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The Role of Entrepreneurs in Thailand's Decarburization Pathway toward Sustainable Development

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ABSTRACT

Decarburization has emerged as a critical global strategy to mitigate climate change and achieve sustainable development. Entrepreneurs, as key drivers of economic growth and innovation, play an essential role in shaping how businesses adopt low-carbon practices. This study explores the knowledge, attitudes, and behaviors of entrepreneurs in Thailand regarding decarburization, with the aim of understanding their contribution to the country's sustainability transition. A survey of 400 entrepreneurs was conducted using a structured questionnaire covering four areas: demographic information, knowledge of carbon reduction, attitudes toward sustainability, and behavioral practices. The data were analyzed using descriptive statistics and measures of central tendency. Findings show that entrepreneurs demonstrate strong knowledge of basic carbon reduction measures such as renewable energy, energy efficiency, and recycling. However, awareness of advanced technologies, such as Carbon Capture and Storage (CCS), remains limited. Attitudes toward decarburization were highly positive, with respondents recognizing its importance for national competitiveness and long-term business sustainability. In practice, entrepreneurs most commonly engaged in low-cost actions, while adoption of capital-intensive strategies was less frequent due to financial and structural barriers.

Key words: *Decarbonization, Sustainable Development, Entrepreneurs, Knowledge and Attitudes, Carbon Reduction*

Introduction

Climate change has become one of the most pressing global challenges of the 21st century, with greenhouse gas (GHG) emissions-particularly carbon dioxide (CO2)-identified as the primary driver of global warming. In response, the international community has emphasized the urgent need for decarburization, which refers to the systematic reduction of carbon emissions through technological innovation, behavioral changes, and sustainable business practices. For emerging economies like Thailand, achieving decarburization is not only an environmental necessity but also a strategic pathway toward long-term sustainable development (Norouzi, *et al*., 2023; Meraj *et al*., 2023; Yuan *et al*., 2023).

Entrepreneurs play a crucial role in this transformation. As key drivers of economic activity, innovation, and employment, entrepreneurs significantly influence the extent to which industries adopt low-carbon technologies and environmentally friendly practices. Their knowledge, attitudes, and behaviors

determine how effectively organizations can implement sustainable strategies and respond to global climate commitments such as the Paris Agreement and the United Nations Sustainable Development Goals (SDGs). Therefore, understanding the perspectives of entrepreneurs is essential for developing policies and strategies that align economic growth with environmental responsibility (Xue *et al*., 2023; Brinken *et al*., 2023; Buonomano *et al*., 2023).

In Thailand, small and medium-sized enterprises (SMEs) account for the majority of businesses and contribute substantially to the country's economic performance. However, they also represent a significant source of carbon emissions due to energy consumption, industrial processes, and transportation. While large corporations may have the resources to adopt decarburization measures, smaller businesses often face challenges such as limited awareness, inadequate financial capacity, and lack of access to advanced green technologies. These barriers highlight the importance of examining entrepreneurs' level of knowledge and their attitudes toward decarburization as a foundation for designing supportive frameworks.

This study aims to explore the role of entrepreneurs in Thailand's decarburization pathway toward sustainable development. Specifically, it investigates three key dimensions: (1) the level of knowledge entrepreneurs possess regarding carbon reduction and related technologies, (2) their attitudes toward integrating decarburization into business strategies, and (3) their behaviors and willingness to adopt sustainable practices. By analyzing these aspects, the study seeks to provide insights into how entrepreneurs can be empowered to become active contributors to Thailand's low-carbon transition. The findings are expected to inform policymakers, academic scholars, and business leaders in creating policies and programs that encourage broader participation in decarburization, ultimately advancing the nation toward sustainable growth.

Research Methodology

This study employed a quantitative research design to investigate the knowledge, attitudes, and behaviors of entrepreneurs in Thailand toward decarburization for sustainable development. A structured questionnaire was developed as the primary research instrument, consisting of four sections: (1) demographic information of respondents, (2) knowledge regarding carbon reduction, (3) attitudes toward decarburization and sustainability, and (4) behaviors and willingness to adopt low-carbon practices. The questionnaire included both multiple-choice questions and Likert scale items (ranging from 1 = strongly disagree to 5 = strongly agree) to measure perceptions and levels of agreement.

Population and Sample

The target population comprised entrepreneurs across different business sectors in Thailand. Given the large size of the entrepreneurial population, a representative sample was determined using Yamane's formula at a 95% confidence level and a 5% margin of error. Based on this calculation, a minimum of 400 respondents was deemed appropriate. The sample was selected using purposive and stratified random sampling to ensure diversity in terms of gender, age, and business sector.

Data Collection

Data were collected through online and paper-based surveys distributed between 2024-2025. The researchers collaborated with local business associations and chambers of commerce to reach participants. Participation was voluntary, and respondents were assured of anonymity and confidentiality to encourage honest responses. Out of the distributed questionnaires, 400 were completed and considered valid for analysis.

Data Analysis

The collected data were coded and analyzed using descriptive statistics, including frequencies, percentages, means, and standard deviations, to summarize demographic characteristics, knowledge levels, and overall patterns in attitudes and behaviors. Inferential statistical methods such as independent t-tests and ANOVA were also applied to examine differences across demographic groups. The analysis provided insights into how entrepreneurs' knowledge and attitudes correlate with their willingness to engage in decarburization practices.

Results and Discussion

Demographic Characteristics of Respondents

Table 1 presents the demographic distribution of the 400 entrepreneurs who participated in the study. A majority was male (61%), while females accounted for 39%. In terms of age, most respondents were be-

tween 40-60 years old (64%), followed by 30-40 years (17%), above 60 years (8.5%), and below 30 years (10.5%).

Table 1. Demographic Characteristics of Respondents (n = 400)

Variable	Category	Frequency	Percentage (%)
Gender	Male	244	61.0
	Female	156	39.0
Age	0–30 yrs	42	10.5
	30–40 yrs	68	17.0
	40–60 yrs	256	64.0
	>60 yrs	34	8.5

These findings reflect the predominance of middle-aged entrepreneurs, which is consistent with the profile of business ownership in Thailand.

Knowledge of Decarburization

The knowledge assessment comprised ten multiple-choice questions. The average correct response rate was 80%, suggesting a strong awareness of basic climate and carbon issues. Table 2 summarizes the results.

Overall, the results show that while entrepreneurs understand common carbon-reduction measures, they lack deeper technical knowledge such as Carbon Capture and Storage (CCS).

Attitudes toward Decarburization and Sustainability

Entrepreneurs expressed strong positive attitudes toward decarburization, with a mean score of 4.25 (SD = 0.61) across ten Likert-scale items. The highest level of agreement was recorded for the belief that carbon reduction is essential for Thailand's future competitiveness (M = 4.48). The lowest mean was observed in confidence in personal knowledge to implement strategies (M = 3.85).

The results confirm a positive mindset toward sustainability, though with limitations in self-confidence.

Behaviors and Willingness to Reduce Carbon

Respondents reported engaging in common, low-cost behaviors such as energy conservation (88.5%) and recycling (65.8%). More capital-intensive practices such as adopting energy-efficient technologies (54.5%) or formulating organizational carbon poli-

Table 2. Knowledge of Decarbonization (n = 400)

Item	Correct Response (%)	Incorrect Response (%)
CO as cause of global warming	92.0	8.0
Renewable energy (solar) reduces carbon	88.0	12.0
Transport as highest-emission sector in Thailand	85.0	15.0
Definition of Carbon Footprint	81.5	18.5
Role of tree planting	90.5	9.5
Wind energy as zero-carbon electricity	84.0	16.0
Meaning of CCS technology	47.5	52.5
EVs reduce CO emissions	86.0	14.0
Turning off unused lights	89.0	11.0
Recycling reduces energy use	83.0	17.0

Table 3. Attitudes Toward Decarburization (n = 400)

Item	Mean (M)	SD	Interpretation
Reducing carbon is vital for Thailand's competitiveness	4.48	0.59	Strongly Agree
Government-business cooperation is necessary	4.42	0.61	Strongly Agree
Reducing carbon helps global sustainability	4.38	0.64	Strongly Agree
My business should contribute to decarbonization	4.29	0.62	Agree
I have sufficient knowledge to implement strategies	3.85	0.71	Agree (moderate)
Consumers prefer low-carbon products	4.21	0.60	Agree
Carbon reduction enhances reputation	4.33	0.63	Strongly Agree
Decarbonization improves long-term profitability	4.27	0.65	Agree
Collaboration with other businesses is necessary	4.25	0.61	Agree
I am willing to change business operations	4.18	0.67	Agree

Table 4. Carbon Reduction Behaviors of Entrepreneurs (n = 400)

Behavior	Frequency (%)
Turn off unused lights/equipment	88.5
Reduce plastic use	70.3
Recycling	65.8
Use renewable energy (e.g., solar panels)	51.2
Invest in energy-efficient technologies	54.5
Develop organizational carbon policies	49.7
Participate in community carbon-reduction projects	47.8

cies (49.7%) were less frequent.

These results indicate entrepreneurs are more likely to adopt everyday actions than long-term investments, reflecting financial and structural barriers.

Discussion

The findings highlight three main insights

Basic Knowledge but Technical Gaps - While entrepreneurs understood general sustainability measures, gaps in advanced knowledge (e.g., CCS) suggest the need for training and awareness campaigns.

Positive Attitudes but Limited Confidence- Strong pro-sustainability attitudes exist, yet entrepreneurs expressed only moderate confidence in applying strategies, showing a disconnect between belief and practice.

Everyday Behaviors vs. Strategic Investment - Entrepreneurs are more engaged in low-cost actions than in structural or financial investments. This suggests that policy incentives, subsidies, and access to green financing are critical for wider adoption.

When compared with prior studies in other developing countries, the results are consistent: SMEs are motivated but constrained by resources. Thailand's pathway toward decarburization will require not only raising awareness but also removing barriers to technology adoption and providing institutional support.

Conclusion

This study examined the knowledge, attitudes, and behaviors of entrepreneurs in Thailand regarding decarburization for sustainable development. The findings provide important insights into how the entrepreneurial sector perceives and engages with carbon reduction initiatives.

First, the results showed that entrepreneurs possess a strong foundation of basic knowledge about carbon reduction, particularly in areas such as renewable energy, recycling, and energy conservation. However, knowledge gaps remain in more technical aspects, such as advanced low-carbon technologies and sector-specific emission contributions. This indicates the need for targeted training and information-sharing programs to strengthen entrepreneurs' capacity for informed decision-making.

Second, entrepreneurs demonstrated overwhelmingly positive attitudes toward decarburization, recognizing its importance for both global sustainability and Thailand's long-term competitiveness. Yet, their confidence in implementing decarburization measures within their own businesses was moderate. This suggests that while motivation exists, entrepreneurs may lack sufficient resources, skills, or institutional support to translate attitudes into practice.

Third, behavioral analysis revealed that entrepreneurs are more likely to engage in low-cost, everyday actions such as turning off unused lights, reducing plastic consumption, and recycling. However, fewer respondents reported adopting capital-intensive measures, such as investing in renewable energy systems or developing organizational carbon policies. This highlights the influence of financial and structural barriers, which must be addressed through supportive government policies, incentives, and accessible green financing mechanisms.

In conclusion, the study affirms that entrepreneurs play a crucial role in Thailand's decarburization pathway. Their positive attitudes and willingness to act provide a strong foundation for progress, but significant gaps in technical knowledge and resource accessibility remain. To accelerate Thailand's transition toward sustainable development, policymakers and stakeholders should expand education and training programs on advanced decarburization technologies.

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Conflict of Interest - None

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