccio et al. (2016).  $Leverage_{it}$  is the debt ratio of firm i in year t, measured as the ratio of total liabilities to total assets of the firm at the end of the year. A firm with more equity or a lower debt-to-asset ratio is less likely to go bankrupt. Thus, that firm has a solid financial foundation, which allows it the flexibility to pursue its business goals.

#### Key variables

Following previous empirical studies, the independent variables in this study include  $fchair$ ,  $chairman\_owns$ , and  $fchair*chairman\_owns$ . Where  $fchair$  is proxied by a dummy variable that takes the value of one if the chairperson is female, and zero otherwise.  $fchair_{it}$  is the gender of the chairpersons of the firm i in year t. Chairman's ownership ( $chairman\_owns$ ) is the ownership ratio of the Chairman in the company calculated as the ratio between the number of shares held by the Chairman compared to the total number of outstanding shares of the company.  $chairman\_owns_{it}$  is the ownership ratio of the Chairman of firm i at the end of year t. The variable  $fchair*chairman\_owns$  is an interaction variable representing the female chair's ownership ratio in the company.

#### Control variables

In the regression model, the author controls several control variables, including the Chairman's and company-specific characteristics, to avoid the dominant impact of these variables on the relationship between the dependent and independent variables. The control variables are determined based on conducted empirical studies. The author follows Jiang et al. (2018) and employs the proportion of women on the board of directors ( $gender\_nfchair$ ) measuring gender diversity on the board of directors of companies. This variable implies gender diversity on the boards of directors of firms. It may help to alleviate concerns that the study's results are driven by gender diversity in the senior management team. The researcher calculated  $gender\_nfchair$  as the ratio between the number of female board members who are not chairs to the total number of board members of the firm at the end of the year. Following Faccio et al. (2016), the author employs some firm-level variables that are known to be correlated with firm risk. They are the sales growth rate ( $salesgrowth$ ), which reflects the company's growth potential and is measured by the revenue growth rate of year t compared to year t-1 of the company; the fixed asset ratio ( $tangibility$ ) is the ratio of fixed assets divided by total assets at the end of the year; firm size ( $firmsize$ ) is calculated as

the natural logarithm of total assets at the end of the year. Firm age (firmage) is the natural logarithm of 1 plus company age, where age is calculated as the number of years from the company's founding until the year being observed. The author also follows Huang & Kisgen (2013) to use a group of correlated variables on the board of directors. They are board size (the number of members on the board of directors at the end of the year) and the independent members (the ratio between the number of independent members on the board of directors divided by the total number of members at the end of the year). The duality variable (Dual) is proxied to a dummy variable assigned the value one if the CEO concurrently holds the position of Chairman and receives the value 0 if not. Finally, the chair characteristic variables based on the research of Jiang et al. (2018), including the Chairman's training level (chairlevel) is the level of the chair take value of one if the Chairman has a degree lower than a bachelor's degree, receiving the value two if the Chairman has a bachelor's degree and three if the Chairman holds a master's degree or higher; the Chairman's experience (chairexe) is measured as the logarithm of the number of years as Chairman that is the number of years from appointment as Chairman until the year under observation; the age of the chairs (chairage) is determined as the natural logarithm of the chair age calculated from the year of birth to the year of observation.

In this study, the author uses ordinary least squares regression (OLS) to test whether female chairs impact firm risk and examine the impact of female chairs's ownership ratio on the relationship between Chairwoman and firm risks. The author also uses the System GMM estimation method for dynamic panel data to alleviate endogeneity concerns. All study observations were removed at the 1% and 99% percentiles to eliminate the influence of outliers.

The model is estimated with standard error (robust) to address the phenomenon of heterogeneous variance. Finally, the regression models include industry-fixed effects ( $\gamma_i$ ) and year-fixed effects ( $\theta_t$ ) to control for the dominant effects of industry and year on the relationship between female chairs and firm risk.

## Results and Discussion

### 1. Descriptive statistics

**Table 1:** describes the statistics of the variables used in this study.

#### Table 1. Descriptive statistics

This table demonstrates the mean value, standard deviation, maximum value, and minimum value of the variables used in this study. Variables belonging to the characteristics of the Chairman and the board of directors include Chairman's gender (fchair), Chairman's ownership ratio (chairman\_owns), Chairman's qualifications (chairlevel), Chairman's experience (chairexe), Chairman's age (chairage), the proportion of women in the board of directors (gender\_nchair), the proportion of independent members in the board of directors (ind\_member), the size of the board of directors (boardsize), and the duality of the Chairman (Dual). Variables belonging to the financial and non-financial characteristics of the company include risk, debt to total assets ratio (Leverage), revenue growth (salesgrowth), company age (firmage), company size

(firm size), fixed asset ratio (tangibility). The sample spans from 2010 to 2020. Detailed descriptions of the variables are shown in the appendix.

Variable	Obs	Mean	Std. Dev.	Min	Max
Risk	2,539	3.877	3.57	0.187	19.953
Leverage	4,252	0.488	0.218	0.039	0.917
Fchair	4,252	0.092	0.289	0	1
chairman_owns	4,252	0.062	0.108	0	0.779
fchair*chairman_owns	4,252	0.007	0.047	0	0.695
gender nfchair	4,252	0.123	0.147	0	0.6
Salesgrowth	4,252	0.154	0.627	-0.984	6.882
Firmage	4,252	2.941	0.62	1.386	4.111
Firm size	4,252	27.169	1.527	23.676	31.505
Tangibility	4,252	0.255	0.208	0.001	0.883
Chairlevel	4,252	2.233	0.483	1	3
Chairage	4,252	3.94	0.127	3.219	4.419
Chairexe	4,252	1.625	0.878	0	3.178
ind_member	4,252	0.162	0.216	0	1
Boardsize	4,252	5.56	1.139	3	9
Dual	4,252	0.296	0.457	0	1

The average value of the RISK variable is about 3.877%, with a standard deviation of 3.57%, a minimum of 0.187%, and a maximum of 19.953%. This result is reasonable because companies operate in many different industries and are affected differently by many factors, leading to entirely dispersed risks. Also related to the risk measure, Table 1 shows that the average value of the Leverage variable is 48.8%, with a minimum of 3.9% and a maximum of 91.7%. The debt ratio represents the financial leverage of the companies in the sample. Table 1 shows that leverage is also entirely dispersed because debt will be uneven from the diverse scale and business fields.

Statistical data on the gender of the chair shows that about 9.2% of firm-year observations have a Chairwoman; this means that in Vietnam, the ratio of female chairs is a little low. The average ownership ratio of presidents is 6.2%; the lowest is 0, and the highest is 77.9%. The average percentage of women on the board of directors is about 12.3%, with a minimum of 0% and a maximum of 60%, showing that gender diversity on the board of directors of companies in Vietnam is still relatively low compared to the target of 27% of women on the board of directors by 2025 as set by the Government of Vietnam. In addition, it can be seen that the distribution of the number of women on the board of directors is significantly dispersed in the company sample with a standard deviation of 14.7%.

Table 2 presents the t-tests analysis of the risk and debt ratio difference between female and male chairs in Vietnamese listed non-financial firms.

**Table 2:** Comparison of firms with a female chair and firms with a male chair.

This table presents summary statistics for two companies led by male and female chairs. The t-test shows the difference in the companies' average values of Risk and Leverage belonging to the two samples mentioned above. The research data collection period is from 2010 to 2020. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% levels, respectively.

Variables	Obs	Mean	Dif	p-value
Risk (female chairs)	282	4.011		
Risk (male chairs)	2.641	3.901	0.11	0.628
Leverage (female chairs)	466	0.448		
Leverage (male chairs)	4.539	0.487	-0.04***	0.001

The results of testing the difference between the two groups of firms have not concluded the difference between companies with female and male chairpersons regarding profit fluctuation risk. However, there is a clear difference between the debt ratio of the two groups mentioned above; specifically, companies with female chairs have an average debt ratio of 4% lower than companies with male chairpersons.

**Table 3:** Correlation coefficient matrix

This table shows the Pearson correlation coefficients between the variables used in the analysis of this article. The characteristic of the Chairman variables include Chairman's gender (fchair), Chairman's ownership ratio (chairman\_owns), Chairman's qualifications (chairlevel), Chairman's experience (chairexe), Chairman's age (chairage), the proportion of women in the board of directors (gender\_nchair), the proportion of independent members on board (ind\_member), the size of the board of directors (boardsize), and the duality of the Chairman (Dual). Variables belonging to the financial and non-financial characteristics of the company include: risk, debt-to-total assets ratio (Leverage), revenue growth (salesgrowth), company age (firmage), company size (firmsize), and fixed asset ratio (tangibility). Detailed descriptions of the variables are provided in the appendix. c, b, and a denote statistical significance at 10%, 5%, and 1% levels, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Risk	1.000															
(2) Leverage	-0.114a (0.000)	1.000														
(3) fchair	0.014 (0.521)	-0.016 (0.460)	1.000													
(4) chairman_owns	0.060a (0.006)	0.065a (0.003)	0.063a (0.004)	1.000												
(5) fchair*chairman_owns	0.087a (0.000)	-0.002 (0.927)	0.473a (0.000)	0.391a (0.000)	1.000											
(6) gender_nchair	0.036c (0.097)	-0.124a (0.000)	0.100a (0.000)	0.111a (0.000)	0.116a (0.000)	1.000										
(7) salesgrowth	0.014 (0.536)	0.057b (0.010)	-0.010 (0.663)	0.011 (0.603)	0.002 (0.923)	0.036c (0.099)	1.000									
(8) firmage	-0.074a (0.001)	0.084a (0.000)	0.022 (0.322)	-0.080a (0.000)	-0.043b (0.048)	0.005 (0.810)	-0.051b (0.021)	1.000								
(9) firmsize	-0.077a (0.000)	0.320a (0.000)	0.042c (0.056)	0.073a (0.001)	0.017 (0.430)	-0.020 (0.351)	0.061a (0.006)	0.114a (0.000)	1.000							
(10) tangibility	0.060a (0.006)	-0.024 (0.265)	-0.061a (0.006)	0.034 (0.119)	-0.018 (0.406)	0.010 (0.638)	-0.024 (0.276)	0.016 (0.465)	0.113a (0.000)	1.000						
(11) chairlevel	-0.037c (0.094)	0.042c (0.055)	-0.039c (0.076)	-0.139a (0.000)	-0.081a (0.000)	0.000 (0.993)	-0.012 (0.584)	0.049b (0.025)	0.053b (0.016)	-0.068a (0.002)	1.000					
(12) chairexe	0.013 (0.557)	0.017 (0.451)	0.057a (0.009)	0.222a (0.000)	0.077a (0.000)	0.025 (0.252)	-0.007 (0.749)	0.050b (0.022)	0.099a (0.000)	-0.054b (0.014)	-0.119a (0.000)	1.000				
(13) chairage	-0.034 (0.126)	-0.016 (0.476)	-0.001 (0.969)	-0.020 (0.369)	-0.084a (0.000)	-0.036c (0.104)	0.010 (0.647)	0.061a (0.006)	0.275a (0.000)	0.058a (0.008)	-0.121a (0.000)	0.278a (0.000)	1.000			
(14) ind_member	0.038c (0.083)	-0.056b (0.010)	0.018 (0.404)	0.036c (0.100)	0.012 (0.580)	-0.033 (0.130)	-0.006 (0.791)	-0.072a (0.001)	-0.080a (0.000)	-0.011 (0.627)	-0.007 (0.749)	0.002 (0.941)	-0.076a (0.001)	1.000		
(15) boardsize	0.015 (0.506)	-0.011 (0.612)	-0.017 (0.433)	0.099a (0.000)	-0.040c (0.066)	0.050b (0.021)	0.034 (0.127)	0.046b (0.036)	0.350a (0.000)	0.109a (0.000)	-0.046b (0.034)	0.168a (0.000)	0.182a (0.000)	-0.059a (0.007)	1.000	
(16) Dual	0.102a (0.000)	0.015 (0.484)	0.046b (0.034)	0.220a (0.000)	0.107a (0.000)	0.039c (0.073)	0.002 (0.912)	0.005 (0.822)	-0.114a (0.000)	-0.096a (0.000)	-0.028 (0.196)	0.252a (0.000)	-0.091a (0.000)	0.015 (0.485)	-0.038c (0.084)	1.000

Table 3 presents the Pearson correlation coefficient matrix between the variables used in the regression analysis. The correlation coefficient between independent variables is generally low, thus eliminating the possibility of multicollinearity in the regression analyses.

## 2. Empirical Results

### 2.1. Female chairs, female chair's ownership ratio, and firm risk

Table 4 presents the OLS regression results to estimate the impact of female chairs and female chairs' ownership ratio on corporate risk-taking during the study period. The results show that the independent variable fchair in all models in columns (1)-(3) has a negative sign. These results show a negative impact of the female chair on firm risk at a high statistical significance level of 5% in the model (3).

**Table 4:** Female chairs and firm risk

This table shows the model regression results using OLS estimation with the dependent variable Risk. The regression results are presented in columns (1)-(3). Risk is the standard deviation of the deviation of the company's EBITDA to Total Assets ratio from the country mean for the corresponding year over the overlapping five-year period for each company. fchair is a dummy variable that takes the value of 1 for firms with a female chair at the end of the observation year. chairman\_owns is the Chairman's ownership ratio in the company, calculated as the ratio between the number of shares held by the Chairman and the company's total outstanding shares. fchair\* chairman\_owns is the female Chairman's ownership ratio. Control variables, industry, and year dummy variables are also included in the model. In addition to the regression coefficient, the intercept coefficient and model fit level are also shown in the table; the t-statistic value is presented in parentheses. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% levels, respectively. Detailed descriptions of the variables are shown in the appendix.

	(1)	(2)	(3)
	Risk	Risk	Risk
VARIABLES	OLS Regression	OLS Regression	OLS Regression
fchair	-0.155 (-0.648)	-0.155 (-0.649)	-0.541** (-1.986)
chairman_owns		-0.220 (-0.308)	-1.093 (-1.414)
fchair*chairman_owns			5.242*** (2.952)
gender_nchair	-0.224 (-0.435)	-0.228 (-0.441)	-0.270 (-0.522)
salesgrowth	0.358*** (2.866)	0.359*** (2.872)	0.367*** (2.936)



VARIABLES	(1) Risk OLS Regression	(2) Risk OLS Regression	(3) Risk OLS Regression
firmage	-0.192* (-1.758)	-0.196* (-1.775)	-0.183* (-1.661)
firmsize	-0.298*** (-5.351)	-0.300*** (-5.382)	-0.295*** (-5.285)
tangibility	0.978*** (2.841)	0.987*** (2.862)	0.972*** (2.821)
chairlevel	-0.081 (-0.541)	-0.098 (-0.650)	-0.087 (-0.580)
chairage	-0.025 (-0.040)	-0.072 (-0.116)	0.073 (0.118)
chairexe	0.028 (0.317)	0.032 (0.356)	0.032 (0.353)
ind_member	0.356 (1.136)	0.364 (1.163)	0.371 (1.186)
boardsize	0.093 (1.378)	0.099 (1.470)	0.110 (1.632)
Dual	0.460*** (2.979)	0.466*** (2.991)	0.467*** (3.004)
Constant	12.855*** (5.084)	13.107*** (5.149)	12.354*** (4.837)
Observations	2,543	2,539	2,539
Adj. R-squared	8.2%	8.3%	8.6%
Industry FE	YES	YES	YES
Year FE	YES	YES	YES

Specifically, the estimated coefficient of the variable fchair is -0.541 (t-stat=-1.986) in column (3) with a significance level of 5%, showing that female chairs will reduce the risk of profit fluctuations of companies. This result supports hypothesis H1. It emphasizes that female presidents are significantly risk averse. The results of this study are consistent with the findings of (Mínguez-Vera & Martin, 2011; Palvia et al., 2014). Women in Asia, in general, and Vietnam, in particular, face significant barriers when they wish to become managers and take on senior management positions. They have to bear the pressure of family responsibilities; some even have their careers interrupted, give up their jobs, or work part-time. As a result,

women have less work experience, and women's careers develop more slowly. Furthermore, because of their efforts towards both career and family, women who approach life management roles are significantly more risk-averse than men.

Column (3) also shows that the Chairwoman's ownership ratio has an estimated coefficient of 5.242 (t-stat=2.952) with a significance level of 1%, showing that the higher the female chair's ownership ratio, the higher the impact of reducing the negative relationship between female chairs and firm risk. This result supports hypothesis H3. However, the impact of the Chairman's ownership ratio is not statistically significant, so hypothesis H2 is not supported.

### 2.2 Female chairs, female chair's ownership ratio and firm leverage

Debt is indispensable in the business strategy of companies because companies' capital resources are limited. Debt can be considered a double-edged sword, bringing high profits but posing many risks for companies. Table 5 below presents the regression results of the influence of female chairs on the debt ratio of companies.

**Table 5: Female chairs and firm leverage**

This table shows the model regression results using OLS estimation with the dependent variable Leverage. The regression results are presented in column (1)-column (3). Leverage is the ratio of total liabilities to total assets. fchair is a dummy variable that takes the value of 1 for firms with a female chair at the end of the observation year. chairman\_owns is the Chairman's ownership ratio in the company, calculated as the ratio between the number of shares held by the Chairman and the company's total outstanding shares. fchair\* chairman\_owns is the female Chairman's ownership ratio. Control variables and industry and year dummy variables are also included in the model. In addition to the regression coefficient, the intercept coefficient and model fit level are also shown in the table; the t-statistic value is presented in parentheses. \*, \*\* and \*\*\* denote statistical significance at 10%, 5% and 1% levels, respectively. Detailed descriptions of the variables are presented in the appendix.

	(1)	(2)	(3)
	Leverage	Leverage	Leverage
VARIABLES	OLS Regression	OLS Regression	OLS Regression
fchair	-0.019* (-1.777)	-0.020* (-1.841)	-0.017 (-1.383)
chairman_owns		0.162*** (5.368)	0.167*** (5.178)
fchair*chairman_owns			-0.036 (-0.451)
gender_nchair	-0.097***	-0.106***	-0.106***

	(-4.532)	(-4.955)	(-4.941)
salesgrowth	0.004	0.004	0.004
	(0.905)	(0.763)	(0.755)
firmage	0.022***	0.025***	0.025***
	(4.344)	(4.899)	(4.885)
firmsize	0.058***	0.058***	0.058***
	(24.791)	(24.829)	(24.824)
tangibility	-0.060***	-0.063***	-0.063***
	(-3.843)	(-4.097)	(-4.090)
chairlevel	0.003	0.008	0.008
	(0.502)	(1.206)	(1.191)
chairage	-0.112***	-0.097***	-0.098***
	(-4.199)	(-3.627)	(-3.653)
chairexe	0.004	-0.000	-0.000
	(1.090)	(-0.038)	(-0.040)
ind_member	-0.022	-0.027*	-0.028*
	(-1.541)	(-1.942)	(-1.954)
boardsize	-0.022***	-0.022***	-0.022***
	(-7.386)	(-7.447)	(-7.459)
Dual	0.005	-0.000	-0.000
	(0.663)	(-0.022)	(-0.025)
Constant	-0.568***	-0.637***	-0.632***
	(-5.039)	(-5.649)	(-5.575)
Observations	4,257	4,252	4,252
Adj.R-squared	19.3%	20.0%	20.0%
Industry FE	YES	YES	YES
Year FE	YES	YES	YES

The estimation results presented in Table 5 show that the estimated coefficient of the fchair variable is -0.019 (t-stat = -1.777) and -0.020 (t-stat=-1.841), and both have a significance level of 10% in column (1) to (2). Therefore, the female chair is also significantly risk-averse and reduces the debt ratio of the companies. These findings are consistent with previous research on female leaders in general, showing the risk-averse nature, especially the risk of using financial leverage, of female leaders in organizations and companies (Cabo et al., 2012; Faccio et al., 2016a; Huang & Kisgen, 2013). This result also differs from previous studies that suggest that female leaders will increase the debt ratio (Ahern & Dittmar, 2012). The

gender of the Chairman does not seem to be an essential issue for the investment level or fluctuations in companies' investments (Parrotta & Smith, 2021).

The ownership ratio of the Chairman has a significant positive impact on the debt ratio of companies at the 1% significance level; this result partly supports hypothesis H2. When the ownership ratio in the company increases, it will motivate the owner to be more proactive in performing tasks and bring better efficiency to the company because their interests are closely tied to the firm's benefits. At the same time, to maintain control, owners with high ownership ratios often increase debt to limit the sharing of voting rights. However, the study did not find an impact of the female chair's ownership ratio on the debt ratio of companies.

### 2.3. Endogeneity Test

Although including industry-fixed effects and year-fixed effects in regression models may alleviate concerns that time-invariant omitted firm characteristics influence the results of the study, the negative relationship between female chairs and firm risk that the author document may be driven by observable factors for which the study could not control. In addition, the endogeneity problem also stems from the possibility of an impact in the opposite direction from company risk to the Chairwoman, affecting the reliability of the results.

**Table 6:** System GMM estimation results

Notes: This table shows the System GMM estimation results of the following models:

$$Risk_{it} = \beta_0 + \beta_1 L.Risk_{it} + \beta_2 fchair_{it} + \beta_3 chairman\_owns_{it} + \beta_4 fchair * chairman\_owns + \beta_5 Controls_{it} + \gamma_i + \theta_i + \varepsilon_{it}$$

$$Leverage_{it} = \beta_0 + \beta_1 L.Leverage_{it} + \beta_2 fchair_{it} + \beta_3 chairman\_owns_{it} + \beta_4 fchair * chairman\_owns + \beta_5 Controls_{it} + \gamma_i + \theta_i + \varepsilon_{it}$$

with the dependent variables Risk and Leverage. The estimation results are presented respectively in columns (1)-column (3) for the dependent variable Risk, and columns (4)-(6) for the dependent variable Leverage. Risk is measured as the standard deviation of the deviation of the company's EBITDA to Total Assets ratio from the country mean for the corresponding year over the overlapping five-year period for each company. Leverage is measured as the ratio of total liabilities to total assets. The variables L.Risk and L.Leverage are the 1-year lagged values of the above dependent variables. Industry and year dummy variables are also included in the model. In addition to the regression coefficient, the intercept coefficient and model fit level, number of observations, and results of AR1, AR2, and Hansen tests are also shown in the table; t-statistic values are presented in parentheses. . \*, \*\* and \*\*\* denote statistical significance at 10%, 5%, and 1% levels, respectively. Detailed descriptions of the variables are presented in the appendix.

	(1)	(2)	(3)	(4)	(5)	(6)
	Risk	Risk	Risk	Leverage	Leverage	Leverage
VARIABLES	System GMM	System GMM	System GMM	System GMM	System GMM	System GMM
	Regression	Regression	Regression	Regression	Regression	Regression

	(1)	(2)	(3)	(4)	(5)	(6)
	Risk	Risk	Risk	Leverage	Leverage	Leverage
VARIABLES	System GMM	System GMM	System GMM	System GMM	System GMM	System GMM
	Regression	Regression	Regression	Regression	Regression	Regression
L.Risk	0.886*** (81.330)	0.887*** (90.780)	0.863*** (166.740)			
L.Leverage				0.665*** (25.807)	0.665*** (27.127)	0.665*** (33.851)
fchair	0.056 (0.760)	0.066 (1.071)	-0.172*** (-2.836)	-0.062*** (-3.023)	-0.065*** (-3.218)	-0.067*** (-4.641)
chairman_owns		1.202** (2.524)	0.171 (0.386)		0.129*** (3.247)	0.170*** (4.215)
fchair*chairman_owns			3.057*** (6.814)			-0.075 (-1.292)
gender_nchair	-0.325 (-1.047)	-0.549** (-2.032)	-0.507*** (-3.224)	0.012 (0.446)	-0.000 (-0.012)	-0.007 (-0.313)
salesgrowth	0.168*** (3.980)	0.173*** (5.174)	0.168*** (7.508)	0.018*** (8.010)	0.019*** (8.515)	0.019*** (9.013)
firmage	-0.100** (-2.463)	-0.094** (-2.436)	-0.104*** (-3.133)	0.012** (2.013)	0.015** (2.507)	0.014*** (2.666)
firmsize	0.197*** (3.807)	0.220*** (4.922)	0.253*** (9.373)	0.067*** (13.527)	0.067*** (13.610)	0.063*** (14.403)
tangibility	0.216 (0.766)	0.232 (1.001)	0.210* (1.700)	-0.167*** (-5.701)	-0.149*** (-5.384)	-0.160*** (-6.404)
chairlevel	-0.022 (-0.416)	-0.016 (-0.312)	-0.019 (-0.455)	-0.009 (-1.425)	-0.007 (-1.072)	-0.006 (-1.034)
chairexe	-0.050 (-1.443)	-0.037 (-1.147)	-0.042* (-1.701)	-0.001 (-0.471)	-0.004 (-1.265)	-0.005** (-2.082)
chairage	-0.165 (-0.660)	-0.285 (-1.321)	-0.178 (-1.114)	-0.138*** (-5.013)	-0.124*** (-4.722)	-0.113*** (-5.247)
ind_member	-0.342 (-1.614)	-0.313* (-1.699)	-0.257** (-2.183)	-0.018 (-1.047)	-0.007 (-0.423)	-0.011 (-0.791)
boardsize	-0.032 (-0.757)	-0.005 (-0.142)	0.053** (2.137)	-0.009*** (-2.816)	-0.009*** (-2.903)	-0.010*** (-3.643)
Dual	0.352*** (2.860)	0.231** (2.390)	0.374*** (6.046)	-0.020*** (-2.710)	-0.028*** (-4.086)	-0.027*** (-4.661)
Constant	-3.859*** (-3.814)	-4.284*** (-4.460)	-5.760*** (-7.807)	-1.082*** (-7.535)	-1.156*** (-8.272)	-1.088*** (-8.656)

	(1)	(2)	(3)	(4)	(5)	(6)
	Risk	Risk	Risk	Leverage	Leverage	Leverage
VARIABLES	System GMM	System GMM	System GMM	System GMM	System GMM	System GMM
	Regression	Regression	Regression	Regression	Regression	Regression
Observations	2,076	2,076	2,076	3,788	3,787	3,787
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Ar1-pvalue	3.59e-06	3.26e-06	2.91e-06	0	0	0
Ar2-pvalue	0.275	0.272	0.284	0.735	0.765	0.781
Hansen-pvalue	0.393	0.332	0.478	0.216	0.323	0.375

In this section, the study further controls the lagged value of the risk variable in the corresponding regression models. We used System GMM estimates applied to dynamic panel data to estimate the models, thereby reducing minimized endogeneity concerns. The results are presented in Table 6. The results show that the estimated coefficients of the variables measuring the impact of a female chair on firm risk are still negative and statistically significant in column (3) and columns (4)-(6) of table 6. Specifically, the estimated coefficient of the fchair variable is -0.172 (t-stat=-2.836) for the dependent variable Risk, and -0.062 (t-stat=-3.023); -0.065 (t-stat=-3.218); -0.067 (t-stat=-4.641) corresponds to the dependent variable Leverage.

From the above endogeneity test results, there is a shred of reliable evidence supporting the negative impact of female chairs on the risk of companies, and the Chairman's ownership ratio still shows a positive impact on the dependent variable Leverage. Finally, the female Chairman's ownership ratio reduces the female chair's risk aversion.

## Conclusions and Suggestions

This study is motivated by previous studies suggesting that female leaders influence firm risk. However, studies mainly focus on the gender of CEOs because their role in companies is vital, but in Asian countries, the Chairman also plays an essential role. In joint stock companies, the Chairman holds the position of manager and administrator. They are the ones who make the program and plan the activities; convene, chair, and chair meetings of the board of directors; ensure that the board of directors operates effectively and plays a significant role in the business development. However, existing research focuses mainly on the CEO's role in critical financial decisions of the company. In this study, the author wants to fill the gap by studying the impact of female chairs on the risk of companies and examining whether the ownership ratio of female chairs affects the relationship between female presidents and the risks of companies.

The research results provide empirical evidence that female chairs do not like risks, so they will contribute to maintaining the stability of firm operations. Currently, regulations on Chairwomen in Vietnam have yet to be. The Vietnamese Government has only issued gender reform policies, including regulations

on gender quotas and the ratio of female CEOs. In the coming time, the Government should introduce appropriate flexible measures to encourage and eliminate prejudices that prevent women from accessing senior management positions, especially the position of Chairman. That may be more effective than administrative measures or strict legal requirements. The innovative policies and initiatives will change societal prejudices, leading to a significant increase in the appointment of women as Chairmen and maintaining the stability of the economy. The government can promote through vocational training programs and promote changes in the culture of discrimination against women.

The vital contribution of the study is to complement previous literature on gender differences in attitudes toward risk by showing that female chairs are risk-averse and maintain lower financial leverage than their counterparts. This study also extends the existing literature by showing that the ownership of female chairs dampens their risk aversion. In particular, cultural differences also lead to differences in risk tolerance between women and men (Allioui et al., 2021). Therefore, this study was conducted in Vietnam to provide a new perspective on the relationship between female leaders and corporate risks in a culture still marked by sizable gender stereotypes.

The limitation of this research is that it has yet to consider whether the Chairwoman is a family member of a family-owned company. If the Chairwoman is a member of a family-owned company, the female chair's impact on the firm risk may change due to the impact of family ownership. The study needed to provide appropriate tools in the data set to address the potential endogeneity of relevant variables. However, the author attempted to address potential endogeneity issues and provide evidence for the robustness of the results by implementing alternative methods of testing for endogeneity.

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## Appendix

Variable	Description of variables
<b>Panel A: Dependent Variables</b>	
Risk	Standard deviation of the deviation of the company's EBITDA/Total Assets ratio from the country average for the corresponding year over overlapping 5-year periods for each firm.
Leverage	Total liabilities /Total assets
<b>Panel B: Key variables</b>	
fchair	It is a dummy variable which equals 1 if the Chair is a woman and 0 otherwise
chairman_owns	Number of shares of the Chairs/Total number of outstanding shares
fchair* chairman_owns	Chairman's ownership ratio * female chairs
<b>Panel C: Control Variables</b>	
gender_nchair	The number of women on boards (not including the female chair)/Total number of people on boards
salesgrowth	Sales growth =[Sale revenue of year t-Sale revenue of year t-1]/Sale revenue of year t-1
firmage	The natural logarithm value of (1 +the numbers of years since incorporation )
firmsize	The natural logarithm value of Total assets
tangibility	Tangibility =Fixed Assets/Total Assets
chairlevel	There are three levels of academic qualification, which is 1 if Chairs hold a degree lower than a bachelor's degree, 2 if Chairs hold a bachelor's degree, 3 for those having a master's degree or higher.
chairexe	The natural logarithm value of the years from the Chair has been in the Chair position.
chairage	The natural logarithm value of the age of the Chairs
ind_member	Independent members/ total number of people on boards
boardsize	The total number of people on boards
Dual	It is a dummy variable which equals 1 if the Chair is simultaneously the CEO and 0 otherwise.

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## Welfare impact of microcredit on rural households in Vietnam

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### Abstract

In Vietnam, microcredit is considered an important solution to improve living standards and reduce poverty, especially in rural areas. This study uses the PSM-DID method to evaluate the welfare impact of microcredit on Vietnamese rural households. The research findings showed that microcredit has a significant positive impact on the economics welfare of rural households in terms of per capita income and per capita expenditure. However, the further analysis for the case of poor households, the result showed that the impact of microcredit per capita income of poor households is insignificant, but is significantly negative for per capita expenditure. Therefore, the study concludes that the beneficiaries of microcredit in rural Vietnam are not poor households.

**Keywords:** Microcredit, Welfare impact, Psm-did, Rural household

### Introduction

In Vietnam, microcredit is being widely developed as an important tool of poverty alleviation. Since 2010, microfinance organizations in Vietnam have been considered as credit institutions with legalized regulations by the Law on Credit Institutions. Microcredit and other microfinance services for the low income and poor people in Vietnam is provided mainly by the Vietnam Bank for Social Policy, the Central People's Credit Fund, the microfinance organizations, and a number of commercial banks such as the Vietnam Bank for Agriculture and Rural Development (Anh, N. K. *et al.*, 2011; VMFWG, 2014)

A much debated question is whether microcredit has actually reached the poor, helping them to improve their welfare and contributed to poverty reduction. Recent studies have confirmed the significant positive impacts of microcredit on household welfare, proxied by income, consumption, education and health expenditure, and on self-employment (Doan, T. *et al.*, 2014; Duong, H. A., & Nghiem, H. S., 2014; Duong, P. B., & Izumida, Y, 2002; Quach, M. H., Mullineux, A. W., & Murinde, V., 2005). Moreover, Nghiem *et al.* (2012) and Luan (2015) argued that the impacts were insignificant. These studies have used a variety of methods, but no study has used a combination of the PSM method with the DID method to minimize selection bias in impact assessment. These studies used a variety of methods, but none used a combination of the the Propensity score matching in combine with Difference in difference method (PSM-DID) as a way to minimize selection bias in impact assessment.

In this study, to obtain more evidence on the impact of microcredit, the PSM-DID method is used to evaluate the welfare impact of microcredit on rural households in Vietnam with the panel data drawn from Vietnam Household Living Standard Survey (VHLSS).

## Research Objectives

To evaluate impacts of microcredit on the economics welfare of rural households in Vietnam.

## Review of Related Literatures

Microcredit is a core part of microfinance, which provides preferential credit for the poor who lack access to conventional credit sources, helping them develop their production and business, improve their living standards and escape from poverty. However, empirical studies have yet to reach consensus on the impacts of microcredit on household welfare.

Many studies indicate that microcredit has significant positive impact on poverty alleviation in many different aspects, especially improving household welfare. Khandker (2005) using dynamic regression model and household fixed effects with panel data conducted in Bangladesh, the author found the significant positive impact on credit participated households' expenditure and the significant impact on poverty reduction in many different aspects at the commune level. Imai *et al.* (2010) employes the treatment effect model to evaluate the impact of microfinance loans for productive purpose on household poverty reduction by using the national household data collected by the Small Industries Development Bank of India on 5,260 borrowers and non-borrowers. The results show that microfinance has a significant positive on households' welfare. The robustness of the results was verified by Tobit regression and the PSM method. Samer, S. *et al.* (2015) used multi-nominal logistic to examine the effects on poverty reduction of Malaysia microfinance Amanah Ikhtiar using the cross-sectional data on 780 old and new clients from urban and rural areas. Their findings indicate that microcredit has a positive impact on household income of the women clients. Li, X. *et al.* (2011) used both primary and secondary panel data of 424 rural households collected in 2009 in Hubei, China. This study uses double differential methods to minimize bias selection issues in estimating the impact of microcredit on household welfare proxies by annual household income and annual household consumption. The results show that although participating in microcredit programs increases household income and expenditure annually, this result is not statistically significant. The other study of Rahman, M. W. *et al.* (2015) used data from 300 households was collected from 3 stages-designed poor counties in Shaanxi, China. The method of difference in difference method according to the model of Coleman (2006) was employed to assess the impact of microcredit on household welfare. Result of the study indicated that people who benefit from microcredit programs are not the poor.

In contrast, several studies argue that the impact of microcredit is insignificant and even negative. Kondo, T *et al.* (2008) design a quasi-experimental to investigate the impacts of the Rural Microenterprise Finance Project on households' welfare in the Philippines. Estimated results show that participation in credit programs has a significant negative impact on per capita income, total per capita expenditure and per capita

food expenditure of the poor households. The conclusion is again confirmed by Crépon *et al.* (2011) and Banerjee *et al.* (2015) with the first using of the randomized controlled trial methodology in accessing the impact of microcredit on poverty reduction. This important study has caused great controversy when affirming that there is no evidence of the impact of microcredit on poverty alleviation as well as the welfare of participating households in many respects.

In Vietnam, Duong, P. B., & Thanh, P. T. (2015) evaluate the impact of microcredit on the welfare of the rural households in Vietnam, especially the poor using PSM method and difference in difference method. The results show that microcredit improves living standard of the rural households via increasing their income and consumption. However, for case of the rural poor, microcredit is found to only improve their consumption but there is no evidence about its impact on their income. This study also found that microcredit programs may not serve the poor households. Luan (2015) used Principal Component Analysis and Propensity Score Matching to assess whether microcredit reaches the poor and its role in poverty reduction. The results shown that microcredit successfully reaches the poor households as 67% of credit recipients belong to the last three bottom groups. But the provision of microcredit has positive but statistically insignificant impact on household income and expenditure.

To evaluate the welfare impact of microcredit on rural households, this study uses the conceptual framework proposed by (Hulme, 2000), presented in Figure 1. This illustrates the impact of microcredit on rural households' welfare chains and their interacting variables. The hypothesis is that access to microcredit will lead to increased household incomes and expenditures. Households accessing microcredit will modify their behavior and practices and thus create changes in their welfare. Those changes could be the impact of microcredit, but can also be the result of other factors. The biggest challenge in assessing this impact is to separate and capture the role of presumptive causal. This problem can be solved by comparing the changes in outcomes of credit-accessed households with non-credit accessed households. In Figure 1, household A is the borrower, belong to the treatment groups, while household B is the non-borrower, belong to control group. To capture the welfare impact of microcredit, variations in incomes and expenditures were compared for the two groups using the difference-in-difference method. Estimated biases will occur if the control group does not match the treatment group. To solve this problem, the study used PSM method to create the appropriate control group.

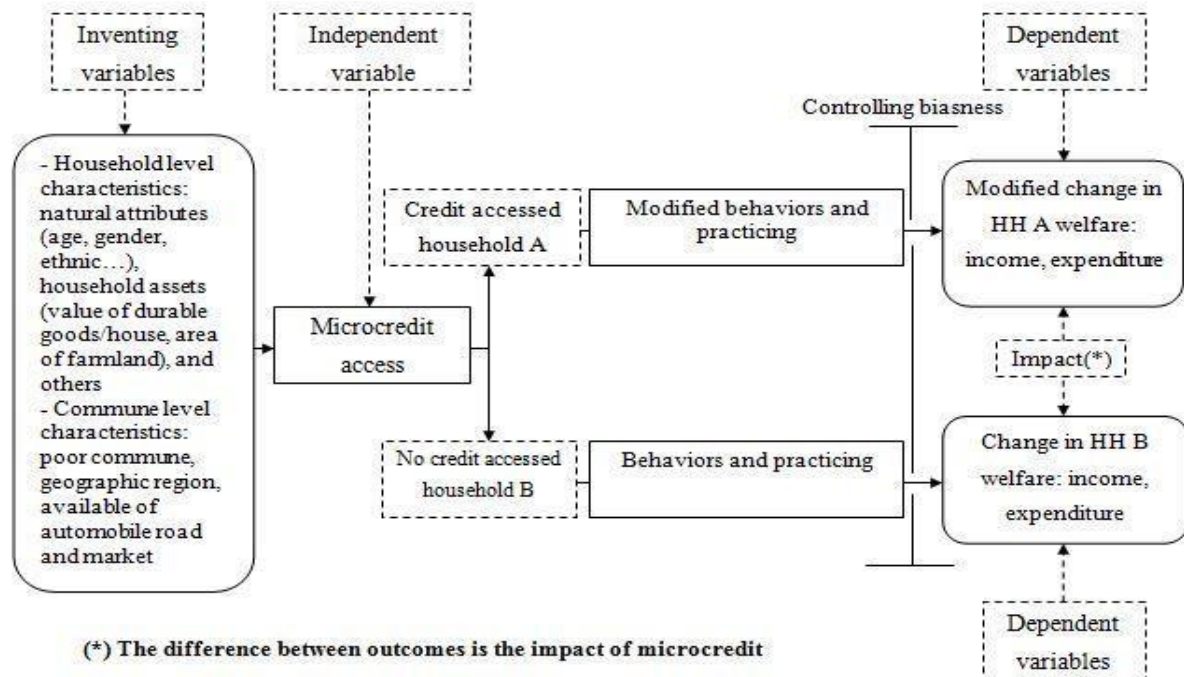


Figure 1: Conceptual framework of the study

## Research Methodology

### 1. The Propensity score matching in combine with Difference in difference method

To evaluate the welfare impact of microcredit on the participation households, this study used the Average Treatment Effects on the Treated (ATT), express as:

$$ATT = E(D = 1) - E(D = 0). \quad (1)$$

Where,  $D$  is treatment indicator,  $D$  equal to 1 if the household belong to treated group and 0 otherwise;  $Y_t^1$  is the outcome of interest of participation household,  $Y_t^0$  is the outcome of the same household without participating.

In equation (1), the term  $(D = 1)$  is unobservable, so we have to find a suitable counterfactual group from the non-participant households. With a control group included non-participant households, we can replace  $E(D = 1)$  by  $E(D = 0)$  (Kono, H., & Takahashi, k., 2010). The equation (1) can be rewritten as follows:

$$ATT = [E(D = 1) - E(D = 0)] - [E(D = 1) - E(D = 0)]. \quad (2)$$

In the equation (2), the last term  $[E(D = 1) - E(D = 0)]$  is the extent of the selection bias. In order to accurately estimate the ATT, the problem is to find ways to eliminate the selection bias or calculate its value. PSM is one of the approaches that can solve this problem. PSM constructs a counterfactual group base on a model of the probability of participating in program, using observed characteristics. Then, the participants are matched to nonparticipants on the basic of this probability, namely propensity score. The ATT is then calculated as the mean difference in outcomes across these two groups (Khandker, S. R., Koolwal, G. B., & Samad, H. A., 2010).

The limitations of PSM is based on the assumption that the unobserved characteristics do not affect the process of participating in the program. If unobserved characteristics determine program participation, PSM is not an appropriate method. This problem can be partially solved by combining PSM with DID (PSM-DID). This approach was suggested by Heckman, J. *et al.* (1997) which has been widely employed in impact evaluation, including microcredit impact.

The DID method measures the impact by the difference in outcomes of treatment group and control group before and after intervention. In combination with PSM the control group is determined by the matching method based on observables. This approach can reduce the bias (Baker, 2000), the ATT estimated by PS-DID as follow:

$$ATT^{PSM-DID} = E(Y_{i2}^1 - Y_{i1}^1 | D = 1) - E[w(i, j)(Y_{j2}^0 - Y_{j1}^0 | D = 0)]. \quad (3)$$

Where,  $w(i, j)$  is the weight, using PSM approach, given to the nonparticipant  $j$  matched to the participant  $i$ .

## 2. Data source and selection sample

To derive empirical evidence of the impact of microcredit on households' welfare, this study uses the panel data, which is drawn from two surveys on household living standards in Vietnam - VHLSS 2016 and VHLSS 2018. VHLSS is a general-purpose survey series, which include characteristics of household living standard such as demographic information, income, expenditure, assets, employment status, and credit status. The sample size of VHLSS 2016 and 2018 covered 9,399 households selected by the stratified random cluster method. Especially, the 2016 and 2018 VHLSS set up a panel data, based on microcredit status, the selection sample included 1890 rural households. The sample households are divided into two groups: the participants group and the non-participants group. The participants group included 602 households which have accessed in the microcredit program within the survey of 2018 but do not access in any other credit program in 2016, the non-participants group included 1288 households who neither participate in the microcredit program nor any other credit programs within the survey of both 2016 and 2018.

## Results and Discussions

### 1. Propensity score matching and balancing test

As was mentioned in the previous section, the PSM is used to creating a control group with similar characteristics to the treatment group. The propensity scores were estimated for all households, the treatment group was matched with the control group that has the closest propensity score within a predetermined caliper (0.01). Table 1 show the post-estimation for quality of balancing in the PSM model. After matching, 564 pairs were successfully matched and the mean of bias decreased from 17.1% to 2.4%. We also test the balance on the differences in means using *t-statistics*, the results show that no variables were statistically different at 1% level after matching.

Figure 2 illustrates the distribution of propensity scores before and after matching. The horizontal axis indicates the estimated propensity score, and the vertical axis indicates observed frequency. The upright

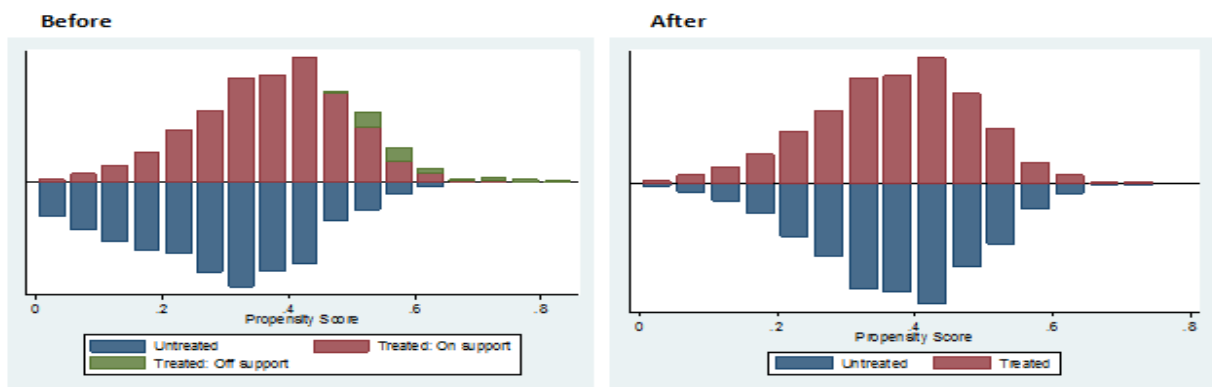


chart indicates for the participants group and the upside down chart indicates for the non-participants group. It can be seen that compared to before matching, become more concentrated after matching. In addition, the distribution of propensity score of the two groups also becomes more balanced after matching. This indicates that matched pairs will allow a more accurate estimate of the impact of accessing microcredit.

**Table 1:** Post estimation test for quality balancing in PSM model

Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.080	192.99	0	17.1	14.2	70.5*	0.57	50
Matched	0.003	4.17	1	2.4	2.6	12.3	0.94	50

\* if B>25%, R outside [0.5; 2]



**Figure 2:** The distribution of Propensity Score: Before and After matching

## 2. Average welfare impact of microcredit on accessed households

In this study, the per capita income and per capita expenditure were proxies for household's welfare. In the DID framework, the treatment variable is a binary form signifying microcredit accessing households (1 = yes; 0 = otherwise). Table 2 represents the  $ATT^{PSM-DID}$  estimated results.

**Table 2 :**  $ATT^{PSM-DID}$  estimation of the impact of microcredit

Outcome variables	Credit accessed HH (n=564)			Non-credit accessed HH (n=564)			$ATT^{PSM-DID}$
	2016	2018	Differences	2016	2018	Differences	
Per capita income (1000VND)	20659.37 (744.45)	25946.38 (962.53)	5287.01*** (1079.28)	19243.74 (783.32)	21579.81 (541.31)	2336.07*** (952.16)	2950.94*** (971.27)
Per capita expenditure (1000VND)	15626.27 (345.62)	18751.03 (428.77)	3124.76*** (550.72)	14886.64 (382.50)	17200.10 (433.28)	2313.46*** (552.84)	811.30* (549.25)

Note: Entries represent means of outcome variables; numbers in parentheses are standard errors.

\* Significant at 10% t level of the t-test; \*\*\* Significant at 1% level .



As shown in Table 2, there is a positive and significant change in per capita income and per capita expenditure of credit accessed households between 2016 and 2018. Over two years, per capita income increased by 5287.01 thousand VND and per capita expenditure also increased by 3124.76 at 1% level of significance. However, the significant improvement in per capita income and per capita expenditure for the credit accessed households could be combined result of time influence and credit impact. To isolate the credit impact on the accessing households, the outcome changes for the non-accessing households during the same period that used to control the impact of time influence on the accessing households. After differencing the mean gains between two groups, the DID estimation suggests that per capita income of accessing households raises by 2950.94 thousand VND as direct result of microcredit participation and is statically significant at 1% level of significance. On the other hand, the per capital expenditure is increased by 811.30 thousand VND due to credit accessing and this positive impact of credit on accessing households is statically significant at 10% level of significance. The results are consistent with those of (Akotey, J. O., & Adjasi, C. K. D., 2016; Khandker, 2005; Li, X., Gan, C., & Hu, B., 2011; Rahman, M. W., Luo, J., & Minjuan, Z., 2015) who also found the positive and significant impact of accessing microcredit on household welfare, proxy by income and expenditure.

### 3. Heterogeneous impact by initial poverty status

One of the important objectives of microcredit is to serve the poor. The results in Table 3 reveal that microcredit has a positive and significant impact on welfare of the non-poor households. The increase in per capita income was positive and significant for the non-poor household, but negative and insignificant for the poor. This indicates that the impact of microcredit on the poor is negligible. On the other hand, the increase in per capita expenditure was positive, significant for the non-poor, but significantly negative for the differential slope. However, the magnitude of the negative coefficient for the differential slope (2948.35 thousand VND) outweighs the magnitude of the positive coefficient for the non-poor (1462.57 thousand VND). This implies that the net impact was negative if participants were the poor. This finding is consistent with (Banerjee, A., Duflo, E., & Glennerster, R., 2015; Coleman, 2006; Crépon, B., Devoto, F., Duflo, E., & Parienté, W. , 2011; Roodman, D., & Morduch, J., 2014; Takahashi, K., Higashikata, T., & Tsukada, K., 2010) who reported on the negligible and negative impact of microfinance on participating households, especially on the poor household in terms of income and expenditure.

**Table 3:** Difference slope for the initial poverty status

Outcome (1000 VND)	ATT for the non-poor	Differential slope for the poor
Per capita income	3795.18*** (968.32)	-3968.13 (2435.41)
Per capita expenditure	1462.98** (683.57)	-2948.35** (1368.49)

*Note: Number in parentheses are standard errors. \*\* represents statistical significance at 5% level; \*\*\* represents statistical significance at 1% level*

## Conclusion

Using panel data from the two households surveys of VHLSS collected in 2016 and 2018, this study investigates the impacts of microcredit on the Vietnamese rural households' welfare based on the PSM-DID method. The results show that microcredit has a significant positive impact on the economic welfare of accessed households in terms of per capita income and per capita expenditure. Specifically, compared to the non-credit accessed households, accessing to credit on average increases the accessed households' per capita income by 2950.94 thousand VND and per capita expenditure by 811.30 thousand VND, respectively. This finding reconfirms the belief in microfinance literature that microcredit helps improve the economic welfare of households.

However, the further analysis for the case of poor households, we find that the impact of microcredit on poor households' per capita income was not statistically significant, but negative significant on their per capita expenditure. Thus, it can be concluded that microcredit programs have a positive impact on the improvement of living standards of rural households in Vietnam in general. However, in order to really make a significant contribution to the process of poverty reduction, these programs need to have certain changes in the goal towards serving the poor.

Evidence of the positive impact of microcredit on rural household economic welfare in our study demonstrates the important role of microcredit programs in rural development in Vietnam. This is an important basis for the government and policy makers to continue positively support the broad and sustainable development of the microcredit sector. In particular, it is necessary to build a transparent and stable legal environment favorable to the establishment and operation of microfinance institutions.

However, the negative and insignificant impacts of microcredit on the poor show that microcredit programs need certain reforms in the goal of poverty reduction. Microcredit programs need to be combined with vocational skills training programs and other financial services to improve access and effective use of loans by poor households.

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## Market analysis and willingness-to-pay for implementing water quality management devices - iots in white leg shrimp farming facilities in the Mekong delta region

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### Abstract

The study aimed to comprehend the market dynamics, the existing scenario of water quality management, and determine the willingness-to-pay (WTP) of individuals for employing IoT devices. The primary research methodology relied on the estimation model of WTP through Multi Logit Regression (MLS) analysis. The outcomes revealed that households exhibit relatively limited capacity in adopting new technological devices; these households suffer considerable losses in white leg shrimp farming - nearly 100 million Vietnamese dong per year. Presently, water quality monitoring mainly relies on experience or manual techniques, with low technological adaptation. However, households expressed willingness to experiment and invest in IoT devices, aspiring to monitor water quality changes. The estimated WTP model results significantly explain the influencing factors regarding the willingness to pay for using these devices. Encouraging farmers to increase device utilization requires a market development strategy alongside cost reduction tactics.

**Keywords:** White leg shrimp, IoT devices, Water quality management

### Introduction

The United Nations' 2030 Sustainable Development Program emphasizes the necessity of setting targets for the aquaculture sector to address food security and nutritional challenges while ensuring sustainable development across economic, social, and environmental domains. In recent years, the seafood market has witnessed rapid growth, with a market value reaching US\$ 160 billion in 2014 (NOAA Fisheries, 2019). Aquaculture markets are predominantly situated in Asia, accounting for 89% of global aquaculture production, where China holds 62%, followed by India, Vietnam, Bangladesh, and Egypt (Budholiya, 2018). However, the aquaculture sector has faced numerous challenges, including environmental pollution and

outbreaks of diseases leading to mass mortality among aquatic organisms. Despite these challenges, the seafood market remains a promising domain for global technology startups. In 2016, technology applications in aquaculture raised investments of US\$193 million, marking a 271% increase compared to the combined investment in 2014 and 2015 (Louisa, 2017).

In Vietnam, particularly within the Mekong Delta region, aquaculture, specifically white leg shrimp farming, plays a pivotal role in the socio-economic development strategy (Tri, 2021). The aquaculture industry significantly contributes to income generation, employment, and effective poverty alleviation, engaging nearly 70% of the rural workforce (Dennis, L. P., 2021). However, the explosive growth in shrimp farming without adequate regulation and improper planning has resulted in severe water pollution, pushing many farms into debt and hindering further aquaculture practices. Various studies converge on the significance of applying water quality management devices in aquaculture, specifically in white leg shrimp farming, as a revolutionary solution. To achieve this, it's essential to first understand the current usage scenario, supply market, and the willingness of individuals to utilize IoT devices. While domestic IoT markets have seen notable research and development efforts since 2014, collaboration between research centers and technology companies has pioneered advanced applications, particularly in shrimp farming.

South Korea stands as a frontrunner in employing emerging technologies for the aquaculture industry. As part of their 4.0 technology development plan, South Korea emphasizes smart agriculture and aquaculture. The country is transforming fish farms into smart farms, integrating IoT technologies to monitor and control water parameters, demonstrating successful results since 2021 (Zervoudi, E. K. (2020)). Notably, Korean technology companies and research organizations have invested significantly in industrial-scale IoT development. For instance, SK Telecom applied IoT platforms in managing aquaculture farms, enabling real-time monitoring and alerts for various water parameters, significantly reducing manual labor (Zachary, 2014; Arirang, 2015). In the shrimp farming domain, South Korea's collaboration with other countries, such as Algeria, in utilizing advanced technology for farming shrimp in the Sahara Desert, has been successful. Applying IoT for water environment control and continuous monitoring enabled successful shrimp farming in groundwater, achieving high yields with a significant reduction in costs (Choi, 2016).

The objective of this study is to assess the current situation and willingness to pay for monitoring and controlling water environments using IoT devices in white leg shrimp farming, encompassing super-intensive, intensive, and semi-intensive practices in concentrated farming

regions within the Mekong Delta. The study aims to propose solutions for market development and enhance the application of these devices to achieve better outcomes.

### Research Objectives

1.1. To assess the current situation and willingness to pay for monitoring and controlling water environments using IoT devices in white leg shrimp farming, encompassing super-intensive, intensive, and semi-intensive practices in concentrated farming regions within the Mekong Delta.

1.2. To propose solutions for market development and enhance the application of these devices to achieve better outcomes.

### Review of Related Literatures

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## Research Methodology

### 1. Research site selection

The Mekong Delta (MD) is a part of the Mekong River basin covering an area of 40.6 thousand square kilometers. Geographically adjacent to the Southeast region of Vietnam, it borders Cambodia to the north, the Gulf of Thailand to the southwest, and the East Sea to the southeast. The natural area of the Mekong Delta is approximately 4.661 million hectares (accounting for 12.25% of the country's total area) with a population of nearly 18 million people (representing 18.5% of the national population), averaging 440 individuals per square kilometer. The majority of the population in the Mekong Delta region is of the Kinh ethnic group. Historically, this area was once part of the Khmer Empire, leading to a significant presence of Khmer people outside Cambodia concentrated in this region.

Despite agricultural and aquaculture cultivation areas in the Mekong Delta accounting for less than 30% of the country's total, the western region contributes over 50% of the rice cultivation area, 71% of aquaculture area, 30% of agricultural production value, and 54% of the country's total aquaculture output. This research is conducted within the geographical territories of two provinces, namely Ca Mau and Bac Lieu, both renowned for their substantial white leg shrimp farming areas, symbolizing the characteristics of the Mekong Delta region.

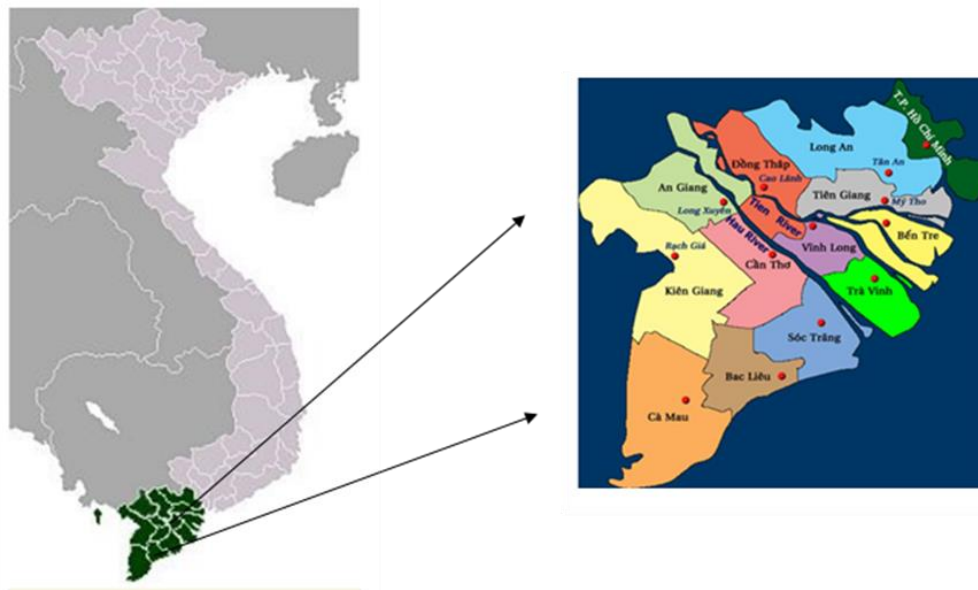


Figure 1: Research site descriptions



**Ca Mau:** it has been a leading province nationwide in aquaculture, processing, and seafood exportation for many years. Aquaculture production has been significantly contributing to the province's economic efficiency, restructuring its economy, eradicating poverty, improving the material life of coastal and rural farmers. It also plays a part in the development direction of Vietnam's key export products, including shrimp and catfish (CTTĐTCM, 2020).

**Bac Lieu:** is situated in a tropical monsoon climate zone characterized by distinct seasons: a rainy season from May to November with an average rainfall of 239.4 mm in 2018, and a dry season from November to April the following year, experiencing very low rainfall, such as in February 2018, which recorded only 0.3 mm (NGTK, 2018). Regarding the province's soil structure, a majority of the land is used for agriculture (accounting for up to 83.8%), while the remaining is non-agricultural or unused land. Within the total agricultural land area, about 43.43% is dedicated to aquaculture (NGTK, 2018), indicating that aquaculture is the focal industry of the province. Benefiting from favorable natural conditions and the aquaculture experience of its people, Bạc Liêu has oriented its economic development towards aquaculture as the province's key economic sector and is currently focusing on its comprehensive growth (TCTS, 2018).

## 2. Sample size

Based on the available time and budget for conducting the research, the authoring team carried out a survey involving 400 households, comprising 221 households in Bạc Liêu province and 220 households in Cà Mau province. The additional 41 samples were set aside as a reserve in case of any unreasonable or irregular sample size found within the selected population. This surplus served the purpose of data refinement and cleansing before analyzing the pertinent information required for the research project. Nonetheless, the entirety of the collected samples ensures accuracy and aptly meets the criteria to represent the characteristics and information pertinent to the surveyed population.

**Table 1:** Sample size and distribution

Indicators	Bac Lieu		Ca Mau		Total	
	n	%	n	%	n	%
<b>I. Intensive shrimp farming</b>	<b>99</b>	<b>45</b>	<b>37</b>	<b>17</b>	<b>136</b>	<b>31</b>
1. Land ponds	99	100	37	100	136	100
<b>II. Super-intensive shrimp farming</b>	<b>122</b>	<b>55</b>	<b>183</b>	<b>83</b>	<b>305</b>	<b>69</b>
1. Pond lined with plastic sheets	109	89	178	97	287	94
2. Floating cage	13	11	5	3	18	6

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<b>Total</b>	221	100	220	100	441	100
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### 3. Analysis models of Willingness to Pay

To achieve the objectives of this research, the study selects the criterion of willingness-to-pay (WTP) and proposes a novel method to estimate the level of willingness-to-pay. This approach is carried out by identifying the demand for using a specific product or service by users based on various price levels to measure the willingness-to-pay of the interviewees. In the context of Price Estimation (PE), WTP represents the maximum amount individuals are willing to pay for purchasing a particular good or enjoying an improved quality of the environment. WTP is a means to determine the price of additional benefits compared to the current conditions and also measures the preference level of individuals or society towards a particular commodity. Furthermore, WTP represents the market demand curve for that commodity.

The willingness-to-pay (WTP) method is utilized to estimate the level of willingness to pay for the use of IoT devices by aquaculture practitioners. The average willingness-to-pay for using IoT devices is determined by the following formula:

$$WTP = \frac{\sum_{k=1}^m WTP_k * nk}{\sum_{k=1}^m nk} \quad [1]$$

The research model examines the factors influencing the level of willingness to pay (WTP), defined by the following:

WTP: Average WTP level of individuals willing to pay for IoT devices.

k: Index of WTP levels, where k = (1-m).

m: WTP levels of individuals willing to pay for IoT devices.

nk: Number of samples investigated corresponding to WTP level k.

WTP<sub>k</sub>: WTP level for the k-th segment.

For individuals who do not have the intention to purchase or use IoT devices (not willing to pay), it is conventionally assumed that WTP = 0.

#### Multinomial Regression and WTP

At the farm level, adaptation involves two stages: researching the understanding of farmers regarding IoT devices and estimating the amount that households are willing to pay for using IoT devices (Adger, W.N., 2009). To analyze the factors influencing the willingness to pay for using these devices, a Multinomial Logistic Regression (MLR) was employed. The determinants of farmers' choices regarding willingness to pay were explored using a multinomial logistic regression. The MLR model, rooted in adoption decision theory within climate change adaptation research, was utilized (Stringer, L.C., Dyer, J.C., 2009). This approach has been previously applied by (Waibel H, 2013; Adger, W.N., 2009; Rosenthal, S., 2003). According

to this model, within the array of adaptation options, the likelihood that a farmer (i) will select a WTP alternative (j) from the available options can be formulated as:

$$\text{Prob} (Y = \frac{j}{X}) = P (U_{ij} > \frac{U_{ik}}{X}) \quad [2.1]$$

Where, 'X' is a vector of explanatory variables.  $U_{ij}$  and  $U_{ik}$  are the perceived utilities for farmer (i) of WTP (j) and (k) respectively. The response probabilities of the multinomial logit model are:

$$\text{Prob} (Y_i = j) = \frac{e^{\beta'_j X_i}}{\sum_{k=0}^j e^{\beta'_k X_i}}, j = 0, 1, 2, \dots \dots \dots J \quad [2.2]$$

Where  $\beta'_j$  is a vector of coefficients on each of the independent variables 'X'. The above equation can be normalized to remove indeterminacy in the model by assuming that  $\beta_0 = 0$  and the probabilities of making a choice from a set of alternatives can be estimated as:

$$\text{Prob} \left( Y_i = \frac{j}{X_i} \right) = \frac{e^{\beta'_j X_i}}{[1 + \sum_{h=1}^j (e^{\beta'_h X_i})]}, j = 0, 1, 2 \dots \dots J, \quad \beta'_j = 0 \quad [2.3]$$

The J log-odds ratio of the model is given as:

$$\ln\left(\frac{P_{ij}}{P_{ik}}\right) = X'_i (\beta_j - \beta_k) = X'_i \beta_j, \text{ if } k = 0 \quad [2.4]$$

For this model the independence of irrelevant alternatives (IIA) assumption should hold. Two basic types of tests can be used to see whether the (IIA) assumption is violated, a choice set partitioning test and model based test. Possibilities include the McFadden, Train and Tye Test, Small and Hsiao test and the Hausman and McFadden. The marginal effects of changes in the explanatory variables are usually derived as:

$$\frac{\partial P_j}{\partial X_i} = P_j [\beta_j - \sum_{k=0}^j P_k \beta_k] = P_j (\beta_j - \beta^-) \quad [2.5]$$

The MLR model was also presented as follows;

$$Y_j = \frac{\partial P_j}{\partial X_i} = \beta_0 + \beta_1 X_{11} + \beta_2 X_{22} + \beta_3 X_{33} + \beta_4 X_{44} + \dots \dots \dots + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + e_i \quad [2.6]$$

Where,  $Y_j$  are the different level of WTP applied by the respondents.  $X_i$  are the different independent or explanatory variables in the model. In the MLR analysis, the estimation of the model was performed by normalizing one category. In the analysis, "WTP = 0" is used as the normalized category or "base category". Using traditional tools such as frequency, descriptive to accumulate the indicators source from the process of interviewing, group discussion and household survey were conducted and presented. In this study, the payment level was categorized into 8 tiers: (i) No payment; (ii) 1<WTP≤5,000; (iii) 5,001<WTP≤10,000; (iv) 10,001<WTP≤20,000; (v) 20,001<WTP≤50,000; (vi) 50,001<WTP≤100,000; (vii) 100,001<WTP≤200,000; (viii) Above 200,000. However, considering that the number of households willing to pay above 20,000 was notably low, the categories were restructured into 3 groups: Group 1: No payment; Group 2: 5,001<WTP≤10,000; Group 3: >20,000. The baseline scenario is considered as Group 1.

**Table 2:** Explanations of the Variables Included in the Estimation Model

No	Variable	Measurement	Explanation	Sign of expectation
I. Dependent variable (Y)				
1	Y (WTPMean)	The cost of 1000 VND per hectare	Dependent variable: The amount of money shrimp farmers are willing to pay for investing in equipment and applying IoT in white leg shrimp farming.	+/-
II. Independent variable p (X)				
Demographic characteristics and experience in farming white leg shrimp				
1	X1 ( Gender)	0: male; 1: female	Gender of producer	+/-
2	X2 (Age)	Year	Age of producer	+
3	X3 (Education)	Year	Year of schooling (12)	+
4	X4 (Labor)	People	Total labor with shrimp	+
5	X5 (Experience)	Year	Years of white leg shrimp	+/-
Production characteristics and technological investment levels				
	X6 (Types of ponds)	0: land pond; 1: others	Types of ponds	-
	X7 (Main incmome)	0: yes; 1: no	Main income	+
	X8 (The proportion of shrimp farming income in total income)	%	% contribution from white leg shrimp	+/-

No	Variable	Measurement	Explanation	Sign of expectation
	X9 (Rotation)	time	Rotation in a year	+
	X10 (Scale)	shrimp/ 1kg	The size of finished shrimp per kilogram 1 kg	+
	X11 (Price )	1000d/ kg	Price per 1 kg	+
	X12 (Damage )	1000d/ year	Loss from raising white leg shrimp	+
	X13 (Polluted level)	0: lowest – 5: highest	Perception producer about water pollution	+
	X14 (Form)	0: Intensive ; 1: Supper-intensive	Form of raising	+
	X15 (Perception about IoT machines)	0:no; 1: yes	Having knowledge	+
	X16 (Decision)	0: Very willing 1: Undecided 2: Not willing 3: Never willing	Level of trial acceptance	+

**Table 2.** describes the number of variables incorporated into the model, consisting of independent variables and 16 dependent variables, along with the expected signs of the variables introduced. The variables introduced are classified into two main groups: demographic variables, encompassing 5 variables, and production and technological characteristics, encompassing 11 variables. The research theme regarding the willingness to pay for IoT devices in water quality control is a novel field. Consequently, the selection of model variables suffers from a limitation due to the lack of comparative studies within the same domain.

## Results/Research

### 1. Brief information

**Table 3** presents general information about households engaged in the farming of white leg shrimp, categorized by farming methods. Shrimp farming is physically demanding, hence the majority of participants

are males, accounting for over 97% according to statistics. Concerning ethnic groups, this activity is primarily undertaken by the Kinh ethnic group, constituting over 98% of the participants, while ethnic minority households are mainly involved in rice cultivation activities.

**Table 3:** Characteristics of households raising white leg shrimp in the Mekong Delta region

Indicators	Unit	Intensiv	Intensive	Floating cage	Avera
		e	Pond lined with plastic sheeting		
		(N=136)	(N=287)	(N=18)	(N=441)
I. Gender					
1. Male	%	98.53	96.86	100.00	97.51
2. Female	%	1.47	3.14	0.00	2.49
II. Ethnic					
1. Kinh	%	97.06	99.65	94.44	98.64
2. Khmer	%	2.94	0.35	5.56	1.36
III. Education					
	Year	6.68	8.55	10.94	8.07
IV. Family scale					
		3.86	4.19	3.56	4.06
V. Labor					
1. Regular labor	labor	1.24	1.70	1.44	1.54
2. Semi- regular labor	labor	0.40	0.74	0.56	0.63
3. Seasonal labor	labor	0.98	1.91	2.44	1.65
VI. Experiences					
1. Shrimp	year	39.68	26.49	8.78	29.83
2. White leg shrimp	year	35.39	20.18	5.44	24.27
VII. Technical leve					

1. No training	%	77.21	46.34	44.44	55.78
2. Have training	%	19.85	42.51	38.89	35.37
3. Intermediate (with certificate)	%	2.21	5.57	0.00	4.31
4. Intermediate training in aquaculture	%	0.00	0.35	0.00	0.23
5. Upper college	%	0.74	5.23	16.67	4.31

Source: Survey data from 2020

This region exhibits one of the lowest educational levels in the country, posing a challenge for the integration of scientific and technological advancements into the production processes. Despite population policies, the average population size has generally stabilized, averaging around 4 members per household, with a notably high average count of the workforce. Shrimp farming represents a vital activity for the livelihoods of local inhabitants, deeply rooted in the community's history with nearly 30 years of accumulated experience. However, the majority of the workforce lacks formal training, which poses a hindrance to shrimp farming with a technological component.

## 2. The statistics regarding the payment level for equipment usage

### 2.1. Level of water pollution

According to the survey conducted (Table 4), households perceive the current pollution level in water sources to be at an average level (approximately 50% of the surveyed households agree). However, over 40% of households engaged in super-intensive shrimp farming believe the water sources are polluted or highly polluted. In comparison to shrimp farming areas in the Central region, pollution in the research area remains relatively low. One of the reasons is that households in the research area have implemented comprehensive approaches and invested significantly, utilizing various types of ponds from nursery ponds, culture ponds, sediment ponds to treatment ponds. Additionally, they have applied multiple shrimp farming techniques along with modern equipment to address bottom pond pollution.

**Table 4:** View from producer about water pollution level

Level	Intensive		Super intensive		Average	%
	N	%	N	%		
Very polluted	14	7.7	9	3.5	23	5.2
Polluted	41	22.7	105	40.4	146	33.1
Certain	93	51.4	118	45.4	211	47.8
Low	31	17.1	28	10.8	59	13.4

Safe	2	1.1	0	0.0	2	0.5
Total	181	100	260	100	441	100

Source: Survey data from 2020

Through the investigation conducted in the research area, the authors observed a positive trend among households showing a tendency to employ scientific methods (sampling for treatment or using tools for testing) to assess water quality rather than relying solely on personal experience. Specifically, 73.5% of households engaged in super-intensive shrimp farming utilize testing tools, and 12.7% use equipment to measure water sources (Table 5). This aids shrimp farming households in promptly and accurately addressing incidents to ensure a conducive shrimp farming environment.

**Table 5:** Method of testing water quality

Method	Intensive		Super intensive		Average %	
	SL	%	SL	%	SL	%
Observation by naked eye based on experience	92	50.8	165	63.5	257	58.3
Sampling for treatment/using tools for testing	108	59.7	191	73.5	299	67.8
Using equipment to measure water sources	12	6.6	33	12.7	45	10.2

Source: Survey data from 2020

*Incidents and losses*

Shrimp farming, specifically white leg shrimp aquaculture in general, is prone to incidents that can lead to high risks of financial losses and indebtedness among local residents. The shrimp farming ponds are categorized into two types: hatchery ponds for shrimp seed and grow-out ponds for shrimp production. The data presented in the table below illustrates that incidents concerning shrimp seed ponds are relatively low, with an average rate of occurrence of just over 5%, while the likelihood of incidents in grow-out ponds is over 30%. The lowest incident rate is found in floating pond systems, at just over 11%. These findings suggest a necessity to prioritize mitigating incidents during the shrimp grow-out phase rather than the hatchery phase.

Regarding the extent of damage, some losses amount to nearly 100 million Vietnamese dong per year. This emphasizes the importance for households to consider investing in sustainable long-term solutions (over 5 years) to minimize such losses. Additionally, these solutions could potentially contribute to increased productivity and improved output quality.

*Description of WTP*

The payment levels for the use of devices connected to IoT in water management have been categorized into highest, lowest, and average payments. The lowest average payment is over 6.8 million Vietnamese dong per device. Low-input shrimp farming facilities demonstrate the lowest willingness to pay,



averaging 6.1 million dong. Conversely, super-intensive shrimp farming facilities agree to a higher average payment of over 7.2 million dong per device. The lowest average payment for similar device values in both facility types is 20 million dong. Similarly, the highest average payment is over 12.1 million dong, with super-intensive farms willing to pay an average of over 11.3 million dong per device. The maximum payment for a single device reaches 30 million dong, whereas super-intensive facilities exhibit a considerable disparity in their average payments, ranging from around 12.8 million dong to a maximum of 50 million dong. The average payment per facility owner for a water quality monitoring IoT device is 9.5 million dong, with the highest recorded payment being 35 million dong. Comparing between the two farming methods, super-intensive farming demonstrates a slightly lower average willingness to pay at 8.7 million dong, approximately 1.7 million dong lower than extensive farming.

From these research outcomes, it can be inferred that, concerning farming methods, super-intensive farming facilities exhibit higher demand and are willing to pay more for water quality management devices. This trend arises due to the larger stocking density in super-intensive farming. Additionally, shrimp farming facilities identify the necessity of machinery and equipment investments in this farming method. Moreover, the considerable feed quantities necessitate higher water control and quality management needs. Furthermore, the analysis delves into willingness-to-pay in terms of investment value for the devices based on the farming method, categorized into four financial groups: those unwilling to pay, payments ranging from 0 to 10 million dong, payments from above 10 million to below 20 million dong, and payments exceeding 20 million dong. Overall, a relatively high proportion of facilities (over 13.2%) are unwilling to invest in these devices. Notably, super-intensive farming facilities show a higher proportion of unwillingness compared to extensive farming facilities, at 14.2% and 11.6%, respectively. The majority of choices fall within the second and third groups. Within the second group, the proportion of facilities agreeing to invest in the devices stands at 37.2%, with super-intensive farms showing a higher selection rate of 44.8% compared to 31.9% in extensive farms. Similarly, within the third group, a significant number of shrimp farms are willing to invest, with an average of 39.2%, including a higher rate of 43.1% in super-intensive farming compared to 33.7% in extensive farming. This trend continues for the highest investment group, where the proportion of facilities agreeing to this payment is relatively low at 10.4%, with super-intensive farming exhibiting a higher selection rate of 10.8% compared to 9.9% in extensive farming.

Although the proportion of facilities unwilling to invest in IoT-connected water management devices is higher, super-intensive farms are more willing to make larger investments in using these devices. This suggests that device suppliers should prioritize accessing this customer group first. Policies encouraging the application of distinctive water management devices should also be developed, especially in the case of approaching super-intensive farming facilities. The subsequent content will delve deeper into analyzing the influencing factors on the decision-making process regarding device payments. The investigation results from expert interviews and direct surveys conducted at shrimp farming facilities highlight that, besides categorizing based on farming methods, the different types of ponds for white leg shrimp farming play a

crucial role not only in output results but also in the investment costs related to equipment, particularly concerning water quality monitoring devices connected via IoT.

As previously discussed, the shrimp ponds are categorized into three groups: earthen ponds, lined ponds, and floating ponds. Each pond type possesses distinct technical features, advantages, and disadvantages. Within the scope of this study, the authors focus on analyzing the willingness-to-pay among shrimp farms in correlation with the different pond types. The research results indicate that most current shrimp farms predominantly use lined ponds, followed by earthen ponds at approximately 30% of facilities. Floating ponds are used by only around 5% of the farms due to being a newly developed model that requires a substantial initial investment. The highest proportion of farms unwilling to pay falls within the lined pond group at 16.4%, followed by the earthen pond group at 8.1%. Interestingly, 100% of the facilities using floating ponds agree to pay for water quality monitoring devices connected to IoT. The majority of facilities using earthen ponds agree to pay at the lowest level, constituting 77.2% of the total, followed by payments ranging from above 10 million to below 20 million dong at 11.8%. Only a very low percentage of farms agree to pay at a level exceeding 20 million dong.

For lined ponds, facilities are more willing to pay for devices compared to those using earthen ponds. Nearly 20% of facilities are willing to pay below 10 million dong, while over 51% are willing to pay below 20 million dong. Notably, the proportion of facilities willing to pay above 20 million dong is also quite high at over 12%. Concerning floating ponds, the majority of facilities are willing to make high payments, with nearly 90% focusing on groups 3 and 4. This indicates that it is a highly potential market for equipment suppliers due to strict.

**Table 6:** Description of Incidents Encountered, Level of Losses, and Willingness to Pay for Technology Investment and IoT Application in White Leg Shrimp Farming

Indicator	Unit	Intensive	Super intensive		Average
		Land pond (N=136)	Pond lined with plastic sheeting (N=287)	Floating cage (N=18)	
I. Incidents Encountered					
1. Shrimp seedling ponds (Mean)	pond	1.2	0.9	1.0	3.1
+ Number of producer	%	7.4	4.2	5.6	5.2
2. Shrimp grow-out ponds (Mean)	ao	1.8	1.6	1.5	4.9
+ Number of producer	%	36.0	30.3	11.1	31.3

Indicator	Unit	Intensive	Super intensive		Average
		Land pond (N=136)	Pond lined with plastic sheeting (N=287)	Floating cage (N=18)	
<hr/>					
II. Loss level	1000 VND/producer / year	76,854	109,947	73,333	98,135
<hr/>					
III. WTP					
<hr/>					
1. Per producer	1000 VND/producer / year	5,629	10,918	16,306	9,507
+ 0	%	7.4	9.8	0.0	8.6
+ 1 <WTP ≤ 10.000	%	81.6	30.7	11.1	45.6
+ <WTP ≤ 20.000	%	9.6	53.7	77.8	41.0
+ 20.001 <WTP ≤ 30.000	%	1.5	5.9	5.6	4.5
+ > 30.000	%	0.0	0.0	5.6	0.2
<hr/>					
2. Per ha	1000 VND/ha/ year	15,358	63,551	69,766	48,942
+ 0	%	7.4	9.8	-	8.6
+ 1 <WTP ≤ 5.000	%	19.9	0.7	-	6.6
+ 5.001 <WTP ≤ 10.000	%	38.2	3.8	-	14.3
+ 10.001 <WTP ≤ 20.000	%	19.9	12.2	11.1	14.5
+ <WTP ≤ 50.000	%	6.6	25.4	22.2	19.5
+ 50.001 <WTP ≤ 100.000	%	7.4	26.8	44.4	21.5
+ 100.001 <WTP ≤ 200.000	%	0.7	19.2	22.2	13.6
0					

Indicator	Unit	Intensive	Super intensive		Average
		Land pond (N=136)	Pond lined with plastic sheeting (N=287)	Floating cage (N=18)	
+ > 200.000	%	-	2.1	-	1.4

Source: Survey data from 2020

### 3. Factors influencing the willingness to pay of shrimp farmers for water management devices and IoT applications

The regression coefficient obtained from the model for the Pseudo R-Square value is 0.694, with a significance level (sig) of 0.000, indicating a high model fitness. The regression results from the model can be used to explain the influence of factors affecting the willingness to pay of shrimp farms regarding the decision to invest in water management devices connected to IoT. The estimated results of the model are based on comparisons with a reference scenario of shrimp farms unwilling to pay for the IoT-connected water management devices. The models are compared against scenarios including: (1)  $Y1-Y0: Y (0 < WTP < 10,000) - Y (WTP = 0)$ ; (2)  $Y2-Y0 (10,000 < WTP < 20,000) - Y (WTP = 0)$ ; (3)  $Y3-Y0 (WTP > 20,000) - Y (WTP = 0)$ .

The study will sequentially delve into analyzing each specific model, examining the impact of explanatory variables on the willingness to pay for the water quality management devices connected to IoT.

(X1): The direction of influence is positive for model (1); however, it's negative for models (2) and (3). This implies that for model (1), male farm owners exhibit a higher willingness to pay for device usage compared to female owners, while in models (2) and (3), male farm owners are not willing to pay for device usage. This could be explained by the proactive nature of male farm owners in adopting new devices, yet they are more cautious in investment decisions, opting for moderate risk instead of accepting high risks. However, the test results across all three models did not verify this explanation, likely due to the low proportion of female farm owners in the survey, preventing an accurate reflection of the investigative process.

(X2): The age variable has a positive impact on model (1) but lacks statistical significance. Conversely, it has a negative impact on models (2) and (3), indicating that for each year increase in the owner's age, the willingness to pay decreases by 0.33 and 0.36 times, respectively. This aligns with reality, as older farm owners tend to have a lower risk tolerance despite possessing more experience, resulting in reduced investment capacity in IoT-connected water management devices.

(X3): This variable has a contradictory impact on all three models. However, the regression results lack statistical significance, indicating no scientific basis to prove that the cultural level of farm owners affects their decision-making ability in adopting IoT-connected water management devices.

(X4): This variable exhibits a consistent positive impact across all three models. When the population count increases by 1 unit, the willingness to pay for IoT-connected water management devices increases by 0.954 times in model (1), 0.967 times in model (2), and 1.222 times in model (3). This demonstrates that farms with larger labor forces, particularly those engaged in shrimp farming, are more interested in applying water management devices to enhance productivity, thereby improving income and reducing livelihood pressures.

(X5): This variable has a positive impact on models (1) and (2), while it displays a negative impact on model (3). However, the slope coefficients in all three models lack statistical significance, indicating no scientific basis to explain how the number of years of farming experience influences the willingness to pay for IoT-connected water management devices among shrimp farms. Research results also suggest that white leg shrimp farms have accumulated substantial experience in shrimp farming activities during their transition.

(X6): This variable exhibits a contradictory impact in models (1) and (2) and a consistent impact in model (3), with only model (1) showing statistically significant regression. The coefficient for variable X5 is -1.855, signifying that pond-based farms have a reduced willingness to pay for IoT-connected water management devices by 1.855 times compared to other pond types. This aligns with prior analysis, indicating that pond-based farms believe these devices offer little difference in water management. They perceive that their existing devices, coupled with farming experience, adequately fulfill these functions.

(X7): This variable has a contradictory impact in models (1) and (3) and a consistent impact in model (2). However, the slope coefficients in all three models lack statistical significance, preventing a conclusive understanding of the role of shrimp farming income on farm owners' willingness to pay for IoT-connected water management devices.

(X8): This variable has a contradictory impact in models (1) and (2) and a consistent impact in model (3). A higher contribution from shrimp farming in the total income increases the likelihood of adopting IoT-connected water management devices in shrimp farming activities. However, only the slope coefficient in the first model holds statistical significance.

(X9): This variable demonstrates a consistent impact across all three models, with statistically significant slope coefficients in models (1) and (2). The slope coefficients of 1.922 and 2.221 in the two models respectively signify that as shrimp farms increase their farming cycles, their willingness to invest in water management devices increases proportionately. This finding aligns with the critical role water quality plays in shrimp farming outcomes, especially in semi-intensive and super-intensive farming practices. Increased farming cycles lead to water treatment challenges due to excess feed and antibiotics, prompting farms to consider investing more in water quality management. The higher slope coefficient in model (2) accurately reflects this reality.

(X10): This variable has a consistent impact across all three models, with only model (2) showing statistically significant regression. The coefficient of X10 in model (2) is 0.040, indicating that with each unit increase in shrimp size, the willingness to invest in IoT-connected water management devices for WTP between 10,000 and 20,000 increases by 0.04 times. This suggests that larger shrimp sizes lead to higher market values, motivating farms to consider investing more in IoT-connected water management devices.

(X11): Similar to shrimp size, this variable has a consistent impact across all three models, but its overall influence is less evident, with very small slope coefficients. Only model (2) shows statistical significance.

(X12): This variable has a consistent impact across all three models, but similar to the previous two variables, the slope coefficients lack statistical significance. Consequently, there is insufficient scientific evidence to assert that the total damage extent from shrimp farming activities influences the decision to invest in IoT-connected water management devices among shrimp farms.

**Table 7:** Findings of estimating the WTP for IoT machine

Models Variable	Y1-Y0 (1)		Y2-Y0 (2)		Y3-Y0 (3)	
	$\beta$	Sig.	<b>B</b>	Sig.	$\beta$	Sig.
Intercept	5.230	.464	-11.581	.091	-42.628	.987
X1 ( Gender)	.609	.780	-.113	.955	-20.155	.
X2 (Age)	.048	.284	-.033	.442	-.056	.504
X3 (Education)	-.179	.268	-.156	.334	-.298	.284
X4 (Labor)	.954	.070	.967	.065	1.222	.067
X5 (Experience)	.079	.332	.079	.332	-.074	.532
X6 (Types of ponds)	-1.850	.069	-.908	.359	.732	.681
X7. (Main income)	-1.900	.353	.472	.780	-.337	.903
X8 (The proportion of shrimp farming income in total income)	-2.664	.001	-.450	.512	.029	.979
X9 (rotation)	1.922	.036	2.221	.011	2.639	.152
X10 (Scale)	.029	.287	.040	.097	.081	.194
X11 (Price )	.000	.401	.000	.051	.000	.206
X12 (Damage )	.000	.292	.000	.860	.000	.749
X13 (Polluted level)	-.332	.555	-.129	.817	1.076	.314
X14 (Form)	.197	.698	.259	.589	.073	.917

X15 (Perception about IoT machines)	-.573	.584	1.767	.070	20.796	.987
X16 (Decision)	-2.370	.000	-1.889	.000	-1.163	.112
Pseudo R-Square	.694					
Log likelihood fn.	186.486					
No of observation	441					

\*WTP = 0 base category (Source: Survey data from 2020)

(X13): The theoretical perspective posits the importance of water pollution awareness in investment decisions for water management devices. However, the regression results reveal contradictory impacts in models (1) and (2), while showing a consistent impact in model (3), with a higher slope coefficient. Importantly, there is no statistical significance in any of the three models, indicating a lack of evidence to establish a correlation between pollution awareness and investment decisions in IoT-connected water management devices.

(X14): Variable X14 has a consistent impact across all three models, with the highest coefficient in model (2). This indicates that super-intensive shrimp farms are more likely to invest in IoT-connected water management devices, especially at an investment level below 20 million VND for a pond. However, this variable lacks statistical significance, limiting the assessment of the correlation between farming methods and investment decisions in these devices.

(X15): This variable has a contradictory impact in models (1) and (3), while showing a consistent impact in models (2) and (3). However, only the slope coefficient for device familiarity has statistical significance in model (2), indicating that as shrimp farms become more familiar with the devices and possess more prior information, their likelihood of investing in water quality management devices connected to IoT increases. Specifically, an increase in device familiarity leads to a 1.767 times increase in willingness to pay for devices priced below 10 million VND. The high slope coefficient of 20.796 in model (3) lacks statistical significance.

(X16): This variable has a contradictory impact across all three models, with statistical significance in models (1) and (2). In these models, the coefficient values for this variable are -2.370 and -1.889 respectively. Changing the trial decision decreases the willingness to pay for IoT-connected water management devices by 2.370 times and 1.889 times in the respective models.

### Conclusions and Suggestions

The market study and willingness-to-pay estimation for the utilization of water management devices - IoTs in white leg shrimp farming hold significant implications in the Mekong region of Vietnam. This serves as an initial step laying the foundation for developing a market strategy in the application and growth of such devices within aquaculture. This initiative not only contributes to enhancing productivity and improving the local economy but also generates positive effects in addressing environmental concerns.

Particularly, this research contributes as a stepping stone toward developing comprehensive solutions, focusing not only on managing and monitoring water quality in aquaculture but also addressing issues related to water pollution treatment. This study can be considered exploratory in advancing the market for IoT devices in the Mekong Delta region as a whole and specifically within the country.

The study represents a report estimating various levels of willingness to pay for the demand of applied devices and solutions used to monitor and control water quality. It provides precise market scale estimations and elasticities concerning producers engaged in white leg shrimp farming, employing extra-intensive, intensive, and semi-intensive models in high-density regions of the Mekong River deltas.

Furthermore, the research results initiate discussions related to enhancing public awareness about IoT devices, effective approaches to device development, and fostering increased application while emphasizing the reduction of losses for farmers. Additionally, there is a need for further research to facilitate cost reduction in new product development for successful market penetration.

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# Appendix

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## Co-host agency

### Academic Conference Host Agency

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2. Ministry of Higher Education, Science, Research and Innovation (Thailand Science Research and Innovation (TSRI))
3. Program Management Unit for Human Resources & Institutional Development, Research and Innovation (PMU-B)
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10. International Governance and Sustainability Institute (ESI)
11. Asia Pacific Security Association (ASPA)



## คำสั่งมหาวิทยาลัยกาฬสินธุ์

ที่ ๐๖๘๓ / ๒๕๖๖

### เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD”

เพื่อให้การจัดโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ ในระหว่างวันที่ ๑๗ - ๑๙ ธันวาคม ๒๕๖๖ ณ มหาวิทยาลัยกาฬสินธุ์ พื้นที่ในเมือง เป็นไปด้วยความเรียบร้อยและบังเกิดผลดีต่อทางราชการ

อาศัยอำนาจตามความในมาตรา ๓๑ แห่งพระราชบัญญัติมหาวิทยาลัยกาฬสินธุ์ พ.ศ. ๒๕๕๘ จึงแต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาติ และนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” ดังต่อไปนี้

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มีหน้าที่ ให้คำปรึกษา แนะนำแนวทางในการดำเนินงาน

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| (๓) นายอรรถพงษ์ ศิริสุวรรณ                | กรรมการ          |
| (๔) รองศาสตราจารย์สุพรรณ สุตสนธิ์         | กรรมการ          |
| (๕) ผู้ช่วยศาสตราจารย์พัฒนา พึ่งพันธ์ุ    | กรรมการ          |
| (๖) ผู้ช่วยศาสตราจารย์ศศิกร สุรมณี        | กรรมการ          |
| (๗) ผู้ช่วยศาสตราจารย์กวีวิษุทธิ์ เพชรจุล | กรรมการ          |
| (๘) ผู้ช่วยศาสตราจารย์ภัชรินทร์ ชาดัน     | กรรมการ          |
| (๙) ผู้ช่วยศาสตราจารย์ทรงกรด พิมพิศาล     | กรรมการ          |
| (๑๐) ผู้ช่วยศาสตราจารย์นฤชิต แสสนปากดี    | กรรมการ          |
| (๑๑) ผู้ช่วยศาสตราจารย์อมร มะลาศรี        | กรรมการ          |
| (๑๒) นายสรายุทธ ฐิตะภาส                   | กรรมการ          |
| (๑๓) นายลิขิต ศิริสันติเมธาคม             | กรรมการ          |

(๑๔) นายศักดิ์เกษม ปานะลาด	กรรมการ
(๑๕) ผู้ช่วยศาสตราจารย์ศาดรา สหัสทัศน์	กรรมการ
(๑๖) ผู้ช่วยศาสตราจารย์นิภา นาสินพร้อม	กรรมการ
(๑๗) รองศาสตราจารย์กัตัญญู แก้วหานาม	กรรมการและเลขานุการ
(๑๘) ผู้ช่วยศาสตราจารย์พิมพ์ลิขิต แก้วหานาม	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผน กำหนดรูปแบบและกิจกรรมในการจัดประชุมทางวิชาการ และให้คำปรึกษาแนะนำในการดำเนินการตามรูปแบบและกิจกรรมในการจัดประชุมแก่คณะกรรมการฝ่ายต่าง ๆ รวมทั้งอำนวยความสะดวกในการจัดประชุมเป็นไปตามวัตถุประสงค์และเป้าหมายในการจัดประชุม

**๓. คณะกรรมการฝ่ายบริหารงานกลาง ประกอบด้วย**

(๑) ผู้ช่วยศาสตราจารย์วิษุทธ จันทะรี	ประธานกรรมการ
(๒) รองศาสตราจารย์สุพรรณ สุตสนธิ์	กรรมการ
(๓) นายอรรถพงษ์ ศิริสุวรรณ	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์พัฒนา พึ่งพันธ์ุ์	กรรมการ
(๕) ผู้ช่วยศาสตราจารย์ศศิกร สุรมณี	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์กวีวิษุฎ เพชรจุล	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์ภัชรินทร์ ซาตัน	กรรมการ
(๘) ผู้ช่วยศาสตราจารย์ทรงกรด พิมพ์ศาล	กรรมการ
(๙) ผู้ช่วยศาสตราจารย์นฤชิต แสนปากดี	กรรมการ
(๑๐) ผู้ช่วยศาสตราจารย์อมร มะลาศรี	กรรมการ
(๑๑) รองศาสตราจารย์กัตัญญู แก้วหานาม	กรรมการ
(๑๒) ผู้ช่วยศาสตราจารย์ศาดรา สหัสทัศน์	กรรมการ
(๑๓) ผู้ช่วยศาสตราจารย์นพคุณ ทองมวล	กรรมการ
(๑๔) นายสรายุทธ ฐิตะภาส	กรรมการ
(๑๕) นายลิขิต ศิริสันติเมธาคม	กรรมการ
(๑๖) ผู้ช่วยศาสตราจารย์กรรณิการ์ ห้วยแสน	กรรมการ
(๑๗) นางปฎิมา บุขราคัม	กรรมการ
(๑๘) นายชาติ ภูตินทราย	กรรมการ
(๑๙) ผู้ช่วยศาสตราจารย์พิมพ์ลิขิต แก้วหานาม	กรรมการและเลขานุการ
(๒๐) ผู้ช่วยศาสตราจารย์ฐิติมา นรโภค	กรรมการและผู้ช่วยเลขานุการ
(๒๑) นางสาวนภัทรธิดา พรหมดีราช	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** การวางแผน กำหนดรูปแบบการจัดงาน เสนอขออนุมัติโครงการ ติดต่อประสานงาน เพื่อเรียนเชิญวิทยากรในพิธีเปิด วิทยากรบรรยายพิเศษ วิทยากรแสดงปาฐกถาพิเศษ วิทยากรประจำกลุ่มย่อย ผู้ทรงคุณวุฒิในการพิจารณาบทความวิชาการ ออกหนังสือเชิญกลุ่มเป้าหมายเข้าร่วมนำเสนอทั้งภาคบรรยาย ไปสเตอร์ตลอดจนตอบข้อซักถามทั่วไป ประชุมวางแผน กำหนดรูปแบบวิธีการจัดงาน ระหว่างมหาวิทยาลัย กาฬสินธุ์ หน่วยงานภาคีร่วมจัด ตลอดจนการเชิญคณะกรรมการจัดงานประชุมเพื่อสรุปความก้าวหน้า การดำเนินงานตลอดช่วงการจัดเตรียมการจัดการประชุม และอื่น ๆ

**๔. คณะกรรมการฝ่ายจัดการประชุมระดับชาติ ประกอบด้วย**

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|---|----------------------------|
| (๑) ผู้ช่วยศาสตราจารย์อมร มะลาศรี   | ประธานกรรมการ              |
| (๒) รองคณบดีคณะศึกษาศาสตร์<br>และนวัตกรรมการศึกษาทุกฝ่าย                  | กรรมการ                    |
| (๓) ผู้ช่วยคณบดีคณะศึกษาศาสตร์<br>และนวัตกรรมการศึกษาทุกฝ่าย              | กรรมการ                    |
| (๔) หัวหน้าสาขาวิชาหรือวิชาเอกสังกัดคณะศึกษาศาสตร์<br>และนวัตกรรมการศึกษา | กรรมการ                    |
| (๕) คณาจารย์คณะศึกษาศาสตร์และนวัตกรรมการศึกษา                             | กรรมการ                    |
| (๖) บุคลากรสายสนับสนุนสังกัดคณะศึกษาศาสตร์<br>และนวัตกรรมการศึกษา         | กรรมการ                    |
| (๗) รองคณบดีฝ่ายวิชาการคณะศึกษาศาสตร์<br>และนวัตกรรมการศึกษา              | กรรมการและเลขานุการ        |
| (๘) นายวิศรุต ผดุงเกียรติคุณ  | กรรมการและผู้ช่วยเลขานุการ |

**มีหน้าที่** วางแผนดำเนินการจัดการประชุมในระดับชาติ ประสานงาน และบันทึก สรุปข้อมูลในการนำเสนอผลงานวิจัยภาคภาษาไทย และอำนวยความสะดวกให้การจัดการประชุมเป็นไปตามวัตถุประสงค์และเป้าหมายในการจัดประชุมและอื่น ๆ

**๕. คณะกรรมการฝ่ายจัดการประชุมระดับนานาชาติ ประกอบด้วย**

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| (๑) ผู้ช่วยศาสตราจารย์ศาดรา สหัสทัศน์    | ประธานกรรมการ       |
| (๒) ผู้ช่วยศาสตราจารย์วนุชชิตา สุภัควนิช | กรรมการ             |
| (๓) Mr. Jonathan Wary                    | กรรมการ             |
| (๔) Mr. Jake Joshua Lomuntad Cachero     | กรรมการ             |
| (๕) นางสาวนฤตา หงษ์ษา                    | กรรมการ             |
| (๖) นางสาวภัทราภรณ์ วาทะวัฒน์            | กรรมการ             |
| (๗) นางวิลาวลัย ทองสุขแก้ง               | กรรมการ             |
| (๘) นายธีติพล วิมุกตานนท์                | กรรมการ             |
| (๙) นางสาวกมลพัฒน์ ไชยสงคราม             | กรรมการ             |
| (๑๐) นางสาวพจมาน อินทร์อุดม              | กรรมการ             |
| (๑๑) นายศุภกวีต ทาทอง                    | กรรมการ             |
| (๑๒) นายนันท์ณัฐ เวียงอินทร์             | กรรมการ             |
| (๑๓) นางสาวอัญมณี ไกยรัตน์               | กรรมการ             |
| (๑๔) นางมณีกาญจน์ พรหมจรรย์              | กรรมการและเลขานุการ |

**มีหน้าที่** วางแผนดำเนินการจัดการประชุมในระดับนานาชาติ ประสานงาน ตลอดจนแปลเอกสารและบันทึก สรุปข้อมูลในการนำเสนอผลงานวิจัยภาคภาษาอังกฤษ และอำนวยความสะดวกให้การจัดการประชุมเป็นไปตามวัตถุประสงค์และเป้าหมายในการจัดประชุม และอื่น ๆ



**๖. คณะกรรมการฝ่ายกองบรรณาธิการ ประกอบด้วย**

(๑) รองศาสตราจารย์กัตัญญู แก้วหาหนาม	ประธานกรรมการ
(๒) รองศาสตราจารย์ปาริชา มารี เคน	กรรมการ
(๓) ผู้ช่วยศาสตราจารย์กรรณิการ์ ห้วยแสน	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์อำภาศรี พอค้ำ	กรรมการ
(๕) ผู้ช่วยศาสตราจารย์กิตติธันต์ ญาณพิสิษฐ์	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์คณางค์ รัตนานิคม	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์ธันชพงษ์ วั่งคำหาญ	กรรมการ
(๘) ผู้ช่วยศาสตราจารย์เกยูร ดวงอุปมา	กรรมการ
(๙) ผู้ช่วยศาสตราจารย์ชาญณรงค์ ชมนาวัง	กรรมการ
(๑๐) ผู้ช่วยศาสตราจารย์พิชชาภรณ์ วันโย	กรรมการ
(๑๑) ผู้ช่วยศาสตราจารย์จุฑามาศ เจียมสาธิต	กรรมการ
(๑๒) ผู้ช่วยศาสตราจารย์ศาดรา สหัสทัศน์	กรรมการ
(๑๓) ผู้ช่วยศาสตราจารย์ศักดิ์สิทธิ์ ฤทธิสัน	กรรมการ
(๑๔) ผู้ช่วยศาสตราจารย์สุชาติ สุรางค์กุล	กรรมการ
(๑๕) ผู้ช่วยศาสตราจารย์จริยา อินทนิล	กรรมการ
(๑๖) ผู้ช่วยศาสตราจารย์สิรินดา กมลเขต	กรรมการ
(๑๗) ผู้ช่วยศาสตราจารย์มณฑนา ทองสุพล	กรรมการ
(๑๘) ผู้ช่วยศาสตราจารย์ ปิยฉัฐ โตอ่อน	กรรมการ
(๑๙) ผู้ช่วยศาสตราจารย์นรงค์ วิชาผา	กรรมการ
(๒๐) ผู้ช่วยศาสตราจารย์ ว่าที่ร้อยตรี อนุชา ศรีบุรีรัมย์	กรรมการ
(๒๑) ผู้ช่วยศาสตราจารย์ประพนธ์ เนียมสา	กรรมการ
(๒๒) ผู้ช่วยศาสตราจารย์ปฐนิกา ฉายเสมอแสง	กรรมการ
(๒๓) นางสาวแก้วตา สุตรสุวรรณ	กรรมการ
(๒๔) นายอภิเชษฐ เสมอใจ	กรรมการ
(๒๕) นางสาวอัจฉรา ชุมพล	กรรมการ
(๒๖) นายวรพจน์ สมมูล	กรรมการ
(๒๗) ผู้ช่วยศาสตราจารย์วรรณธิตา ยลวิลาศ	กรรมการและเลขานุการ
(๒๘) นางสาวพรพิทักษ์ เข็มบาสัตย์	กรรมการและผู้ช่วยเลขานุการ
(๒๙) นางสาวนภัทรธิตา พรหมดีราช	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผนงาน ประสานงานสถาบันและหน่วยงานภายนอกในการส่งบทความ กำหนดรูปแบบการจัดทำบทความ รวบรวมบทความ ที่ผู้สมัครผ่านทาง online และจัดทำเอกสารบทความทาง วิชาการประกอบการประชุม ประสานงานผู้ทรงคุณวุฒิภายนอก และพิจารณาคัดกรองบทความในเบื้องต้น ติดตามการจัดส่งบทความ แจ้งตอบรับการนำเสนอบทความ กำหนดรูปแบบเล่มรวมผลงานให้เป็นไปตามวัตถุประสงค์ ดำเนินไปด้วยความเรียบร้อยมีประสิทธิภาพ และอื่น ๆ

**๗. คณะกรรมการฝ่ายระดมทุนและประสานความร่วมมือ ประกอบด้วย**

(๑) ผู้ช่วยศาสตราจารย์ภัชรินทร์ ชาติตัน	ประธานกรรมการ
(๒) นายบัญชา เหลือผล	รองประธานกรรมการ
(๓) ผู้ช่วยศาสตราจารย์นายรุ่ง ไชยกำบัง	กรรมการ
(๔) นางสาวมณฑกานต์ ทুমมาวัตติ	กรรมการ
(๕) นางสาวนิศากร สรรพเลิศ	กรรมการ
(๖) นางสาวสดชื่น อุดอามาตย์	กรรมการ
(๗) นางสาวลักษณ์ จิตติมงคล	กรรมการและเลขานุการ
(๘) นายสุขสันต์ พรหมบุญเรือง	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** การวางแผน ประสานงานหน่วยงานภายนอกในการขอรับการสนับสนุนงบประมาณ ให้เป็นไปตามวัตถุประสงค์ ดำเนินไปด้วยความเรียบร้อย มีประสิทธิภาพ และอื่น ๆ

**๘. คณะกรรมการฝ่ายประชาสัมพันธ์และสารสนเทศ ประกอบด้วย**

(๑) นายลิขิต ศิริสันติเมธาคม	ประธานกรรมการ
(๒) นายศักดิ์เกษม ปานะลาด	รองประธานกรรมการ
(๓) ผู้ช่วยศาสตราจารย์นุกูล แก่นจันทร์	กรรมการ
(๔) นายเกียรติพงษ์ เจริญจิตต์	กรรมการ
(๕) ผู้ช่วยศาสตราจารย์กนกเนตร พิณีจาด่านกลาง	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์ภัควรินทร์ มานะสิริสิทธิ์	กรรมการ
(๗) นายวิจิตร ศิริกิจ	กรรมการ
(๘) นายธีรนนท์ ชันดี	กรรมการ
(๙) นางสาวอารยา ลานน้ำเที่ยง	กรรมการ
(๑๐) ผู้ช่วยศาสตราจารย์มัลลิกา ธีระกุล	กรรมการ
(๑๑) นายรัฐพล มีลาภสม	กรรมการ
(๑๒) นางกันทิมา ศิริสันติเมธาคม	กรรมการ
(๑๓) นางสาวมณฑนา จันสุณา	กรรมการ
(๑๔) นายวรรณพล พิมพะสาตี	กรรมการ
(๑๕) นางสาวเนตรดาราร จันทรอูตส่าห์	กรรมการ
(๑๖) นายศาสตรา มุลวิไล	กรรมการ
(๑๗) นายเกษมศักดิ์ ทองตัน	กรรมการ
(๑๘) นายปิยะ สร้อยอุดม	กรรมการ
(๒๐) นายเทวฤทธิ์ ภูดี	กรรมการ
(๒๑) ว่าที่ร้อยตรีพิชิตชัย บุญแสน	กรรมการ
(๒๒) นายปิยะ บุญราช	กรรมการ
(๒๓) นายมานพ คำประเทือง	กรรมการ
(๒๔) นางสาวศตพร คนหาญ	กรรมการ
(๒๕) นายอชิตพล ดีเลิศ	กรรมการ
(๒๖) นายวินัย ชุ่มอภัย	กรรมการ
(๒๗) นายวีรพล คำสุวรรณ	กรรมการ

(๒๘) นายธนดล บุญมี	กรรมการ
(๒๙) นางสาวพรนภา หมั่นเรียน	กรรมการ
(๓๐) นางสาวสุนันทา จันมีวงษ์	กรรมการ
(๓๑) นางสาวสุกัญญา ชะกิจ	กรรมการ
(๓๒) นายณัฐพล วารินทร์	กรรมการ
(๓๓) นางสาวศรินทิพย์ ช้ายจันทิก	กรรมการ
(๓๔) นายจรรยา ราชจำปา	กรรมการ
(๓๕) นายชัยสิทธิ์ มูลแพงศรี	กรรมการ
(๓๖) นายประจักษ์ อิมประสงค์	กรรมการ
(๓๗) นางสาวหงษ์ฟ้า ค่ายศ	กรรมการและเลขานุการ
(๓๘) นางสาวปนัดดา โมกขะรัตน์	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** ในการวางแผนงาน กำหนดรูปแบบประชาสัมพันธ์การจัดงานผ่านสื่อประชาสัมพันธ์ อาทิ website สื่อประชาสัมพันธ์หน่วยงานที่เกี่ยวข้อง จัดทำสื่อประชาสัมพันธ์ผลงานทางวิชาการและผลงานที่ร่วมแสดงนิทรรศการ และเก็บบันทึกภาพระหว่างจัดประชุม ตลอดจนความเรียบร้อยของอุปกรณ์โสตทัศนูปกรณ์ที่ใช้ในการจัดประชุมในห้องประชุม และห้องประชุมกลุ่มย่อย การจัดงานแถลงข่าว และอื่น ๆ

**๙. คณะกรรมการฝ่ายลงทะเบียนและเอกสารประกอบการประชุม ประกอบด้วย**

(๑) ผู้ช่วยศาสตราจารย์กวีวิชญ์ เพชรจุล	ประธานกรรมการ
(๒) นายจักรินทร์ ตริอินทอง	กรรมการ
(๓) นายเอกรินทร์ สารีพัว	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์จิระนนท์ อินทรีย์	กรรมการ
(๕) นางสาวอภิญา ภูมิสายดอน	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์สายัญ พันธุ์สมบูรณ์	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์มัลลิกา ธีระกุล	กรรมการ
(๘) ผู้ช่วยศาสตราจารย์นุกูล แก่นจันทร์	กรรมการ
(๙) ผู้ช่วยศาสตราจารย์สิริกาญดา ธนาสุวรรณ	กรรมการ
(๑๐) นายวุฒิ รัตนวิชัย	กรรมการ
(๑๑) ผู้ช่วยศาสตราจารย์ปริญดา แข็งขัน	กรรมการ
(๑๒) นายอัยชัย คงปิ่น	กรรมการ
(๑๓) นางสาวปญญาธิศา ชารีรักษ์	กรรมการ
(๑๔) ผู้ช่วยศาสตราจารย์วรเมธ ภูสามารถ	กรรมการ
(๑๕) ผู้ช่วยศาสตราจารย์จิรัฐติ ธรรมศิริ	กรรมการ
(๑๖) นายนพรัตน์ ผกาเชิด	กรรมการ
(๑๗) นางสาวทิพย์สุดา บุญมาพัน	กรรมการ
(๑๘) นายณัฐวัฒน์ ต้นพล	กรรมการ
(๑๙) ผู้ช่วยศาสตราจารย์สมจิตร ก้นธำพรหม	กรรมการ
(๒๐) นายศราวุธ ดวงมะวงศ์	กรรมการ
(๒๑) นางสาวชโลธร อัมพร	กรรมการ
(๒๒) นางสาวภลิตา วรรณนะวาสิน	กรรมการ

(๒๓) ผู้ช่วยศาสตราจารย์ชรินทร์ญา โสอินทร์	กรรมการ
(๒๔) ผู้ช่วยศาสตราจารย์อุไร กุลบุญ	กรรมการ
(๒๔) ผู้ช่วยศาสตราจารย์สาวิภา รัตน์กร	กรรมการ
(๒๖) นางศิวาพร สีตาบุตร	กรรมการ
(๒๗) นายเกษม เชตะวัน	กรรมการ
(๒๘) นายบุญถม ทับสมบัติ	กรรมการ
(๒๙) ผู้ช่วยศาสตราจารย์ปิยนันท์ ชมนาวัง	กรรมการ
(๓๐) ผู้ช่วยศาสตราจารย์ณัฐพงษ์ ศรีสมุทร	กรรมการ
(๓๑) นางสาวแก้วตา สุตรสุวรรณ	กรรมการ
(๓๒) นายวรมัน ไม้เจริญ	กรรมการ
(๓๓) นางสาวสุภาภรณ์ ภูจิตทอง	กรรมการ
(๓๔) นางสาวนิตยา แน่นอุดร	กรรมการ
(๓๕) นางกนกวรรณ ตรีเพชร	กรรมการ
(๓๖) นางสาวพิศมร สระศาสตร์	กรรมการ
(๓๗) นางจริญญา เกษนัส	กรรมการ
(๓๘) นางสาวจุฬารัตน์ สุกิจมงคลกุล	กรรมการ
(๓๙) นายวิระจิตร คุณราษฎร์	กรรมการ
(๔๐) นางสาวจันทร์จิรา ตลับแก้ว	กรรมการ
(๔๑) นางสาวฐณน นน ฆารชัย	กรรมการ
(๔๒) นางสาวสุทธินันท์ เจริญไวย์	กรรมการ
(๔๓) นายวุฒิชัย สุรินทร์	กรรมการ
(๔๔) นายราชิต แก้วอาสา	กรรมการ
(๔๕) นายณัฐพล วารินทร์	กรรมการ
(๔๖) ผู้ช่วยศาสตราจารย์ปิยะฉัตร วิริยะอำไพวงศ์	กรรมการและเลขานุการ
(๔๗) ผู้ช่วยศาสตราจารย์อนุพงษ์ ทานกระโทก	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** การวางแผน กำหนดรูปแบบ วิธีการรับลงทะเบียนโดยการใช้เครื่อง RFID สำหรับ ผู้สมัครเข้าร่วมประชุม การจัดเตรียมเอกสารประกอบการประชุม ประสานงานกับฝ่ายที่เกี่ยวข้องระหว่างนักวิจัย ผู้นำเสนอผลงานทั้งภาคบรรยายและภาคโปสเตอร์ ผู้เข้าร่วมประชุมและประสาน งานข้อมูลที่เกี่ยวข้องใน แต่ละฝ่าย และอื่น ๆ

**๑๐. คณะกรรมการฝ่ายพิธีการ** ประกอบด้วย

(๑) ผู้ช่วยศาสตราจารย์พิมพ์ลิขิต แก้วหานาม	ประธานกรรมการ
(๒) ผู้ช่วยศาสตราจารย์ฐิติมา นรโภค	รองประธานกรรมการ
(๓) ผู้ช่วยศาสตราจารย์ภคคิปป ไกรโสตา	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์อาริยา ป้องศิริ	กรรมการ
(๕) นางสาวทิพย์สุดา บุญมาทัน	กรรมการ
(๖) นายณัฐวัฒน์ ต้นพล	กรรมการ
(๗) นายนิศย์ นามวงษ์	กรรมการ
(๘) นางสาวศรุดา หมูโยธา	กรรมการ

(๙) นางสาวสุมาลา นันบุญ	กรรมการ
(๑๐) นางสาวกฤติกา สุวรรณเรือง	กรรมการ
(๑๑) นางสาวอภิญญา แสบงบาล	กรรมการ
(๑๒) ว่าที่ร้อยตรีหญิงภาวิณี ไชยรักษ์	กรรมการ
(๑๓) นางสาวจุฬารัตน์ สุภีร์คำ	กรรมการ
(๑๔) นางจิตาภา เจริญธรรม	กรรมการ
(๑๕) นางสาวหทัยา วิระพันธ์	กรรมการ
(๑๖) นางจตุพร พิณีจนิก	กรรมการและเลขานุการ
(๑๗) นางสาวนภัทรธิดา พรหมดีราช	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผน กำหนดรูปแบบพิธีการ ขั้นตอนและกิจกรรมในพิธีเปิด - ปิด คำกล่าวเปิด - ปิด จัดเตรียมและฝึกซ้อมกำหนดการด้านพิธีการต่าง ๆ ทั้งก่อนการประชุม ระหว่างการประชุม และหลังเสร็จสิ้นการประชุม กำหนดผู้รับผิดชอบให้การดำเนินงานจัดประชุมเป็นไปด้วยความเรียบร้อยและมีประสิทธิภาพ รายงานผลการเตรียมความพร้อมของคณะทำงานให้ที่ประชุมทราบก่อนและหลังการจัดงาน ประสานงานข้อมูลที่เกี่ยวข้องในแต่ละฝ่ายและอื่น ๆ

**๑๑. คณะกรรมการฝ่ายงานเลี้ยงรับรอง ประกอบด้วย**

(๑) นางปฎิมา บุขุราคัม	ประธานกรรมการ
(๒) นางสาวกรรณิการ์ เดชประเสริฐ	กรรมการ
(๓) นางสาวพรพิมล สืบสำราญ	กรรมการ
(๔) นางสาวมธุรส เก่งกว่าสิงห์	กรรมการ
(๕) นางสาวณัฐธัญชา ทองโชติ	กรรมการ
(๖) นางสาวสุชาดา อุทัยกลม	กรรมการ
(๗) นางสุพรรณิการ์ ผาดงยาง	กรรมการ
(๘) นางสาวพัชรีทรัพย์ ใจเอื้อ	กรรมการ
(๙) นางสาวจันทิมา จุฑาศักดิ์	กรรมการ
(๑๐) นางสาวกัณท์ภีรมย์ สุดสนธิ์	กรรมการ
(๑๑) นางสาววรรณวิสาข์ จันทร์สมัย	กรรมการ
(๑๒) นางพิภัทรา จักรนามน	กรรมการ
(๑๓) นางสาวกาญจนา คำวาริห์	กรรมการ
(๑๔) นางสาวปาหนัน นันตะนัน	กรรมการ
(๑๕) นางวันเพ็ญ มองเพชร	กรรมการ
(๑๖) นางสาวมณีเนตร ยลละออ	กรรมการ
(๑๗) นางสุพรรณิ หมายเทียมกลาง	กรรมการ
(๑๘) นางศศิประภา ชนะบุญ	กรรมการและเลขานุการ

**มีหน้าที่** การวางแผนงาน ประสานงานด้านการเตรียมงานเลี้ยงรับรองสำหรับผู้เข้าร่วมงาน และอื่น ๆ

**๑๒. คณะกรรมการฝ่ายรับรองผู้ทรงคุณวุฒิและวิทยากรหลัก ประกอบด้วย**

(๑) ผู้ช่วยศาสตราจารย์ศศิกร สุรมณี	ประธานกรรมการ
(๒) ผู้ช่วยศาสตราจารย์ภัควรินทร์ มานะสิริสิทธิ์	รองประธานกรรมการ
(๓) นางสาวสุรีวรรณ เดชบุรีรัมย์	กรรมการ
(๔) นางสาวอรลดา โนนคำ	กรรมการ
(๕) นางวันเพ็ญ มองเพชร	กรรมการ
(๖) นางสาวปาหนัน นันตะนัย	กรรมการ
(๗) นางสาวรุ่งทิภา คำประสาร	กรรมการ
(๘) นางสาวที่ศราพร ไกยะฝ้าย	กรรมการ
(๙) นางสุภาพร จำพล	กรรมการ
(๑๐) นางอรพินท์ กมลวิบูลย์	กรรมการและเลขานุการ
(๑๑) นางสาวกนกรัตน์ บุตรแก้ว	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผนงาน ประสานงานด้านการเตรียมการรับรองสำหรับผู้ทรงคุณวุฒิและวิทยากรหลัก และอื่นๆ ที่เกี่ยวข้องภายในงาน

**๑๓. คณะกรรมการฝ่ายอาหารและเครื่องดื่ม ประกอบด้วย**

(๑) ผู้ช่วยศาสตราจารย์กรรณิการ์ ห้วยแสน	ประธานกรรมการ
(๒) ผู้ช่วยศาสตราจารย์ศุภชัย ภูลายดอก	กรรมการ
(๓) ผู้ช่วยศาสตราจารย์อรนุช สีหามาลา	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์ชาญณรงค์ ชมนาวัง	กรรมการ
(๕) ผู้ช่วยศาสตราจารย์ปิยนันท์ ชมนาวัง	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์หนูเดือน สาระบุตร	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์พิชชาภรณ์ วินโย	กรรมการ
(๘) ผู้ช่วยศาสตราจารย์ฟุ้งเกียรติ มหิพันธ์	กรรมการ
(๙) นางมยุรดา มหิพันธ์	กรรมการ
(๑๐) นางสุภาพร พุ่มรีว	กรรมการ
(๑๑) นายณัฐพงษ์ เจนวิพากษ์	กรรมการ
(๑๒) นายบุญยศ คำจิแจ่ม	กรรมการ
(๑๓) นายเกียรติพงษ์ เจริญจิตต์	กรรมการ
(๑๔) นางสาวอภิญา ภูมิสายตอน	กรรมการ
(๑๕) นางสาวทอรั้ง ประนิล	กรรมการ
(๑๖) นายวิระจิตร คุณราชฤทธิ์	กรรมการ
(๑๗) นางสาวฐณน นารชัย	กรรมการ
(๑๘) นางพนอจิต นิติสุข	กรรมการและเลขานุการ
(๑๙) นางสาวพนิดา วงศ์ปรีดี	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผน ควบคุม ตลอดจนการประสานงานด้านการจัดเตรียมด้านอาหาร และเครื่องดื่มตลอดการจัดประชุม สำหรับผู้เข้าร่วมการประชุม คณะวิทยากร ประสานงานข้อมูลที่เกี่ยวข้อง ในแต่ละฝ่าย และอื่น ๆ

๑๔. คณะกรรมการฝ่ายอาคารสถานที่ ประกอบด้วย

(๑) นายอรรถพงษ์ ศิริสุวรรณ	ประธานกรรมการ
(๒) นายลิขิต ศิริสันติเมธาคม	รองประธานกรรมการ
(๓) นายศักดิ์เกษม ปานะลาด	กรรมการ
(๔) นายบัณฑิต สุริยวงศ์พงศา	กรรมการ
(๕) นายสิทธิศักดิ์ เรืองฤทธิ์	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์อัทธา เหมันต์	กรรมการ
(๗) นายหอมหวน ตาสาโรจน์	กรรมการ
(๘) นายชัยพิชิต ป็องวิชัย	กรรมการ
(๙) นายภาณุวัฒน์ ถวิลการ	กรรมการ
(๑๐) นายอนุวัฒน์ ชัยช่วย	กรรมการ
(๑๑) นายประจักษ์ อิมประสงค์	กรรมการ
(๑๒) นายบรรลุ คงเจริญ	กรรมการ
(๑๓) นายสาคร พันผาด	กรรมการ
(๑๔) นายชัยสิทธิ์ มูลแพงศรี	กรรมการ
(๑๕) นายสุริยันต์ วงอานาม	กรรมการ
(๑๖) นายนิรัน ภูตองลม	กรรมการ
(๑๗) นายสมเพชร กระดม	กรรมการ
(๑๘) นายคำพา บรรณามล	กรรมการ
(๑๙) นายสาคร นาชัยเริ่ม	กรรมการ
(๒๐) นายสิทธิศักดิ์ การปั้น	กรรมการ
(๒๑) นายสมชาย สิ้นธุ์โคตร	กรรมการ
(๒๒) นายวุฒิชัย สุรินทร์	กรรมการ
(๒๓) นายวิระ สุขเกษม	กรรมการ
(๒๔) นายเกรียงศักดิ์ โพธิรัตน์	กรรมการ
(๒๕) นางจินตนา นาดาแสง	กรรมการ
(๒๖) นายชาติวันชัย ฆารเสถียร	กรรมการ
(๒๗) นายสัญญา ภูนาสูง	กรรมการ
(๒๘) นายพิละนันท์ อิมสะอาด	กรรมการ
(๒๙) นายประมาณ เทพพร	กรรมการ
(๓๐) นายพงษ์พันธ์ ทวาศรี	กรรมการ
(๒๑) นายวิระสันต์ วิระพันธ์	กรรมการ
(๓๒) นายบวรนันท์ กุดวงศ์แก้ว	กรรมการ
(๓๓) นายธีระศักดิ์ บุญเกตุ	กรรมการ
(๓๔) นายวุฒันต์ ศรีวิเศษ	กรรมการ
(๓๕) นายวัชรินทร์ ฆารโสภณ	กรรมการ
(๓๖) นางสาวพิศมัย สร้อยสีทา	กรรมการ
(๓๗) นายจักราวุธ ฉายจรุง	กรรมการ
(๓๘) นายวุฒินันท์ ชุตนอก	กรรมการ

(๓๙) นางสาวหทัยา วิระพันธุ์	กรรมการ
(๔๐) นายนิยม จันทวงศ์	กรรมการ
(๔๑) นางวันเพ็ญ มงเพชร	กรรมการ
(๔๒) นางสาวสุวิวรรณ เดชบุรีรัมย์	กรรมการ
(๔๓) นางสาวอรลดา โนนคำ	กรรมการ
(๔๔) นางสาวปาหนัน นันตะนัย	กรรมการ
(๔๕) นางสาวรุ่งทิภา คำประสาร	กรรมการ
(๔๖) นายสุเทพ โสภภาพาน	กรรมการ
(๔๗) นายชัยณรงค์ ทรัพย์โชติ	กรรมการ
(๔๘) นายไมตรี กำจร	กรรมการ
(๔๙) นายทองสุข นาเสถียร	กรรมการ
(๕๐) นายทวีพงษ์ ปริจำรัส	กรรมการ
(๕๑) นายदनัย คำไชโย	กรรมการ
(๕๒) นายอภิชาติ พรหมรักษ์	กรรมการ
(๕๓) นายสาธิต สารคำ	กรรมการ
(๕๔) นายวุฒิชัย ก้าวประดับ	กรรมการ
(๕๕) นายพล เขียวสด	กรรมการ
(๕๖) นายพรสิริวรรณ จุฑาสัตย์	กรรมการ
(๕๗) นายทศพร อุทสิง	กรรมการ
(๕๘) นายชยพล ดื่อดอกบัว	กรรมการ
(๕๙) นายหนูรัตน์ ผิวผัน	กรรมการ
(๖๐) นายคมสันต์ มฤกุล	กรรมการ
(๖๑) นายสุภชัย ภูมาสี	กรรมการ
(๖๒) นายนิกรณ ดุงศรีแก้ว	กรรมการ
(๖๓) นายไชยพร ไช้สมบัติ	กรรมการ
(๖๔) นายชาติ ภูตินทราย	กรรมการและเลขานุการ
(๖๕) นายณรงค์ฤทธิ์ พลสินธุ์	กรรมการและผู้ช่วยเลขานุการ

มีหน้าที่ ในการวางแผน ควบคุม การประสานงานด้านการจัดเตรียมความพร้อมด้านสถานที่จัดการประชุม สถานที่จัดนิทรรศการ สถานที่เลี้ยงรับรอง สถานที่รับประทานอาหารคณะวิทยากร ผู้เข้าร่วมประชุม สถานที่จอดรถ และอื่น ๆ

#### ๑๕. คณะกรรมการฝ่ายยานพาหนะ ประกอบด้วย

(๑) นายชาติ ภูตินทราย	ประธานกรรมการ
(๒) นายอัครเดช ปัตถารัตน์	กรรมการ
(๓) นายปรัชญา โคตะวินนท	กรรมการ
(๔) นายวีระชัย ทองธารา	กรรมการ
(๕) นายประดิษฐ์ ก้วมาลา	กรรมการ
(๖) นายวัชรพงษ์ สุขบรม	กรรมการ
(๗) นายชัชชัย บัญชา	กรรมการ



(๘) นายธราดล บุญโสดา	กรรมการ
(๙) นายสมชัย ชินคีรี	กรรมการ
(๑๐) นายวิทวัส บุญใหญ่	กรรมการ
(๑๑) นางสาวพิชญภาภา บุญเริ่ม	กรรมการและเลขานุการ
(๑๒) นายพัฒนพงษ์ ศรีเมือง	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผน ควบคุม กำกับ การจัดเตรียมยานพาหนะเพื่อรับส่งคณะวิทยากร แขกรับเชิญ ผู้เข้าร่วมประชุม ระหว่างที่พักถึงที่ประชุม สนามบินถึงที่ประชุม ตลอดจนความพร้อมด้านยานพาหนะตลอด ช่วงการจัดประชุมวิชาการ และอื่น ๆ

**๑๖. คณะกรรมการฝ่ายการเงินและพัสดุ** ประกอบด้วย

(๑) นายอรรถพงษ์ ศิริสุวรรณ	ประธานกรรมการ
(๒) นางสาวพิมพ์พิมพ์ สือตตะ	กรรมการ
(๓) นางสาวกมลวรรณ โพธิรัตน์	กรรมการ
(๔) นางสาวมณฑิตา ภูงามแจ้ง	กรรมการ
(๕) นางสาวบุญเลิศ อิมสำอางค์	กรรมการ
(๖) นางสาวรวิภา สัมปยุญา	กรรมการ
(๗) นางสาวพนารัตน์ สุวรรณพันธ์	กรรมการ
(๘) นางพัชรนันท์ ศักดิ์วงษ์	กรรมการ
(๙) นางสาวมยุรี กำจร	กรรมการ
(๑๐) นางสาวกัญญา โคตรสีลา	กรรมการ
(๑๑) นางสาวปาหนัน นันตะนัย	กรรมการ
(๑๒) นายแสงสุรีย์ นันททรัพย์	กรรมการ
(๑๓) นางสาวกาญจนา คำวาริห์	กรรมการ
(๑๔) นางพิภัทธา จักรนามน	กรรมการ
(๑๕) นางสุพรรณณี หมายเทียมกลาง	กรรมการ
(๑๖) นางวันเพ็ญ มองเพชร	กรรมการ
(๑๗) นายแสงสุรีย์ นันททรัพย์	กรรมการ
(๑๘) นางสาวมณีเนตร ยลละออ	กรรมการ
(๑๙) นางสาวกาญจนา คำวาริห์	กรรมการ
(๒๐) นางสมบัติมา ร้อยพิลา	กรรมการและเลขานุการ
(๒๑) นางชญัญญาชู แสงแก้ว	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผนงาน ควบคุม กำกับ จัดซื้อจัดจ้างวัสดุ อุปกรณ์ประกอบการจัดประชุม การเตรียมเอกสาร เพื่อเบิกจ่ายตามหลักฐานการเบิกจ่ายทั้งก่อนดำเนินงาน ระหว่างดำเนินงาน ภายหลังเสร็จสิ้น การดำเนินงาน ตลอดจนการจัดเตรียมเอกสารหลักฐานต่าง ๆ ที่เกี่ยวข้องทางด้านการเงินและพัสดุ ให้เป็นไป ตามหลักเกณฑ์และระเบียบที่กำหนด และอื่น ๆ

**๑๗. คณะกรรมการฝ่ายต้อนรับและจัดกิจกรรมการศึกษาดูงาน** ประกอบด้วย

(๑) ผู้ช่วยศาสตราจารย์นฤชิต แสนปากดี	ประธานกรรมการ
(๒) ผู้ช่วยศาสตราจารย์จริยา อินทนิล	กรรมการ

(๓) ผู้ช่วยศาสตราจารย์สิรินดา กมลเขต	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์กนกเนตร พินิจดำเนินกลาง	กรรมการ
(๕) ผู้ช่วยศาสตราจารย์อัศรเจตน์ ชัยภูมิ	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์นันทนา ศิริชาติ	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์ปารมี ลางคูลานนท์	กรรมการ
(๘) ผู้ช่วยศาสตราจารย์ฟุ้งเกียรติ มหิพันธ์	กรรมการ
(๙) ว่าที่ร้อยตรีเกริกไกร นรภาร	กรรมการ
(๑๐) นายธวัชชัย เคหะบาล	กรรมการ
(๑๑) นายธีรนนท์ ชันดี	กรรมการ
(๑๒) นางสาวพรพิทักษ์ เข้มบาสัตย์	กรรมการ
(๑๓) นายศักดิ์เกษม ปานะลาด	กรรมการ
(๑๔) นางสาวนิลวรรณ สายสมบัติ	กรรมการ
(๑๕) นายภูมิ หมั่นพลศรี	กรรมการ
(๑๖) นางมยุรดา มหิพันธ์	กรรมการ
(๑๗) ผู้ช่วยศาสตราจารย์มัลลิกา นาจันทอง	กรรมการและเลขานุการ
(๑๘) นางสาวอารยา ลาน้ำเที่ยง	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผนและกำหนดรูปแบบการศึกษาดูงาน ประสานงานกับหน่วยงานที่เกี่ยวข้อง เพื่อประชาสัมพันธ์สถานที่ท่องเที่ยวสำคัญของจังหวัดกาฬสินธุ์ และอื่น ๆ

**๑๘. คณะกรรมการฝ่ายจัดกิจกรรมการแสดงผลงานและวัฒนธรรม** ประกอบด้วย

(๑) ผู้ช่วยศาสตราจารย์พัฒนา พึ่งพันธ์	ประธานกรรมการ
(๒) นางปฎิมา บุษราคัม	รองประธานกรรมการ
(๓) นายณรงค์ อุไรโคตร	กรรมการ
(๔) นายภานุพงษ์ แสนปากดี	กรรมการ
(๕) นางสาววิรัชดา พรหมคำบุตร	กรรมการ
(๖) นายอรรคเดช อิมพัฒน์	กรรมการ
(๗) นางสาวสุดาทิพย์ เกาะสมบัติ	กรรมการ
(๘) นางสาวจันทร์จิรา ตลับแก้ว	กรรมการ
(๙) นายจรรยา ภูกิ่งหิน	กรรมการ
(๑๐) นางสาวกาญจนา สุภีร์คำ	กรรมการ
(๑๑) นางสร้อยญา ศรีพุทธิรัตน์	กรรมการ
(๑๒) นางธีรารัสม์ ผลไชย	กรรมการ
(๑๓) นางโชติกา ชันธีรัตน์	กรรมการ
(๑๔) นางสาวชุตติภา โคนกือษา	กรรมการ
(๑๕) นายเสถียร กาสารัง	กรรมการ
(๑๖) นายเดชา บุ่งอุทุม	กรรมการและเลขานุการ
(๑๗) นางสาวธิดาวรรณ ยนต์ชัย	กรรมการและผู้ช่วยเลขานุการ
(๑๘) นายวิฑธวัฒน์ ฤทธิรุ่ง	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผนและกำหนดรูปแบบการจัดให้มีกิจกรรมการแสดง ประสานงานกับหน่วยงาน ทั้งภายในและภายนอกในการจัดการแสดงในพิธีเปิด และงานเลี้ยงต้อนรับแขกผู้มีเกียรติ ผู้ทรงคุณวุฒิ นักวิจัย และผู้เข้าร่วมงานประชุมวิชาการทั้งในและต่างประเทศ และอื่น ๆ

**๑๙. คณะกรรมการฝ่ายออกแบบและจัดทำภาพจำลองเสมือนจริง (๓D) ประกอบด้วย**

(๑) นายสรายุทธ ฐิตะภาส	ประธานกรรมการ
(๒) นางสาวหัสยา สิงห์ศรี	กรรมการ
(๓) ผู้ช่วยศาสตราจารย์กำธร สารวรรณ	กรรมการ
(๕) ผู้ช่วยศาสตราจารย์มณฑนา ทองสุพล	กรรมการ
(๖) นายอภิชัย สารทอง	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์ประพนธ์ เนียมสา	กรรมการและเลขานุการ
(๘) นางสาวธันยนันท์ พิมพะสาสิทธิ์	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผนและกำหนดรูปแบบการจัดงานอาคารและสถานที่ในการจัดงานประชุมวิชาการระดับชาติและนานาชาติ เสมือนจริงด้วยระบบภาพสามมิติ ตลอดจนการบรรยายและนำเสนอ ให้เข้าใจภาพโดยรวมของการจัดงานในครั้งนี้

**๒๐. คณะกรรมการฝ่ายจัดทำโลโก้และเกียรติบัตร ประกอบด้วย**

(๑) ผู้ช่วยศาสตราจารย์นพคุณ ทองมวล	ประธานกรรมการ
(๒) ผู้ช่วยศาสตราจารย์สุชาติดา สุรงค์กุล	กรรมการ
(๓) ผู้ช่วยศาสตราจารย์ปนัดดา สังข์ศรีแก้ว	กรรมการ
(๔) นางถนอมรัตน์ มหาชัย	กรรมการ
(๕) นางสาวสุภาพร ร้อยพิลา	กรรมการ
(๖) นางสาวสมทรัพย์ มาตย์วิเศษ	กรรมการ
(๗) นายศาสตรา มุลวิไล	กรรมการ
(๘) นางปิยะฉัตร โยธารินทร์	กรรมการ
(๙) นางพีรภา ภูพวก	กรรมการ
(๑๐) นางสาวมยุรี ฤทธิไชย	กรรมการ
(๑๑) นายอาวุธ โสเพ็ง	กรรมการ
(๑๒) นางสาวจิราภา นาครินทร์	กรรมการ
(๑๓) นางสาวสุภาณี ศรีอุทธา	กรรมการ
(๑๔) นายปิยะพงศ์ อิศรนิววัฒน์	กรรมการ
(๑๕) นางสาวพัชรารัตน์ บุญสร้อย	กรรมการ
(๑๖) นางสุภัคชรี โคตรพัฒน์	กรรมการ
(๑๗) นางปุณณณช จันทร์สมุด	กรรมการ
(๑๘) นายเลอพงศ์ ไกรยะสา	กรรมการ
(๑๙) นางสาวดวงเดือน อิมประสงค์ บุญใหญ่	กรรมการ
(๒๐) นางสาวสุวิภา ยอดแก้ว	กรรมการ
(๒๑) นางสาวนฤมล ตะธง	กรรมการ
(๒๒) นางสาวนิตยา สารุชาติ	กรรมการ

(๒๓) นายวรพจน์ สมมูล

กรรมการและเลขานุการ

(๒๔) นายสนามชัย บริบูรณ์

กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผน กำหนดรูปแบบเกียรติบัตร และจัดพิมพ์เกียรติบัตรให้แก่ผู้เข้าร่วมนำเสนอ บทความและโปสเตอร์ และจัดพิมพ์เกียรติบัตรให้แก่ผู้ที่ได้รับรางวัลบทความดีเด่น และโปสเตอร์ดีเด่น ด้านวิทยาศาสตร์และด้านสังคมศาสตร์

**๒๑. คณะกรรมการฝ่ายนิทรรศการ** ประกอบด้วย

(๑) ผู้ช่วยศาสตราจารย์ทรงกรด พิมพิศาล	ประธานกรรมการ
(๒) นายธัญย์สิริจันต์ สุขเสริม	กรรมการ
(๓) นายณรงค์ฤทธิ์ มะสุใส	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์ธีรนาถ สุวรรณเรือง	กรรมการ
(๕) นายรัฐพล มีลาภสม	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์กฤษณ์ ขุนลิก	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์ธัชพงษ์ วั่งคำหาญ	กรรมการ
(๘) ผู้ช่วยศาสตราจารย์วิราวรรณ เหมันต์	กรรมการ
(๙) นางจตุพร คำสงค์	กรรมการ
(๑๐) ผู้ช่วยศาสตราจารย์อนงค์นาถ โจรจนกร วั่งคำหาญ	กรรมการและเลขานุการ
(๑๑) นายณรงค์ อุไรโคตร	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** วางแผน ควบคุม การประสานงานและดำเนินการด้านจัดนิทรรศการ และอื่น ๆ

**๒๒. คณะกรรมการฝ่ายติดตามประเมินผล** ประกอบด้วย

(๑) รองศาสตราจารย์สุพรรณ สุตสนธิ์	ประธานกรรมการ
(๒) นายศักดิ์เกษม ปานะลาด	รองประธานกรรมการ
(๓) นางธัญกร นรภาร	กรรมการ
(๔) นายคารมย์ เรืองไชย	กรรมการ
(๕) นายจักรพันธ์ ภัคดีแก้ว	กรรมการ
(๖) นายอธิพงษ์ ภูมิแสง	กรรมการ
(๗) ว่าที่ร้อยตรีธินิต ภูอินนา	กรรมการและเลขานุการ
(๘) นางสาววราภรณ์ สิ้นธุเดช	กรรมการและผู้ช่วยเลขานุการ
(๙) นายจีระพล ศรีแพงมนต์	กรรมการและผู้ช่วยเลขานุการ

**มีหน้าที่** ประเมินผล การสรุปผลการจัดประชุม วิเคราะห์ปัญหา อุปสรรค เพื่อนำมาพัฒนา และปรับปรุง ในการวางแผนการทำงานในครั้งต่อไป และอื่น ๆ

**๒๓. คณะกรรมการดำเนินงานนิทรรศการด้านการพัฒนาเชิงพื้นที่และขีดความยากจน** ประกอบด้วย

(๑) ผู้ช่วยศาสตราจารย์วิษุทธ จันทะรี	ประธานกรรมการ
(๒) รองศาสตราจารย์กตัญญู แก้วหานาม	กรรมการ
(๓) ผู้ช่วยศาสตราจารย์พิมพ์ลิขิต แก้วหานาม	กรรมการ
(๔) ผู้ช่วยศาสตราจารย์นพคุณ ทองมวล	กรรมการ

(๕) ผู้ช่วยศาสตราจารย์ทรงกรด พิมพิศาล	กรรมการ
(๖) ผู้ช่วยศาสตราจารย์ณัฐิต แสนปากดี	กรรมการ
(๗) ผู้ช่วยศาสตราจารย์อาริยา ป้องศิริ	กรรมการ
(๘) ผู้ช่วยศาสตราจารย์ภัคคิปี ไกรโสดา	กรรมการ
(๙) ผู้ช่วยศาสตราจารย์จรรยา อินทนิล	กรรมการ
(๑๐) ผู้ช่วยศาสตราจารย์เกษฎา สิงห์ทองชัย	กรรมการ
(๑๑) ผู้ช่วยศาสตราจารย์ณัฐวุฒิ ศรีวิบูลย์	กรรมการ
(๑๒) ผู้ช่วยศาสตราจารย์สายัญ พันธุ์สมบุญ	กรรมการ
(๑๓) ผู้ช่วยศาสตราจารย์จิระนันท์ อินทรีย์	กรรมการ
(๑๔) ผู้ช่วยศาสตราจารย์จิรัฐติ ธรรมศิริ	กรรมการ
(๑๕) ผู้ช่วยศาสตราจารย์สิรินดา กมลเขต	กรรมการ
(๑๗) ผู้ช่วยศาสตราจารย์จิตติมา นรโภาค	กรรมการ
(๑๘) ผู้ช่วยศาสตราจารย์คมสันที ขจรปัญญาไพศาล	กรรมการ
(๑๙) ผู้ช่วยศาสตราจารย์มัลลิกา ธีระกุล	กรรมการ
(๒๐) ผู้ช่วยศาสตราจารย์อัครเจตน์ ชัยภูมิ	กรรมการ
(๒๑) ผู้ช่วยศาสตราจารย์ชาญณรงค์ ชมนาวัง	กรรมการ
(๒๒) ผู้ช่วยศาสตราจารย์อดชา เหมันต์	กรรมการ
(๒๓) ผู้ช่วยศาสตราจารย์โกศล เรืองแสน	กรรมการ
(๒๔) ผู้ช่วยศาสตราจารย์หนูเดือน สาระบุตร	กรรมการ
(๒๕) ผู้ช่วยศาสตราจารย์ธนชพงษ์ วั่งคำหาญ	กรรมการ
(๒๖) นายธนิตพันธ์ พงษ์จงมิตร	กรรมการ
(๒๗) นายนพรัตน์ ผกาเชิด	กรรมการ
(๒๘) นางสาวทิพย์สุดา บุญมาทัน	กรรมการ
(๒๙) นายณัฐวัฒน์ ต้นพล	กรรมการ
(๓๐) นางสาวกมลวรรณ รัชตเวชกุล	กรรมการ
(๓๑) นายสุพจน์ ดีบุญมี	กรรมการ
(๓๒) นายศักดิ์เกษม ปานะลาด	กรรมการ
(๓๓) นางสาวแก้วตา สุตรสุวรรณ	กรรมการ
(๓๔) นางกัณทิมา ศิริสันติเมธาคม	กรรมการ
(๓๕) นายยุทธพงษ์ เชื้อนแก้ว	กรรมการ
(๓๖) นายจักรินทร์ ตรีอินทอง	กรรมการ
(๓๗) นางพนอจิต นิติสุข	กรรมการ
(๓๘) นางสาวพนิดา วงศ์ปรีดี	กรรมการ
(๓๙) นายเกียรติพงษ์ เจริญจิตต์	กรรมการ
(๔๐) นางสาวอภิญญา ภูมิสายดอน	กรรมการ
(๔๑) นายมารุต พลรักษา	กรรมการ
(๔๒) นายชัชวาลย์ ศรีมนตรี	กรรมการ
(๔๓) นางสาวอารยา ลาน้ำเที่ยง	กรรมการ
(๔๔) นางสาวสุชานาถ สิงหาปัด	กรรมการ

(๔๕) นางสาวกรรณิกา ฤณาพรรณ	กรรมการ
(๔๖) นายธีรนนท์ ชันดี	กรรมการ
(๔๗) นางนิตยา เคหะบาล	กรรมการ
(๔๘) นางสาวอภิรดี ดอนอ่อนเบา	กรรมการ
(๔๙) นายณรงค์ฤทธิ์ มะสุใส	กรรมการ
(๕๐) นายจุมพล ทองจำรูญ	กรรมการ
(๕๑) นายไพฑูรย์ ทิพย์สันเทียะ	กรรมการ
(๕๒) นายธวัชชัย เคหะบาล	กรรมการ
(๕๓) นายเทวฤทธิ์ ภูดี	กรรมการ
(๕๔) นายจักรพันธ์ ภัคดีแก้ว	กรรมการ
(๕๕) นายลิขิต ศิริสันติเมธาคม	กรรมการและเลขานุการ

**มีหน้าที่** ประสานงาน แลกเปลี่ยนข้อมูล จัดนิทรรศการพัฒนาพื้นที่และแก้จนจังหวัดกาฬสินธุ์ การนำเสนอผลงานวิจัย และประสานภาคีความร่วมมือที่เกี่ยวกับการพัฒนาพื้นที่ในการนำเสนอวิชาการด้านการพัฒนาพื้นที่

ทั้งนี้ ตั้งแต่วันที่ ๑๐ เดือน สิงหาคม พ.ศ. ๒๕๖๖ เป็นต้นไป

สั่ง ณ วันที่ ๑๐ เดือน สิงหาคม พ.ศ. ๒๕๖๖



(รองศาสตราจารย์จรัสพันธ์ ห้วยแสน)  
อธิการบดีมหาวิทยาลัยกาฬสินธุ์



คำสั่งมหาวิทยาลัยกาฬสินธุ์

ที่ ๐๗๓๓/ ๒๕๖๖

เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” (เพิ่มเติม)

ตามที่มหาวิทยาลัยกาฬสินธุ์ ได้มีคำสั่งที่ ๐๖๘๓/๒๕๖๖ ลงวันที่ ๑๐ สิงหาคม ๒๕๖๖ เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” นั้น เพื่อให้การจัดโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ ในระหว่างวันที่ ๑๗ - ๑๙ ธันวาคม ๒๕๖๖ ณ มหาวิทยาลัยกาฬสินธุ์ พื้นที่ในเมือง เป็นไปด้วยความเรียบร้อยและบังเกิดผลดีต่อทางราชการ

อาศัยอำนาจตามความในมาตรา ๓๑ แห่งพระราชบัญญัติมหาวิทยาลัยกาฬสินธุ์ พ.ศ. ๒๕๕๘ จึงแต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” (เพิ่มเติม) ดังต่อไปนี้

**๑) คณะกรรมการฝ่ายกองบรรณาธิการ ประกอบด้วย**

- |   |         |
|---|---------|
| ๑. ผู้ช่วยศาสตราจารย์สถิตย์พงศ์ เสี่ยงมศักดิ์ | กรรมการ |
| ๒. นางสาวสวลี อุตตรา                          | กรรมการ |
| ๓. นางสาวอาจารย์ แสงเสถียร                    | กรรมการ |
| ๔. นายไทยทัศน์ สุดสวนสี                       | กรรมการ |
| ๕. นายสรายุทธ กรวิรัตน์                       | กรรมการ |
| ๖. นายรณชัย ส้มหมื่นเมา                       | กรรมการ |

**มีหน้าที่** วางแผนงาน ประสานงานสถาบันและหน่วยงานภายนอกในการส่งบทความ กำหนดรูปแบบการจัดทำบทความ รวบรวมบทความ ที่ผู้สมัครผ่านทาง online และจัดทำเอกสารบทความทางวิชาการประกอบการประชุม ประสานงานผู้ทรงคุณวุฒิภายนอก และพิจารณาคัดกรองบทความในเบื้องต้น ติดตามการจัดส่งบทความ แจ้งตอบรับการนำเสนอบทความ กำหนดรูปแบบเล่มรวมผลงานให้เป็นไปตามวัตถุประสงค์ ดำเนินไปด้วยความเรียบร้อย มีประสิทธิภาพ และอื่น ๆ

**๒) คณะกรรมการฝ่ายลงทะเบียนและเอกสารประกอบการประชุม ประกอบด้วย**

- |                                       |         |
|---------------------------------------|---------|
| ผู้ช่วยศาสตราจารย์วิลาสินี ศรีแสนรงค์ | กรรมการ |
|---------------------------------------|---------|

**มีหน้าที่** การวางแผน กำหนดรูปแบบ วิธีการลงทะเบียนโดยการใช้เครื่อง RFID สำหรับผู้สมัครเข้าร่วมประชุม การจัดเตรียมเอกสารประกอบการประชุม ประสานงานกับฝ่ายที่เกี่ยวข้องระหว่างนักวิจัย ผู้นำเสนอผลงานทั้งภาคบรรยายและภาคโปสเตอร์ ผู้เข้าร่วมประชุมและประสาน งานข้อมูลที่เกี่ยวข้องในแต่ละฝ่าย และอื่น ๆ

๓) คณะกรรมการดำเนินงานนิทรรศการด้านการพัฒนาเชิงพื้นที่และขีดความยากจน ประกอบด้วย  
ผู้ช่วยศาสตราจารย์ปิยนันท์ ชมนาวัง กรรมการ

มีหน้าที่ ประสานงาน แลกเปลี่ยน จัดนิทรรศการพัฒนาพื้นที่และแก้จนจังหวัดกาฬสินธุ์ การนำเสนอ  
ผลงานวิจัย และประสานภาคีความร่วมมือที่เกี่ยวกับการพัฒนาพื้นที่ในการนำเสนอวิชาการด้านการพัฒนา  
พื้นที่

ทั้งนี้ ตั้งแต่วันที่ ๓๑ เดือน สิงหาคม พ.ศ. ๒๕๖๖ เป็นต้นไป

สั่ง ณ วันที่ ๓๑ เดือน สิงหาคม พ.ศ. ๒๕๖๖



(รองศาสตราจารย์จิระพันธ์ ห้วยแสน)  
อธิการบดีมหาวิทยาลัยกาฬสินธุ์





คำสั่งมหาวิทยาลัยกาฬสินธุ์

ที่ ๐๗๙๓ / ๒๕๖๖

เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ  
มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒

หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน”

KSU SINtech 2023 for ADSCD Hybrid Conference (Onsite & Online) (เพิ่มเติม)

ตามที่มีมหาวิทยาลัยกาฬสินธุ์ ได้มีคำสั่งที่ ๐๖๘๓/๒๕๖๖ ลงวันที่ ๑๐ สิงหาคม ๒๕๖๖ เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” และ คำสั่ง ที่ ๐๗๓๓/๒๕๖๖ ลงวันที่ ๓๑ สิงหาคม ๒๕๖๖ เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” (เพิ่มเติม) นั้น โดยการดำเนินโครงการประชุมวิชาการดังกล่าวได้มีการเปลี่ยนหัวข้อเป็น “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน” KSU SINtech 2023 for ADSCD Hybrid Conference (Onsite & Online)” เพื่อให้การจัดโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ ในระหว่างวันที่ ๑๗ - ๑๙ ธันวาคม ๒๕๖๖ ณ มหาวิทยาลัยกาฬสินธุ์ พื้นที่ในเมือง เป็นไปด้วยความเรียบร้อยและบังเกิดผลดีต่อทางราชการ

อาศัยอำนาจตามความในมาตรา ๓๑ แห่งพระราชบัญญัติมหาวิทยาลัยกาฬสินธุ์ พ.ศ. ๒๕๕๘ จึงแต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาตินานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน” KSU SINtech 2023 for ADSCD Hybrid Conference (Onsite & Online) (เพิ่มเติม) ดังต่อไปนี้

๑) คณะกรรมการฝ่ายลงทะเบียนและเอกสารประกอบการประชุม ประกอบด้วย

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|--|---------|
| ๑. ผู้ช่วยศาสตราจารย์กำธร สารวรรณ      | กรรมการ |
| ๒. ผู้ช่วยศาสตราจารย์ปิยะพงษ์ บุญสรรค์ | กรรมการ |
| ๓. นายภูริ จันทิมา                     | กรรมการ |
| ๔. นางสาวณภัทรวัลย์ ศรีสอาด            | กรรมการ |
| ๕. นายทองปึก ทับสมบัติ                 | กรรมการ |
| ๖. นายพิรพจน์ นิตินันท์                | กรรมการ |
| ๗. นายธนิตพันธ์ พงษ์จงมิตร             | กรรมการ |
| ๘. นายเกษมศักดิ์ ทองตัน                | กรรมการ |

**มีหน้าที่** การวางแผน กำหนดรูปแบบ วิธีการลงทะเบียนโดยใช้รูปแบบสแกน QR Code สำหรับผู้สมัครเข้าร่วมประชุม ประสานงานกับคณะกรรมการฝ่ายออกแบบเพื่อเชื่อมโยงสถานที่ภายในงาน รวมถึงประสานงานกับฝ่ายอื่น ๆ ที่เกี่ยวข้องระหว่างนักวิจัย ผู้นำเสนอผลงานทั้งภาคบรรยายและภาคโปสเตอร์ ผู้เข้าร่วมประชุมและประสาน งานข้อมูลที่เกี่ยวข้องในแต่ละฝ่าย และอื่น ๆ

๒) คณะกรรมการฝ่ายนิทรรศการ ประกอบด้วย

- |   |         |
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| ๑. รองศาสตราจารย์ชนกานต์ สหัทธินันท์      | กรรมการ |
| ๒. ผู้ช่วยศาสตราจารย์ธัญญา ใจเที่ยง       | กรรมการ |
| ๓. ผู้ช่วยศาสตราจารย์ระพีพรรณ ประจันตะเสน | กรรมการ |
| ๔. ผู้ช่วยศาสตราจารย์ชาญชัยณรงค์ ทรงศาตร์ | กรรมการ |
| ๕. ผู้ช่วยศาสตราจารย์ธรรมนุญ ปัญญาทิพย์   | กรรมการ |
| ๖. ผู้ช่วยศาสตราจารย์นวลใจ โคตรแสง        | กรรมการ |
| ๗. ผู้ช่วยศาสตราจารย์กชพรรณ วงศ์เจริญ     | กรรมการ |
| ๘. ผู้ช่วยศาสตราจารย์ศิริพร จรรยา         | กรรมการ |
| ๙. ผู้ช่วยศาสตราจารย์สัน นามตะคุ          | กรรมการ |
| ๑๐. ผู้ช่วยศาสตราจารย์คณางค์ รัตนาภิคม    | กรรมการ |
| ๑๑. ผู้ช่วยศาสตราจารย์เกษภา สิ่งทองชัย    | กรรมการ |
| ๑๒. ผู้ช่วยศาสตราจารย์ปฎิภา ฉายเสมแสง     | กรรมการ |
| ๑๓. ผู้ช่วยศาสตราจารย์ดำรงค์ ก่องดวง      | กรรมการ |
| ๑๔. ผู้ช่วยศาสตราจารย์จุฑามาศ เจียมสาธิต  | กรรมการ |
| ๑๕. ผู้ช่วยศาสตราจารย์ปนัดดา โพธินาม      | กรรมการ |
| ๑๖. นายณัฐวุฒิ ศรีวิบูลย์                 | กรรมการ |
| ๑๗. นางสาวอัจฉรา สุ่มังเกษตร              | กรรมการ |
| ๑๘. นายอนุรักษ์ ปิ่นทอง                   | กรรมการ |
| ๑๙. นายพงศกร ชาวเชียงตุง                  | กรรมการ |
| ๒๐. นายไพฑูรย์ ทิพย์สันเทียะ              | กรรมการ |
| ๒๑. นายนิรันดร์ นิติสุข                   | กรรมการ |
| ๒๒. นายวรรณพล พิมพะสาตี                   | กรรมการ |
| ๒๓. นายเดชาวุธ บุญลักษณ์                  | กรรมการ |
| ๒๔. นายชัยพงศ์ บางใบ                      | กรรมการ |
| ๒๕. นางกัณทิมา ศิริสันติเมธาคม            | กรรมการ |
| ๒๖. นางสาวมณฑนา จันสุนา                   | กรรมการ |
| ๒๗. นางสาวเนตรดารา จันทร์อุตสาห์          | กรรมการ |
| ๒๘. นายนพคุณ ทองมวล                       | กรรมการ |
| ๒๙. นายเกษภา ขจรฤทธิ                      | กรรมการ |
| ๓๐. นายธวัชวงศ์ชัย ไตรทิพย์               | กรรมการ |
| ๓๑. นางสาวบุษกร สุวรรณรงค์                | กรรมการ |
| ๓๒. นายวรรกร วิชัยโย                      | กรรมการ |
| ๓๓. นางสาวนิตยา แสงประจักษ์               | กรรมการ |
| ๓๔. นายสุรศักดิ์ ธรรมรักษ์เจริญ           | กรรมการ |
| ๓๕. นางสาวสนธยา ไยสาตี                    | กรรมการ |
| ๓๖. นายคมกริช อ่อนประสงค์                 | กรรมการ |
| ๓๗. นายพงศธร ทวีธนวาณิชย์                 | กรรมการ |
| ๓๘. นายชยากร ปัตลา                        | กรรมการ |

๓๙. นายเกษมศักดิ์ ทองตัน	กรรมการ
๔๐. นางสาวอุบลวัลย์ สิงห์ชัย	กรรมการ
๔๑. นางสาวเดือน พิมพิศาล	กรรมการ
๔๒. นายผดุงศักดิ์ คำยศ	กรรมการ
๔๓. นายสมหมาย แสนมหาชัย	กรรมการ
๔๔. นางสาวศุภลักษณ์ ภูกาสอน	กรรมการ
๔๕. นางภาวินี เสาวโชติ	กรรมการ

มีหน้าที่ วางแผน ควบคุม การประสานงานและดำเนินการด้านจัดนิทรรศการ และอื่น ๆ  
ให้เป็นไปด้วยความเรียบร้อย

ทั้งนี้ ตั้งแต่วันที่ ๑๒ เดือน กันยายน พ.ศ. ๒๕๖๖ เป็นต้นไป

สั่ง ณ วันที่ ๑๒ เดือน กันยายน พ.ศ. ๒๕๖๖



(รองศาสตราจารย์จรัสพันธ์ ห้วยแสน)  
อธิการบดีมหาวิทยาลัยกาฬสินธุ์



คำสั่งมหาวิทยาลัยกาฬสินธุ์

ที่ ๐๘๔๖/ ๒๕๖๖

เรื่อง แต่งตั้งกรรมการฝ่ายระดมทุนและประสานความร่วมมือ ในโครงการประชุมวิชาการระดับชาติ และนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน”  
KSU SINtech 2023 for ADSCD Hybrid Conference (Onsite & Online) (เพิ่มเติม)

ตามที่มหาวิทยาลัยกาฬสินธุ์ ได้มีคำสั่งที่ ๐๖๘๓/๒๕๖๖ ลงวันที่ ๑๐ สิงหาคม ๒๕๖๖ เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาติและนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” คำสั่ง ที่ ๐๗๓๓/๒๕๖๖ ลงวันที่ ๓๑ สิงหาคม ๒๕๖๖ เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาติและนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “KSU-Social Innovation and Technology to sustainable Community Development : KSU\_SINtech to SCD” (เพิ่มเติม) และ คำสั่งที่ ๐๗๙๓/๒๕๖๖ ลงวันที่ ๑๒ กันยายน ๒๕๖๖ เรื่อง แต่งตั้งคณะกรรมการดำเนินโครงการประชุมวิชาการระดับชาติและนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน” KSU SINtech ๒๐๒๓ for ADSCD Hybrid Conference (Onsite & Online) (เพิ่มเติม) นั้น เพื่อให้การจัดโครงการประชุมวิชาการระดับชาติและนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ ในระหว่างวันที่ ๑๗ - ๑๙ ธันวาคม ๒๕๖๖ ณ มหาวิทยาลัยกาฬสินธุ์ พื้นที่ในเมือง เป็นไปด้วยความเรียบร้อยและบังเกิดผลดีต่อทางราชการ

อาศัยอำนาจตามความในมาตรา ๓๑ แห่งพระราชบัญญัติมหาวิทยาลัยกาฬสินธุ์ พ.ศ. ๒๕๕๘ จึงแต่งตั้งกรรมการฝ่ายระดมทุนและประสานความร่วมมือในโครงการประชุมวิชาการระดับชาติและนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน” KSU SINtech ๒๐๒๓ for ADSCD Hybrid Conference (Onsite & Online) (เพิ่มเติม) ดังต่อไปนี้

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|---|---------|
| ๑. ผู้ช่วยศาสตราจารย์มนชยา สภานุชาต         | กรรมการ |
| ๒. ผู้ช่วยศาสตราจารย์อุดม วงศ์สุภา          | กรรมการ |
| ๓. ผู้ช่วยศาสตราจารย์นุสรุา วรรณศิริ        | กรรมการ |
| ๔. ผู้ช่วยศาสตราจารย์จุฑามาศ สุนทร          | กรรมการ |
| ๕. ผู้ช่วยศาสตราจารย์ฉัตรรัชดา วิโรจน์รัตน์ | กรรมการ |
| ๖. ผู้ช่วยศาสตราจารย์กัลยรัศมี ทิณรัตน์     | กรรมการ |
| ๗. นางกรกนก ดลโสภณ                          | กรรมการ |
| ๘. นางสาวจิตต์ศุภางค์ แก้วคำ                | กรรมการ |
| ๙. นางสาวกมลวรรณ รัชตเวชกุล                 | กรรมการ |
| ๑๐. นางอนันตพร พุทธิสสะ                     | กรรมการ |
| ๑๑. นายธรรมรัตน์ บุญรอด                     | กรรมการ |
| ๑๒. นายมารุต พลรักษา                        | กรรมการ |
| ๑๓. นายทยากร สุวรรณปักษ์                    | กรรมการ |

๑๔. นายอนุชา พุฒิกุลสาคร	กรรมการ
๑๕. นางสาวภัทราพร ภาระนาค	กรรมการ
๑๖. นางปาลวี พุฒิกุลสาคร	กรรมการ
๑๗. นางเพ็ญสิริ ภูวรกิจ	กรรมการ
๑๘. นายกันต์ กิ่งไก่อ	กรรมการ
๑๙. นายวรมัน ไม้เจริญ	กรรมการ
๒๐. นางสาวสิริอร วงษ์ทวี	กรรมการ
๒๑. นางสาวพัชรา โสระธิดา	กรรมการ
๒๒. นางสาวอรุณี ฮามคำไพ	กรรมการ
๒๓. นางสาวจินตนา อ่อนลา	กรรมการ
๒๔. นายชัชวิชัย คำภีรมย์	กรรมการ
๒๕. นางไอลดา คุณโรง	กรรมการ
๒๖. นางกนกวรรณ ตีระเพชร	กรรมการ
๒๗. นางภาวิณี เสาวโชติ	กรรมการ
๒๘. นางจินตนา นาดาแสง	กรรมการ
๒๙. นางสุธาสินี สุรินทร์	กรรมการ
๓๐. นางสาวศิริพรรณ พรพนม	กรรมการ

**มีหน้าที่** การวางแผน ประสานงานหน่วยงานภายนอกในการขอรับการสนับสนุนงบประมาณ ให้เป็นไปตามวัตถุประสงค์ ดำเนินไปด้วยความเรียบร้อย มีประสิทธิภาพ และอื่น ๆ

ทั้งนี้ ตั้งแต่วันที่ ๒๕ เดือน กันยายน พ.ศ. ๒๕๖๖ เป็นต้นไป

สั่ง ณ วันที่ ๒๕ เดือน กันยายน พ.ศ. ๒๕๖๖



(รองศาสตราจารย์จรัสพันธ์ ห้วยแสน)  
อธิการบดีมหาวิทยาลัยกาฬสินธุ์



คำสั่งมหาวิทยาลัยกาฬสินธุ์

ที่ ๐๘๘๐/ ๒๕๖๖

เรื่อง แต่งตั้งผู้ทรงคุณวุฒิพิจารณาคุณภาพบทความในโครงการประชุมวิชาการระดับชาติ  
และนานาชาติ มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒  
หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน”  
KSU SINtech 2023 for ADSCD Hybrid Conference (Onsite &Online)

เพื่อให้การพิจารณาคุณภาพบทความในโครงการประชุมวิชาการระดับชาติและนานาชาติ  
มหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่  
เพื่อการพัฒนาชุมชนที่ยั่งยืน” KSU SINtech ๒๐๒๓ for ADSCD Hybrid Conference (Onsite &Online)  
ระหว่างวันที่ ๑๗ - ๑๙ ธันวาคม ๒๕๖๖ ณ มหาวิทยาลัยกาฬสินธุ์ พื้นที่ในเมือง เป็นไปด้วยความเรียบร้อยและ  
บังเกิดผลดีต่อทางราชการ

อาศัยอำนาจตามความในมาตรา ๓๑ แห่งพระราชบัญญัติมหาวิทยาลัยกาฬสินธุ์ พ.ศ. ๒๕๕๘  
จึงแต่งตั้งผู้ทรงคุณวุฒิพิจารณาคุณภาพบทความในโครงการประชุมวิชาการระดับชาติและนานาชาติ มหาวิทยาลัย  
กาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนา  
ชุมชนที่ยั่งยืน” KSU SINtech ๒๐๒๓ for ADSCD Hybrid Conference (Onsite &Online) ดังต่อไปนี้

๑) ผู้ทรงคุณวุฒิพิจารณาคุณภาพบทความด้านวิศวกรรมศาสตร์และนวัตกรรม ประกอบด้วย

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|--|----------------------|
| ๑. ผู้ช่วยศาสตราจารย์ ดร.นรงค์ วิชาผา                | มหาวิทยาลัยกาฬสินธุ์ |
| ๒. ผู้ช่วยศาสตราจารย์ ดร.มณฑนา ทองสุพล               | มหาวิทยาลัยกาฬสินธุ์ |
| ๓. ผู้ช่วยศาสตราจารย์ ดร.เกยูร ดวงอุปมา              | มหาวิทยาลัยกาฬสินธุ์ |
| ๔. ผู้ช่วยศาสตราจารย์ ดร.โกศล เรืองแสน               | มหาวิทยาลัยกาฬสินธุ์ |
| ๕. ผู้ช่วยศาสตราจารย์ ดร.สถิตพงศ์ เสี่ยงมศักดิ์      | มหาวิทยาลัยกาฬสินธุ์ |
| ๖. ผู้ช่วยศาสตราจารย์ ดร.ธรรมนุญ ปัญญาทิพย์          | มหาวิทยาลัยกาฬสินธุ์ |
| ๗. ผู้ช่วยศาสตราจารย์สุรสิทธิ์ พอค้า                 | มหาวิทยาลัยกาฬสินธุ์ |
| ๘. ผู้ช่วยศาสตราจารย์ว่าที่ร้อยตรีอนุชา ศรีบุรีรัมย์ | มหาวิทยาลัยกาฬสินธุ์ |
| ๙. ผู้ช่วยศาสตราจารย์ปิยณัฐ โตอ่อน                   | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๐. ผู้ช่วยศาสตราจารย์รัชฎา แต่งภูเขียว              | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๑. ผู้ช่วยศาสตราจารย์ชินภัทร ชูระการ                | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๒. ผู้ช่วยศาสตราจารย์กัมปนาท ไชยเพชร                | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๓. ผู้ช่วยศาสตราจารย์ศิริพร จรรยา                   | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๔. อาจารย์ ดร.สุพัตรา บุโธสง                        | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๕. อาจารย์ ดร.ไพฑูรย์ ทิพย์สันเทียะ                 | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๖. อาจารย์ ดร.สวลี อุตรา                            | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๗. อาจารย์ ดร.อัจฉรา ชุมพล                          | มหาวิทยาลัยกาฬสินธุ์ |
| ๑๘. อาจารย์ ดร.วรพจน์ สมมูล                          | มหาวิทยาลัยกาฬสินธุ์ |

๑๙. อาจารย์ ดร.อาจารย์ แสงเสถียร	มหาวิทยาลัยกาฬสินธุ์
๒๐. อาจารย์ ดร.ไทยทัศน์ สุดสวนสี	มหาวิทยาลัยกาฬสินธุ์
๒๑. อาจารย์ ดร.สรายุทธ กรวิรัตน์	มหาวิทยาลัยกาฬสินธุ์
๒๒. อาจารย์ ดร.ธนกร ญาณกาย	มหาวิทยาลัยกาฬสินธุ์
๒๓. ผู้ช่วยศาสตราจารย์ ดร.อนุวัฒน์ ศรีสุวรรณ	มหาวิทยาลัยราชภัฏศรีสะเกษ
๒๔. ผู้ช่วยศาสตราจารย์ ดร.กนิษฐา อินธิจิต	มหาวิทยาลัยราชภัฏศรีสะเกษ
๒๕. ผู้ช่วยศาสตราจารย์ ดร.สัมพันธ์ ทองแดง	มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน วิทยาเขตสกลนคร
๒๖. ผู้ช่วยศาสตราจารย์ ดร.วารุณี ศรีสงคราม	มหาวิทยาลัยเทคโนโลยีราชมงคลสุวรรณภูมิ
๒๗. ผู้ช่วยศาสตราจารย์ ดร.บัณฑิต บุญขาว	มหาวิทยาลัยนครพนม

**๒) ผู้ทรงคุณวุฒิพิจารณาคณาภพบทความด้านวิทยาศาสตร์สุขภาพและเทคโนโลยี ประกอบด้วย**

๑. ผู้ช่วยศาสตราจารย์ ดร.คณางค์ รัตนานิคม	มหาวิทยาลัยกาฬสินธุ์
๒. ผู้ช่วยศาสตราจารย์ ดร.ปฎิภา ฉายเสมแสง	มหาวิทยาลัยกาฬสินธุ์
๓. ผู้ช่วยศาสตราจารย์ ดร.ธนัชพงษ์ วงศ์หาญ	มหาวิทยาลัยกาฬสินธุ์
๔. ผู้ช่วยศาสตราจารย์ ดร.สัน นามตะคุ	มหาวิทยาลัยกาฬสินธุ์
๕. ผู้ช่วยศาสตราจารย์ ดร.กชพรรณ วงค์เจริญ	มหาวิทยาลัยกาฬสินธุ์
๖. ผู้ช่วยศาสตราจารย์ ดร.นวลใจ โคตรแสง	มหาวิทยาลัยกาฬสินธุ์
๗. ผู้ช่วยศาสตราจารย์ ดร.กฤษณ์ ขุนล็ก	มหาวิทยาลัยกาฬสินธุ์
๘. ผู้ช่วยศาสตราจารย์ ดร.ระพีพรรณ ประจันตะเสน	มหาวิทยาลัยกาฬสินธุ์
๙. ผู้ช่วยศาสตราจารย์ ดร.จุฑามาศ เจียมสาธิต	มหาวิทยาลัยกาฬสินธุ์
๑๐. ผู้ช่วยศาสตราจารย์ ดร.ชาญชัยณรงค์ ทรงคาศรี	มหาวิทยาลัยกาฬสินธุ์
๑๑. ผู้ช่วยศาสตราจารย์ ดร.ดำรงค์ ก่องดวง	มหาวิทยาลัยกาฬสินธุ์
๑๒. ผู้ช่วยศาสตราจารย์ ดร.ธันวา ใจเที่ยง	มหาวิทยาลัยกาฬสินธุ์
๑๓. ผู้ช่วยศาสตราจารย์อนงค์นาถ โรจนกร วงศ์หาญ	มหาวิทยาลัยกาฬสินธุ์
๑๔. อาจารย์ ดร.ธัญย์สิริจันท์ สุขเสริม	มหาวิทยาลัยกาฬสินธุ์
๑๕. อาจารย์ ดร.วรกร วิชัยโย	มหาวิทยาลัยกาฬสินธุ์
๑๖. อาจารย์ ดร.รัฐพล มีลาภสม	มหาวิทยาลัยกาฬสินธุ์
๑๗. อาจารย์ ดร.พงศธร ทวีธนาณิชย์	มหาวิทยาลัยกาฬสินธุ์
๑๘. อาจารย์ ดร.กันทิมา ศิริสันติเมธาคม	มหาวิทยาลัยกาฬสินธุ์
๑๙. อาจารย์สุรศักดิ์ ธรรมรักษ์เจริญ	มหาวิทยาลัยกาฬสินธุ์
๒๐. ผู้ช่วยศาสตราจารย์ ดร.พัชรวรรณ สิทธิศาสตร์	มหาวิทยาลัยราชภัฏศรีสะเกษ
๒๑. ผู้ช่วยศาสตราจารย์ ดร.เตชภณ ทองเต็ม	มหาวิทยาลัยราชภัฏศรีสะเกษ
๒๒. รองศาสตราจารย์ ดร.วัชรพงษ์ เรือนคำ	มหาวิทยาลัยราชภัฏเชียงราย
๒๓. ผู้ช่วยศาสตราจารย์ ดร.พัชรินทร์ วินยางค์กุล	มหาวิทยาลัยราชภัฏเชียงราย
๒๔. ผู้ช่วยศาสตราจารย์ ดร.พินัญฉิณีย์ จิตคำ	มหาวิทยาลัยราชภัฏเชียงราย
๒๕. ผู้ช่วยศาสตราจารย์อนุสรรา บุญจิตร	มหาวิทยาลัยราชภัฏเชียงราย

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| ๒๖. ผู้ช่วยศาสตราจารย์ฉัตรทิมา ทาสุวรรณอินทร์ | มหาวิทยาลัยราชภัฏเชียงราย                          |
| ๒๗. ผู้ช่วยศาสตราจารย์เนตรา สมกำลัง           | มหาวิทยาลัยราชภัฏเชียงราย                          |
| ๒๘. อาจารย์ ดร.เรืองชัย ตาแสง                 | มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน<br>วิทยาเขตสกลนคร |

๓) ผู้ทรงคุณวุฒิพิจารณาคูณภาพบทความด้านเทคโนโลยีและนวัตกรรมการเกษตร  
ประกอบด้วย

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| ๑. ผู้ช่วยศาสตราจารย์ ดร.กรรณิการ์ ห้วยแสน    | มหาวิทยาลัยกาฬสินธุ์                |
| ๒. ผู้ช่วยศาสตราจารย์ ดร.ชาญณรงค์ ชมนาวัง     | มหาวิทยาลัยกาฬสินธุ์                |
| ๓. ผู้ช่วยศาสตราจารย์ ดร.อรนุช สีหามาลา       | มหาวิทยาลัยกาฬสินธุ์                |
| ๔. ผู้ช่วยศาสตราจารย์ ดร.พิชชาภรณ์ วันโย      | มหาวิทยาลัยกาฬสินธุ์                |
| ๕. ผู้ช่วยศาสตราจารย์ ดร.มัลลิกา อีระกุล      | มหาวิทยาลัยกาฬสินธุ์                |
| ๖. ผู้ช่วยศาสตราจารย์ ดร.ปิยนันท์ ชมนาวัง     | มหาวิทยาลัยกาฬสินธุ์                |
| ๗. ผู้ช่วยศาสตราจารย์ ดร.ณัฐพงษ์ ศรีสมุทร     | มหาวิทยาลัยกาฬสินธุ์                |
| ๘. ผู้ช่วยศาสตราจารย์ ดร.อนุพงษ์ ทานกระโทก    | มหาวิทยาลัยกาฬสินธุ์                |
| ๙. ผู้ช่วยศาสตราจารย์ ดร.จิระนันท์ อินทรีย์   | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๐. ผู้ช่วยศาสตราจารย์ ดร.ฉัตรทิมา นรโภค      | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๑. ผู้ช่วยศาสตราจารย์ ดร.วรเมธ ภูสามารถ      | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๒. ผู้ช่วยศาสตราจารย์ ดร.สายัญ พันธุ์สมบูรณ์ | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๓. ผู้ช่วยศาสตราจารย์ ดร.กีรวิชญ์ เพชรจุล    | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๔. ผู้ช่วยศาสตราจารย์ ดร.สาวิภา รัตนกร       | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๕. ผู้ช่วยศาสตราจารย์ ดร.ชรินญา ไสอินทร์     | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๖. ผู้ช่วยศาสตราจารย์ ดร.สมจิตต์ กันธาพรหม   | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๗. ผู้ช่วยศาสตราจารย์ ดร.สิริกานดา ธนาสุวรรณ | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๘. ผู้ช่วยศาสตราจารย์ ดร.วิลาสินี ศรีแสนยงค์ | มหาวิทยาลัยกาฬสินธุ์                |
| ๑๙. ผู้ช่วยศาสตราจารย์ ดร.จิรัฐติ ธรรมศิริ    | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๐. ผู้ช่วยศาสตราจารย์นุกูล แก่นจันทร์        | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๑. อาจารย์ ดร.อชัญ คงปิ่น                    | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๒. อาจารย์ ดร.เอกรินทร์ สารีพัว              | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๓. อาจารย์ ดร.วุฒิ รัตนวิชัย                 | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๔. อาจารย์ ดร.บุญญา ซาริรักษ์                | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๕. อาจารย์ ดร.วรมัน ไม้เจริญ                 | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๖. อาจารย์ ดร.จักรินทร์ ตรีอินทอง            | มหาวิทยาลัยกาฬสินธุ์                |
| ๒๗. ผู้ช่วยศาสตราจารย์ ดร.สิริพร ยศแสน        | มหาวิทยาลัยราชภัฏศรีสะเกษ           |
| ๒๘. ผู้ช่วยศาสตราจารย์ ดร.สายัญ สืบผาง        | มหาวิทยาลัยราชภัฏศรีสะเกษ           |
| ๒๙. ผู้ช่วยศาสตราจารย์ ดร.ดวงสิริ สยมภาค      | มหาวิทยาลัยเทคโนโลยีราชมงคลตะวันออก |



๔) ผู้ทรงคุณวุฒิพิจารณาคูณภาพบทความด้านบริหารธุรกิจ เศรษฐศาสตร์ การบริการ และการท่องเที่ยว ประกอบด้วย

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| ๑. ผู้ช่วยศาสตราจารย์ ดร.อำภาศรี พอค้ำ          | มหาวิทยาลัยกาฬสินธุ์                               |
| ๒. ผู้ช่วยศาสตราจารย์ ดร.ฉายรุ่ง ไชยกำบัง       | มหาวิทยาลัยกาฬสินธุ์                               |
| ๓. ผู้ช่วยศาสตราจารย์ ดร.ฉัตรรัชดา วิโรจรัตน์   | มหาวิทยาลัยกาฬสินธุ์                               |
| ๔. ผู้ช่วยศาสตราจารย์ ดร.นันทพัทธ์ โนนศรีเมือง  | มหาวิทยาลัยกาฬสินธุ์                               |
| ๕. ผู้ช่วยศาสตราจารย์ภัชชินทร์ ชาดัน            | มหาวิทยาลัยกาฬสินธุ์                               |
| ๖. ผู้ช่วยศาสตราจารย์กัลยรัศมี ทิณรัตน์         | มหาวิทยาลัยกาฬสินธุ์                               |
| ๗. ผู้ช่วยศาสตราจารย์สุกัญญา ดวงอุปมา           | มหาวิทยาลัยกาฬสินธุ์                               |
| ๘. ผู้ช่วยศาสตราจารย์ปิยะนุช เทือกเทพ           | มหาวิทยาลัยกาฬสินธุ์                               |
| ๙. ผู้ช่วยศาสตราจารย์วไลพร พลอยวิเลิศ           | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๐. ผู้ช่วยศาสตราจารย์อดม วงศ์สุภา              | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๑. ผู้ช่วยศาสตราจารย์มนชยา สภานูชาติ           | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๒. ผู้ช่วยศาสตราจารย์จุฑามาศ สุนทร             | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๓. ผู้ช่วยศาสตราจารย์นุสรุา วรรณศิริ           | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๔. อาจารย์ ดร.บัญชา เหลือผล                    | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๕. อาจารย์ ดร.ธรรมรัตน์ บุณรอด                 | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๖. อาจารย์ ดร.มณฑกานต์ ทูมมาวดี                | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๗. อาจารย์ ดร.เสาวลักษณ์ จิตติมงคล             | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๘. อาจารย์ ดร.กรกนก ดลโสภณ                     | มหาวิทยาลัยกาฬสินธุ์                               |
| ๑๙. อาจารย์ ดร.ยุพาภรณ์ ชัยเสนา                 | มหาวิทยาลัยกาฬสินธุ์                               |
| ๒๐. อาจารย์ ดร.มัลลิกา จำปาแพง                  | มหาวิทยาลัยกาฬสินธุ์                               |
| ๒๑. อาจารย์ ดร.อนุชา พุฒิกุลสาคร                | มหาวิทยาลัยกาฬสินธุ์                               |
| ๒๒. อาจารย์ ดร.ปาลวี พุฒิกุลสาคร                | มหาวิทยาลัยกาฬสินธุ์                               |
| ๒๓. อาจารย์ ดร.อนันตพร พุทธิสสะ                 | มหาวิทยาลัยกาฬสินธุ์                               |
| ๒๔. อาจารย์ ดร.อรุณี ฮามคำไพ                    | มหาวิทยาลัยกาฬสินธุ์                               |
| ๒๕. ผู้ช่วยศาสตราจารย์ ดร.พรรณีภา อนุรักษากรกุล | มหาวิทยาลัยบูรพา                                   |
| ๒๖. ผู้ช่วยศาสตราจารย์ดาริกา แสนพวง             | มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน<br>วิทยาเขตสกลนคร |
| ๒๗. ผู้ช่วยศาสตราจารย์ ดร.กนกกาญจน์ วิชาศิลป์   | มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน<br>วิทยาเขตสกลนคร |
| ๒๘. อาจารย์ ดร.มีแสน แก่นชวงค์                  | มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน<br>วิทยาเขตสกลนคร |

๕) ผู้ทรงคุณวุฒิพิจารณาคูณภาพบทความด้านศึกษาศาสตร์ ครุศาสตร์ และนวัตกรรมการจัดการเรียนรู้ ประกอบด้วย

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| ๑. ผู้ช่วยศาสตราจารย์ ดร.อนุชา พิมศักดิ์ | มหาวิทยาลัยกาฬสินธุ์ |
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๒. ผู้ช่วยศาสตราจารย์ ดร.ศักดิ์สิทธิ์ ฤทธิลัน มหาวิทยาลัยกาฬสินธุ์
๓. ผู้ช่วยศาสตราจารย์ ดร.คมสันท์ ขจรปัญญาไพศาล มหาวิทยาลัยกาฬสินธุ์
๔. ผู้ช่วยศาสตราจารย์ ดร.วรรณธิดา ยลวิลาศ มหาวิทยาลัยกาฬสินธุ์
๕. ผู้ช่วยศาสตราจารย์ ดร.สายหยุด ภูปุย มหาวิทยาลัยกาฬสินธุ์
๖. ผู้ช่วยศาสตราจารย์ ดร.ชุลิดา เหมตะศิลป์ มหาวิทยาลัยกาฬสินธุ์
๗. ผู้ช่วยศาสตราจารย์ ดร.อัญญาปาร์ย์ ศิลปนิลมาลย์ มหาวิทยาลัยกาฬสินธุ์
๘. ผู้ช่วยศาสตราจารย์ ดร.สวียา สุรมณี มหาวิทยาลัยกาฬสินธุ์
๙. ผู้ช่วยศาสตราจารย์ ดร.ปนัดดา สังข์ศรีแก้ว มหาวิทยาลัยกาฬสินธุ์
๑๐. ผู้ช่วยศาสตราจารย์ ดร.ทิพย์อุบล ทิพเลิศ มหาวิทยาลัยกาฬสินธุ์
๑๑. ผู้ช่วยศาสตราจารย์ ดร.ณิชากาท์ กันขุนทด มหาวิทยาลัยกาฬสินธุ์
๑๒. ผู้ช่วยศาสตราจารย์ ดร.วาทัญญู แก้วสุพรรณ มหาวิทยาลัยกาฬสินธุ์
๑๓. ผู้ช่วยศาสตราจารย์วรนุช นิลเขต มหาวิทยาลัยกาฬสินธุ์
๑๔. ผู้ช่วยศาสตราจารย์สุวรรณวัฒน์ เทียนยุทธกุล มหาวิทยาลัยกาฬสินธุ์
๑๕. อาจารย์ ดร.ปวีณา ชันธศิลา มหาวิทยาลัยกาฬสินธุ์
๑๖. อาจารย์ ดร.วิศรุต พยุงเกียรติคุณ มหาวิทยาลัยกาฬสินธุ์
๑๗. อาจารย์ ดร.สุพจน์ ดวงเนตร มหาวิทยาลัยกาฬสินธุ์
๑๘. อาจารย์ ดร.นิตยา ค้อไผ่ มหาวิทยาลัยกาฬสินธุ์
๑๙. อาจารย์ ดร.แจ่มจันทร์ ณ กาฬสินธุ์ มหาวิทยาลัยกาฬสินธุ์
๒๐. อาจารย์ ดร.ลาวัณย์ ดุลยชาติ มหาวิทยาลัยกาฬสินธุ์

**๖) ผู้ทรงคุณวุฒิพิจารณาคณาคุณภาพบทความมนุษยศาสตร์ สังคมศาสตร์ และนวัตกรรม เพื่อพัฒนาท้องถิ่น ประกอบด้วย**

๑. รองศาสตราจารย์ ดร.ปาริชา มารี เคน มหาวิทยาลัยกาฬสินธุ์
๒. ผู้ช่วยศาสตราจารย์ ดร. มัลลิกา นาจันทอง มหาวิทยาลัยกาฬสินธุ์
๓. ผู้ช่วยศาสตราจารย์ ดร. พิพิธธนวัติ สมคะเณย์ มหาวิทยาลัยกาฬสินธุ์
๔. ผู้ช่วยศาสตราจารย์ ดร.จริยา อินทนิล มหาวิทยาลัยกาฬสินธุ์
๕. ผู้ช่วยศาสตราจารย์ ดร.ศาดรา สหัสทัศน์ มหาวิทยาลัยกาฬสินธุ์
๖. ผู้ช่วยศาสตราจารย์ ดร.กิตติ์ธันต์ ญาณพิสิษฐ์ มหาวิทยาลัยกาฬสินธุ์
๗. ผู้ช่วยศาสตราจารย์ ดร.อัครเจตน์ ชัยภูมิ มหาวิทยาลัยกาฬสินธุ์
๘. ผู้ช่วยศาสตราจารย์ ดร.นันทนา ศิริชาติ มหาวิทยาลัยกาฬสินธุ์
๙. ผู้ช่วยศาสตราจารย์ทรงเกียรติ ชატัน มหาวิทยาลัยกาฬสินธุ์
๑๐. ผู้ช่วยศาสตราจารย์วนุชชิตา สุภักควนิช มหาวิทยาลัยกาฬสินธุ์
๑๑. ผู้ช่วยศาสตราจารย์ณภัทร สร้อยจิต มหาวิทยาลัยกาฬสินธุ์
๑๒. ผู้ช่วยศาสตราจารย์สิรินดา กมลเขต มหาวิทยาลัยกาฬสินธุ์
๑๓. ผู้ช่วยศาสตราจารย์นฤชิต แสนปากดี มหาวิทยาลัยกาฬสินธุ์
๑๔. ผู้ช่วยศาสตราจารย์กนกเนตร พินิจด่านกลาง มหาวิทยาลัยกาฬสินธุ์
๑๕. ผู้ช่วยศาสตราจารย์ปารมี ลางกุลานนท์ มหาวิทยาลัยกาฬสินธุ์

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| ๑๖. ผู้ช่วยศาสตราจารย์มะลิวรรณ สุวรรณพฤกษ์         | มหาวิทยาลัยกาฬสินธุ์  |
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| ๑๘. ผู้ช่วยศาสตราจารย์สุชาดา สุรางค์กุล            | มหาวิทยาลัยกาฬสินธุ์  |
| ๑๙. ผู้ช่วยศาสตราจารย์ฟุ้งเกียรติ มหิพันธ์         | มหาวิทยาลัยกาฬสินธุ์  |
| ๒๐. อาจารย์ ดร.ศักดิ์เกษม ปานะลาด                  | มหาวิทยาลัยกาฬสินธุ์  |
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| ๒๒. อาจารย์ ดร.อ้อต โนนกระยอม                      | มหาวิทยาลัยกาฬสินธุ์  |
| ๒๓. รองศาสตราจารย์ ดร.อัครพนธ์ เนื้อไม้หอม         | มหาวิทยาลัยราชภัฏบุรีรัมย์  |
| ๒๔. ผู้ช่วยศาสตราจารย์ ดร.วรวิทย์ อินทนนท์         | มหาวิทยาลัยนครพนม   |
| ๒๕. ผู้ช่วยศาสตราจารย์ ดร.เกรียงไกร ผาสุดตะ        | มหาวิทยาลัยนครพนม   |
| ๒๖. ผู้ช่วยศาสตราจารย์ ดร.กฤษวรรณ โลหะชินทร์       | วิทยาลัยการปกครองท้องถิ่น<br>มหาวิทยาลัยขอนแก่น                       |
| ๒๗. ผู้ช่วยศาสตราจารย์ ดร.นิเทศ สนั่นนารี          | มหาวิทยาลัยมหาจุฬาลงกรณราชวิทยาลัย<br>วิทยาเขตขอนแก่น                 |
| ๒๘. ผู้ช่วยศาสตราจารย์ ดร.ภูกาญจน์ภุชงค์ ปุณัรัมย์ | มหาวิทยาลัยมหาจุฬาลงกรณราชวิทยาลัย<br>วิทยาเขตขอนแก่น                 |
| ๒๙. พระมหาณัฐพันธ์ สุทสนวิภาณี                     | มหาวิทยาลัยมหาจุฬาลงกรณราชวิทยาลัย<br>วิทยาเขตขอนแก่น                 |
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| ๓๑. อาจารย์ ดร.สายชล ปัญจมาตย์                     | สถาบันการอาชีวศึกษาภาคตะวันออกเฉียงเหนือ ๓<br>วิทยาลัยเทคนิคมหาสารคาม |
| ๓๒. รองศาสตราจารย์ ดร.พัสสรณ์ วรภัทร์ธีระกุล       | มหาวิทยาลัยเวสเทิร์น  |

**๓) ผู้ทรงคุณวุฒิพิจารณาคุณภาพบทความนวัตกรรมการแก้ไขปัญหาความยากจนเชิงพื้นที่เพื่อความยั่งยืน ประกอบด้วย**

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| ๑. รองศาสตราจารย์ ดร.กตัญญู แก้วหานาม    | มหาวิทยาลัยกาฬสินธุ์ |
| ๒. ผู้ช่วยศาสตราจารย์ ดร.ปนัดดา โปธินาม  | มหาวิทยาลัยกาฬสินธุ์ |
| ๓. ผู้ช่วยศาสตราจารย์ ดร.วุฒิชัย กันนุฬา | มหาวิทยาลัยนครพนม    |
| ๔. ผู้ช่วยศาสตราจารย์ ดร.กัญญา มิชะมา    | มหาวิทยาลัยนครพนม    |

มีหน้าที่ กลั่นกรอง พิจารณาคุณภาพบทความ ให้ข้อเสนอแนะแก่ผู้นิพนธ์ ที่ส่งบทความมานำเสนอในงานประชุมวิชาการมหาวิทยาลัยกาฬสินธุ์ ประจำปี ๒๕๖๖ ครั้งที่ ๒ หัวข้อ “นวัตกรรมสังคมและเทคโนโลยีการพัฒนาเชิงพื้นที่ เพื่อการพัฒนาชุมชนที่ยั่งยืน” KSU SINtech ๒๐๒๓ for ADSCD Hybrid Conference (Onsite & Online)

ทั้งนี้ ตั้งแต่วันที่ ๓ เดือน ตุลาคม พ.ศ. ๒๕๖๖ เป็นต้นไป

สั่ง ณ วันที่ ๓ เดือน ตุลาคม พ.ศ. ๒๕๖๖



(รองศาสตราจารย์จิระพันธ์ ห้วยแสน)  
อธิการบดีมหาวิทยาลัยกาฬสินธุ์

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