

RICE Journal

of Creative Entrepreneurship and Management



Rattanakosin International College of Creative Entrepreneurship, RMUTR

VOLUME 7 NUMBER 1

JANUARY-APRIL 2026

ISSN 2821-9074 (Online)

ISSN 2730-2601 (Print)

<https://so12.tci-thaijo.org/index.php/RJCM>

ISSN 2821-9074(Online)
ISSN 2730-2601(Print)

RJCM

RICE JOURNAL OF CREATIVE ENTREPRENEURSHIP
AND MANAGEMENT

Rattanakosin International College of Creative Entrepreneurship (RICE)
Rajamangala University of Technology Rattanakosin (RMUTR)

Volume 7, Number 1, January-April 2026

Published by:

Rattanakosin International College of Creative Entrepreneurship (RICE)
Rajamangala University of Technology Rattanakosin (RMUTR)

Editorial Office: Academic Division

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RICE Journal of Creative Entrepreneurship and Management(RJCM)
 Rattanakosin International College of Creative Entrepreneurship (RICE)
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About Us

RJCM is an international journal for academics and scholars at the higher education level to communicate and share their viewpoints and academic work with fellow professionals in the areas of creative entrepreneurship and management as practiced in their fields of specializations in social sciences. Currently, it is under the supervision of Thai-Journal Citation Index (TCI).

RJCM publishes three numbers per volume annually and welcomes contributors to submit their manuscript in January, May, and September of each year. We accept both academic and research papers in social sciences from contributors. The papers are double-blind reviewed by three independent reviewers in each volume and published online-plus-print thrice a year.

The length of the unformatted manuscript in WORD can be 15-25 pages in length including references. The contents of the manuscript should include (1) a title with the author's name, affiliate, email address and telephone contact, (2) an abstract of 150 words with 3-5 keywords, (3) an introduction, (4) a rationale and background of the study, (5) research objectives, (6) research methodology, (7) data collection procedure, (8) data analysis, (9) results and discussion, (10) research limitation (if any), (11) conclusion, (12) acknowledgement(s) (if any), (13) the author's biography of about 50-80 words, (14) references, and (15) an appendix or appendices (if any).

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RJCM Vol. 7, No. 1, January-April 2026

RICE Journal of Creative Entrepreneurship and Management (RJCM)
 Rattanakosin International College of Creative Entrepreneurship (RICE)
 Rajamangala University of Technology Rattanakosin (RMUTR)

RJCM Vol. 7, No. 1, (January-April 2026)

Table of Contents	Page
About Us	i-iii
Note from the Editors of RJCM	vi
Address from RICE Director	vii
The Influence of Cultural Landscape Architecture of Chinese Gardens on Youth Tourists Intentions: Case of Four Gardens in China	1-17
<i>Jiayu Chen</i> <i>Nutteera Phakdeephirot</i> <i>Rajamangala University of Technology Rattanakosin, Nakhon Pathom, Thailand</i>	
The Impact of Human Resource Management Practices on Transportation Efficiency in the OEM Health and Beauty Supplement Industry in Samut Sakhon Province	18-29
<i>Ntapat Worapongpat</i> <i>Eastern Institute of Technology Suvarnabhumi (EIT) and Research and Development Center, SCG Grand Co., Ltd.</i>	
Financial Integration Strategies of Chinese Enterprises after Cross-border Mergers and Acquisitions: A case of Geely and Volvo Cars	30-41
<i>Xiaoyu Lu</i> <i>Management, Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin</i>	
Comparative Study on Green Development between China and Thailand — Based on the Perspective of Management	42-55
<i>Jie Gao</i> <i>Center for Interdisciplinary Sciences, Dali University, Dali, China</i>	
<i>Fan Wang</i> <i>Hospitality Management, Hebei Tourism College, Chengde, China</i>	
Determinants of Artificial Intelligence (AI) Adoption in Green Entrepreneurship: An Integrated Framework of UTAUT and VBN Theory	56-68
<i>Yiteng Zhang</i> <i>Admissions and Career Development Office, Chengde College of Applied Technology, Chengde City, China.</i>	
<i>Xinmin Yang</i> <i>Proctor's Office, Chengde College of Applied Technology, Chengde City, China.</i>	

Restudy Captain Ahab's downfall, as a Violator of SDG 14, Reveals Moby Dick as an Embodiment of Nature's Vengeance and a Foreshadowing of Humanity's Potential Fate 69-80

Cindy Hsing-Yu Wang

Vince Jia-Lin Lu

General Education Center, Learning Center, Hsiuping University of Science and Technology

Logistics Capability and Firm Performance: A Strategic Perspective on Supply Chain Resilience and Customer Service Excellence in Thailand's Industrial Sector 81-95

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Dear *RJCM* Readers,

Rattanakosin International College of Creative Entrepreneurship (RICE), Rajamangala University of Technology Rattanakosin (RMUTR), Thailand, is pleased to present RICE Journal of Creative Entrepreneurship and Management (RJCM) now steps in the seventh year, Volume 7 Number1 (January–April 2026).

This issue features seven articles that have undergone rigorous peer review by three distinguished experts in relevant fields. Importantly, the reviewers are independent of the authors and the evaluation process was conducted under a double-blind system.

The articles published in this issue reflect a diversity of topics within the journal's academic scope. They contribute valuable theoretical insights that scholars and researchers may further develop, extend into new studies, or employ in the creation of new knowledge.

The Editorial Board extends its sincere gratitude to all authors who submitted their work for publication, to the peer reviewers who generously devoted their time to provide constructive evaluations and recommendations, and to the advisory team whose contributions were vital in bringing this issue to completion.

We hope that RICE Journal of Creative Entrepreneurship and Management (RJCM) will serve as a meaningful academic resource for all readers. The Editorial Board warmly welcomes submissions for future issues, which will undergo thorough review by qualified experts both within and outside the institution. We also welcome suggestions and feedback, which will be carefully considered to further enhance the quality and standards of the journal.

Wichai Siriteerawas, Ed.D.

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Address from RICE Director

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Rattanakosin International College of Creative Entrepreneurship (RICE)

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Dear *RJCM* Readers,

It is with great pride and anticipation that I present this issue of *RICE Journal of Creative Entrepreneurship and Management (RJCM)*. As the journal continues to grow in scope and influence, it remains steadfast in its mission to serve as a platform for advancing knowledge, fostering innovations, and bridging theories with practices in the fields of entrepreneurship and management.

RJCM is committed to nurturing scholarly dialogue that not only enriches academic discourse but also inspires practical applications for educators, business leaders, and policymakers. Each article published here reflects rigorous peer review, intellectual integrity, and a dedication to excellence—qualities that ensure the journal's contribution to both local and global communities of practice.

I extend my deepest gratitude to the authors for their valuable contributions, to the reviewers for their critical insights, and to the editorial team for their tireless efforts in upholding the journal's standards. Together, we are cultivating a vibrant academic ecosystem that encourages creativity, resilience, and forward-thinking leadership.

It is my sincere hope that this issue of *RJCM* will serve as a source of inspiration and guidance for readers, sparking new ideas and collaborations that advance the frontiers of creative entrepreneurship and management.

Nuttapong Jotikasthira, Ph.D.

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RJCM Vol. 7, No. 1, January-April 2026

e-ISSN 2821-9074

Print-ISSN 2730-2601

RICE Journal of Creative Entrepreneurship and Management, Vol. 7, No.1, pp. 1-17,
January-April 2026

© 2026 Rajamangala University of Technology Rattanakosin, Thailand

doi: 10.14456/rjcm.2026.1

Received 12.12.25/ Revised 23.01.26/ Accepted 26.01.26

The Influence of Cultural Landscape Architecture of Chinese Gardens on Youth Tourists Intentions: Case of Four Gardens in China

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Abstract

Understanding how cultural landscape attributes of heritage sites influence young tourists' travel intentions is essential for the sustainable development of cultural tourism. However, existing studies have paid limited attention to the psychological mechanisms linking cultural landscape experience and behavioral intention, particularly among youth tourists in the context of classical Chinese gardens. This study examines the influence of cultural landscape experience on youth tourists' travel intentions, with cultural identity as a mediating variable.

Using four renowned Chinese gardens — the Summer Palace, the Chengde Mountain Resort, the Humble Administrator's Garden, and the Linger Garden— as the research context, data were collected through an online questionnaire survey of young tourists aged 18–35 (n = 200). Descriptive statistics, Pearson chi-square tests, independent-samples t-tests, and multiple regression analyses were employed to examine the relationships among cultural landscape experience, cultural identity, and travel intention.

The results indicate that cultural landscape experience has a significant positive effect on both cultural identity and travel intention. Cultural identity, in turn, significantly predicts youth tourists' willingness to revisit and recommend Chinese classical gardens, suggesting its mediating role in the relationship between cultural landscape experience and travel intention. In addition, young tourists show a strong preference for immersive and interactive cultural experiences. Gender differences are observed in experiential perception and behavioral intention, while no significant difference is found in the core dimension of cultural identity.

This study contributes to cultural landscape and tourism research by empirically validating a “cultural landscape experience–cultural identity–travel intention” framework from a youth tourism perspective. Practically, the findings provide implications for heritage garden management, highlighting the importance of immersive interpretation, digital engagement, and youth-oriented cultural experience design.

Keywords: *China's Four Great Gardens; cultural landscape; young tourist intentions; cultural Identity; cultural landscape theory*

1.Introduction

1.1 Research Background

Classical Chinese gardens, as a glittering treasure of Chinese civilization, possess rich cultural landscapes, embodying the philosophical concept of "harmony between man and nature" and the pinnacle of gardening. The "Four Great Gardens of China," represented by the Summer Palace, the Mountain Resort, the Humble Administrator's Garden, and the Linger Garden, are valuable not only for their historical significance, such as witnessing the Qing Dynasty's policy of ethnic integration, or for their artistic significance, such as the stone appreciation culture exemplified by the "Crown Cloud Peak" of the Linger Garden (Pan, Fan et al. 2020). Furthermore, through the organic integration of architecture, landscape, and plants, they create three-dimensional artistic spaces that are both livable and enjoyable, serving as living vessels for both tangible and intangible cultural heritage (Ma and Lin 2023).

Currently, these precious cultural heritage sites are at the intersection of preservation and development. On the one hand, these renowned gardens adhere to the principles of "minimal intervention" and "repairing the old as it was." They strive to maintain the authenticity of their historical features through methods such as restoring paintings using original techniques and materials and establishing a three-dimensional database of ancient and famous trees. On the other hand, to meet the needs of modern tourism, they are also beginning to introduce new exhibition methods and interactive experiences. However, the challenges of this transition remain significant. Overdevelopment can lead to landscape alienation and authenticity disputes, and ecological conservation faces ongoing pressure (Wang 2024). How to maintain cultural authenticity while innovating interpretation methods to meet the needs of modern tourists has become a core issue facing garden conservation and development.

The urgency of this issue is particularly evident in the increasingly youthful tourism market. By 2023, young tourists accounted for 32.5% of the total population nationwide, and they are gradually becoming the main force in garden tourism (Hu 2001). Young tourists' travel behavior exhibits distinct characteristics of their times: they are no longer satisfied with superficial tours and prefer in-depth, participatory experiences (Xia 2024).

The prevalence of "check-in" culture, which is carried out through social media, is driven by a strong motivation among young people to transform their travel experiences into social capital, with related topics frequently generating billions of views on social platforms (Zhou, Zhang et al. 2021). At the same time, while their curiosity about cultural connotations is growing, traditional information delivery methods, such as limited interpretation systems, often fail to capture their interest and may even hinder their visitor experience.

In the face of these new changes, in-depth research into the mechanisms by which garden cultural landscapes influence youth travel intentions is particularly important (Yin 2011). Can the current management model of gardens effectively meet the emerging needs of young tourists for immersive experiences, social sharing, and emotional resonance? (Vukic, Kuzmanovic et al. 2014) How can the profound cultural symbolism they carry (such as the Confucian ethics embodied in the "Danbo Jingcheng" Hall) (Du and Li 2013) be effectively perceived and identified by contemporary young people? These questions remain unanswered. Therefore, systematically analyzing the behavioral characteristics of young tourists and exploring more effective cultural communication channels will not only help enhance the visitor experience but also open up new paths for the innovative inheritance of traditional culture, this is also a positive exploration of the development model of integrated cultural and tourism development (Zhang and Zhu 2020).

1.2 Research Gap and Purpose

Although existing studies have explored cultural heritage tourism, landscape experience, and cultural identity from different perspectives, most of them focus on general tourist groups or examine these factors in isolation. Empirical research that systematically investigates the internal mechanism linking cultural landscape experience, cultural identity, and travel intention among youth tourists remains limited, particularly in the context of classical Chinese gardens. Moreover, while Chinese classical gardens are frequently discussed as important cultural heritage sites, few studies empirically examine how young tourists perceive their cultural landscape attributes and how such perceptions translate into identity formation and behavioral intention.

To address these gaps, this study focuses on youth tourists aged 18–35 and examines the influence of cultural landscape experience on travel intention, with cultural identity as a key mediating variable, using four renowned Chinese gardens as the research context. By constructing and empirically testing a “cultural landscape experience–cultural identity–travel intention” framework, this study aims to contribute to a more integrated understanding of youth cultural tourism behavior and provide evidence-based insights for the sustainable management of classical garden heritage.

1.3 Research Questions

RQ1: How do youth tourists perceive and experience the cultural landscape attributes of classical Chinese gardens?

RQ2: How does cultural landscape experience influence youth tourists' cultural identity toward Chinese classical gardens?

RQ3: How does cultural identity, shaped by cultural landscape experience, affect youth tourists' travel intentions toward classical Chinese gardens?

1.4 Research Objectives

The purpose of this study is to examine how cultural landscape experience in classical Chinese gardens influences youth tourists' travel intentions, with cultural identity serving as a key psychological mechanism. Taking four renowned Chinese gardens—the Summer Palace, the Chengde Mountain Resort, the Humble Administrator's Garden, and the Linger Garden—as the research context, this study aims to:

1. Explore youth tourists' perceptions of and experiences with cultural landscape attributes in classical Chinese gardens.
2. Examine the influence of cultural landscape experience on youth tourists' cultural identity toward Chinese classical gardens.
3. Investigate how cultural identity, shaped by cultural landscape experience, affects youth tourists' travel intentions, including their willingness to revisit and recommend garden destinations.

1.5 Research Significance

This study holds both theoretical and practical significance. From a theoretical perspective, it enriches the academic understanding of how cultural landscape construction influences youth tourists' travel intentions by integrating cultural landscape theory and cultural identity theory, and by constructing a mechanism model linking experience, identity, and intention. From a practical perspective, the findings provide insights for the management and development of the Four Famous Gardens, particularly in optimizing cultural landscape presentation, introducing interactive and digital experiences, and enhancing their attractiveness to youth tourists. From a broader social perspective, this research contributes to strengthening young people's cultural identity, fostering the inheritance and dissemination of traditional Chinese culture, and promoting the sustainable development of cultural tourism.

1.6 Research Limitations and Innovations

The limitations of this study primarily lie in three aspects. First, the selection of the Four Great Gardens as case studies may limit the generalizability of the findings due to regional specificity. Second, the definition of the youth group (ages 18–35) is relatively broad and may mask nuanced differences within this demographic. Third, data collection relied solely on self-reported questionnaire responses, which may introduce subjective bias and lacks triangulation with objective behavioral data.

The innovations of this study are reflected in the following aspects. Theoretically, it proposes and empirically tests an integrated framework of “Cultural Landscape Architecture – Cultural Identity – Tourists Intention,” providing a structured understanding of their interrelationships. Methodologically, it employs a multi-analytical approach combining descriptive statistics, correlation analysis, t-tests, and multiple regression on original survey data from young visitors, enhancing the robustness of the findings. Practically, the results offer actionable insights for designing digital and immersive experiences that strengthen youth cultural identity, supporting the youth-oriented sustainable development of garden heritage.

2. Literature Review

2.1 Cultural Landscape Theory and Cultural Identity Theory

Cultural landscape theory views landscape as a comprehensive carrier of cultural values and natural elements, providing a theoretical framework for interpreting classical Chinese gardens. Gardens, through diverse cultural elements such as architecture, landscape, and literature, constitute a unique "three-dimensional cultural text system." (Keswick and Hardie 2003) However, the cultural symbols embedded in gardens (Zhang, Hu et al. 2024), which carry profound connotations such as Confucian ethics and the spirit of literati, face a contemporary interpretation dilemma, making it difficult for young tourists to effectively perceive and identify with their value. Successful cultural landscape architecture can activate the connotations of gardens, influencing youth travel intentions by creating an immersive atmosphere, enhancing emotional resonance, and leveraging technological innovations (Dionysopoulou and Mylonakis 2013) to impart knowledge.

Cultural identity theory offers a new perspective for understanding tourist behavior, arguing that individuals construct a sense of belonging through exposure to cultural symbols. Research shows that as many as 92.7% of young people view travel as an important way to broaden their horizons (Wang 2023). Contemporary youth's cultural identity model has shifted from the traditional "knowledge-based learning" to an "experiential participation" model focused on contextual immersion and a "social expression" model facilitated by social media. By introducing immersive situational experiences, digital narrative tools and diversified social communication mechanisms (Nicoli, Henriksen et al. 2022), we can better meet the interests and preferences of young tourists and promote the continued inheritance and innovative development of garden culture among the new generation (Zheng 2024).

2.2 Four gardens cultural landscape and cultural identity

2.2.1 The Summer Place

The Summer Palace in Beijing is China's largest and best-preserved royal garden, representing the pinnacle of Qing imperial landscaping. Its cultural landscape is characterized by the integration of Kunming Lake, Longevity Hill, and a large number of pavilions, palaces, and corridors, reflecting the Chinese philosophy of “harmony between heaven and humanity” (Chen and Wu 2009) The “Long Corridor”, decorated with over 14,000 colorful paintings, is a distinctive cultural symbol. Recent studies show that digitalized exhibitions of the corridor paintings increased youth visitors' understanding of royal garden culture by 35% (Wang 2023). For young tourists, such innovative interpretive

methods not only enhance cultural cognition but also foster a stronger sense of cultural identity through immersive engagement.

Figure 1 The Summer Palace



2.2.2 Chengde Mountain Resort

The Chengde Mountain Resort, built during the Qing Dynasty, combines vast natural scenery with architectural styles of Han, Mongolian, Tibetan, and Manchu cultures, forming a multicultural landscape that symbolizes ethnic integration (Wang, Hu et al. 2025). It embodies political unity and national harmony. According to visitor surveys, more than 70% of youth tourists reported that multi-ethnic cultural narratives increased their recognition of the “diversity of Chinese culture” (Hui 2020). By participating in thematic tours—such as exhibitions on imperial diplomacy and ethnic exchange—youth tourists not only acquire historical knowledge but also strengthen cultural pride, highlighting the role of cultural landscapes in building identity.

Figure 2 Chengde Mountain Resort



2.2.3 The Humble Administrator's Garden

Located in Suzhou, the Humble Administrator's Garden is one of the most famous Jiangnan gardens, noted for its water-centered design, poetic scenery, and literati aesthetics. It exemplifies the fusion of art, philosophy, and landscape in Chinese culture (Liu, Liao et al. 2019). A case study showed that youth tourists who participated in “garden poetry gatherings” and immersive activities such as “real-scene role-playing” reported a cultural identity score of 4.2 (out of 5), compared to 3.5 for non-participants (Huang 2025). These findings indicate that experiential programs significantly enhance youth tourists' emotional resonance and identification with traditional literati culture, shifting their role from passive spectators to active cultural participants.

Figure 3 The Humble Administrator's Garden

2.2.4 The Lingering Garden

The Lingering Garden, also in Suzhou, is renowned for its ingenious architecture, artistic rockeries, and sophisticated spatial design (Keswick and Hardie 2003). It epitomizes the refined lifestyle and aesthetic values of the Jiangnan region. Its cultural landscape not only represents philosophical ideals of elegance and balance but also provides a unique medium for cultural learning. Recent visitor data indicate that guided tours and digital storytelling increased youth tourists' satisfaction scores by 20% (Xu 2013). By combining aesthetic appreciation with historical interpretation, the Lingering Garden enables young visitors to connect emotionally with classical Chinese cultural ideals, reinforcing both cultural cognition and identity.

Figure 4 The Lingering Garden

2.3 Youth tourists' characteristics and preference

Youth tourists, usually aged 15–30, show distinct differences from traditional tourist groups. Their travel behaviors are more experience-oriented, preferring interactive and immersive activities over passive sightseeing. For instance, activities such as “garden-themed role-playing” in Suzhou extended average stay time by 40% and increased revisit rates by 25%, showing their strong demand for participatory tourism. At the same time, youth travelers place high value on digital engagement. Research shows that youth tourists often rely on mobile applications and social media for planning and sharing their travel experiences (Wu, Ma et al. 2022). In addition, digital interpretive tools such as multimedia exhibits or interactive displays at heritage sites like the Summer Palace

may enhance cultural understanding among youth visitors.

Moreover, youth tourists emphasize social expression and identity building. A survey by China Youth Daily (Wang 2023) revealed that 92.7% of young respondents regarded tourism as an important way to “know the country and broaden horizons,” highlighting their pursuit of both cultural recognition and self-expression.

In sum, youth tourists prefer interactive experiences, digital tools, and social sharing, which distinguishes them from traditional visitors and directly shapes their cultural tourism intentions.

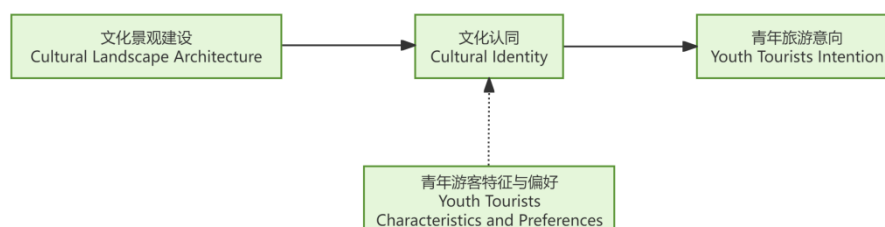
2.4 Youth tourists intentions

Young people's travel behavior exhibits a distinctly experience-oriented nature. The demand for cultural experience has surpassed price as the primary factor influencing their decision-making. This tendency manifests itself in a strong preference for immersive and interactive activities in classical garden tourism, as well as a pronounced tendency to manage their image through social media. Research has found that young tourists experience a gap between their ability to discern cultural symbols and their historical understanding. Consequently, they prefer to establish an emotional connection with traditional culture through scenario-based experiences and hands-on practice. Their knowledge acquisition also shows a shift from passive acceptance to active exploration. Notably, different generations (Cavagnaro, Staffieri et al. 2018) of young people express identity differently, forming a dynamic identity spectrum (Jani and Hussain 2011).

2.5 Theoretical framework

In summary, existing research often explores the impacts of cultural heritage or tourism experience from a singular perspective. However, there is a lack of a systematic framework that integrates all three. Therefore, this study constructs a theoretical model of 'Cultural Landscape Architecture - Cultural Identity - Tourists Intention' by drawing on social identity theory and planned behavior theory, in order to more comprehensively analyze the intrinsic relationships among the three.

Figure 5 Cultural Landscape Architecture - Cultural Identity – Youth Tourists Intention Framework



Cultural Landscape Architecture → Cultural Identity → Youth Travel Intentions

Cultural Landscape Architecture: The cultural elements provided by gardens, such as architecture and design.

Cultural Identity: The enhancement of tourists' pride in traditional culture and their sense of identity.

Youth Travel Intentions: The willingness of tourists to revisit or recommend.

The theoretical framework of this study aims to clarify how the cultural landscape of Chinese classical gardens can enhance the cultural identity of young tourists, thereby influencing their travel intentions.

2.6 Research Hypotheses

H1: Age and the frequency of trips per year have a significant relationship with youth tourists' travel intentions.

H2: Gender significantly influences the experience of Chinese garden cultural landscapes.

H3: Gender significantly influences cultural identity formation among youth tourists.

H4: Gender has a significant impact on youth tourists' characteristics and tourism preferences.

H5: Gender significantly affects youth tourists' travel intentions toward Chinese classical gardens.

3. Research Methods

3.1 Research Design and Data Collection

To explore the mechanisms by which Chinese garden cultural landscapes influence youth travel intentions, this study adopts a mixed research approach. Core data were collected through an online purposive survey, targeting young tourists aged 18–35 who had visited at least one of the Four Great Gardens in the past three years. The questionnaire link was distributed via social media platforms and travel forums frequented by this age group, ensuring that respondents met the study criteria.

The questionnaire consisted of five sections: basic personal information, experience of Chinese garden culture landscape, cultural identity, youth tourists' characteristics and preferences, and youth tourists' intentions, measured using a five-point Likert scale. The items were adapted from previous studies and reviewed by three experts in tourism and cultural studies to ensure content validity. Minor revisions were made to improve clarity and suitability for the target youth population.

The questionnaire was administered online using Qualtrics, allowing for efficient data collection and automatic recording of responses. All collected data were securely stored and retained for a period of two years in compliance with research data management guidelines.

3.2 Questionnaire Reliability Test

In this study, questionnaire quality is crucial for ensuring reliable research conclusions. To examine the internal consistency of the questionnaire, Cronbach's alpha was calculated (Bujang, Omar et al., 2018). Cronbach's alpha is a widely used indicator for assessing internal consistency in multi-item measurement studies. In many social science studies, an alpha value of 0.70 or higher is generally considered acceptable (Taber, 2018).

Before the formal survey, an SPSS reliability analysis was conducted on 47 pre-test questionnaires. The results showed a high Cronbach's alpha of 0.963, far exceeding the generally accepted threshold. This indicates that the questionnaire items exhibit very high consistency and stability, reliably measuring the core variables of this study. Therefore, this questionnaire has good reliability and is suitable for subsequent large-scale data collection.

3.3 Data Analysis Methods

The collected data were processed and analyzed using SPSS software. First, descriptive statistics were performed to summarize the basic characteristics of the sample and core variables. Subsequently, correlation analysis and independent sample t-tests were conducted to explore inter-variable associations and group differences. Furthermore, multiple linear regression analysis was used to examine the relationships and potential causal pathways among experience of Chinese garden cultural landscapes, cultural identity, and youth tourist behavioral intentions, in order to test the proposed theoretical model of "cultural landscape → cultural identity → behavioral intention."

All regression analyses were conducted using SPSS linear regression procedures. The results of these analyses are presented in Chapter 4 (Results).

4. Results and Discussion

4.1 Demographic Variables

The respondents' demographic variables are presented in Table 4-1 as shown below.

Table Basic information of respondents (n=200)

Variables	Details	Frequency	Percent
Gender	Male	77	38.5
	Female	123	61.5
Age group	18-22	46	23.0
	22-28	102	51.0
	28-35	52	26.0
Occupation	Student	56	28.0
	Employee	93	46.5
	Civil servant	10	5.0
	Other occupation	41	20.5
Monthly income (yuan)	Under 3500	74	37.0
	3500-5000	68	34.0
	5000-10000	43	21.5
	Over 10000	15	7.5

Table 1 shows that 61.5% of the respondents were female in this survey, more than males (38.5%). In terms of age, the 22-28 year old group accounted for the largest group, accounting for 51.0%, and the overall group was dominated by young people. In terms of occupations, the main components were general employees (46.5%) and students (28.0%). In terms of income, the proportion of monthly income is less than 5,000 yuan, and the overall income level is low. Overall, the sample characteristics were consistent with the youth group of the study subjects.

4.2 Consumer Behavior

Table 2 Consumer behavior statistics

Variables	Details	Frequency	Percent
Have ever visited the Chinese garden?	Yes	133	66.5
	No	67	33.5
Number of participants	Alone	25	12.5
	2-4 people	142	71.0
	5-8 people	29	14.5
	More than 8 people	4	2.0
Times of trips per year	Under 1	45	22.5
	1-2	88	44.0
	3-4	42	21.0
	Over 5	25	12.5

Table 2 shows that most of the respondents have visited Chinese gardens, accounting for 66.5%; 33.5% said they had not visited. In terms of the number of travelers, 2-4 people were the main travelers, accounting for 71.0%, indicating that most respondents preferred to travel together. In terms of travel frequency, 44.0% of the people visit 1-2 times a year, 21.0% visit 3-4 times, and only 12.5% visit more than 5 times, indicating that most young people visit less frequently and mainly occasionally have leisure.

4.3 Descriptive statistical analysis of core variables

Table 3 Descriptive statistical analysis of young tourists' experience of Chinese garden culture

variables	NO.		Mean	SD.
Experience of Chinese Garden Culture Landscape	Q1	The cultural landscape of the garden has a unique architectural style and strong traditional cultural characteristics.	4.40	0.88
	Q2	The landscape design of the garden (such as water features, rockery, and plant arrangements) is pleasing to the eye.	4.39	0.89
	Q3	The cultural displays in the gardens (such as couplets, plaques, and guided tours) can help me understand traditional culture.	4.40	0.76
	Q4	The interactive experience of the garden (such as guided tours, handicraft experiences, and immersive activities) makes me more willing to explore garden culture.	4.13	0.98
Total			4.33	0.74
Cultural Identity	Q5	Visiting Chinese gardens has made me more interested in traditional Chinese culture.	4.34	0.79
	Q6	The cultural atmosphere of the garden inspires my pride in traditional culture.	4.47	0.76
	Q7	The cultural experience of the garden has enhanced my identification with Chinese culture.	4.47	0.72
	Q8	My experience visiting the gardens has made me more willing to share traditional cultural knowledge with friends and family.	4.20	0.99
Total			4.37	0.69
Youth Tourists Characteristics and Preferences	Q9	When choosing a travel destination, I attach great importance to its historical and cultural value.	4.03	0.88
	Q10	I prefer to choose scenic spots that can provide immersive experiences.	4.30	0.88
	Q11	When traveling, I will actively participate in cultural interactive activities (such as garden tours and handicraft experiences).	3.71	1.11
	Q12	I tend to choose scenic spots with a strong cultural atmosphere rather than purely entertainment-oriented ones.	4.11	0.99
Total			4.03	0.79
Youth Tourists Intentions	Q13	I would like to visit or recommend the garden to friends or family in the future.	4.24	0.91
	Q14	The cultural experience of Chinese gardens will influence my choice of travel destination.	4.01	1.05
	Q15	Compared with other types of scenic spots, I prefer cultural garden scenic spots.	4.11	1.00
	Q16	If new cultural experience projects are launched, I would like to visit the garden again.	4.10	1.05
Total			4.11	0.85
ALL Total			4.21	0.68

Table 3 shows the overall mean score for all variables is 4.21, with a standard deviation of 0.68, indicating a generally positive response from the survey participants, specifically manifested as: (1)Experience of Chinese Garden Culture Landscape: This category received a total mean score of 4.33; (2) Cultural Identity: This construct scored the highest among the four categories, with a total mean of 4.37; (3)Youth Tourists Characteristics and Preferences: This section had a total mean of 4.03; (4)Youth Tourists Intentions: The total mean for tourist intentions was 4.11.

4.4 Pearson Chi-square

Table 4 Number and Chi-square of the Relationship between Age and Trip Times

Trip Times (per year)	Age						Pearson Chi-square P=.705
	18-22		23-28		28-35		
	Number	%	Number	%	Number	%	
Under 1	10	21.7	24	23.5	11	21.2	
1-2	23	50	43	42.2	22	42.3	
3-5	6	13	25	24.5	11	21.2	
Over 5	7	15.2	10	9.8	8	15.4	
Total	46	100	103	100	52	100	

* Significantly at the .05 level

Statistical assumptions

H0: $p = 0$ Times of trip is not dependent on age

H1: $p \neq 0$ Times of trip is dependent on age

P (probability) = 0.000, α (significance level) = .05

Therefore, the P-value is more than the value α , so rejected H1 and accepted H0.

In conclusion, the times of trip is not dependent on age at the significance level .05.

Table 4 results shows the Pearson chi-square value was $P=0.705$, which was greater than the significance level $\alpha=0.05$, so the null hypothesis (H0) was accepted. The conclusion showed that there was no significant difference in the distribution of trip frequency among tourists of different age groups, that is, travel frequency and age are independent factors and there is no statistical correlation.

4.5 Mean, S.D. and t-test

Table 5: Analysis of Differences in Measurement Items by Gender (M $\pm$ SD)

variables	NO		Male		Female		t	p
			Mean	SD.	Mean	SD.		
Experience of Chinese Garden Culture Landscape	Q1	The cultural landscape of the garden has a unique architectural style and strong traditional cultural characteristics.	4.17	0.992	4.54	0.771	-2.832	0.005
	Q2	The landscape design of the garden (such as water features, rockery, and plant arrangements) is pleasing to the eye.	4.23	1.037	4.49	0.772	-1.852	0.066
	Q3	The cultural displays in the gardens (such as couplets, plaques, and guided tours) can help me understand traditional culture.	4.30	0.796	4.46	0.739	-1.489	0.138

variables	NO		Male		Female		t	p
			Mean	SD.	Mean	SD.		
	Q4	The interactive experience of the garden (such as guided tours, handicraft experiences, and immersive activities) makes me more willing to explore garden culture.	3.73	1.072	4.38	0.825	-4.580	0.000
Total			4.1.7	0.765	4.47	0.685	-3.481	0.001
Cultural Identity	Q5	Visiting Chinese gardens has made me more interested in traditional Chinese culture.	4.22	0.821	4.41	0.766	-1.622	0.106
	Q6	The cultural atmosphere of the garden inspires my pride in traditional culture.	4.43	0.733	4.50	0.772	-0.612	0.541
	Q7	The cultural experience of the garden has enhanced my identification with Chinese culture.	4.49	0.681	4.45	0.749	0.441	0.660
	Q8	My experience visiting the gardens has made me more willing to share traditional cultural knowledge with friends and family.	4.03	1.100	4.31	0.907	-1.976	0.050
Total			4.29	0.634	4.41	0.714	-1.264	0.208
Youth Tourists Characteristics and Preferences	Q9	When choosing a travel destination, I attach great importance to its historical and cultural value.	4.09	1.002	3.98	1.101	0.693	0.489
	Q10	I prefer to choose scenic spots that can provide immersive experiences.	4.14	0.969	4.39	0.806	-1.951	0.052
	Q11	I prefer to choose scenic spots that can provide immersive experiences.	3.49	1.154	3.84	1.059	-2.159	0.032
	Q12	I tend to choose scenic spots with a strong cultural atmosphere rather than purely entertainment-oriented ones.	3.96	0.966	4.20	0.997	-1.635	0.104
Total			3.92	0.804	4.10	0.774	-1.572	0.117
Youth Tourists Intentions	Q13	I would like to visit or recommend the garden to friends or family in the future.	4.10	1.021	4.32	0.833	-1.613	0.108
	Q14	The cultural experience of Chinese gardens will influence my choice of travel destination.	3.90	0.981	4.09	1.086	-4.069	0.000

variables	NO		Male		Female		t	p
			Mean	SD.	Mean	SD.		
	Q15	Compared with other types of scenic spots, I prefer cultural garden scenic spots.	3.75	1.066	4.33	0.901	-1.270	0.205
	Q16	If new cultural experience projects are launched, I would like to visit the garden again.	3.81	1.159	4.28	0.926	-3.174	0.002
Total			3.89	0.889	4.25	0.801	-2.982	0.003
ALL Total			4.05	0.667	4.31	0.663	-2.658	0.009

* Significantly at the .05 level

The results of the independent-samples T-test in Table 4-5 revealed significant gender differences in young tourists' experience and intentions toward Chinese gardens. Overall, female tourists were significantly more positive than male tourists (overall mean: 4.31 for females vs. 4.05 for males, $p=0.009$). These differences were primarily reflected in their feeling of the experience and future behavior: women expressed a greater appreciation for the architectural style and cultural landscape of the gardens, and were significantly more interested in and willing to participate in interactive experiences like guided tours and crafts ($p<0.05$). Consequently, a positive garden experience was more influential in women's future travel decisions, and they were significantly more likely to revisit for new experiences.

However, it is noteworthy that despite differences in experience preferences and future intentions, there was no statistically significant difference between men and women on the core dimension of "cultural identity" ($p=0.208$). This suggests that Chinese gardens are universally effective in inspiring cultural pride and strengthening identification with Chinese culture among young tourists, with an equally positive impact on both men and women. Therefore, it can be considered that the cultural core of gardens has universal appeal to young people, but female tourists are more sensitive to the aesthetic and interactive elements therein, and are more likely to convert this favorability into future tourism consumption behavior.

4.6 Comments on the Four Gardens

Regarding Comments on the Four Gardens, we received 200 responses, with 85 valid comments, which can be grouped into seven broad categories of suggestions and feedback. Many comments covered multiple categories, so the total number exceeds 100.

Table 6 Comments on the Four Gardens

Item	Comment	frequency
1	Increase activity experience and interaction	24
2	Strengthen publicity and promotion	24
3	Develop IP and cultural and creative products	20
4	Improve services and facilities	19
5	Enhance the landscape and atmosphere	16
6	Enhance content and narrative	7
7	Protecting the environment and heritage	6

In summary, most visitors believe the area boasts beautiful scenery and a strong foundation (Item 5), but they urgently seek more engaging activities and interactive experiences (Item 1) and the development of attractive cultural and creative products (Item 3). Furthermore, publicity and promotion efforts are severely insufficient (Item 2), and basic service facilities (Item 4) need improvement. Finally, all development should be

based on the preservation of cultural heritage and the natural environment (Item 7) and the telling of compelling cultural stories (Item 6).

5. Conclusion and Future Research

5.1 Discussion and Conclusion

This study aimed to examine how the cultural landscape of classical Chinese gardens influences youth tourists' travel intentions, with cultural identity serving as a potential psychological mechanism. Based on empirical data collected from four renowned gardens—the Summer Palace, Chengde Mountain Resort, Humble Administrator's Garden, and Linger Garden—the following key findings can be drawn in relation to the research questions and objectives:

First, regarding RQ1 and the first objective, the study shows that young tourists highly value the unique cultural landscape attributes of classical Chinese gardens. Architectural elegance, poetic garden design, and rich cultural displays collectively create a strong experiential impact. The average score of cultural landscape experience (4.33) indicates that youth visitors recognize the core cultural value of the gardens.

Second, addressing RQ2, cultural landscape experience appears to enhance youth tourists' cultural identity toward Chinese gardens. Exposure to garden aesthetics, historical narratives, and cultural activities stimulates interest, pride, and appreciation for traditional culture. Both male and female tourists show high levels of identity, although some differences exist in experience preferences and future intentions. For instance, male tourists may prefer architectural or historical content, while female tourists may be more drawn to interactive or immersive activities. These differences highlight the need for garden managers to design experiences that appeal to diverse preferences while reinforcing the shared cultural identity.

Third, in relation to RQ3 and the third objective, the results suggest that cultural identity may serve as a psychological mechanism linking cultural landscape experience to travel intentions. Youth tourists with a stronger sense of cultural identity are more likely to express intentions to revisit, recommend, and prioritize garden attractions. Although the mediating role of cultural identity was not formally statistically tested, the observed patterns are consistent with theoretical expectations from cultural landscape and identity literature: cultural experiences can transform visitors from passive tourists into engaged cultural identifiers and communicators.

Finally, the study also highlights the evolving demands of young tourists. They seek more immersive and interactive experiences—guided tours, handicraft making, and cultural activities—beyond passive sightseeing. Social sharing and appreciation of historical and cultural value are important motivators. These insights provide practical guidance for garden managers, emphasizing the importance of innovation, engagement, and cultural education.

5.2 Future Research

This study provides preliminary insights into how cultural landscape experience influences youth travel intentions through cultural identity, yet several limitations suggest directions for future research. Future studies could broaden research subjects and methods, including gardens of different types or regions, to capture diverse cultural experiences. More precise segmentation of youth groups based on age, interests, or subcultures could clarify differences in preferences and engagement. Theoretical models could incorporate additional psychological or social variables to explore more complex mechanisms of influence. Finally, collaboration with garden management could allow for follow-up studies and evaluations of innovative practices to test their effectiveness in engaging young visitors.

6. References

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The Impact of Human Resource Management Practices on Transportation Efficiency in the OEM Health and Beauty Supplement Industry in Samut Sakhon Province

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Abstract

The objectives of this research were: (1) to examine human resource management (HRM) practices in the OEM health and beauty dietary supplement industry; (2) to assess the level of transportation efficiency in the industry; and (3) to analyze the influence of HRM practices on transportation efficiency in enterprises located within the local administrative jurisdictions of Samut Sakhon Province. The sample consisted of 227 employees and managers from logistics and human resource departments of OEM enterprises in the health and beauty dietary supplement sector. A purposive sampling method was applied. The research instrument was a questionnaire with a reliability coefficient (Cronbach's alpha) of 0.92. Data were analyzed using descriptive statistics (percentage, mean, and standard deviation) and inferential statistics, specifically stepwise multiple regression analysis. The findings indicated that overall HRM practices were implemented at a high level, particularly in digital skill development and adaptability to technological change. Transportation efficiency was also rated at a high level, especially in terms of delivery speed and accuracy. The regression results revealed that HRM practices related to training, workforce planning, and employee retention had a statistically significant positive effect on transportation efficiency at the 0.05 level.

Keywords: *Human resource management practices; transportation efficiency; OEM industry; health and beauty supplements; Samut Sakhon Province*

1. Introduction

In an era characterized by rapid technological transformation and intensified global competition, human resource management (HRM) has become a critical determinant of organizational capability and operational performance (Worapongpat, 2025e). This importance is particularly pronounced in logistics-intensive industries, such as the OEM health and beauty dietary supplement sector, where workforce competencies directly influence supply chain and transportation outcomes. Previous studies indicate that organizations implementing integrated HRM systems especially those emphasizing employee training, digital skill development, and motivational practices can significantly enhance supply chain performance compared to organizations with less structured HRM approaches (Gladenkova, 2022; Islami et al., 2024).

In Thailand, the OEM health and beauty dietary supplement industry represents a rapidly growing manufacturing segment. According to the Department of Industrial

Promotion, OEM enterprises in Samut Sakhon Province recorded a production growth rate of 11.4% in the previous year. Despite this expansion, many firms continue to experience operational challenges, particularly delays in transportation processes and shortages of personnel with appropriate logistics-related competencies. These constraints have adversely affected delivery performance and overall competitiveness within the industry.

A review of existing literature reveals that although numerous studies have examined logistics performance and supply chain efficiency (Worapongpat, 2025d) as well as HRM-related issues in service and manufacturing sectors (Jeon & Park, 2021), empirical research explicitly linking HRM practices with transportation efficiency remains limited. This gap is especially evident in studies focusing on specific regional and industrial contexts, such as the OEM health and beauty dietary supplement industry in Samut Sakhon Province (Sato et al., 2023; Worapongpat, 2021a). Consequently, there is a clear need for research that integrates HRM and logistics perspectives through a systematic and context-specific analytical framework.

Samut Sakhon Province is recognized as one of Thailand's key economic zones, particularly in processed food and health supplement manufacturing, where a dense concentration of medium- and large-scale OEM enterprises is located (Worapongpat, 2025c). Although the province benefits from favorable logistics infrastructure and proximity to major transportation routes, enterprises in the region face persistent shortages of transportation personnel equipped with digital-age skills. These skills include the use of product tracking systems, cross-departmental coordination, and warehouse management technologies (Kitipadung & Jaiborisudhi, 2021). Based on the researcher's experience in collaborative training and development activities with local enterprises, it is evident that existing HRM practices are often insufficiently aligned with logistics performance objectives, limiting the effectiveness of workforce utilization in transportation operations (Worapongpat, 2025b).

Against this backdrop, the present study aims to examine the influence of human resource management practices on transportation efficiency in OEM health and beauty dietary supplement enterprises located within the local administrative jurisdictions of Samut Sakhon Province. This research adopts a quantitative approach, with data collected during the second quarter of 2024 through a structured questionnaire administered to employees and managers involved in HRM and logistics functions (Worapongpat, 2025a). Data were analyzed using descriptive statistics and stepwise multiple regression analysis to identify the relationships between HRM practices and transportation performance (Worapongpat, 2024b).

This study focuses on key dimensions of HRM practices, including training and skill development, workforce planning, employee retention, competency evaluation, and the application of HRM-related technologies, and examines their effects on transportation outcomes such as delivery speed, accuracy, flexibility, and customer satisfaction. By addressing a critical empirical gap, the study seeks to contribute to the body of knowledge on the integration of HRM and logistics management at the organizational level. Furthermore, the findings are expected to provide practical insights for business practitioners and local policymakers to enhance workforce management strategies and sustainably improve transportation efficiency and competitiveness in the Thai OEM industry.

1.1 Objectives

1. To examine human resource management (HRM) practices in OEM enterprises in the health and beauty dietary supplement industry within the local administrative jurisdictions of Samut Sakhon Province.

2.To investigate the level of transportation efficiency in OEM enterprises in the health and beauty dietary supplement industry within the local administrative jurisdictions of Samut Sakhon Province.

3.To analyze the influence of human resource management (HRM) practices on transportation efficiency in OEM enterprises in the health and beauty dietary supplement industry within the local administrative jurisdictions of Samut Sakhon Province.

2.Literature Review

Modern Human Resource Management and Its Role in Industry

A substantial body of literature emphasizes the critical role of modern human resource management (HRM) in enhancing organizational performance across diverse industries (Worapongpat, 2024a). Modern HRM extends beyond traditional personnel administration by focusing on strategic workforce planning, continuous skill development, employee retention, and the integration of digital technologies to support organizational competitiveness. These HRM practices are increasingly essential in industries operating in dynamic and technology-driven environments, where employee capabilities directly influence operational efficiency and service quality (Oppong et al., 2021).

In manufacturing and logistics-intensive sectors, effective HRM practices have been shown to contribute significantly to productivity, operational reliability, and performance outcomes. Workforce planning ensures that organizations maintain an adequate number of competent employees aligned with operational demands, while systematic training and skill development enable employees to adapt to technological advancements and process innovations. Employee retention and motivation further support organizational continuity by reducing turnover-related disruptions and preserving institutional knowledge (Worapongpat, 2024a).

Transportation Efficiency and Logistics Performance

Transportation efficiency is widely recognized as a key determinant of organizational competitiveness, particularly in industries with complex supply chains such as the dietary supplement sector. Prior research indicates that efficient transportation processes directly affect delivery speed, accuracy, cost control, and customer satisfaction (Worapongpat, 2023b). The adoption of information technology and logistics management systems (LMS) has been found to enhance transportation performance by improving shipment tracking, coordination, and decision-making accuracy (Park et al., 2023).

Despite the growing body of research on logistics performance, most studies have primarily focused on technological systems, infrastructure, and process optimization. Comparatively fewer studies have examined human-related factors particularly HRM practices as critical determinants of transportation efficiency (Worapongpat, 2021b). This omission is noteworthy, given that logistics operations are highly dependent on employee competencies, coordination, and decision-making capabilities.

HRM Practices and Transportation Efficiency

Several empirical studies have identified positive relationships between HRM practices and logistics performance outcomes. Practices such as employee training, motivation, and skill development have been associated with improved operational efficiency, reduced errors, and enhanced service quality in logistics and supply chain contexts (Worapongpat, 2023a). These findings suggest that HRM practices play a mediating role between organizational resources and logistics performance.

However, empirical evidence examining how specific dimensions of modern HRM such as workforce planning, digital skill development, and employee retention affect transportation efficiency in the OEM health and beauty dietary supplement industry

remains limited. This gap is particularly evident in localized industrial contexts, such as Samut Sakhon Province, where organizational structures, labor characteristics, and operational constraints may differ from those examined in broader national or international studies (Panitsettakorn et al., 2023).

Research Gap and Conceptual Direction

The reviewed literature underscores the importance of modern HRM practices in driving organizational and logistics performance. Nevertheless, there is a clear lack of empirical research directly linking HRM practices to transportation efficiency in the OEM health and beauty dietary supplement industry, particularly within the regional context of Samut Sakhon Province. Existing studies tend to examine HRM or logistics performance independently, rather than adopting an integrated analytical perspective.

Accordingly, this study seeks to address this gap by systematically investigating the influence of human resource management practices specifically workforce planning, training and skill development, and employee retention on transportation efficiency in OEM enterprises in the health and beauty dietary supplement industry. By integrating HRM and logistics perspectives, the study contributes to a more comprehensive understanding of organizational performance and provides a conceptual foundation for examining causal relationships between HRM practices and transportation efficiency.

3. Research Conceptual Framework

This study is grounded in the concept of modern human resource management (HRM), which emphasizes strategic workforce planning, continuous skill development, employee retention, and the integration of digital technologies to enhance organizational performance. Drawing on prior studies, modern HRM practices are viewed as critical organizational resources that influence operational outcomes, particularly in logistics-intensive industries.

In the context of the OEM health and beauty dietary supplement industry, transportation efficiency is highly dependent on employee competencies, coordination, and workforce stability. Accordingly, this study proposes that modern HRM practices function as key antecedents of transportation efficiency.

Independent Variables: Human Resource Management Practices

Based on the literature review, the independent variables of this study consist of the following HRM practices:

Workforce planning in logistics, referring to the systematic allocation and forecasting of human resources to meet transportation and delivery demands.

Recruitment and selection of transportation personnel, focusing on the acquisition of employees with appropriate logistics-related skills and experience.

Digital technology skills development, emphasizing training and upskilling related to logistics systems, shipment tracking, and digital coordination tools.

Employee retention and motivation, addressing practices that reduce turnover and sustain employee commitment in logistics operations.

Continuous competency evaluation and development, involving ongoing assessment and enhancement of employee capabilities to support operational efficiency.

Dependent Variable: Transportation Efficiency

Transportation efficiency is conceptualized as the effectiveness of logistics operations in terms of delivery speed, accuracy, cost control, and operational reliability within OEM enterprises.

4. Methods

4.1 Research Design

This study employed a quantitative research design using a survey approach to examine the patterns of modern human resource management (HRM) practices and to analyze their influence on transportation efficiency in OEM-based health and beauty dietary supplement enterprises in Samut Sakhon Province.

4.2 Population and Sample

The target population consisted of employees and managers working in logistics and human resource departments of OEM enterprises engaged in the production of health and beauty dietary supplements in Samut Sakhon Province. These enterprises were required to be formally registered with the Department of Business Development and to maintain continuous logistics operations.

The sample was selected using a purposive sampling technique. Inclusion criteria required respondents to be directly involved in HRM or transportation-related activities within their organizations. A total of 227 respondents were included in the study, which was considered adequate for statistical analysis based on the sampling guidelines proposed by Krejcie and Morgan

4.3. Research Instrument

The primary data collection instrument was a researcher-developed questionnaire, structured into three sections:

Section 1 : General demographic information, including gender, age, position, years of work experience, and department.

Section 2 : A scale measuring human resource management (HRM) practices, covering workforce planning, recruitment and selection, digital skill development, employee retention and motivation, and competency evaluation.

Section 3 : A scale measuring transportation efficiency, assessed through indicators such as delivery speed, accuracy, cost efficiency, shipment tracking, and customer satisfaction.

Validity Testing:

Content validity was assessed by a panel of three experts. The Item-Objective Congruence (IOC) index ranged from 0.80 to 1.00, indicating acceptable content validity.

Reliability Testing:

A pilot test was conducted with 30 respondents who had characteristics similar to the target population. The overall Cronbach's alpha coefficient was 0.92, indicating high internal consistency.

4.4. Data Collection Procedures

Questionnaires were distributed directly to participants and, where physical access was limited, through online platforms (e.g., Google Forms). Cooperation was facilitated through local business associations and networks of OEM enterprises in Samut Sakhon Province. Data collection was completed over a period of 30 days.

5. Data Analysis

The collected data were analyzed using statistical software as follows:

Descriptive statistics:

Frequency, percentage, mean, and standard deviation were used to describe respondent characteristics, HRM practices, and transportation efficiency levels.

Inferential statistics:

Pearson's correlation coefficient was used to examine the relationships between HRM practices and transportation efficiency.

Multiple regression analysis (stepwise method) was conducted to analyze the influence of HRM practices on transportation efficiency in the OEM industry.

5.Results

Objective 1 : To examine the practices of modern human resource management (MHRM) in OEM enterprises producing health and beauty dietary supplements in Samut Sakhon Province.

Table 1 presents the general characteristics of respondents ($n = 400$). The majority were operational staff in transportation departments (280 persons, 70.0%), followed by logistics supervisors (119 persons, 29.8%), and a small proportion in other positions (1 person, 0.2%). In terms of logistics experience, 35.0% had less than 5 years, while 32.5% each reported 5–10 years and more than 10 years of experience.

Table 1 General Characteristics of Respondents ($n = 400$)

Item	Frequency (n)	Percentage (%)
Job Position		
– Operational transportation staff	280	70.0
– Logistics supervisors	119	29.8
– Others	1	0.2
Logistics Experience		
– Less than 5 years	140	35.0
– 5–10 years	130	32.5
– More than 10 years	130	32.5

Note. Percentages were calculated based on the total sample ($n = 400$).

Table 2 shows the mean and standard deviation of modern HRM practices. The results indicated that respondents perceived all dimensions at a high level. The highest mean score was for technological skills development (Mean = 4.51, SD = 0.49), followed by logistics workforce planning (Mean = 4.36, SD = 0.56), appropriate recruitment and selection (Mean = 4.31, SD = 0.61), employee retention and welfare (Mean = 4.21, SD = 0.53), and performance evaluation and motivation (Mean = 4.16, SD = 0.58).

Table 2 Mean and Standard Deviation of Modern HRM Practices

HRM Dimension	Mean	SD	Level of Perception
Logistics workforce planning	4.36	0.56	High
Technological skills development	4.51	0.49	High
Recruitment and selection	4.31	0.61	High
Employee retention and welfare	4.21	0.53	High
Performance evaluation and motivation	4.16	0.58	High

Note. All dimensions were perceived at a high level.

These findings suggest that OEM enterprises in Samut Sakhon place strong emphasis on HRM practices that align with technological skills and workforce planning to enhance logistics capacity.

Objective 3 :To analyze the influence of modern HRM practices on transportation efficiency in OEM enterprises producing health and beauty dietary supplements in Samut Sakhon Province.

Table 3 Mean and Standard Deviation of Transportation Efficiency Indicators

Indicator	Mean	SD	Level of Perception
Speed of delivery	4.21	0.61	High
Accuracy of product delivery	4.26	0.53	High
Transportation cost per unit	3.81	0.66	Moderately High

Note. Accuracy received the highest score, while cost efficiency was rated moderately high.

Table 4 Correlation Between HRM Practices and Transportation Efficiency

Independent Variable	Dependent Variable	Pearson r	Sig. (2-tailed)	Relationship
Technological skills development	Speed of delivery	.631	< .01	Significant

Note. A significant positive correlation was found between technological skills development and delivery speed ($p < .01$).

Table 5 Multiple Regression Analysis of HRM Practices Influencing Transportation Efficiency

Predictor	β	Sig.	Statistical Interpretation
Logistics workforce planning	0.43	.004	Significant
Technological skills development	0.52	.000	Significant
Employee retention and welfare	0.31	.008	Significant

Adjusted $R^2 = 0.48$

Table 5 presents the results of the multiple regression analysis. Three HRM practices were found to have a statistically significant influence on transportation efficiency: logistics workforce planning ($\beta = 0.43$, $p = .004$), technological skills development ($\beta = 0.52$, $p = .000$), and employee retention and welfare ($\beta = 0.31$, $p = .008$). The adjusted R^2 value of 0.48 indicates that these HRM practices collectively explained 48% of the variance in transportation efficiency.

In this study, logistics workforce planning refers to the systematic allocation of personnel, workload balancing, and scheduling aligned with transportation demands. Technological skills development encompasses training in digital logistics systems, shipment tracking, and data-based coordination tools. Employee retention and welfare include practices related to job security, benefits, motivation, and supportive working conditions that reduce turnover among logistics staff.

These findings are consistent with prior research indicating that strategic HRM practices contribute significantly to operational and logistics performance. Previous studies have shown that workforce planning improves operational continuity and resource utilization, while technological skill development enhances accuracy, speed, and adaptability in logistics processes. Furthermore, retention strategies have been identified as critical factors in sustaining organizational performance, as they reduce employee turnover, preserve accumulated expertise, and maintain service quality (Oppong et al., 2021; Worapongpat, 2023a). The significance of employee retention in this study suggests that stable and motivated logistics personnel are essential for maintaining reliable transportation operations in the OEM health and beauty supplement industry.

Overall, the results confirm that modern HRM practices particularly technological skills development, workforce planning, and retention strategies are key predictors of logistics and transportation performance in the targeted industry context.

6. Discussion

Findings related to Objective 1 The study revealed that contemporary human resource development (HRD) management practices in OEM enterprises in the health and beauty dietary supplement industry within Samut Sakhon Province emphasize systematic workforce planning and technological skill development. Technological upskilling emerged as a particularly critical factor, reflecting organizational readiness to adapt to the digital era. This may be attributed to the need for firms to enhance competitiveness in a rapidly changing and highly competitive market, especially in areas such as logistics systems and production technologies. These findings are consistent with (Aljabhan, 2023; Worapongpat & Chaoluang, 2024). who underscored the importance of continuous HR development and adaptability in the modern era.

Findings related to Objective 2 indicate that the overall level of transportation efficiency in the surveyed enterprises was high, particularly in terms of delivery speed and accuracy. These performance aspects contributed to improved customer satisfaction and reduced operational costs. Such outcomes may be attributed to effective human resource management (HRM) practices, including appropriate workforce planning and targeted technological training, which directly support logistics operations and coordination processes. This result is consistent with previous studies, which have emphasized that effective HRM practices play a crucial role in strengthening logistics and transportation performance (Bond, 2024; Worapongpat & Narong Uttamavangso, 2024). These studies highlight that well-trained and properly allocated personnel contribute to faster delivery, fewer operational errors, and improved service reliability.

Findings related to Objective 3 The analysis confirmed that contemporary HRD practices especially technological skills development, workforce planning, and employee retention exerted a statistically significant influence on transportation efficiency. This finding suggests that investments in human capital and HRM practices responsive to modern organizational needs are essential for operational performance. Skilled employees equipped with updated competencies and managed under efficient workforce planning reduce delays and errors in product delivery. This aligns with Demirel, D. (2022). Worapongpat, N., Limlertrid, T., Zangphukieo, N., Wongkumchai, T., & Muangmee, C. (2023). who highlighted the role of HRM in enhancing logistics and supply chain efficiency.

7. Originality and Body of Knowledge

This research provides new empirical insights into the role of contemporary human resource management (HRM) practices in enhancing transportation efficiency within OEM enterprises in the health and beauty dietary supplement industry in Samut Sakhon Province. While prior studies have examined HRM or logistics performance separately, this study integrates both perspectives by empirically analyzing the influence of specific HRM practices on transportation outcomes within a localized industrial context.

The key theoretical contribution of this research is the development of an integrated HRM model that identifies technological skill development, logistics workforce planning, and employee retention as significant predictors of transportation efficiency. This model demonstrates how human resource practices function as strategic drivers of operational logistics performance, rather than merely as supportive administrative functions.



Figure 1 illustrates the proposed model, indicating that technological skill development exerts the strongest influence on delivery speed and accuracy, while systematic workforce planning and retention practices help reduce labor shortages and enhance operational continuity. Collectively, these HRM dimensions explain 48% of the variance in transportation efficiency, highlighting the critical role of aligning HRM practices with digital transformation and operational demands.

From a theoretical perspective, this study contributes to the integration of human resource management and logistics performance literature by providing empirical evidence from the OEM health and beauty supplement industry. From a practical standpoint, the findings offer a strategic framework for enterprises and policymakers to improve transportation performance through targeted HRM interventions.

8. Suggestions

Based on Objective 1, organizations should provide continuous training and digital skill development for logistics personnel while implementing workforce planning strategies aligned with business needs.

Based on Objective 2, given the importance of delivery speed and accuracy in driving customer satisfaction and competitiveness, enterprises should improve logistics processes and tracking systems while minimizing unnecessary costs.

Based on Objective 3, HRM strategies that integrate development, planning, and retention should be prioritized to sustain competitive advantage and ensure operational continuity.

Suggestions for Future Research

This study highlights that contemporary HRD management, with its focus on technological skills and workforce planning, has a direct impact on transportation efficiency in OEM health and beauty dietary supplement enterprises. The findings may be extended to similar industries, such as cosmetics or other health-related manufacturing sectors, where integration of HRM and technology is equally critical. Future research should examine the influence of external factors including market dynamics, competitive pressures, and emerging technologies—on HRM practices and operational performance within the OEM industry.

9. Conclusion

Contemporary HRD management in OEM enterprises within the health and beauty dietary supplement industry plays a vital role in enhancing transportation efficiency. Specifically, technological skill development, workforce planning, and employee retention emerged as significant determinants of delivery speed, accuracy, and cost-effectiveness. Moreover, the analysis confirmed a significant positive relationship between HRM practices and transportation efficiency, reinforcing the strategic value of HRM in logistics operations.

10. Acknowledgements

I would like to express my sincere gratitude to Dr. Ratchavich Wachanapreechasak, the CEO, and all the employees of SCG Grand Co., Ltd. and its affiliated companies for their invaluable cooperation in this study.

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RJCM Vol. 7, No. 1, January-April 2026

e-ISSN 2821-9074

Print-ISSN 2730-2601

RICE Journal of Creative Entrepreneurship and Management, Vol. 7, No.1, pp. 30-41,
January-April 2026

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doi: 10.14456/rjcm.2026.3

Received 15.01.26/ Revised 10.03.26/ Accepted 19.03.26

Financial Integration Strategies of Chinese Enterprises after Cross-border Mergers and Acquisitions: A case of Geely and Volvo Cars

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Abstract

This paper takes Geely's acquisition of Volvo Cars as an example to explore the financial integration and risk management of multinational corporations in cross-border mergers and acquisitions. Drawing on the specific context of cross-border M&A in China, it systematically summarizes the key risks associated with financial integration, such as financial mechanisms, financial management, financial performance, and cross-cultural communication barriers. Using a case study approach, this article traces Geely's financial integration trajectory, analyzes how these risks manifested in the Volvo acquisition, and proposes targeted mitigation strategies. The findings aim to provide practical guidance for companies in China and other emerging markets conducting cross-border M&A, helping them prevent and manage financial integration risks, thereby successfully completing integration and supporting their long-term development.

Keywords: *Cross – border; Mergers and acquisitions; Financial integration; Risk*

1. Introduction

1.1 Background

In the context of economic globalization, cross-border mergers and acquisitions (M&A) have emerged as a prevalent strategic choice for enterprises aiming to expand their global footprint, access new markets, acquire advanced technologies, and achieve synergistic effects. The volume and scale of cross-border M&A activities have been on the rise in recent decades. For instance, Chinese enterprises have increasingly engaged in cross-border M&A, with the value of outbound M&A deals reaching hundreds of billions of USD in 2015 (IMAA, 2016). Recent empirical research shows that cross-border M&A by emerging economy firms serves as a new channel for technology augmentation (Hong, Shin, & Zou, 2024).

However, despite the potential benefits, cross-border M&A is fraught with challenges. The post-M&A integration process, especially financial integration, has proven to be a major stumbling block for many enterprises (Ma, 2021). In China, a significant number of enterprises that have completed cross-border M&A transactions have encountered various problems during the integration phase, often being labeled as “problem enterprises.” The root causes of these issues are multifaceted. Firstly, many M&A enterprises do not attach sufficient importance to the integration work after M&A.

They tend to focus more on the deal-making process and underestimate the complexity and significance of post-M&A integration (Wang et al., 2024). Secondly, inappropriate integration strategies are often formulated. These strategies may not fully consider the differences between the merging and acquiring parties in terms of organizational structure, culture, business operations, and financial systems. Thirdly, the integration cost is frequently too high, which may be due to inefficiencies in the integration process, unforeseen financial liabilities, or difficulties in aligning different business models.

Financial integration after cross-border mergers and acquisitions is the process of integrating and managing the financial management systems, policies, processes, assets, and liabilities of the merging and acquiring parties after the completion of the M&A transaction. It aims to reduce costs, optimize resource allocation, improve efficiency, and ensure that the post-M&A enterprise can achieve synergies and strategic objectives through unified financial management (Zhang, 2023). For example, in a cross-border M&A between two manufacturing companies, financial integration may involve aligning their accounting systems, standardizing financial reporting processes, and integrating their cash management and investment strategies. Without effective financial integration, the expected synergies from the M&A may not materialize, and the enterprise may face financial instability and operational inefficiencies. Empirical evidence in the Geely-Volvo case shows that Geely's net profit margin has shown steady growth after the acquisition, indicating improved profitability and efficient resource management (Pang, 2024).

1.2 Research Objectives

Although existing literature has provided valuable insights into cross-border M&A and financial integration, there are still gaps. Most previous studies have either focused on overall M&A performance or individual aspects of financial risks. There is a lack of in-depth case-based research that comprehensively analyzes the entire process of financial integration in cross-border M&A, especially for Chinese enterprises acquiring well-known international brands.

For example, when a Chinese enterprise acquires a European luxury brand, how to effectively integrate financial management systems, considering not only financial factors but also cultural, institutional, and management differences, remains under-explored. In addition, the existing literature has not fully addressed how to accurately identify and measure financial integration risks in different stages of cross-border M&A and develop targeted and practical risk prevention strategies.

Therefore, this study aims to fill these research gaps by taking the case of Geely's acquisition of Volvo Cars. It will comprehensively analyze the financial integration process, identify the key financial integration risks, and propose corresponding prevention strategies, hoping to provide practical guidance for Chinese EMNEs engaged in cross-border M&A activities.

1.3 Literature Review

Research on cross-border M&A and financial integration has been extensive in both domestic and international academic circles.

A study by Morgan Stanley in 2025 anticipates a rebound in M&A activities in 2025, ascribing it to a more conducive regulatory environment and stronger capital markets (Morgan Stanley, 2025). The report also points out that financial sponsor activity is likely to increase, and there is a growing interest in cross-border transactions across global regions. In the banking sector, some studies find that higher cross-border financial linkages are associated with greater cross-border M&A probability. The number of cross-border acquisitions has been growing worldwide, rising from 23% of total mergers in 1998 to 45% in 2007. However, national borders add an extra element to the

calculation of domestic mergers, as they are associated with a range of additional frictions that can hinder or facilitate mergers (Erel et al., 2024).

Regarding risk analysis in cross-border M&A, earlier research by Desislava Dikova and Ahmad Arslan identified several risk sources, including strategic decision-making risks due to information asymmetry before acquisition, valuation risks, financing risks, payment risks, and integration risks (Desislava Dikova & Ahmad Arslan, 2015). Recent studies continue to build on these risk categorizations. For example, in the context of emerging economy firms, Hong, Shin and Zou shows that EMNEs engaging in cross-border M&A, especially acquiring targets in advanced economies, tend to improve their innovation capability. This implies that financial integration plays a role in mediating outcomes (Hong et al., 2024).

Another relevant study, In a related study, Záborský et al., using data from over 700 transactions, investigate how regulatory quality in the acquirer's home country influences motivations for cross-border mergers and acquisitions (Záborský et al., 2021). Their results suggest that regulatory quality and institutional dynamics influence motivations, supporting the need to consider the institutional and regulatory context when understanding the process of financial integration. At the same time, regulatory quality and institutional dynamics influence incentives, supporting the need to consider the institutional and regulatory context when understanding the financial integration process.

In the Geely-Volvo context, a relevant empirical work is Financial analysis on Geely major acquisition on Volvo (Pang, 2024), which analyzes Geely's financial performance after its acquisition of Volvo, focusing on indicators such as net profit margin, return on total assets, market share, sales volume, and export volume. That study found Geely experienced consistent increases in sales volume (especially in exports) and steady growth in net profit margin, indicating that financial integration has, in this case, produced performance gains.

Despite these advances, there remains a gap: few studies systematically map all stages of financial integration (from pre-acquisition planning, through the integration process, to post-acquisition outcomes), and link these with quantitative financial metrics and non-financial factors (culture, institution) in a single case. Also, very few give detailed prevention risk mitigation strategies grounded in both theory and empirical data for Chinese EMNEs.

2. Methodology

2.1 Case Study Method

Case study research is especially suitable when exploring how financial integration unfolds in its real-world context, and when the phenomenon is intertwined with its institutional, cultural, and organizational environments (Mtisi & Muranda, 2022). Its strength lies in enabling a rich, holistic understanding of “how” and “why” questions through detailed examination of a single case over time, using multiple sources of evidence (documents, archival records, interviews, observations). Moreover, scholars such as Eisenhardt emphasize that case studies facilitate theory building, allowing researchers to generate theoretical constructs and propositions inductively from empirical data (Eisenhardt, 1989). Consequently, in this study, employing the Geely-Volvo case allows us not only to trace the financial integration process in depth, but also to derive insights that may contribute to refining M&A integration theories (Liu, 2023). This study adopts the case study method as its core qualitative research approach, which is highly compatible with the research theme for two reasons:

First, the study focuses on exploring the "process mechanism" of financial integration and risk management in Chinese enterprises' cross-border M&A. Unlike quantitative research that emphasizes universal laws, the case study method can deeply dissect the complex interactions between financial systems, organizational cultures, and institutional environments, and clarify how enterprises respond to financial integration risks through phased strategies.

Second, the single-case design (Geely's acquisition of Volvo) is applicable here because the case has typicality and representativeness (Cao, 2023). As a landmark event of Chinese private enterprises acquiring European luxury auto brands, it covers core financial integration links (cross-border financing, debt restructuring, system unification, cross-cultural management) with complete event traces (over 10 years of post-acquisition operation) and sufficient public information, supporting in-depth analysis.

For example, the synergies and conflicts during the integration process can be illustrated through case analysis using a single case design based on published information and communications (Konda et al., 2022). Also, the other authors used in-depth qualitative case studies, collecting data from internal documents, interviews, external reports etc., to trace how accounting systems and financial systems change across M&A phases (Marianiet al., 2024).

2.2 Case Selection Criteria

Geely Holding Group's acquisition of Volvo Cars is a classic example of a small-to-large acquisition. It marks a milestone in cross-border acquisitions for Chinese companies, significantly boosting the development of the Chinese automotive industry and signaling the country's automotive industry's move beyond its borders and into the global arena. Through this acquisition, Geely Group has taken a solid step toward its transformation into a global company (Jonsson, 2023). A comprehensive and in-depth analysis of this exemplary cross-border acquisition can provide insights and reflections for other companies seeking to successfully execute mergers and acquisitions.

Such as Lin uses Geely's acquisition of Volvo as an example to analyze the benefits it has brought to Geely, and also analyzes the challenges and solutions faced by Chinese companies in overseas M&A (Lin, 2024). Zhao studies the reasons for Geely's success since its acquisition of Volvo Cars in 2010, from the unpopular "Snake swallowing elephant" to the ownership of a multi-brand portfolio (Chen, 2018).

3. Case Introduction and Analysis

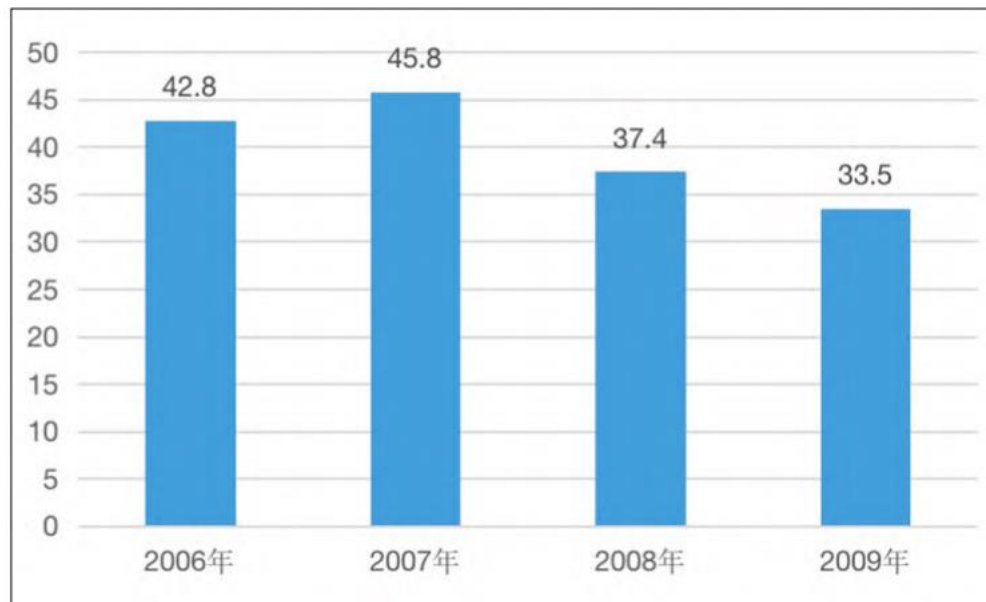
3.1 Case Introduction

Geely Holding Group, founded in 1986, is a prominent private automobile manufacturer in China. Its operations encompass research & development, manufacturing, and sales of passenger vehicles, motorcycles, and parts. Over time, Geely has risen to a leading position in China's automotive sector, using innovative business strategies and repeatedly being ranked among the Top 500 Chinese enterprises.

Volvo Cars is a Swedish premium car brand, internationally renowned for its safety engineering, superior quality, and Scandinavian design. In 1999, Volvo Cars was acquired by Ford Motor Company. During its heyday, Ford acquired numerous renowned global auto brands, at its peak comprising eight brands: Ford, Lincoln, Mercury, Mazda, Aston Martin, Land Rover, Jaguar, and Volvo. In 1999, Ford spent a staggering \$6.4 billion to acquire Volvo and subsequently invested tens of billions in research and development. However, Ford's management of the Volvo brand was unsuccessful. Sales declined after the acquisition, and the company continued to suffer losses. In 2007, Ford suffered its first loss in a century, and Geely believed that Ford would eventually sell Volvo. In 2008,

the subprime mortgage crisis erupted, leading to a sharp decline in US corporate sales. Ford reported a \$14.6 billion loss for the year (of which Volvo's loss was \$1.69 billion), marking Ford's third consecutive year of losses. The stability of the Chinese market provided Geely with great space to acquire Volvo, and Geely began to negotiate with Volvo. Figure 1 shows the changes in Volvo car sales from 2006 to 2009.

Figure 1 Changes in Volvo Car Sales from 2006 to 2009 (10,000 units) Source: Lin (2024)



On March 28, 2010, Geely Holding Group completed the acquisition of 100% of Volvo Cars and its related assets from Ford for approximately USD 1.8 billion, thereby gaining Volvo's product platforms, intellectual property, R&D personnel, and global distribution channels.

This acquisition is considered a landmark case in China's cross-border mergers & acquisitions. It represented a strategic leap for Geely: elevating its technological capabilities, improving product quality, gaining access to premium market segments, and enhancing global competitiveness. For Volvo, the deal offered fresh capital, new growth prospects, and the freedom to continue its brand development under new ownership.

3.2 Case Analysis

After Geely acquired Volvo Cars for approximately US\$1.8 billion in 2010, its financial integration efforts have had mixed results. While achieving significant success, they have also presented certain risks. The following case study will explore the risks and strategies that emerged after the merger.

3.2.1 Funding Mechanism Risk

Funding mechanism risk refers to the risk of inefficient use of funds, unreasonable distribution of funds, and liquidity problems caused by the differences between the integrating parties in the financial management system, fund operation mode, and financial organizational structure during the integration of multinational enterprises. These risks may stem from inconsistencies in financial mechanisms before and after the M&A, such as different enterprises may have different fund management policies, investment strategies and risk control measures. After the M&A, enterprises need to integrate and unify these different financial mechanisms, which may lead to a series of problems such as poor fund scheduling, lower return on investment and higher capital costs. We use the initial data from Geely's acquisition of Volvo as an example to analyze Volvo's financial changes after the merger.

In 2013 Volvo posted an operating profit of MSEK 1,919, a dramatic improvement from MSEK 66 in 2012 and MSEK 26.9 in 2011, even though its revenues slightly declined (MSEK 122,245 in 2013, 124,547 in 2012). This suggests that internal cost control, capital reallocations, and fund deployment optimization played a key role in recovery. (Volvo Car Group, 2013). The fact that profitability improved despite flat revenue indicates that the merged entity had to rely not only on sales growth but also on improving capital efficiency and optimizing funds across units. Figure 2 and 3 show financial change between 2012 and 2013.

Figure 2 Operating Income (MSEK) in 2012 and 2013 Source: Volvo Car Group-Financial Report (2013)

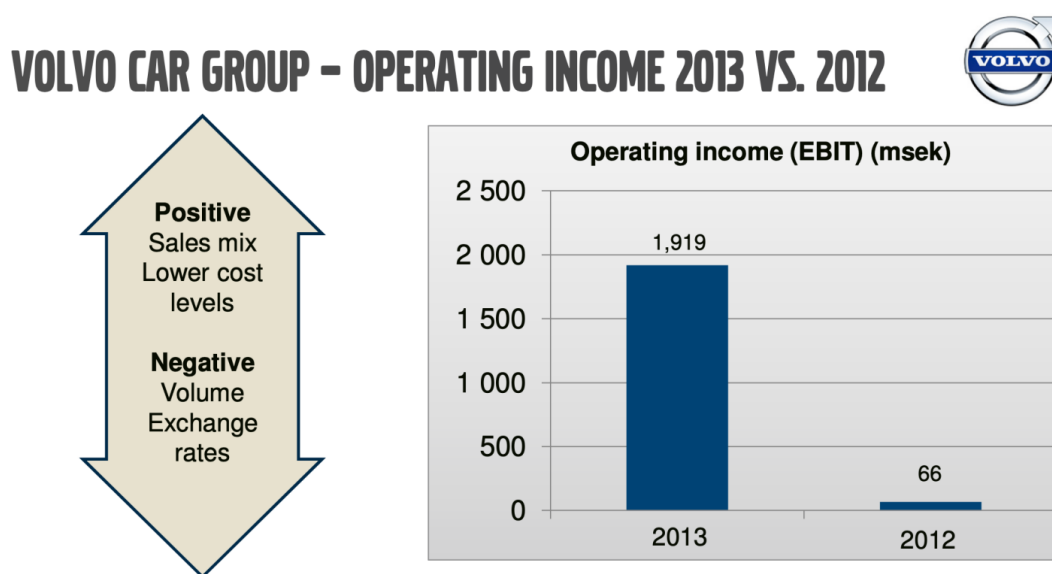
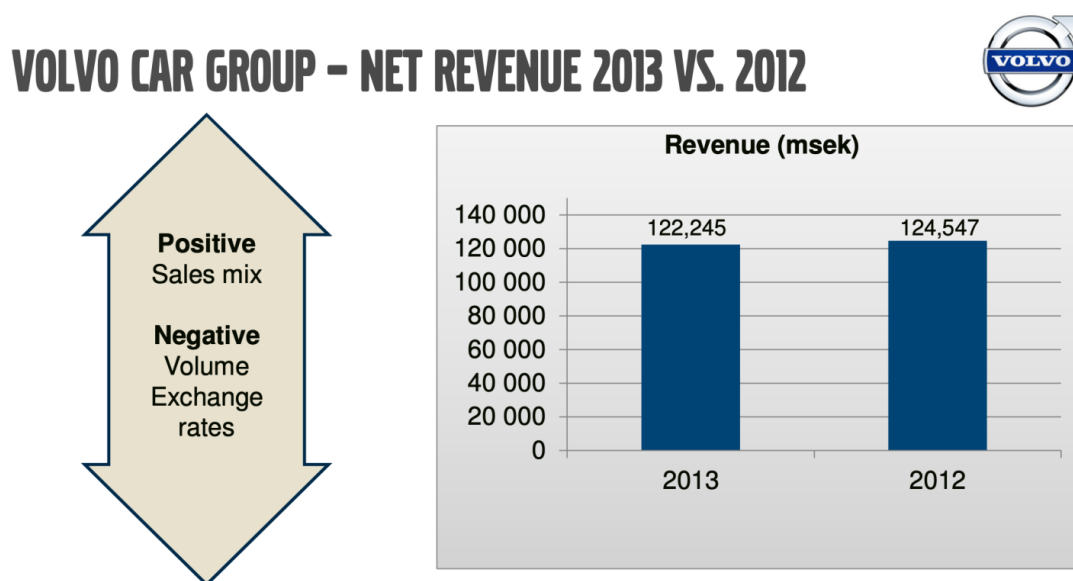


Figure 3 Revenue (MSEK) in 2012 and 2013 Source: Volvo Car Group-Financial Report (2013)



After Geely's acquisition, its sales rate, return on total assets and return on net assets continued to grow steadily from 2011 to 2013, indicating that Geely's sales capabilities have been enhanced while achieving good integrated operations and

significantly improving short-term synergy effects. Some case studies mention that Geely set up a “risk isolation barrier” around Volvo, aiming to segregate financing or cash flows to protect Volvo’s operations from potential financial distress in Geely’s other business units. (Li, 2024).

3.2.2 Financing Management Risk

Financing risk is a series of risks that enterprises may face in order to raise the funds required for M&A in cross-border enterprise M&A activities. These risks may include the increase in financing costs, uncertainty of financing channels, excessive debt burden, and the impact of changes in the market environment on financing. In the process of mergers and acquisitions, enterprises may need to raise funds by issuing stocks, bonds or other financial instruments, and these financing methods may be affected by changes in market interest rates, investor confidence, macroeconomic environment and other factors. If an enterprise fails to accurately assess market conditions or effectively manage financing costs during the financing process, it may result in higher-than-expected financing costs, thereby affecting the economic efficiency of the M&A. In addition, over-reliance on debt financing may increase the financial leverage of the enterprise, leading to a heavier debt burden and affecting the financial stability and solvency of the enterprise.

During Geely's acquisition of Volvo, both the initial acquisition and subsequent integration required a large amount of debt financing. According to multiple analyses, Geely assumed “a large amount of debt in the acquisition process,” creating continuing financial pressure in later years. (Li, 2023) The merged entity’s capacity to service interest and principal obligations depended heavily on performance improvement in Volvo’s operations and Geely’s broader cash flows. Some research notes that if Volvo’s performance faltered, interest payments could strain overall profitability and liquidity. (Li, 2023).

3.2.3 Financial Position Risk

Financial position risk is an important issue that may be encountered in the process of financial integration after M&A of multinational enterprises. After the completion of M&A activities, a series of potential financial problems may be identified when the enterprise begins to deeply integrate its financial resources and review the financial records of the acquiree. These problems may include, but are not limited to, hidden liabilities, incomplete disclosure of financial liabilities, inaccurate financial reporting, and over or undervaluation of assets. Hidden liabilities, such as unrecorded liabilities or potential lawsuit costs, may suddenly become apparent at some point after the M&A, placing an unexpected financial burden on the business. And inaccurate financial reporting may lead the acquirer to misjudge the true financial position of the acquiree, thus affecting the M&A decision and subsequent financial planning. These problems will not only have a direct impact on the financial stability of the M&A enterprise, but may also damage the enterprise's credibility and market confidence, which in turn affects the enterprise's share price and financing ability.

Some studies note that although Geely gained significant technology and brand assets, the heavy debt burden remained a concern for long-term financial health (Li, 2023). Volvo’s performance exhibited volatility in 2012 (lost MSEK 542) before turning around in 2013 (Volvo Car Group, 2013). In 2013, the company launched new platforms (such as the Drive-E engine family) and a major product refresh, indicating that assumptions about its underlying assets, liabilities, or cash flows may have required later adjustment.

3.2.4 Cultural and Communication Barrier Risk

Cultural and communication barriers are one of the common challenges in M&A activities of multinational enterprises, and they have a profound impact on the success of financial integration. Cultural differences may manifest themselves in work attitudes, decision-making processes, communication styles, perceptions of authority, and acceptance of change. When M&A parties come from different cultural backgrounds, these differences may lead to misunderstandings and conflicts, which in turn may affect inter-team collaboration and the effective transfer of information. Poor communication can lead to biased delivery and understanding of financial information, which is especially critical for financial integration that requires precise data and accurate analysis. Inconsistent interpretation of financial reports by management and employees, or divergent understanding of financial objectives and strategies, may lead to decisions based on erroneous information, which in turn affects the rational allocation and efficiency of resource utilization.

In the case of Geely's acquisition of Volvo, cultural differences between Chinese and Swedish management (decision-making styles, delegation of authority, and work norms) posed a significant challenge to the integration process (Alex, 2024). Volvo's brand is built on high quality, safety, and environmental standards. Combining Geely's cost-oriented approach with Volvo's premium culture likely required extensive negotiations regarding financial investment, product standards, and resource allocation. Geely effectively utilized Volvo's resources, and Volvo's operational autonomy enabled it to fully unleash its creativity, resulting in a win-win situation for both parties. Geely has forged a unique path of cultural integration and developed a distinctive approach to global development.

4. Risk Prevention Strategies

4.1 Due Diligence

Enterprises should conduct exhaustive financial due diligence before mergers and acquisitions, to understand the financial situation of the target enterprise and the mode of operation of funds, and to assess its compatibility with their own financial mechanisms. After the merger and acquisition, enterprises should quickly take measures to establish a unified financial management framework, optimize the allocation of funds to ensure the effective use of funds and liquidity (Honcharenko, 2024). At the same time, enterprises also need to strengthen internal control and risk management to ensure the compliance and safety of capital operations and prevent financial crises triggered by the mismatch of capital mechanisms (Mariani, 2024). Through these measures, enterprises can effectively reduce the risk of capital mechanism, to protect the financial stability and healthy development of enterprises after mergers and acquisitions.

4.2 Making Financing Plan

Secondly, in order to effectively manage the financing risk, enterprises should conduct a comprehensive market analysis and financial assessment before the merger and acquisition, formulate a reasonable financing plan, and choose an appropriate financing structure. Enterprises should also consider diversified financing channels to reduce dependence on a single source of financing and improve the flexibility of financing (Vertakova, 2021). At the same time, enterprises should closely monitor market dynamics and financing costs in order to make timely adjustments to their financing strategies and respond to market changes. Through these measures, enterprises can reduce financing risks, ensure the smooth progress of M&A activities, and maintain the financial health and long-term development of the enterprise.

4.3 Improve Financial Management System

In order to reduce financial risk, enterprises need to establish a sound financial management system after M&A, including strict financial control and audit procedures, as well as effective risk assessment and management mechanisms. Enterprises should conduct sufficient market research and risk analysis of financial decisions to ensure the rationality and feasibility of decisions (Zhan, 2025). At the same time, enterprises also need to strengthen internal communication to ensure the transparency and accuracy of financial information, so that all relevant departments and management can make consistent decisions based on the same information (Wang, 2025). In addition, enterprises should also train a professional financial team, who not only have professional knowledge of financial management, but also have the ability to deal with complex financial issues. Through these measures, enterprises can effectively avoid and cope with financial risks, protect the enterprise from unnecessary financial losses, and ensure the financial stability and sustainable growth of the enterprise after the merger and acquisition.

4.4 Financial Analysis and Forecast

In avoiding the risk of capital use structure, enterprises should carry out comprehensive financial analysis and forecasting before M&A, and formulate a reasonable plan for the use of funds. This includes an accurate assessment of the cost of the M&A, an estimate of the additional costs that may be incurred during the integration process, and a forecast of the operating capital needs of the enterprise after the M&A. Enterprises should also consider establishing contingency funds to deal with unforeseen costs or market fluctuations that may arise. During the M&A implementation process, enterprises need to closely monitor the flow of funds to ensure that they are reasonably allocated according to plan (Chinta, 2023). At the same time, enterprises should strengthen financial management, optimize cash flow management and improve the efficiency of capital use. This may involve cooperation with financial institutions to obtain the necessary financing support, or improving the financial position through asset restructuring and debt management.

4.5 Cultural Integration

In order to overcome cultural and communication barriers, companies need to take active measures to promote cultural integration and smooth communication. First, companies can improve employees' understanding of and respect for different cultures through cross-cultural training and enhance communication skills among teams. Second, an open and inclusive communication environment should be established to encourage employees to put forward their opinions and suggestions, and to ensure the transparency and flow of information. In the decision-making process, enterprises should take cultural diversity into account and adopt an inclusive approach to decision-making to ensure that the voices of all parties are heard and valued (Iwao, 2020). Through these measures, enterprises can reduce the negative impact of cultural and communication barriers and improve the efficiency and effectiveness of financial integration, thus laying a solid foundation for long-term development.

4.6 Risk Management and Contingency Planning

The establishment of risk management and contingency plans can help enterprises respond quickly and effectively when facing potential risks. Enterprises should identify various risks that may be encountered during the M&A process and formulate a response plan (Routhu, 2024), as well as establish a risk monitoring and reporting mechanism to ensure that risks are promptly identified and dealt with.

5. Conclusion

In conclusion, this paper demonstrates that financial integration is not merely a procedural step after a merger, but a critical determinant of whether the cross-border M&A yields sustainable value. The Geely and Volvo case vividly illustrates that success depends on more than just acquiring assets: it requires mastering the integration of capital, systems, culture, and risk management. Volvo's performance in 2013 posting an operating income of MSEK 1,919 (versus MSEK 66 in 2012) and a net income of MSEK 960 after a loss of MSEK –542 in the prior year was underpinned by disciplined cost control, operational improvements, and strengthened market presence in China, which saw a 45.6 % year-on-year increase in sales to 61,146 units (Volvo Car Group, 2013). These results underscore that even in a challenging revenue environment, profitability turnaround can come from optimized capital allocation and financial discipline.

From this case, Chinese and other emerging-market firms can extract several strategic imperatives: first, deep and conservative due diligence is essential, especially around hidden liabilities, valuation assumptions, and sensitivity to downside scenarios. Second, prudent financing strategy balance debt and equity, hedging interest and currency risk avoid overleverage that is key to maintaining financial resilience. Third, robust alignment of financial management systems, including unified reporting, budgeting, monitoring and cash-pooling mechanisms, is critical to translate strategic goals into coordinated execution. Fourth, continuous forecasting and scenario stress-testing should guide decision-making, especially when a large share of growth depends on a single market segment or region. Fifth, cultural and communication integration must not be underestimated; differences in managerial styles, budget discipline, and organizational norms require deliberate bridging efforts to minimize financial friction. Finally, building risk mitigation and contingency planning to help the merged entity absorb external shocks like regulatory changes or currency fluctuations.

If firms internalize these lessons and embed them into their M&A playbook, they will be better equipped to navigate the complex challenges of global acquisitions, reduce financial integration risk, and transform cross-border M&A into long-term, value-creating growth rather than short-term gain.

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RJCM Vol. 7, No. 1, January-April 2026

e-ISSN 2821-9074

Print-ISSN 2730-2601

RICE Journal of Creative Entrepreneurship and Management, Vol. 7, No.1, pp. 42-55,
January-April 2026

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doi: 10.14456/rjcm.2026.4

Received 15.01.26/ Revised 13.03.26/ Accepted 19.03.26

Comparative Study on Green Development between China and Thailand —— Based on the Perspective of Management

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Abstract

Objective This study aims to conduct a comprehensive comparative analysis of green development in China and Thailand from a management perspective, identifying key differences and commonalities in policies, industries, technologies, and public awareness to inform future cooperation and global sustainable practices. **Methods** Using a multi-method approach that integrates literature review, comparative analysis, and case studies, this study systematically compares China and Thailand across five dimensions: policy management, industrial development, technological innovation, green awareness cultivation, and representative case practices. The analytical framework focuses on policy governance structure, stakeholder participation, industrial specialization, and innovation mechanisms to enhance methodological clarity and rigor. **Results** The comparative analysis reveals that China adopts a centralized, top-down governance model, whereas Thailand emphasizes stakeholder collaboration and community participation. China demonstrates stronger performance in large-scale green sectors such as new energy, while Thailand shows comparative advantages in niche and flexible fields such as organic agriculture and ecotourism. In technological innovation, China leads in green R&D investment and overall innovation capacity, whereas Thailand performs better in selected application-oriented areas such as ecotourism technology. In terms of public awareness cultivation, China relies more on systematic education and media promotion, while Thailand draws more heavily on cultural traditions and grassroots engagement. These findings indicate strong complementarities between the two countries and highlight substantial potential for bilateral learning and joint innovation. **Implications** The study provides a blueprint for mutually beneficial cooperation in green development. Policymakers can use the findings to enhance institutional design and public engagement, while practitioners may apply insights to foster industry synergies and capacity-building. It also contributes to global sustainability by offering comparative, practical solutions tailored to different national contexts.

Keywords: *Green Development; cultural exchange; sustainable development; global sustainable practices*

1. Introduction

Globalization and industrialization, human society is facing unprecedented environmental challenges. With rapid economic growth, problems such as overconsumption of resources, increased environmental pollution, and ecosystem degradation are becoming increasingly prominent (Xiong et al., 2023). These issues not only threaten the quality of human life but also hinder sustainable economic development. Against this backdrop, the concept of green development has emerged. It emphasizes achieving efficient resource utilization and effective environmental protection while maintaining economic growth, pursuing coordinated progress in the economic, social, and environmental fields (Yang & Solangi, 2024). It has become the only way for countries around the world to achieve sustainable development (Adamowicz, 2022).

As influential economies in Asia, China and Thailand have both demonstrated a proactive spirit of exploration and practical action in the field of green development (Adamowicz, 2022). A comparative study of the current status of green development in these two countries from a management perspective is of multifaceted significance.

From a theoretical perspective, although existing research on green development has generated valuable insights, it mainly concentrates on single-country practical analyses or broad macro-level discussions. What remains insufficient is a governance-based and management-theory-driven comparative perspective that can systematically explain how different institutional arrangements, policy coordination mechanisms, stakeholder participation patterns, and innovation management approaches shape green development outcomes across countries. In particular, comparative studies grounded in the actual contexts of China and Thailand are still scarce. To address this theoretical and managerial gap, this study conducts an in-depth comparative analysis of green policy management, green industry development, green technological innovation, and green awareness cultivation in China and Thailand. By doing so, it seeks to reveal the underlying patterns and governance characteristics of green development in both countries, thereby providing new empirical evidence and management-oriented theoretical insights for enriching and refining the green development theory system.

From a practical perspective, China and Thailand have certain differences in economic structure, resource endowment, cultural traditions, and policies and institutions, leading to different choices in green development paths and models. Comparative research can clearly identify the strengths and weaknesses of each country in its green development efforts, providing opportunities for mutual learning, exchange, and cooperation. For example, China has advantages in the scale of green industries and policy implementation (Chen et al., 2021), while Thailand possesses unique experience in cultivating distinctive green industries and fostering a culture-driven green consciousness (Napathorn, 2022). Through exchange and cooperation, the two countries can complement each other's strengths and jointly elevate their green development capabilities. Furthermore, the green development practices of China and Thailand offer valuable insights for other countries, providing diverse development strategies and practical examples for countries at different stages of development and with varying resource requirements (Zhuang et al., 2025).

In summary, this study aims to conduct a comprehensive and in-depth comparative analysis of green development in China and Thailand from a management perspective and using scientific research methods, identify similarities and differences between the two countries' green development, and provide theoretical support and decision-making basis for in-depth cooperation and exchanges between China and Thailand in the field of green development. It also contributes academic wisdom and practical experience to the global green development cause.

2. Literature Review

2.1 Research on Green Development Theory

The rise of the concept of green development is a profound reflection on the shortcomings of the traditional development model, and many scholars have conducted in-depth discussions on it from different perspectives. In its 2011 Green Economy Report, the United Nations Environment Programme (UNEP) emphasized the importance of green development in promoting the coordinated advancement of economic growth, environmental protection, and social welfare, and pointed out that green development is the core path to achieving sustainable development (Adamowicz, 2022). Domestic scholars Jiang et al. (2022) from the perspective of ecological economics, proposed that green development should decouple economic growth from environmental impacts and promote sustainable economic transformation through efficient resource utilization and environmentally friendly technological innovation. These theoretical studies have provided a solid theoretical foundation for subsequent green development practices in various countries, and also provided a macro-guidance framework for the formulation and implementation of green development policies in China and Thailand.

2.2 Research on China's Green Development

In recent years, China has made significant progress in the field of green development, and related research has emerged in an endless stream. In terms of policy management, Li (2020) and Du et al. (2021) pointed out in 2015 that China has established a relatively complete green development policy system by formulating a series of strict environmental policies and plans, such as the "Overall Plan for the Reform of the Ecological Civilization System", strengthened the supervision and punishment of environmental violations, and effectively promoted the green transformation of the industrial structure. At the level of industrial development, the scale of China's green industry continues to expand, and emerging industries such as new energy, energy conservation and environmental protection have become new drivers of economic growth. Fang (2023) found that China's investment in renewable energy and technological innovation have continued to increase, and the installed capacity of renewable energy such as solar energy and wind energy ranks among the top in the world, making important contributions to the optimization of energy structure and the reduction of carbon emissions. In addition, in terms of scientific and technological innovation, Xu et al. (2022) pointed out that China has increased its investment in green technology research and development, and has made breakthroughs in some key technologies, such as electric vehicle technology and sewage treatment technology, which have improved resource utilization efficiency and environmental governance.

2.3 Research on Thailand's Green Development

Thailand also has its own unique practices and explorations in green development. In the agricultural sector, Thailand has implemented an "organic agriculture" development strategy, encouraging farmers to adopt organic planting methods, reduce the use of chemical fertilizers and pesticides, and improve the quality and safety of agricultural products (Rattanawong et al., 2024). A study by scholars Baird (2024) showed that Thailand's organic agriculture not only protects the ecological environment, but also enhances the competitiveness of agricultural products in the international market. In the tourism industry, Thailand focuses on developing "ecotourism" by protecting natural landscapes and cultural heritage and developing distinctive ecotourism products, attracting a large number of domestic and foreign tourists (Hussain et al., 2024). Suchatvee Tseng et al. (2019) pointed out that the development of ecotourism has promoted the development of the local economy and enhanced the public's environmental awareness. In addition, Linh et al. (2023) pointed out that Thailand has also taken a series of measures in green buildings, water resources management, etc. to promote the green development of cities.

2.4 Comparative Study on Green Development between China and Thailand

At present, there are relatively few studies on the comparison of green development between China and Thailand, but some scholars have begun to pay attention to this area. Some scholars compared the environmental policies of China and Thailand and found that China's environmental policies focus more on macroeconomic regulation and mandatory constraints (Chai et al., 2021), while Thailand's environmental policies emphasize cooperation and participation among the government, enterprises and society (Chaiya, 2024). In terms of industrial development, a study pointed out that China's green industry has scale advantages and technological advantages (Song et al., 2022), while Thailand's green industry is more distinctive and flexible, such as Thailand's organic agriculture and ecotourism industries. However, most existing studies focus on specific sectors or isolated aspects of green development and therefore lack a comprehensive and systematic comparison between China and Thailand. Although some comparative research has provided useful descriptive insights, it often remains at the level of general policy review or narrative comparison, without adopting a clear management-theory-based analytical framework. In particular, there is still limited research that grounds the comparison in the actual national contexts of China and Thailand while systematically examining governance structures, stakeholder coordination, industrial pathways, and innovation mechanisms. This study advances beyond prior comparative research by employing a management-oriented and multidimensional analytical framework to compare the two countries across green policy management, industrial development, technological innovation, and public awareness cultivation. In doing so, it not only identifies similarities and differences, but also explains how distinct governance and management arrangements shape green development trajectories in the two national contexts.

Table 1 summarizes the key research findings in the literature

Dimension	China Findings)	(Key Thailand (Key Findings)	Synthesis/Interconnection
Policy	Top-down, centralized (Li, 2020)	Multi-stakeholder, community-based (Chaiya, 2024)	Complementary governance models
Industry	Large-scale, new energy (Fang, 2023)	Niche, organic agriculture (Baird, 2024)	Potential for industrial synergy
Technology	R&D intensive, EV leader (Xu et al., 2022)	Application-focused, ecotourism (Tseng et al., 2019)	Technology transfer opportunities
Awareness	Systemic education (Chen et al., 2024)	Cultural/Grassroots (Khunweechuay et al., 2022)	Diverse paths to green consciousness

In summary, although domestic and international scholars have achieved rich research results in the field of green development, the comparative study of green development between China and Thailand still needs to be further deepened. This study will start from the actual situation of China and Thailand, apply relevant management theories and methods, and conduct a comprehensive and systematic comparative analysis of policy management, industrial development, scientific and technological innovation, and awareness cultivation in China and Thailand's green development, in order to provide theoretical support and decision-making reference for the green development cooperation between China and Thailand.

3. Research Methods

This study uses literature research, comparative analysis and case analysis to conduct a comprehensive and systematic in-depth exploration of China-Thailand green development.

3.1 Documentary Research Method

This study collected, organized, and analyzed policy documents, academic publications, research reports, and statistical data on green development from both domestic and international sources. The selected materials were chosen according to three criteria: relevance to green development governance and management, direct connection to the national contexts of China and Thailand, and representativeness in terms of policy authority, academic influence, or data reliability. Policy documents, including the United Nations Environment Programme's *Green Economy Report* and China's *Overall Plan for the Reform of the Ecological Civilization System*, were examined to identify the macro-policy orientations and institutional priorities of green development. In addition, the study reviewed representative scholarly works by Zhu Dajian (2022), Wang Yi (2022), and Somsak Jitsuchon (2023) to assess the current state of research on green development theory and practice in China and Thailand, thereby establishing the theoretical foundation for the subsequent analysis.

3.2 Comparative Analysis

This paper conducts a multidimensional comparative analysis of green development in China and Thailand across four key dimensions: policy management, industrial development, technological innovation, and awareness-building. In the dimension of policy management, the comparison focuses on governance structure, policy coordination, regulatory intensity, and stakeholder participation. In terms of industrial development, the analysis examines industrial scale, sectoral specialization, market adaptability, and the degree of green transformation. For technological innovation, the study compares R&D investment, innovation capacity, technology application, and the diffusion of green technologies. In the dimension of awareness-building, the comparison considers environmental education, media communication, public participation, and the role of cultural values in shaping green behavior. Based on these dimensions and indicators, the paper contrasts China's stringent and centralized environmental governance with Thailand's greater emphasis on multilateral cooperation, compares China's scale and technological advantages in green industries with Thailand's flexibility and niche-oriented development, and summarizes the major experiences and lessons of green development in the two countries.

3.3 Case Analysis

This study selected and analyzed representative cases of green development in China and Thailand based on their national significance, policy relevance, industrial visibility, and capacity to reflect broader development patterns. In China, the new energy industry was chosen because it is a strategically important sector strongly supported by national policy, characterized by rapid technological upgrading, large-scale market expansion, and broad influence on the country's green transition. It therefore serves as a representative case for examining how policy support, innovation capacity, and market mechanisms interact in China's green development model. In Thailand, the organic agriculture and ecotourism industries were selected because they reflect the country's resource endowments, community-based development approach, and emphasis on sustainability-oriented niche sectors. These cases are analytically relevant for understanding how Thailand combines local participation, environmental protection, and flexible industrial strategies in promoting green development. By comparing these representative cases, the study provides concrete practical references for China–Thailand green development cooperation.

4. Research Content and Results

This study analyzes China and Thailand's green development from five perspectives: policy management, industrial development, technological innovation, awareness-raising, and case studies. The two countries have distinct policy management systems but share potential for cooperation; industrial development demonstrates complementary strengths; China leads in technological innovation, offering opportunities for collaboration between the two countries; awareness-raising, while taking action, faces challenges; and case studies offer models for mutual learning. Overall, China and Thailand have broad prospects for multi-faceted cooperation in green development, potentially achieving mutual benefit and win-win outcomes. The detailed analysis is as follows:

4.1 Policy Management Dimension

4.1.1 Differences in policy systems

A detailed review of policy documents from both countries reveals that China has established a rigorous and comprehensive environmental policy framework. This framework, centered around the "Overall Plan for Ecological Civilization System Reform," covers every level, from macro-planning to micro-implementation. This plan clearly defines the overall goals, key tasks, and reform measures for ecological civilization development, providing a comprehensive and systematic institutional framework for green development (Dong et al., 2025). Furthermore, a series of supporting policies, such as the "Action Plan for Air Pollution Prevention and Control" and the "Action Plan for Water Pollution Prevention and Control," address specific environmental issues with detailed measures and targets to ensure effective policy implementation (Feng et al., 2019; Qiang et al., 2024; Wu, 2023).

Thailand's environmental policy emphasizes multi-stakeholder collaboration. The Thai government encourages government departments, businesses, and all sectors of society to participate in green development (Napathorn, 2022). For example, it establishes public-private partnerships (PPPs) to attract corporate investment in environmental projects and promotes community participation in environmental management, raising public awareness and engagement in environmental issues. This policy model emphasizes collaborative efforts and leverages the strengths of all sectors of society.

4.1.2 Causes of Differences and Cooperation Potential

The differences in the two countries' policy systems stem from their different national conditions, political systems, and development stages. As a large country with a large population and vast territory, China requires a rigorous policy framework to ensure the comprehensive advancement of green development. Thailand's relatively smaller economy and social structure, on the other hand, allow for greater flexibility and adaptability in its multilateral cooperation mechanisms.

This difference also provides ample room for cooperation between the two sides. China can draw on Thailand's experience in multilateral cooperation to further improve mechanisms for social participation in policy implementation; Thailand can learn from China's comprehensive approach to policy system construction to enhance the systematicness and pertinence of its policies. Through policy exchange and cooperation, both sides hope to optimize their respective policy systems and improve their effectiveness and adaptability.

4.2 Industrial Development Dimension

4.2.1 Complementary Industrial Advantages

In terms of industrial development, China and Thailand demonstrate clear complementary advantages. China holds significant advantages in green industries such as new energy, energy conservation, and environmental protection. Taking the new energy sector as an example, China leads the world in technology research and development and industrial application in areas such as solar and wind energy (Pan et al., 2022). China boasts a complete new energy industry chain, from upstream raw material production to midstream equipment manufacturing and downstream power generation applications, with strong competitiveness in every link (Dong & Li, 2021). Furthermore, the Chinese

government has strongly supported the development of the new energy industry through policies and measures such as subsidies and tax incentives, driving rapid expansion of the industry (Jiang & Xu, 2023).

Thailand has unique advantages in distinctive green industries such as organic agriculture and ecotourism. Thailand's organic agriculture focuses on ecological balance and agricultural product quality and safety, combining traditional agricultural techniques with modern ecological concepts to produce high-quality organic produce (Rattanawong et al., 2024). Thailand's ecotourism industry leverages its abundant natural resources and unique cultural heritage to develop diverse ecotourism offerings, such as tropical rainforest adventures and coastal eco-resorts, attracting a large number of domestic and international tourists (Tseng et al., 2019).

4.2.2 Cooperation Model and Prospects

The two sides can achieve synergistic industrial development through various cooperation models. For example, in the field of new energy, China can export advanced technology and equipment to Thailand to help Thailand develop clean energy. In organic agriculture, Thailand can provide China with high-quality organic produce, while China can provide Thailand with agricultural technology and market access support. In the field of ecotourism, the two countries can strengthen the integration of tourism resources and market promotion, jointly creating a tourism brand with international influence. Through industrial cooperation, China and Thailand can achieve resource sharing, technological exchange, and market expansion, promoting the joint development of green industries.

4.3 Technological Innovation Dimension

4.3.1 Gap in scientific and technological research and development

China has invested heavily in the research and development and application of green technologies, achieving a series of internationally influential scientific research results. In the field of new energy vehicles, Chinese companies, through independent R&D and technological innovation, have mastered core electric vehicle technologies, such as batteries and motor control, making China the world's largest new energy vehicle production and consumption market (Yeung, 2019). Regarding renewable energy utilization, Chinese research institutions have conducted extensive research in solar, wind, and hydropower, improving energy efficiency and stability (Liu et al., 2020). In environmental monitoring and governance, China has developed a series of advanced monitoring equipment and governance technologies that enable real-time monitoring of environmental quality and effective pollution control (Ren et al., 2023).

In contrast, Thailand's green technology R&D capabilities are relatively weak. Although Thailand has achieved certain innovative results in some special fields, such as agricultural biotechnology and ecotourism technology, its overall R&D investment and scientific research level are far behind China.

4.3.2 Cooperation Opportunities and Strategies

The two sides can establish a scientific and technological cooperation platform to strengthen exchanges among researchers and collaborative projects, thereby complementing each other's strengths. China can help Thailand enhance its green technology R&D capabilities and introduce advanced green technologies to Thailand through technology transfer and joint R&D. Thailand can provide China with unique

research scenarios and application markets, promoting the transformation and application of scientific and technological achievements. For example, in the field of agricultural biotechnology, the two sides can collaborate on research on organic agricultural variety improvement and pest control technologies. In the field of ecotourism, the two sides can jointly develop intelligent tourism management systems and ecological environment monitoring technologies.

4.4 Awareness Cultivation Dimension

4.4.1 Current status of awareness cultivation

Both China and Thailand recognize the importance of cultivating awareness about green development and are conducting publicity and education campaigns through various channels. China is raising public awareness of environmental protection and green consumption through various means, including school education, media outreach, and community activities. In terms of school education, environmental protection knowledge is incorporated into primary and secondary school curricula to cultivate students' environmental awareness and behavioral habits (Chen et al., 2024). In terms of media outreach, green development concepts and environmental protection knowledge are widely promoted through television, newspapers, the internet, and other media platforms (Guo et al., 2025; Wu et al., 2022). In terms of community activities, environmental volunteer services and waste sorting awareness campaigns are organized to increase community participation in environmental protection (Yin et al., 2021).

Thailand emphasizes the role of communities and cultural traditions, fostering a positive atmosphere for all-society participation in green development through community engagement and cultural heritage. Community organizations in Thailand actively carry out environmental protection activities, such as waste sorting and tree planting, to enhance residents' awareness and sense of responsibility. Furthermore, Thailand's cultural traditions are rich in ecological conservation concepts, which are passed down and promoted through cultural activities and religious rituals (Khunweechuay et al., 2022).

4.4.2 Challenges and Cooperation Directions

However, both countries still face challenges in raising awareness. Public understanding of green development is insufficient in depth and breadth, and some individuals lack a precise understanding of the concept and significance of green development. The green consumer market is not yet fully mature, and consumers' awareness of and willingness to purchase green products needs to be improved.

The two sides can strengthen cooperation and jointly explore more effective models for awareness-raising. For example, they can conduct cross-border environmental awareness campaigns and share their experiences and practices in awareness-raising; strengthen educational exchanges and cooperation by sending students and teachers to study and exchange courses related to green development; and jointly organize cultural activities on the theme of green development to promote public understanding and recognition of the concept of green development in both countries.

4.5 Case Analysis Dimensions

4.5.1 Reference to Chinese Case Studies

The development of China's new energy industry offers a valuable model for Thailand. The Chinese government has driven the rapid growth of the new energy industry through industrial policies, increased R&D investment, and the development of industrial parks. For example, some of China's new energy industrial parks have fostered industrial clustering by bringing together upstream and downstream enterprises, enhancing industry competitiveness. Furthermore, through continuous innovation and technological upgrades, Chinese companies have reduced the cost of new energy products and improved their market competitiveness (Li et al., 2021; Piao et al., 2022).

4.5.2 Lessons from the Thai Case

The success of Thailand's organic agriculture and ecotourism industries also provides valuable insights for China's development of specialty agriculture and ecotourism. Thailand's organic agriculture industry, through the establishment of a rigorous certification system and quality control mechanism, ensures the quality and market credibility of organic agricultural products (Panyasing et al., 2022). Thailand's ecotourism industry emphasizes ecological and environmental protection and cultural heritage, enhancing the sustainable development of the tourism industry through the development of diverse tourism products and the provision of high-quality tourism services (Tseng et al., 2019).

5. Conclusions and Recommendations

5.1 Conclusion

A comparative study of China and Thailand in green policy management, green industrial development, green technological innovation, and green awareness cultivation reveals that both countries have made notable progress in green development, while also facing their own limitations. The comparison shows that the two countries share certain common goals but differ significantly in their governance structures, industrial pathways, innovation patterns, and approaches to public engagement. In green policy management, China prioritizes government leadership, whereas Thailand emphasizes cooperation and partnerships. In green industrial development, China demonstrates large scale and a relatively complete industrial system, while Thailand focuses more on cultivating specialized and adaptive industries. In green technological innovation, China possesses stronger scientific research and innovation capabilities, whereas Thailand has achieved meaningful results in selected specialized fields. In green awareness cultivation, China relies more on systematic education and publicity, while Thailand makes greater use of cultural traditions and community-based practices. Conceptually, this study contributes to the green development governance literature by showing that green development outcomes are shaped not only by policy objectives, but also by the interaction among governance structure, stakeholder participation, industrial organization, and innovation mechanisms, thereby providing a comparative management-based framework for understanding national green development pathways.

5.2 Recommendations

Strengthen Policy Exchange and Cooperation: China and Thailand should regularly hold green policy seminars to share experiences in policy formulation and implementation, and jointly research and resolve issues encountered in policy implementation. They should establish a policy communication and coordination mechanism and strengthen cooperation in areas such as international environmental governance. Furthermore, they should learn from each other's policy management models to optimize their own policy systems.

Promote Green Industry Cooperation: Carry out industrial matchmaking activities in areas such as new energy, energy conservation and environmental protection, and agriculture, encouraging mutual investment and joint factory construction. Establish green industry cooperation parks to share technology, talent, and market resources to enhance the international competitiveness of industries. Strengthen mutual recognition of industry standards and certifications to promote trade in green products and services.

Strengthen cooperation in green technology innovation: Establish a China-Thailand Joint Green Technology R&D Center to jointly conduct research on green technology projects. Exchange scientific research personnel for study and exchange to strengthen cooperation in talent development. Establish a Green Technology Cooperation Fund to support joint R&D between scientific research institutions and enterprises in both countries. Furthermore, strengthen the transformation and application of scientific and technological achievements to promote the industrialization of green technology.

Deepen cooperation in green awareness cultivation: Carry out exchanges and cooperation in environmental awareness education activities, jointly organize cultural events and academic seminars on environmental themes, exchange educational delegations to share green education experiences, and jointly develop environmental education curriculum and teaching materials. Leverage the cultural characteristics of both countries to innovate green awareness cultivation methods and enhance public awareness and participation in environmental protection.

In short, given the close geographical, cultural, political, and economic ties between China and Thailand, there is broad room for cooperation in green development. By strengthening cooperation and exchanges, the two countries can achieve their shared goal of green development and make positive contributions to global sustainable development.

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e-ISSN 2821-9074

Print-ISSN 2730-2601

RICE Journal of Creative Entrepreneurship and Management, Vol. 7, No.1, pp. 56-68,
January-April 2026

© 2026 Rajamangala University of Technology Rattanakosin, Thailand

doi: 10.14456/rjcm.2026.5

Received 15.01.26/ Revised 06.03.26/ Accepted 19.03.26

Determinants of Artificial Intelligence (AI) Adoption in Green Entrepreneurship: An Integrated Framework of UTAUT and VBN Theory

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Abstract

With the rapid development of artificial intelligence (AI) technologies, their potential in green entrepreneurship has become increasingly evident, particularly in achieving sustainable development goals. Although AI can support green entrepreneurship by optimizing resource management, reducing energy consumption, and lowering emissions, its adoption faces numerous challenges. This paper aims to explore the application of AI in green entrepreneurship, focusing on the factors influencing the formation of Green Entrepreneurial Intention (GEI). By integrating the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Value-Belief-Norm (VBN) theory, we construct an integrated framework to examine how performance expectancy, effort expectancy, social influence, facilitating conditions, and pro-environmental personal norms collectively influence entrepreneurs' decisions to adopt AI. Using survey data from 260 green entrepreneurs in Beijing, we applied Partial Least Squares Structural Equation Modeling (PLS-SEM) for analysis. The results show that all five factors significantly positively affect GEI, with pro-environmental personal norms having the strongest influence. This study offers a new theoretical perspective on green entrepreneurship and provides practical recommendations for policymakers, entrepreneurs, and AI technology providers in promoting the adoption of sustainable technologies.

Keywords: *Artificial Intelligence (AI); Green Entrepreneurship; Technology Acceptance; Value-Belief-Norm (VBN) Theory; Unified Theory of Acceptance and Use of Technology (UTAUT)*

1. Introduction

Artificial intelligence (AI) is widely regarded as a transformative technology that empowers systems with capabilities such as machine learning, autonomous decision-making, and human-machine collaboration (Duraimutharasan et al., 2025; Khosravy et al., 2023). Within the context of sustainable development, AI plays a pivotal role in addressing environmental challenges by optimizing energy usage, reducing emissions, and enabling intelligent resource management (Vinuesa et al., 2020; Wamba et al., 2021). In green entrepreneurship, AI assists entrepreneurs in identifying eco-friendly opportunities, automating sustainability assessments, and designing low-impact business models (Jöhnk et al., 2021). For instance, AI-powered tools can predict demand for sustainable materials, streamline logistics for reduced carbon footprints, and support closed-loop production systems (Dwivedi et al., 2021). These applications support the prevailing belief that technological innovation—particularly through AI—can align economic development with ecological preservation (Vinuesa et al., 2020; United Nations, 2015). International organizations have echoed this optimism: the UN's Sustainable Development Goals (SDGs) report that AI could positively contribute to over 93% of environment-related targets (Jöhnk et al., 2021), reinforcing its potential as a catalyst for green transformation.

Despite these advantages, the adoption of AI in green entrepreneurship is not without tension. On one hand, AI enhances productivity, reduces uncertainty, and improves decision-making in environmentally oriented ventures (Venkatesh et al., 2003). On the other hand, AI systems—particularly those requiring high computational power—can significantly increase energy consumption, thereby producing unintended environmental burdens that may counteract their green potential (Strubell et al., 2019). Furthermore, the complexity and cost of AI tools pose adoption barriers for small- and medium-sized entrepreneurs, especially in resource-constrained contexts (Gast et al., 2017). These issues raise a crucial paradox: while AI is promoted as a solution for environmental sustainability, its actual ecological footprint and accessibility constraints remain underexplored in entrepreneurial settings. This duality suggests that merely promoting AI adoption may not guarantee green outcomes. Understanding how entrepreneurs perceive and integrate AI into their value creation processes—both technologically and normatively—is therefore essential.

Building on this tension, this study focuses on entrepreneurs—particularly those from digitally native cohorts such as Generation Z and Millennials—who demonstrate heightened awareness of environmental issues and increasing reliance on intelligent technologies in business (Stern, 2000). Although these entrepreneurs are at the forefront of AI-driven green ventures, existing research has not adequately examined the mechanisms shaping their green entrepreneurial intentions (Ajzen, 1991). Specifically, few studies have empirically investigated how cognitive evaluations of AI (e.g., performance expectancy, effort expectancy) interact with value-based personal norms (e.g., ecological responsibility, pro-environmental moral obligation) to influence sustainable entrepreneurial behavior. To address this theoretical gap, we propose an integrated framework combining the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Value-Belief-Norm (VBN) theory. This model captures the technological and normative determinants of green entrepreneurial intention. Drawing on data from early-stage entrepreneurs, the study contributes by offering new insights into how AI can be leveraged to foster environmentally responsible entrepreneurship through a dual lens of innovation acceptance and value-driven sustainability motivation.

2. Literature Review

2.1 Artificial Intelligence Technologies: Evolution and Entrepreneurial Application

This study focuses on artificial intelligence (AI) technologies that support entrepreneurs in enhancing operational efficiency, environmental awareness, and sustainable innovation. With the advancement of algorithms, deep learning, and computing power, AI has evolved from rule-based automation tools to intelligent systems capable of perception, prediction, and autonomous decision-making (Jordan & Mitchell, 2015; Lecun, Bengio, & Hinton, 2015). Existing literature indicates that AI technologies have been widely applied in sectors such as smart retail, digital marketing, green logistics, and sustainable energy management—areas highly relevant to emerging green entrepreneurial practices (Kshetri, 2018; Wamba et al., 2021). In particular, three categories of AI technologies have shown strong integration into entrepreneurial activities: (1) intelligent voice assistants for business coordination and energy control (Hoy, 2018); (2) AI-based energy management systems in smart offices and green buildings (Ahmad et al., 2021); and (3) recommendation engines used by green platforms to guide sustainable consumer choices (Chen et al., 2021). These applications not only enhance productivity and reduce operational costs but also enable eco-conscious business models, providing a solid contextual foundation for this study.

2.2 AI and the Pathway to Green Entrepreneurship

Meanwhile, sustainable development has become a central concern in both academic and policy domains worldwide. Existing research suggests that achieving goals such as environmental protection, green transformation, and low-carbon development requires not only institutional arrangements and public policies but increasingly depends on the behavioral shift enabled by digital technologies (Vinuesa et al., 2020). AI, in particular, is considered a transformative enabler for ecological transition, especially in carbon-intensive sectors such as agriculture (Murugan et al., 2022), energy systems (Ahmad et al., 2021), and transportation (Zhao et al., 2020). Studies have shown that AI can enhance energy efficiency through intelligent control and predictive optimization (Frank, 2021) and can also drive green innovation in business models through data-enabled redesign (Bao & Xie, 2022; Jöhnk et al., 2021). In this regard, placing AI technologies within the context of green entrepreneurship offers a valuable lens to examine how intelligent systems influence entrepreneurs' sustainability-oriented intentions and decisions. Such an approach bridges individual-level technology adoption with macro-level ecological transitions and provides theoretical and practical insights into digital sustainability pathways.

2.3 Integrating UTAUT and VBN to Explain Green Entrepreneurial Intentions

To better understand how individuals form green entrepreneurial intentions (GEI) when engaging with AI products, this study adopts an integrated perspective combining the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Value-Belief-Norm (VBN) theory.

The UTAUT framework identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as central factors shaping technology adoption (Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012). These constructs offer a useful lens for explaining how entrepreneurs assess the commercial and environmental potential of AI technologies in their decision-making processes (Dwivedi et al., 2021).

The VBN framework extends the analysis by emphasizing the pro-environmental personal norm (PPN) as a reflection of deeply held values, which can activate environmental responsibility and moral obligation (Stern, 2000; Steg & Vlek, 2009). This value-based orientation creates a normative foundation through which pro-environmental

beliefs translate into concrete entrepreneurial behaviors (Kaiser et al., 2005).

By linking UTAUT and VBN, the proposed model captures the interplay between technological acceptance and normative value commitments, offering a multi-layered explanation of why environmentally conscious entrepreneurs are more likely to integrate AI into green business models. This integrated approach also addresses the lack of cross-theoretical perspectives in the current literature on sustainable entrepreneurship (Kirkwood & Walton, 2010; Hsu et al., 2017).

3. Research Model and Hypotheses Development

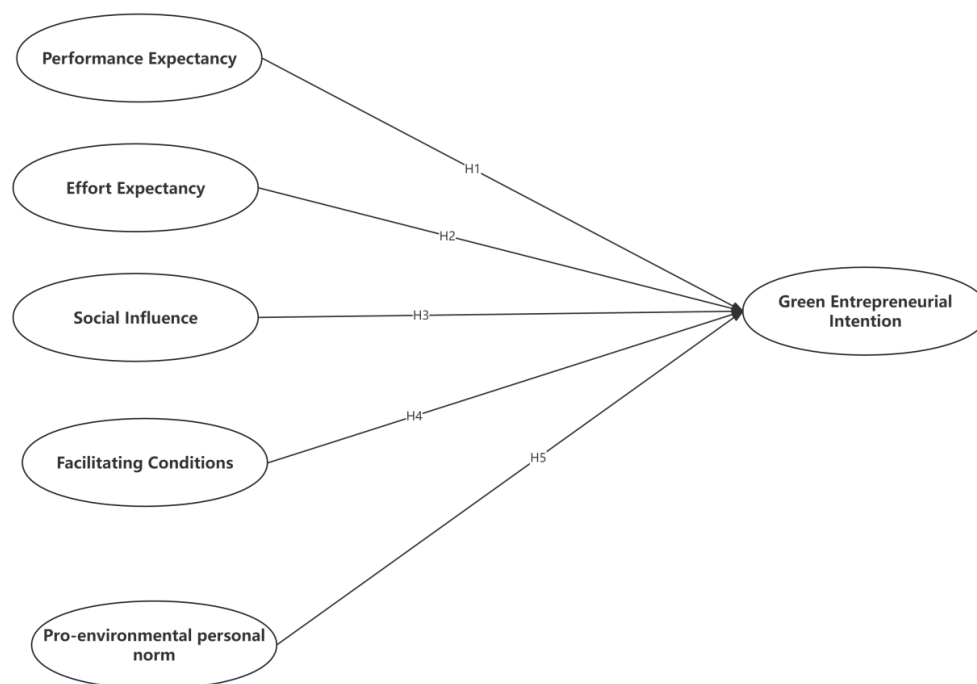
This study integrates two prominent theoretical perspectives—the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Value-Belief-Norm (VBN) theory—to examine the drivers of AI-enabled green entrepreneurial intention (GEI). GEI refers to the commitment and readiness of entrepreneurs to establish ventures that prioritize environmental sustainability through the use of artificial intelligence (AI) technologies.

From the UTAUT framework, Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) represent core determinants of technology adoption intentions. These constructs explain how entrepreneurs evaluate the usefulness, ease of use, social endorsement, and available resources for AI adoption in green entrepreneurship (Venkatesh et al., 2003; Williams et al., 2015).

The VBN theory introduces Pro-environmental Personal Norm (PPN) as a value-oriented driver that reflects moral obligation and ecological responsibility in entrepreneurial decision-making (Stern, 2000). PPN emphasizes that deeply internalized values and moral commitments can strongly motivate entrepreneurs to pursue environmentally sustainable ventures.

In the proposed model, GEI serves as the sole endogenous construct, while five determinants (PE, EE, SI, FC, and PPN) are modeled as exogenous variables directly influencing GEI. The conceptual framework is illustrated in Figure 1.

Figure1 Research model



Performance Expectancy (PE) refers to the extent to which entrepreneurs believe that the use of AI technologies will enhance the effectiveness and outcomes of their green entrepreneurial efforts. Drawing on UTAUT, individuals who perceive AI as beneficial for improving business performance, resource efficiency, or innovation are more likely to form strong green entrepreneurial intentions (Venkatesh et al., 2003; Dwivedi et al., 2021).

H1: Performance expectancy has a significant positive effect on green entrepreneurial intention.

Effort Expectancy (EE) denotes the perceived ease of learning and operating AI technologies in the context of green entrepreneurship. When entrepreneurs find AI systems intuitive and less demanding, they are more likely to integrate them into their green innovation processes. Consistent with UTAUT, ease of use reduces adoption barriers (Venkatesh et al., 2003; Tamilmani et al., 2021).

H2: Effort expectancy has a significant positive effect on green entrepreneurial intention.

Social Influence (SI) captures the perceived pressure or encouragement from important referents—such as mentors, peers, or professional networks—to adopt AI for sustainable entrepreneurship. In socially visible domains like environmental entrepreneurship, normative influence is particularly salient (Ajzen, 1991; Dwivedi et al., 2019).

H3: Social influence has a significant positive effect on green entrepreneurial intention.

Facilitating Conditions (FC) refer to the availability of organizational, technical, and institutional resources needed to implement AI-enabled green entrepreneurship. This includes access to platforms, skills, support networks, and policy incentives. According to UTAUT, such conditions are pivotal for adoption intentions (Venkatesh et al., 2003; Williams et al., 2015).

H4: Facilitating conditions have a significant positive effect on green entrepreneurial intention.

Pro-environmental Personal Norm (PPN), derived from the VBN theory, represents an entrepreneur's intrinsic motivation and moral obligation to conserve energy and act sustainably. This value-driven norm is expected to positively shape green entrepreneurial intentions (Stern, 2000; Harland et al., 1999).

H5: Pro-environmental personal norm has a significant positive effect on green entrepreneurial intention.

4. Research methodology

4.1 Sampling and Data Collection

This study targeted green entrepreneurs in Beijing who are actively engaged in ventures with an environmental or sustainability focus and have experience with artificial intelligence (AI) technologies. Given the study's aim of understanding the determinants of AI-enabled green entrepreneurial intention, a purposive sampling approach was adopted to ensure that all respondents were actual users of AI tools in their entrepreneurial activities.

The survey was conducted between April and June 2025 using a structured questionnaire. Participants were recruited through entrepreneurial networks, incubators, and social media platforms related to green innovation. The questionnaire link was distributed via WeChat, email, and entrepreneurial forums. Before proceeding to the main survey, a screening question confirmed whether respondents had prior experience in applying AI technologies—such as predictive analytics, intelligent recommendation

systems, or AI-enabled automation—within their business operations. Only those answering affirmatively were allowed to continue.

Out of 300 distributed questionnaires, 260 valid responses were retained after excluding incomplete and invalid entries, resulting in an effective response rate of 86.7%. This sample size exceeds the recommended minimum for PLS-SEM analysis, following both the “10-times rule” (Chin, 1998) and G*Power calculations (effect size = 0.15, α = 0.05, power = 0.95), which indicated a minimum requirement of 166 cases. The final sample is therefore adequate for testing the proposed UTAUT–VBN integrated model.

Table 1 Demographic Profile of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	142	54.6
	Female	118	45.4
Age	21–30	85	32.7
	31–40	100	38.5
	Above 40	75	28.8
Education Level	College diploma	39	15
	Bachelor’s degree	120	46.2
	Master’s degree	84	32.3
	Doctoral degree	17	6.5
Entrepreneurial Experience	1–3 years	108	41.5
	4–6 years	96	36.9
	Above 6 years	56	21.5
AI Usage Experience	1–3 years	103	39.6
	4–6 years	88	33.8
	Above 6 years	69	26.5
	Renewable energy solutions	73	28.1
Industry Sector	Sustainable agriculture	64	24.6
	Green manufacturing	56	21.5
	Eco-friendly services	39	15
	Waste recycling	28	10.8

4.2 Measurements

The measurement instrument comprised 30 items adapted from validated scales in prior literature, covering five independent variables—Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), and Pro-environmental Personal Norm (PPN)—and the dependent variable, Green Entrepreneurial Intention (GEI).

All items were phrased as statements and assessed on a five-point Likert scale ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”). The original English version of the questionnaire was professionally translated into Chinese and then back-translated to ensure conceptual equivalence (Brislin, 1970). A pilot test with 20 respondents confirmed the clarity of the items and the reliability of the instrument.

Sample items include:

PE: “Using AI technologies will enhance the performance of my green entrepreneurship projects.”

EE: “It is easy for me to learn and operate AI systems in my entrepreneurial activities.”

SI: “People who influence my decisions think I should adopt AI for green entrepreneurship.”

FC: “I have access to the necessary resources and support to implement AI in my green business.”

PPN: “I feel a moral obligation to act in an environmentally friendly way in my business operations.”

GEI: “I intend to start or expand a green business using AI technologies within the next two years.”

Respondents were assured of confidentiality and informed that the data would be used solely for academic purposes. Descriptive statistics and reliability coefficients for each construct are presented in Table 2, with Cronbach’s alpha values exceeding the recommended threshold of 0.70 (Hair et al., 2012), indicating strong internal consistency.

Table 2 Constructs Descriptive Statistics

Construct	Mean	Std. Deviation	Cronbach’s Alpha
Performance Expectancy (PE)	3.86	0.73	0.891
Effort Expectancy (EE)	3.71	0.77	0.872
Social Influence (SI)	3.55	0.81	0.86
Facilitating Conditions (FC)	3.69	0.75	0.847
Pro-environmental Personal Norm (PPN)	4.12	0.59	0.918
Green Entrepreneurial Intention (GEI)	3.92	0.74	0.905

4.3 Data Analysis

Data analysis was performed using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS 4. This variance-based approach was selected because the study is exploratory, the proposed relationships in the AI-enabled green entrepreneurship context have not been extensively tested, and the model involves multiple latent constructs and indicators. PLS-SEM is also suitable for predictive modeling and can accommodate moderate sample sizes effectively (Hair et al., 2012).

The analysis followed a two-stage procedure. In the first stage, the measurement model was evaluated in terms of indicator reliability, internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity (average variance extracted, AVE), and discriminant validity using both the Fornell–Larcker criterion and heterotrait–monotrait (HTMT) ratios. In the second stage, the structural model was tested to assess the significance and magnitude of the hypothesized paths from the five independent variables—Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), and Pro-environmental Personal Norm (PPN)—to the dependent variable, Green Entrepreneurial Intention (GEI), through bootstrapping with 5,000 resamples.

Additional diagnostics were conducted to check for collinearity using variance inflation factors (VIF), and model quality was further examined through the coefficient of determination (R^2), effect sizes (f^2), and predictive relevance (Q^2).

Where applicable, a multi-group analysis (PLS-MGA) was employed to explore potential differences in path coefficients between subgroups (e.g., demographic categories or entrepreneurial experience levels). Prior to conducting PLS-MGA, the measurement invariance of composite models (MICOM) procedure was applied to ensure comparability across groups (Hair Jr et al., 2017).

5. Results

5.1. Common Method Bias

Given that the study employed a self-reported survey method with all variables collected from the same respondents, the potential for common method bias (CMB) was examined. First, Harman's single-factor test was conducted using exploratory factor analysis (EFA) in SPSS 28. The unrotated factor solution revealed that the first factor accounted for 34.7% of the total variance, well below the critical threshold of 50% (Podsakoff et al., 2003), indicating that CMB is unlikely to be a serious concern.

Second, the full collinearity test was performed in SmartPLS 4 following Kock (2015). The variance inflation factors (VIFs) for all latent constructs ranged from 1.28 to 2.41, below the threshold of 3.3, further suggesting the absence of substantial common method variance. Collectively, these results provide evidence that CMB does not significantly affect the data in this study.

5.2. Measurement Model Assessment

All constructs demonstrated satisfactory internal consistency, with Cronbach's alpha values ranging from 0.846 to 0.918 and composite reliability (CR) values between 0.889 and 0.954, exceeding the recommended threshold of 0.70 (Hair et al., 2012; Hair Jr et al., 2017). Convergent validity was supported as all average variance extracted (AVE) values ranged from 0.652 to 0.781, above the 0.50 criterion, and all standardized factor loadings were greater than 0.70. These results indicate that the measurement model possesses adequate reliability and convergent validity.

Table 3 Measurement Model Assessment Results

Construct	Item	Outer Loading	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Performance Expectancy (PE)	PE1	0.761	0.892	0.927	0.762
	PE2	0.909			
	PE3	0.906			
	PE4	0.833			
Effort Expectancy (EE)	EE1	0.812	0.874	0.915	0.689
	EE2	0.849			
	EE3	0.727			
	EE4	0.898			
Social Influence (SI)	SI1	0.741	0.861	0.902	0.703
	SI2	0.901			
	SI3	0.758			
	SI4	0.822			
Facilitating Conditions (FC)	FC1	0.833	0.846	0.903	0.652
	FC2	0.79			
	FC3	0.813			
	FC4	0.868			
Pro-environmental Personal Norm (PPN)	PPN1	0.917	0.918	0.954	0.781
	PPN2	0.878			
	PPN3	0.852			
	PPN4	0.77			
	PPN5	0.833			
	PPN6	0.847			
Green Entrepreneurial Intention (GEI)	GEI1	0.727	0.905	0.932	0.711
	GEI2	0.833			
	GEI3	0.736			
	GEI4	0.894			

5.3. Structural Model Assessment

The structural model was evaluated to examine the hypothesized relationships among the constructs. Bootstrapping with 5,000 resamples was employed to assess the significance of path coefficients. As shown in Table 4 and illustrated in Figure 3, all five hypothesized paths were statistically significant.

Performance Expectancy ($\beta = 0.168$, $t = 3.210$, $p = 0.001$), Effort Expectancy ($\beta = 0.124$, $t = 2.280$, $p = 0.023$), Social Influence ($\beta = 0.097$, $t = 2.010$, $p = 0.045$), and Facilitating Conditions ($\beta = 0.131$, $t = 2.430$, $p = 0.015$) demonstrated positive and significant effects on Green Entrepreneurial Intention (GEI). Importantly, Pro-environmental Personal Norm ($\beta = 0.215$, $t = 4.020$, $p < 0.001$) exerted the strongest influence, underscoring the central role of normative commitments in driving AI-enabled green entrepreneurship.

The coefficient of determination for GEI was $R^2 = 0.583$, indicating that the five predictors jointly explain 58.3% of the variance in GEI. The Stone–Geisser Q^2 value for GEI was 0.371, exceeding zero and confirming the model's predictive relevance. Effect size analysis showed that PPN ($f^2 = 0.092$) and PE ($f^2 = 0.058$) exerted relatively stronger influences, while SI had the weakest but still significant effect ($f^2 = 0.020$).

These results support the robustness of the revised model and highlight the complementary roles of technological acceptance (UTAUT) and value-based personal norms (VBN) in shaping AI-enabled green entrepreneurial intentions.

Table 4 Structural Model Assessment Results

Hypothesis	Path	β	t-value	p-value	f^2	Results
H1	PE $\rightarrow$ GEI	0.168	3.21	0.001	0.058	Supported
H2	EE $\rightarrow$ GEI	0.124	2.28	0.023	0.03	Supported
H3	SI $\rightarrow$ GEI	0.097	2.01	0.045	0.02	Supported
H4	FC $\rightarrow$ GEI	0.131	2.43	0.015	0.034	Supported
H5	PPN $\rightarrow$ GEI	0.215	4.02	<0.001	0.092	Supported

Notes: Bootstrapping with 5,000 resamples. $R^2(\text{GEI}) = 0.583$; $Q^2(\text{GEI}) = 0.371$.
 f^2 benchmarks: 0.02 = small, 0.15 = medium, 0.35 = large.

Figure 3 Structural model results



6. Discussion

6.1 Summary of Key Findings and Theoretical Implications

This study investigated the determinants of AI-enabled green entrepreneurial intention (GEI) by integrating the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Value-Belief-Norm (VBN) theory. Using survey data from 260 green entrepreneurs in Beijing, the findings showed that performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and pro-environmental personal norm (PPN) all exerted significant and positive effects on GEI. Among them, PPN had the strongest influence, highlighting that moral obligation and ecological values play a pivotal role in shaping entrepreneurial decisions.

From the UTAUT perspective, the results validate the roles of perceived usefulness, ease of use, social encouragement, and available support in technology-driven entrepreneurship (Venkatesh et al., 2003; Williams et al., 2015). From the VBN perspective, the strong effect of PPN confirms that intrinsic values and personal norms are powerful predictors of sustainability-oriented behavior (Stern, 2000). Together, these findings extend prior research by showing that technology adoption and value-based motivation jointly drive AI adoption in green ventures.

6.2 Practical Implications

The findings provide several actionable insights. First, entrepreneurs should strengthen AI literacy and integrate intelligent tools into green business models to enhance efficiency and foster eco-innovation. Second, policymakers can improve facilitating conditions by investing in AI infrastructure, offering targeted training, and providing fiscal incentives for sustainable technology adoption. Third, investors and incubators are encouraged to support AI-enabled green startups, given their combined environmental and economic potential. Fourth, AI providers can promote adoption by enhancing usability and demonstrating the ecological benefits of their systems. Finally, environmental organizations can leverage normative influence to reinforce entrepreneurs' pro-environmental personal norms and encourage AI integration in sustainability practices.

6.3 Unexpected Insights, Limitations, and Future Research

Although all hypothesized relationships were significant, social influence (SI) showed a relatively weaker effect compared to other predictors. This suggests that in emerging ecosystems, entrepreneurs may rely more on personal values (PPN) and perceived utility (PE, EE) than on external peer pressure. Such findings highlight that normative and intrinsic motivations may outweigh social dynamics in the early stages of AI adoption for sustainability.

This study also has limitations. The reliance on a Beijing-based sample restricts the generalizability of the findings; future research should explore diverse cultural and geographic contexts. The cross-sectional design precludes causal inference, pointing to the need for longitudinal studies. Moreover, future studies could investigate mediating mechanisms such as environmental commitment or satisfaction with AI usage, and moderating factors such as environmental regulation or industry type. Comparative research across regions or between AI-enabled and traditional green entrepreneurs would further enrich understanding of how technology and values interact in driving sustainable entrepreneurship.

7. Conclusion

This study examined the determinants of AI-enabled green entrepreneurial intention (GEI) by integrating the Unified Theory of Acceptance and Use of Technology (UTAUT)

with the Value-Belief-Norm (VBN) theory. Survey data from 260 green entrepreneurs in Beijing confirmed that performance expectancy, effort expectancy, social influence, facilitating conditions, and pro-environmental personal norms significantly influence GEI, with normative values (PPN) emerging as the strongest predictor.

The findings contribute to the literature by extending UTAUT and VBN into the domain of AI-enabled sustainable entrepreneurship, demonstrating that both technological acceptance and value-based motivations jointly drive entrepreneurial intentions. Practically, the results provide insights for entrepreneurs, policymakers, and AI providers on enhancing adoption through usability, supportive conditions, and normative reinforcement.

While the study is limited by its Beijing-based sample and cross-sectional design, it offers a foundation for future research to test the model across contexts and over time. Overall, the integration of technology acceptance and ecological values highlights a dual pathway through which AI can promote environmentally responsible entrepreneurship and support sustainable development goals.

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Restudy Captain Ahab's downfall, as a Violator of SDG 14, Reveals Moby Dick as an Embodiment of Nature's Vengeance and a Foreshadowing of Humanity's Potential Fate

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Abstract

Moby Dick is a novel written by Herman Melville, first published in 1851. It is considered one of the greatest American novels and tells the story of Ishmael, the narrator, and his journey aboard the whaling ship Pequod, led by the obsessive and vengeful Captain Ahab. Ahab's sole mission is to hunt down and kill Moby Dick, a giant white whale that had previously destroyed Ahab's previous ship and severed his leg. While *Moby Dick* was written long before the SDGs were established, the novel touches upon themes that relate to SDG 14, Life Below Water. For example, the novel's focus on whaling directly connects to SDG 14, which aims to conserve and sustainably use the oceans, seas, and marine resources. *Moby Dick* reflects on the dangers of over-exploitation of marine life (whales) and the impact of human greed on the environment. Captain Ahab's relentless hunt for Moby Dick can be seen as a metaphor for the destructive pursuit of natural resources without regard for sustainability.

In the proposed project, we will examine how Captain Ahab's downfall—seen as a violation of Sustainable Development Goal 14 (Life Below Water)—frames *Moby Dick* as an allegory of nature's revenge. The white whale symbolizes the ocean's resistance to human exploitation, and Ahab's obsessive pursuit leads to his ruin, foreshadowing the consequences of unchecked marine resource depletion. As such, *Moby Dick* offers a powerful narrative for environmental education, connecting literature with ocean conservation.

Keywords: white whale environmental education; marine ecosystems; sustainable; SDGs

1.Introduction

The Sustainable Development Goals (SDGs)—also called the Global Goals—were adopted by the United Nations in 2015 as a worldwide plan to create a better future for everyone by the year 2030. During that year's global summit, world leaders agreed on the 2030 Agenda for Sustainable Development, which includes 17 specific goals. These goals cover key areas like reducing poverty and hunger, improving health and education, promoting equality, protecting the environment, and supporting strong and peaceful communities. The SDGs serve as a shared action plan for people, the planet, prosperity, peace, and partnership. They are meant to be carried out by all countries and all sectors of society working together. As stated in the 2030 Agenda, the world is committed to ending poverty and hunger in every form, making sure people live with dignity and equality in a clean and healthy environment. It also emphasizes protecting the Earth by using natural resources

responsibly, reducing pollution, and acting quickly to stop climate change—so future generations can thrive. The SDGs also aim for economic growth that respects nature and promotes peace, justice, and cooperation among all nations. In total, the SDGs include 169 targets, which are both quantitative (measurable) and qualitative (descriptive). These targets recognize that every country is different, and they allow flexibility based on a country's resources, priorities, and stage of development.

SDG 14 specifically focuses on protecting our oceans, seas, and marine resources. It calls for the conservation and sustainable use of the ocean to prevent further damage from overfishing, plastic pollution, habitat destruction, and climate change. The ocean plays a vital role in regulating the Earth's climate and supports millions of livelihoods, especially in coastal communities. SDG 14 urges countries to reduce marine pollution, manage fish stocks responsibly, protect marine ecosystems, and support small-scale fishers. It is a reminder that healthy oceans are essential to the well-being of the planet, and without ocean sustainability, many other SDGs—like those for food security, health, and climate—will be harder to achieve.

Moby Dick is a novel written by Herman Melville, first published in 1851. It is considered one of the greatest American novels and tells the story of Ishmael, the narrator, and his journey aboard the whaling ship *Pequod*, led by the obsessive and vengeful Captain Ahab. Ahab's sole mission is to hunt down and kill Moby Dick, a giant white whale that had previously destroyed Ahab's previous ship and severed his leg. While *Moby Dick* was written long before the SDGs were established, the novel touches upon themes that relate to SDG 14, Life Below Water. For example, the novel's focus on whaling directly connects to SDG 14, which aims to conserve and sustainably use the oceans, seas, and marine resources. *Moby Dick* reflects on the dangers of over-exploitation of marine life (whales) and the impact of human greed on the environment. Captain Ahab's relentless hunt for Moby Dick can be seen as a metaphor for the destructive pursuit of natural resources without regard for sustainability.

In the proposed project, We will explore how Captain Ahab's downfall, as a violator of SDG 14, reveals Moby Dick as an embodiment of nature's vengeance and foreshadows the consequences humanity may face if it continues the relentless exploitation of marine resources—ultimately suffering the same backlash from nature as the protagonist did in the story.

2. Research Objectives

This study undertakes a critical re-examination of *Moby-Dick* through the dual lenses of ecocriticism and narrative theory, with the aim of positioning Herman Melville's seminal work as a literary precursor to contemporary concerns surrounding marine sustainability and environmental ethics. Departing from traditional interpretations that emphasize metaphysical inquiry or psychological obsession, the research reframes *Moby-Dick* as a narrative deeply entangled with the cultural, economic, and ethical dimensions of marine exploitation. In doing so, the study aligns its analytical framework with the normative aspirations of the United Nations' Sustainable Development Goal 14 (Life Below Water), which calls for the conservation and sustainable use of marine ecosystems.

Drawing on Buell's (2005) assertion that environmental criticism must engage not only with depictions of nature but also with the imaginative and cultural constructs that mediate human-environment interactions, this research approaches *Moby-Dick* as a site where extractive ideology, technological ambition, and moral reflection converge. The novel's extensive treatment of whaling—framed as both industrial enterprise and symbolic ritual—renders it particularly apt for exploring how literature can simultaneously reproduce and critique dominant historical attitudes toward the ocean. By foregrounding the ecological and ethical consequences of treating the sea as an infinite reservoir of resources, the study seeks to demonstrate the text's capacity to expose the ideological underpinnings of marine violence.

Moreover, the study revisits the tragic structure of *Moby-Dick*, focusing specifically on the figure of Captain Ahab and the classical concept of hamartia. Engaging with recent reinterpretations of tragic failure (Vinje, 2021), the research considers Ahab's downfall not

as an isolated personal defect but as a systemic and ethically embedded manifestation of human hubris—a narrative expression of ecological overreach. This tragic lens enables a deeper understanding of how the novel allegorizes the costs of violating the limits of coexistence with marine life.

Through this interdisciplinary approach, the research pursues the following core objectives:

1. To interpret *Moby-Dick* as an ecocritical text that reveals the cultural, ideological, and ethical frameworks underpinning marine exploitation.
2. To analyze how narrative form and tragic structure collaborate in dramatizing the environmental consequences of unchecked human ambition.
3. To demonstrate how literary tragedy can serve as a critical and pedagogical tool for advancing understanding of contemporary sustainability discourses, particularly as they relate to SDG 14.

3. Research Methodology

This proposed project employs Tragic Theory (Tragic Theory is a framework for understanding how tragedies work—what makes a story tragic, how characters downfall from grace, and what emotional impact it has on the audience. It originated in ancient Greek drama and is most famously defined by Aristotle in *Poetics*.) research methodology and SDG theory, specifically focusing on SDG 14, for the textual analysis of the selected primary text. It also utilizes published books, research journals, online articles, and reviews related to the chosen topic as secondary data for the research.

Tragic heroes are typically characterized by a fatal flaw, which leads to their downfall. Ahab's tragic flaw is his obsessive vengeance against Moby Dick the white whale. This obsession blinds him to reason and ultimately leads to his destruction. Near the beginning of *Moby Dick*, Ishmael speaks of Ahab as “a mighty pageant creature, formed for noble tragedies.” (*Moby Dick*, p.80) By the end of the novel Ahab does indeed achieve a tragic stature. He fulfills the role of the classical tragic hero, a man impelled by Fate into committing an act that ends in tragedy. The greater his ensuing grief, the greater his tragic stature. Ahab reaches this realization as he sees Moby Dick destroy his ship, “Oh, lonely death on lonely life! Oh, now I feel my topmost greatness lies in my topmost grief.” (*Moby Dick*, p.653) Many scholars and critics have recognized the deep influence that Shakespeare had on Herman Melville's writing. One strong example appears in *Moby Dick*, chapter 117, when the mysterious Parsee, Fedallah, gives a strange prophecy to Captain Ahab. He tells Ahab that “two hearses must verily be seen by thee on the sea; the first not made by mortal hands; and the visible wood of the last one must be grown in America,” (*Moby Dick*, p.567) and also warns him that he will die by hemp, suggesting he will be killed by rope. Parsee, Fedallah says, ““Take another pledge, old man’ said the Parsee, as his eyes lighted up like fire-flies in the gollm-‘Hemp only can kill thee.’” (*Moby Dick*, p.568)

This kind of prophetic warning is very similar to what happens in Shakespeare's *Macbeth*. In the play, the three witches promise Macbeth that he will become king. As the story unfolds, Macbeth is deep in bloodshed and becomes desperate to know what else fate has in store for him. He says he is “in blood Stepp'd” and “bent to know the worst” (Act III, Scene IV), and seeks more answers from the witches. They summon three ghostly apparitions, who tell him: “none of woman born shall harm Macbeth” and “Macbeth shall never vanquished be until Great Birnam Wood to high Dunsinane Hill shall come against him” (Act IV, Scene I). These words seem to promise safety, but just like Ahab, Macbeth misunderstands the meaning. The witches' words eventually come true—Macbeth is killed by Macduff, who was “from his mother's womb untimely ripped” (Act V, Scene VII), meaning he wasn't technically “born of woman.” Similarly, Fedallah dies before Ahab, the

great white whale turns out to be the first "hearse not made by mortal hands," and Ahab is finally killed by the rope (the "hemp"), with his ship acting as the second hearse "grown in America."

Charles Olson explored these Shakespearean connections in his influential essay 'Lear and Moby Dick,' which was later expanded into his 1947 book *Call Me Ishmael*. Olson pointed out that *King Lear* had "the deepest creative impact" (Olson, p. 47) on Melville's writing. The whale in *Moby Dick*, enormous and mysterious, symbolizes unstoppable power and authority, especially with its haunting white color. Ahab, who has already lost one leg to the whale, knows how dangerous this chase is—but instead of turning away, he becomes obsessed. He refuses to surrender and throws himself into the hunt, even though it leads to his destruction. He is trapped between giving up the fight and saving his pride, but his compulsive need to assert himself drives him forward.

Melville's feelings of despair and anger about death and human struggle are clear throughout *Moby Dick*. Ahab is portrayed as a complex character—part tragic hero, part villain—whose madness and defiance of nature sometimes feel even more intense than what we see in *King Lear* or *Macbeth*. However, just as Shakespeare includes characters like Macduff in *Macbeth* and Edgar in *King Lear*, who survive and represent hope, Melville gives us Ishmael. As the sole survivor of the Pequod's doomed voyage, Ishmael escapes both physically and mentally unharmed. In the end, he stands for the resilience and hope of humanity, even in the face of overwhelming loss.

Like Shakespeare's tragic heroes King Lear and Macbeth, Captain Ahab embodies the fatal flaw of overweening pride—an excessive self-confidence that blinds him to reason and morality. This prideful characteristic drives Ahab to defy the natural order, much like Lear's reckless renunciation of power and Macbeth's bloody ambition for it. In *Moby Dick*, Ahab's obsessive quest to conquer the whale becomes not merely a personal obsessive revenge but a symbolic rebellion against the very forces of nature. Fedallah's prophecy, like the witches' mysterious promises to Macbeth, forewarns of inevitable doom veiled in ambiguity. Ignoring these warnings, Ahab relentlessly pursues Moby Dick, seeing the whale not as an animal but as an embodiment of incomprehensible evil. In doing so, Ahab violates the ethical imperative of sustainable coexistence with marine life, as outlined in the United Nations' SDG 14 ("Life Below Water"), which seeks to conserve and sustainably use the oceans and marine resources. His vengeful whaling crusade exemplifies human arrogance and environmental exploitation, culminating in nature's violent retaliation. Ultimately, Ahab's death—entangled by the very rope meant to kill the whale—mirrors the tragic downfalls of Lear and Macbeth, revealing how unchecked pride and defiance of natural law can lead to ruin. His demise stands as both a personal tragedy and a cautionary tale about the consequences of violating the balance between humanity and the environment.

4.Data Analysis

This study also employs a qualitative and interpretive methodology, grounded in close textual analysis informed by ecocriticism and narrative theory. Rather than treating *Moby-Dick* as a direct or transparent historical record of the whaling industry, the novel is approached as a complex literary artifact that actively constructs meanings about nature, violence, and human aspiration. Following Buell's (2005) assertion that environmental criticism must address both formal elements and cultural imaginaries, this research interprets the novel as a narrative site in which environmental values are encoded and contested through metaphor, symbolism, and structural organization.

At the narrative level, the study adopts James's (2018) ecocritical framework to explore how environmental meanings emerge through literary form. Specific attention is

devoted to the novel's oscillation between narrative modes—shifting from encyclopedic exposition to dramatic episodes—and to its recurring personification of the whale and oceanic forces. These narrative techniques are analyzed not merely as stylistic flourishes, but as formal mechanisms that alternately normalize and disrupt extractive logics. By tracing patterns of narrative voice, temporal sequencing, and symbolic excess, the analysis illuminates how the text invites readers to critically engage with the moral ambiguities of marine exploitation.

Tragic theory provides an additional interpretive lens, particularly through the classical notion of hamartia recontextualized within contemporary ecological ethics. Drawing on Vinje's (2021) reconceptualization of tragic failure, the study interprets Captain Ahab's obsessive quest not simply as psychological pathology but as an ethically charged misrecognition of ecological boundaries. Ahab's refusal to acknowledge the limits imposed by the nonhuman world is read as emblematic of an anthropocentric worldview that equates mastery with legitimacy. This interpretive move situates Ahab's downfall within a broader critique of extractive ambition, thereby linking individual character arc to systemic patterns of environmental breakdown.

The interpretive framework is further aligned with the normative orientation of the United Nations' Sustainable Development Goal 14 (Life Below Water), which advocates for the preservation and sustainable use of marine ecosystems. While SDG 14 is not employed as a rigid evaluative rubric, it functions as a critical heuristic that foregrounds the ethical stakes of marine exploitation as dramatized in the novel. Rather than retroactively imposing policy frameworks on a nineteenth-century text, the study uses SDG 14 as a lens to reveal how *Moby-Dick* anticipates—and critiques—the ideological conditions that enable environmental degradation.

Through this triangulated approach—combining ecocriticism, narrative theory, and tragic analysis—the study demonstrates how *Moby-Dick* functions as a cultural text that both reflects and interrogates the epistemological and moral foundations of unsustainable oceanic practices. In doing so, the research affirms literature's capacity to contribute meaningfully to contemporary conversations on ecological responsibility and sustainability ethics.

5.Results

Herman Melville's *Moby Dick* is widely regarded as one of the most well-known novels that explores the conflict between humans and animals—told from the viewpoint of a whaler. The story centers around a massive sperm whale named Moby Dick, who ends up destroying the whaling ship *Pequod* as the crew tries to hunt him down. In the end, everyone on board dies except for the narrator, Ishmael. While the book offers a fairly accurate portrayal of 19th-century whaling culture, it also raises some questions—especially about the way Moby Dick is given human-like qualities. The whale is portrayed almost as if it were a conscious, vengeful being on a mission to kill, which may reflect more about human fear and projection than the reality of animal behavior.

Herman Melville's *Moby Dick* portrays the American whaling industry before the Civil War. While on the surface it's an epic story about one man's obsession with a whale, the novel also brings attention to the environmental consequences of whaling, criticizing the industry for its mass killing of whales. Environmental writer Graham Huggan points out the brutality of the trade, noting that, "Whales have literally been torn apart to create oil for lighting, soap, and margarine; baleen and bone for various decorative and sartorial purposes. For a time, the trade in whales for oil would match the trade in humans for sugar as the commercial basis for the British Empire" (Huggan, 2018, p. vii). Whales were a vital resource, especially for the oil that helped fuel the growth of European civilization and its

colonies. In particular, oil from sperm whales—described by Melville as “pure, limpid, odiferous”—was seen as the best and “most precious of all his oily vintages” (Melville, 1851, p. 286). Ishmael even remarks, “You must go to New Bedford to see a brilliant wedding; for, they say, they have reservoirs of oil in every house, and every night recklessly burn their lengths in spermaceti candles” (*Moby Dick*, p.32). These moments in the novel show just how central whaling was to American life in the 19th century.

But *Moby Dick* is not just about Captain Ahab’s obsession or his view of the whale as a mere “dumb brute” (*Moby Dick*, p.176). The novel also speaks to the larger theme of capitalism’s exploitation of nature—whales were hunted not just out of fear or curiosity, but because of their commercial value. At the same time, the whale itself, Moby Dick, is portrayed as a dark force of nature. Ahab describes him as having “outrageous strength, with an inscrutable malice sinewing it. That inscrutable thing is chiefly what I hate” (*Moby Dick*, p.176). To the sailors, the ocean is a violent, unforgiving place: “The universal cannibalism of the sea; all whose creatures prey upon each other, carrying on eternal war since the world began” (*Moby Dick*, p.296). Ishmael admits that part of his reason for joining the voyage was the mysterious power of the whale itself, saying, “Chief among these motives was the overwhelming idea of the great whale himself. Such a portentous and mysterious monster roused all my curiosity” (*Moby Dick*, p.4). Still, it’s clear that the main motivation behind whaling was economic gain.

Melville sometimes romanticizes whales in poetic ways that reflect how humans often see nature as timeless and endlessly available. He writes, “Wherefore, for all these things, we account the whale immortal in his species, however perishable in his individuality. He swam the seas before the continents broke... he once swam over the site of the Tuileries, and Windsor Castle, and the Kremlin” (*Moby Dick*, p.519). But in other places, Melville frames whales as monstrous and dangerous: “and in all seasons and all oceans declared everlasting war with the mightiest animated mass that has survived the flood; most monstrous and most mountainous! That Himmalehan, salt-sea, Mastodon, clothed with such portentousness of unconscious power, that his very panics are more to be dreaded than his most fearless and malicious assaults!” (*Moby Dick*, p.70). Scholar Armstrong points out the contradiction in how Melville treats whales, “The novel thus mythologizes the whale in order to deny the possibility of its extinction, in a manner diametrically opposed to the aims of late-twentieth century environmentalism, which mythologized the whale to make it the symbol of vulnerable biodiversity” (Armstrong, 2004, p. 25).

SDG14 set by the United Nations, aims to “conserve and sustainably use the oceans, seas and marine resources for sustainable development.” It calls for urgent action to reduce marine pollution, protect marine biodiversity, end overfishing, and promote sustainable use of ocean resources. In stark contrast, the 19th century viewed the ocean not as an ecosystem to protect but as a frontier to conquer. Herman Melville, in *Moby Dick*, praised whalers as courageous men on noble missions. He wrote, “I know a man that, in his lifetime, has taken three hundred and fifty whales. I account that man more honourable than that great captain of antiquity who boasted of taking as many walled towns” (Melville, 1851, p. 218). However, what was once seen as valor is now recognized as devastation. Centuries of excessive whaling drove many species to near-extinction; some, such as the North Pacific right whale, still remain critically endangered today (Cornell University Blog). Melville’s glorification of whaling has since drawn strong criticism. Scholar Susan Schultz notes, “At a time when the health of the world’s oceans and their inhabitants is indeed of increasing global concern and when first-time readers of *Moby Dick* can see very little ‘honor and glory’ in the enterprise of whaling” (Schultz, 2000, p. 97), the novel demands re-evaluation through an eco-critical lens. This lens not only challenges the myth of heroic whalers but

also confronts humanity's broader history of exploiting nature under capitalist motives. Captain Ahab's downfall mirrors that of Shakespeare's Macbeth and King Lear—tragic figures whose overreaching pride and defiance of natural and moral order lead to their ruin. Like Ahab, Macbeth and Lear become blinded by ambition and ego, ultimately bringing destruction upon themselves and their worlds. In *Moby Dick*, Ahab's relentless pursuit of the whale represents not only personal obsession but also a symbolic violation of nature, one that foreshadows the environmental collapse SDG 14 now seeks to prevent. The transformation in how we view the ocean—from a battleground of human conquest to a fragile ecosystem in need of protection—marks a significant cultural and ethical shift, one that Melville's novel, ironically, helps us better understand.

The historical attitudes toward ocean resources, as depicted in Herman Melville's *Moby Dick*, reflect a time when nature—particularly marine life—was seen as something to be conquered, exploited, and commodified. Whales were not viewed as sentient creatures or vital members of a delicate ecosystem, but rather as economic assets, harvested for their oil, bones, and baleen. The glorification of whalers as noble heroes, celebrated for their success in killing hundreds of whales, represents an outdated worldview rooted in domination, greed, and human-centered pride. However, the growing environmental crisis and the establishment of the United Nations' Sustainable Development Goal 14 (SDG 14) demand a radical transformation in this mindset. SDG 14 emphasizes the conservation and sustainable use of the oceans, seas, and marine resources, calling for urgent action to reduce pollution, halt overfishing, protect biodiversity, and promote practices that ensure long-term ecological balance. In my view, to move from being exploiters to guardians of the sea, humanity must undergo both a cultural and ethical shift:

1. Reframing Nature as a Living System, Not a Commodity

Just as *Moby Dick* mythologizes the whale as a powerful, almost supernatural force, modern societies must learn to respect marine life not for its market value, but for its intrinsic worth and ecological importance. Marine ecosystems regulate climate, provide oxygen, and support millions of species—including humans. Viewing the ocean as a living, interconnected system is essential to fostering respect and responsibility.

2. Embracing Sustainable Practices

Unlike the destructive whaling industry of the 19th century, today's industries must implement sustainable fishing methods, reduce bycatch, and ensure that marine habitats are protected. Policies should support community-based coastal management, especially involving small-scale fishers who depend directly on healthy oceans.

3. Environmental Education and Awareness

Literature like *Moby Dick* can be used in environmental education to reflect on the consequences of unchecked exploitation. By engaging students and the public with cultural narratives and environmental science, we can build a deeper emotional connection to ocean conservation.

4. Global Cooperation and Policy Enforcement

As SDG 14 highlights, safeguarding the oceans requires international cooperation. Countries must enforce regulations against illegal fishing, marine pollution, and habitat destruction. Marine protected areas (MPAs) and global agreements must be strengthened to ensure compliance and long-term stewardship.

5. Reinterpreting Cultural Narratives

Just as scholars now read *Moby Dick* through an eco-critical lens, societies must reinterpret their historical relationships with nature. This means questioning long-held myths of conquest and dominance and replacing them with stories of coexistence, humility, and resilience.

6. SDG 14 and the Ethical Reframing of Marine Life

The United Nations' Sustainable Development Goal 14 (Life Below Water) provides a contemporary ethical and policy-oriented framework that advocates for the conservation and sustainable use of marine ecosystems. It addresses pressing global challenges such as the mitigation of ocean pollution, the protection of marine biodiversity, the regulation of overfishing, and the promotion of long-term ecological balance (United Nations, 2024). Although Herman Melville's *Moby-Dick* predates the formulation of the SDGs by over a century, the novel's dramatization of oceanic violence and its moral implications resonate powerfully with the ethical imperatives embodied in SDG 14.

In this study, SDG 14 is not employed as an anachronistic metric to evaluate Melville's historical moment, nor as a checklist imposed upon a literary artifact. Rather, it serves as a normative interpretive lens—one that enables a critical reassessment of the novel's environmental representations in light of contemporary sustainability discourse. This approach foregrounds themes of ecological responsibility, marine stewardship, and the ethical boundaries of human ambition, framing *Moby-Dick* not merely as a literary classic, but as a text that engages with—and anticipates—modern concerns about oceanic ethics and environmental crisis.

Viewed through this lens, Captain Ahab's obsessive pursuit of the white whale becomes more than a psychological or metaphysical tragedy. It exemplifies a symbolic transgression of the ecological limits that SDG 14 seeks to defend. Ahab's worldview, which perceives the ocean as a hostile frontier and marine life as a resource to be dominated, starkly contrasts with the sustainability-centered ethos of SDG 14. The *Pequod*'s ultimate destruction may therefore be read as an allegory of ecological collapse, a narrative prefiguration of the consequences that follow when human systems pursue unchecked exploitation of natural environments.

Importantly, SDG 14 also functions as a bridge between literary interpretation and environmental education. By situating *Moby-Dick* within the context of modern sustainability goals, the novel emerges as a powerful pedagogical resource—one that reveals how cultural narratives historically legitimized practices such as whaling, while offering a lens through which contemporary readers can interrogate the ideological roots of environmental degradation. In this way, SDG 14 does not constrain literary analysis; it enriches it, enabling a deeper exploration of how narrative forms mediate ethical relationships with the marine world.

7. Research Limitations

While the integration of SDG 14 into literary analysis provides valuable ethical insight, several limitations must be acknowledged. First, as a policy-based and normatively prescriptive framework, SDG 14 was not designed as a tool for literary interpretation. Its application to a nineteenth-century fictional text necessarily involves a degree of conceptual abstraction. The objective of this study is not to measure empirical outcomes within the narrative, but to use SDG 14 as a heuristic for interpreting the ethical dimensions of *Moby-Dick*. This requires careful attention to symbolic resonance rather than empirical validation.

Second, the scope of the study is limited by its reliance on a single primary text. While *Moby-Dick* offers a rich site for ecocritical inquiry, exclusive focus on Melville's novel constrains the generalizability of the findings. The environmental themes illuminated in this analysis may not be representative of the broader spectrum of nineteenth-century maritime literature, nor do they encompass non-Western perspectives on oceanic ethics. Future research might address this limitation by conducting comparative studies across diverse literary traditions and geographies.

Third, the qualitative and interpretive nature of the study entails an element of subjectivity inherent to literary criticism. Although the analysis is grounded in established frameworks—including ecocriticism, narrative theory, and tragic theory—the interpretation of motifs, symbols, and ethical implications remains contingent on critical judgment. Alternative theoretical approaches, such as postcolonial or theological readings, could yield different insights that fall outside the scope of this study.

Finally, the historical distance between *Moby-Dick* and the emergence of SDG 14 presents a temporal limitation. The novel was produced in a socio-economic context fundamentally distinct from today's sustainability discourse. Applying modern ethical frameworks to historical texts risks presentism—the imposition of contemporary values onto past cultural artifacts. To mitigate this, the study treats SDG 14 not as a prescriptive measure but as a reflective instrument, one that enables ethical dialogue between past and present without collapsing their historical specificity.

8. Ecocritical Reframing: From “Heroic Whaling” to Environmental Violence

Although *Moby-Dick* is often interpreted as a metaphysical tragedy or a testament to American ambition, an ecocritical lens reveals that the novel also serves as a sustained meditation on environmental ethics. Rather than merely presenting the ocean as a passive backdrop for human action, Melville renders it as a morally and materially charged space. Schultz (2000) contends that the novel's encyclopedic structure—its oscillation between narrative episodes and digressions on cetology, whaling industry practices, and philosophical reflections—is not ornamental but instrumental. These digressions repeatedly redirect the reader's attention to the ecological ramifications of transforming living marine bodies into economic value. In this context, the whaling expedition emerges as a cultural system that legitimizes industrial-scale marine violence through ritualized language, hierarchical organization, and institutionalized practice.

This interpretive shift is especially pertinent to the present study's engagement with SDG 14 (Life Below Water), as it positions *Moby-Dick* as a potential text for environmental education. Instead of isolating Captain Ahab's obsession as a psychological anomaly, the narrative foregrounds the structural forces—industrial, ideological, and historical—that render his obsession intelligible, even heroic. Through Schultz's ecocritical approach, the Pequod is reimagined not merely as a vessel for tragic destiny, but as a mobile apparatus of extraction and ecological disruption. The ocean, under this framework, is no longer an “empty space” to be conquered but a living ecosystem whose exploitation provokes both ethical and material consequences.

By emphasizing this systemic dimension, the novel lays bare the contradiction between romanticized myths of nature and the realities of ecological degradation. Whales, simultaneously depicted as awe-inspiring wonders and commodified resources, exemplify this duality. This tension parallels contemporary sustainability discourse, in which celebratory narratives of maritime enterprise often obscure the environmental costs of resource extraction. Within the scope of SDG 14, *Moby-Dick* thus functions as a cultural case study in how literary narratives can naturalize—and thereby perpetuate—environmentally destructive practices. Schultz's analysis ultimately supports reading *Moby-Dick* not only as a work about nature but as a critique of unsustainable human-ocean relations.

9. More-than-Human Ethics: Whale Bodies, Sympathy

To deepen the ecocritical analysis, Armstrong (2004) introduces a vital ethical framework that reconceptualizes the whale not as a mere symbol or antagonist, but as a “more-than-human” presence that challenges anthropocentric worldviews. Armstrong's

emphasis on compassion underscores how the novel continually destabilizes the boundary between human subjectivity and animal objecthood. Even when the crew employs commercial and militaristic language to describe whales, the narrative inserts moments of ambivalence—scenes marked by wonder, hesitation, and moral discomfort—that interrupt an instrumental logic of domination.

This ethical reorientation is central to the aims of SDG 14, which calls not only for better marine governance but also for a shift in how societies value marine life. When viewed through Armstrong's perspective, the whale's body becomes a contested site of meaning: it is simultaneously a commercial object, a sublime entity, and a moral provocateur. This complex representation compels readers to question the legitimacy of violence normalized through economic and cultural systems. Armstrong's focus on affect and sympathy enables *Moby-Dick* to function as a text that "teaches" sustainability—not through didactic messaging, but by immersing the reader in the affective structures that make exploitation possible, and then gradually unraveling them.

Within this interpretive frame, *Moby Dick*'s "revenge" ceases to function as a literal act of animal vengeance. Instead, it serves as a narrative device that dramatizes the ethical consequences of unchecked anthropocentrism. The whale becomes an allegorical figure—embodying a "more-than-human" resistance to extractive logic. This reading reinforces the broader argument that Ahab's downfall symbolizes the collapse of human exceptionalism in the face of ecological limits. As such, Armstrong's analysis strengthens the view that *Moby-Dick* anticipates contemporary debates about marine ethics, sustainability, and the moral scope of human responsibility.

10. An Anthropocene Lens: The Pequod as a System of Extraction and Feedback

A third layer of analysis emerges through Krien's (2021) Anthropocene reading of *Moby-Dick*, which frames the novel not as a tale of individual obsession but as a narrative of interconnected systems—economic, technological, and ecological. Krien's interpretation is particularly useful for enriching the present study's "Results and Discussion" section, as it substantiates the claim that the Pequod operates not just as a ship or stage for personal tragedy but as a systemic mechanism that organizes energy, labor, knowledge, and violence into a unified extractive enterprise.

Within this paradigm, Ahab's monomania is not the origin of destruction but a symptom of an already entrenched industrial logic. The routines of the crew, the ship's machinery, and the commercial imperatives of whaling converge to form a system in which marine life is transformed into oil, capital, and geopolitical prestige. The novel thus stages a feedback loop: the more aggressively the system seeks to dominate nature, the more it accelerates its own instability and collapse. This dynamic prefigures a central concern of Anthropocene discourse—the ecological consequences of human systems that overreach by commodifying nonhuman life.

Krien's contribution fortifies the study's claim that *Moby-Dick* anticipates the systemic crises that SDG 14 seeks to address. The novel's catastrophic ending is not merely poetic justice but a structural warning: when extractive imperatives override all other values—when even labor, knowledge, and meaning are subsumed into production—the result is ecological self-destruction. In this light, the narrative becomes pedagogically significant for sustainability education, not because it prescribes solutions, but because it reveals the consequences of a worldview that denies limits.

11. Integrated Insights: Ecocriticism and the Sustainability Agenda

Taken together, the insights of Schultz (2000), Armstrong (2004), and Krien (2021) provide a cohesive framework for reinterpreting *Moby-Dick* as a work of lasting relevance

to ecocriticism and Anthropocene studies. Schultz elucidates the novel's critique of cultural systems that normalize marine exploitation; Armstrong supplies an ethical vocabulary that expands the reader's empathy beyond the human; and Krien contextualizes the Pequod within a larger system of extractive feedback loops. These perspectives collectively affirm the novel's pedagogical utility in the context of SDG 14, framing Ahab's demise as an allegory for the collapse of unsustainable human-ocean relations.

In sum, *Moby-Dick* should be re-evaluated not merely as a literary artifact of American Romanticism, but as a complex environmental text that interrogates the logics of conquest, commodification, and ecological transgression. Its enduring relevance lies in its capacity to reveal the moral, systemic, and existential dimensions of marine exploitation—a relevance that resonates powerfully within contemporary debates about sustainability, ocean ethics, and global environmental futures.

12. Conclusion and Discussion

Herman Melville's *Moby Dick*, though written in the 19th century, remains deeply relevant in today's context of environmental awareness and sustainability. Through the lens of Tragic Theory and SDG 14 (Life Below Water), Captain Ahab's doomed quest emerges not only as a personal tragedy driven by overconfident pride but also as a powerful allegory for humanity's historical and ongoing exploitation of marine life.

Ahab's downfall—mirroring Shakespearean tragic heroes like Macbeth and King Lear—highlights the consequences of over proud and the failure to respect natural boundaries. His obsessive pursuit of Moby Dick symbolizes a larger, systemic human impulse to dominate nature, an impulse that has contributed to marine degradation and biodiversity loss. Melville's depiction of whaling as a noble and heroic endeavor reflects the values of his time, when the ocean was viewed as an infinite resource to be conquered. However, through modern ecological understanding and the framework of SDG 14, we now recognize the dangers of such thinking. What was once perceived as valor is now seen as environmental violence.

This re-evaluation calls for a shift in perspective. As SDG 14 urges, the ocean must be protected through sustainable practices that reduce overfishing, marine pollution, and habitat destruction. Melville's romantic and mythic portrayal of the whale, contrasted with the violent reality of the whaling industry, reveals the tension between human fantasy and environmental responsibility. The novel, therefore, becomes a site of critical reflection—not only on literary tragedy but on the ecological tragedies unfolding in real life.

Furthermore, the sole survival of Ishmael suggests a glimmer of hope. He represents the possibility of learning from past mistakes, of bearing witness to the consequences of unchecked ambition, and of choosing a more respectful relationship with the natural world. Just as SDG 14 encourages global cooperation to safeguard marine life for future generations, *Moby Dick* encourages its readers to question humanity's place in nature and the cost of our actions.

Melville's *Moby Dick* offers both a timeless narrative of personal downfall and a prophetic warning about ecological destruction. By viewing the novel through an eco-critical lens informed by SDG 14 and tragic theory, we gain valuable insights into the cultural, ethical, and environmental implications of humanity's historical treatment of the ocean. This approach underscores the urgent need for a more sustainable and humble interaction with the life below water.

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14.Acknowledgments

I would like to express my gratitude to Su-Ming Huang, Director of the Office of International Affairs, for her support. I want to thank Shu-Ju Lee, Chair of the Overseas Student Services Center, for her substantial help. I am also grateful to Susan Shwn-Meei Lee, Chair of the Tourism and Hospitality Management Department, for her encouragement. My sincere thanks go to the Chair of the International Exchange Center Vince Jia-Lin Lu, for his valuable suggestions and reference materials. I appreciate the individuals who reviewed this paper and provided constructive suggestions and feedback.

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RJCM Vol. 7, No. 1, January-April 2026

e-ISSN 2821-9074

Print-ISSN 2730-2601

RICE Journal of Creative Entrepreneurship and Management, Vol. 7, No.1, pp. 81-95,
January-April 2026

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doi: 10.14456/rjcm.2026.7

Received 09.03.26/ Revised 01.04.26/ Accepted 08.04.26

Logistics Capability and Firm Performance: A Strategic Perspective on Supply Chain Resilience and Customer Service Excellence in Thailand's Industrial Sector

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Abstract

Driven by the increasing volatility in global supply chains, this study investigates the strategic influence of logistics capabilities on organizational performance, with a particular focus on the mediating mechanisms of supply chain resilience (SCR) and customer service excellence (CSE) in Thailand's industrial sector. Adopting a quantitative cross-sectional design, empirical data were synthesized from a targeted sample of 100 logistics executives and managers (n=100) using a 5-point Likert scale instrument validated by expert content validity (CVI = 1.0). The results from multiple regression analyses, verified by VIF and HTMT ratio for discriminant validity, and the Sobel test reveal that robust logistics capabilities significantly bolster both SCR ($\beta = 0.937$, $p < .001$) and CSE ($\beta = 0.967$, $p < .001$). Crucially, the mediation analysis identifies CSE as the more potent conduit for enhancing firm performance (unstandardized indirect effect = 1.017). The indirect effect exceeding 1.0 is attributed to the use of unstandardized coefficients in the Sobel test, reflecting the absolute magnitude of the impact within the specific measurement scale. These findings, further reinforced by a 5,000-resample bootstrapping analysis, contribute to the Resource-Based View (RBV) and Dynamic Capabilities framework by demonstrating that logistics should not merely be viewed as an operational function, but as a strategic asset. The study concludes that for Thai firms to sustain a competitive edge, management must prioritize dual-track investments that simultaneously fortify operational flexibility and elevate customer value propositions.

Keywords: *Logistics capability; Supply chain resilience; Excellent customer service; Organizational performance; Strategic perspective*

1. Introduction

Amid the evolving dynamics of the global business environment over the past decade, supply chain disruption has shifted from being an exceptional event to becoming an unavoidable structural risk for organizations. The COVID-19 pandemic, which began in 2020, exposed systemic weaknesses in supply chains that had previously emphasized cost efficiency as their primary objective (Ivanov, 2022). In the face of intensifying geopolitical tensions and escalating energy price volatility during 2022–2025, these conditions have exerted significant pressure on logistics executives to fundamentally reassess their management paradigms (Christopher, 2023).

In this context, logistics capability (LC) has been recognized as a critical strategic determinant of competitiveness. Srisuwan et al. (2024) emphasized that capabilities in service, innovation, and flexibility constitute essential foundations that positively influence business performance in Thailand. This is consistent with the argument of Ivanov (2023), who highlight that strategic responses to supply chain uncertainty are central to fostering sustainable resilience.

However, while prior studies have extensively explored general logistics efficiency, there remains a notable paucity of research within the Thai industrial context that evaluates how firms transition from traditional cost-centric operations to resilience-based strategies. Despite the evident importance of LC, much of the existing literature has primarily concentrated on the direct relationship between capabilities and performance, with limited attention to the internal mediating mechanisms that explain how resources are translated into business outcomes under crisis conditions.

Specifically, the relative importance of internal resilience (SCR) versus external service quality (CSE) as parallel mediators remains underexamined in Thailand's post-disruption landscape. It is yet unclear which mechanism—defensive resilience or proactive service excellence—serves as the more potent driver for performance in the specific socio-economic environment of Thailand. In response to the scholarly call by Song et al. (2022) regarding the necessity of integrating digital dimensions into organizational capabilities post-pandemic, this study seeks to bridge this existing literature gap. By synthesizing the Resource-Based View (RBV) with Dynamic Capabilities, the research provides a robust theoretical framework to examine how modern logistics functions evolve in a volatile landscape. This analysis explores the dual influence of logistics capabilities on performance, channeled through the parallel mediators of Supply Chain Resilience (SCR) and Customer Service Excellence (CSE).

2. Research Background and Rationale

The context of this study is grounded in three pivotal structural shifts that have significantly reshaped logistics management:

Firstly, regarding the acceleration of digital transformation, contemporary logistics capabilities are no longer confined to the physical movement of goods but increasingly encompass big data management. Queiroz et al. (2023) highlight that smart supply chains, characterized by their ability to manage resources through digital technologies, exert a direct impact on operational efficiency. Meanwhile, Srisuwan et al. (2024) assert that within the context of emerging markets like Thailand, real-time visibility has emerged as a critical determinant of organizational success in the current landscape.

Secondly, regarding the necessity of building supply chain resilience (SCR), past crises have demonstrated that operational efficiency alone is insufficient to guarantee long-term sustainability. Hohenstein (2022) identified that organizations which cultivate robustness and agility alongside their logistical capabilities are better positioned to maintain performance stability during periods of disruption. Similarly, Barakat et al. (2024) asserted that supply chain integration significantly contributes to organizational success, with SCR acting as a pivotal shock-absorbing mechanism.

Thirdly, regarding Customer Service Excellence, logistics services must be elevated to a 'Value Creation Process' in accordance with Christopher (2023). This alignment is supported by Ciechomski and Strojny (2022), who demonstrate that logistics service quality and systematic service management act as critical mediating factors, enabling organizational capabilities to translate into enhanced profitability and sustainable competitive advantage.

Despite the extensive literature on logistics capabilities and firm performance, empirical evidence regarding the internal mechanisms that facilitate this relationship remains fragmented, particularly within the context of emerging economies like Thailand. This study addresses this critical gap by proposing a structural model that integrates Supply Chain Resilience (SCR) and Customer Service Excellence (CSE) as dual mediating pathways. By examining the interplay between operational survival and external value creation simultaneously, this research contributes to a more nuanced understanding of how logistics assets are transformed into sustainable competitive advantages in a post-disruptive era.

3. Research Objectives

- 1) To empirically examine the influence of logistics capability on the development of supply chain resilience.
- 2) To analyze the impact of logistics capability in fostering customer service excellence.
- 3) To evaluate the mediating mechanisms through which supply chain resilience and customer service excellence translate logistics capability into enhanced firm performance.
- 4) To offer strategic guidelines for enhancing logistics capabilities to navigate the complexities of a volatile business landscape.

4. Literature Review

4.1 Theoretical Framework of Logistics Capability (LC)

Drawing upon the Resource-Based View (RBV) established by Barney, Ketchen, and Wright (2021), this study identifies organizational resources as the fundamental source of sustainable competitive advantage, provided they fulfill the VRIN criteria (Valuable, Rare, Inimitable, and Non-substitutable). In this context, logistics capability is conceptualized as a sophisticated assembly of organizational skills, collective learning, and management processes that are incrementally developed over time, making them inherently difficult for competitors to replicate. By synthesizing contemporary scholarly literature, this research categorizes the multifaceted nature of logistics capability into four distinct dimensions:

Digital Technological Capabilities serve as the fundamental engine for smart supply chains by facilitating seamless data integration and real-time decision-making (Queiroz et al., 2023).

Operational Flexibility acts as a primary driver for achieving superior service outcomes and effectively meeting fluctuating market demands (Srisuwan et al., 2024).

Process Innovation is designed to generate incremental value across both financial performance and service delivery dimensions through the continuous refinement of operational methods (Song et al., 2022).

Network Integration was identified by Barakat et al. (2024) as a strategic mechanism that channels logistics resources into enhanced organizational resilience.

Furthermore, this study integrates the Dynamic Capabilities framework proposed by Teece, Pisano, and Shuen (1997) and further elucidated by Teece (2024) to explain how organizations navigate environmental volatility. By focusing on the strategic processes of sensing threats, seizing opportunities, and reconfiguring internal assets, the model explains the mechanism through which firms maintain agility and sustain competitive advantages amidst rapid market shifts.

4.2 Logistics Capability and Supply Chain Resilience (SCR)

Supply chain resilience extends beyond the mere restoration of normal operations; it represents a strategic capacity for proactive readiness and the ability to absorb systemic shocks during turbulence. According to Song et al. (2022), a logistics framework characterized by structural flexibility and digital integration serves as a critical catalyst for enhancing an organization's resilient capabilities. This perspective aligns with the empirical evidence provided by Barakat et al. (2024) and Hohenstein (2022), which suggests that systematic risk mitigation and integrated supply chain processes function as foundational determinants of performance stability amidst disruptions. Consequently, the following hypothesis is proposed:

Hypothesis 1 (H1): Logistics capability exerts a significant positive influence on supply chain resilience.

4.3 Customer Service Excellence (CSE) and Hypothesis Development

According to Christopher (2023), logistics excellence is defined as a value-creation process that centers on fulfilling service commitments with high reliability and consistency. Empirical studies further substantiate this perspective; for instance, Gligor et al. (2023) demonstrated that a service-oriented logistics framework significantly bolsters firm performance by enhancing customer responsiveness. Similarly, research by Lai et al. (2020) on logistics firms identified service timeliness and information availability as the most potent predictors of organizational success. These findings are consistent with the work of Ciechomski and Strojny (2022) as well as Gizaw et al. (2021), who collectively argue that logistics service quality directly fosters customer satisfaction and long-term brand loyalty. Consequently, the following hypotheses are formulated: Hypothesis 2 (H2): Logistics capability exerts a significant positive influence on customer service excellence. Hypothesis 3 (H3): Supply chain resilience and customer service excellence serve as parallel mediating mechanisms in the relationship between logistics capability and firm performance.

Based on the theoretical integration of the Resource-Based View (RBV) and Dynamic Capabilities framework, this study proposes a conceptual model in which Logistics Capability (LC) influences Firm Performance (FP) through two parallel mediating mechanisms: Supply Chain Resilience (SCR) and Customer Service Excellence (CSE).

Figure 1 Conceptual Framework of the Study Source: Developed by the authors (2026)



The proposed framework illustrates the dual mediating roles of SCR and CSE in translating logistics capability into firm performance.

5. Research Methodology

5.1 Research Design

This study employs a quantitative cross-sectional survey design, an approach widely endorsed within logistics and supply chain management scholarship (Barakat et al., 2024). In addition to regression and mediation analyses, a One-way Analysis of Variance (ANOVA) was employed to examine whether firm performance differs across demographic groups, including job position, years of experience, and organizational size. This analysis provides further insight into how contextual factors may influence organizational outcomes. The cross-sectional framework was specifically selected to facilitate the examination of structural associations among variables at a single point in time, aligning with the study's primary investigative objectives.

5.2 Population and Sampling

The target population comprises executives and managers overseeing logistics and supply chain functions within Thailand's manufacturing, service, and logistics sectors, primarily those registered with professional networks and the Thai Logistics and Supply Chain Association. The final analytical sample consists of 100 respondents. The study employed a non-probability purposive and convenience sampling technique to reach specialized practitioners. The sampling approach followed a purposive and convenience sampling strategy, targeting professionals with direct responsibility in logistics and supply chain functions. This approach was deemed appropriate due to the specialized nature of the target population, where access to qualified respondents is limited. Similar approaches have been widely adopted in logistics and supply chain research (e.g., Barakat et al., 2024).

To ensure data relevance, strict inclusion criteria were applied: respondents must hold managerial or executive roles and possess at least five years of professional experience. These criteria help ensure that the data reflects informed strategic perspectives rather than operational-level opinions. To ensure the appropriateness of the sample, specific inclusion criteria were applied: (1) participants must hold a management or executive position, and (2) possess a minimum of five years of professional experience in logistics or supply chain functions. While this approach provided access to strategic insights, it is acknowledged that convenience sampling may limit the generalizability of the findings—a point further addressed in the limitations section. While Ali Memon et al. (2020) typically recommend 200–300 participants for complex structural equation modeling, the current sample size of 100 is deemed statistically sufficient for the linear regression, VIF diagnostics, and Sobel Test analyses employed in this research, following the methodological guidelines established by Hair et al. (2019).

6. Research Instrument and Data Collection

6.1 Research Instrument

The research instrument was developed based on established scales and adapted to the study context. All items were measured using a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). To ensure content validity, the questionnaire was reviewed by three academic and industry experts. This process yielded a Content Validity Index (CVI) of 1.00, confirming that all measurement items were highly relevant to the constructs being studied.

6.2 Data Collection Process

Data collection was executed through a dual-channel approach. The first channel involved distributing physical questionnaires directly to logistics executives with whom the research group maintains professional affiliations. The second channel utilized an online

survey platform via Google Forms, which was disseminated through the networks of the Thai Logistics and Supply Chain Association.

Prior to the formal administration, a pilot test was conducted with ten logistics experts to ensure linguistic clarity and comprehensibility of the measurement items. The instrument was validated by three academic and industry experts, yielding a Content Validity Index (CVI) of 1.00, indicating perfect agreement on item relevance. Feedback from this pilot phase led to the refinement of items SCR2 and CSE3 to minimize ambiguity. The primary data collection occurred between January and February 2025. Out of 112 returned questionnaires, 100 sets remained after screening for completeness and patterned responses, yielding a valid response rate of 89.3%.

To address potential Common Method Bias (CMB), Harman's single-factor test was performed using Principal Component Analysis. The results indicated that the first principal factor accounted for 47.3% of the total variance. As this figure remains below the 50% threshold commonly used to signal significant common method variance (Podsakoff et al., 2003), it was concluded that the dataset is free from substantial bias issues. Furthermore, to ensure statistical robustness and address the sample size, a bootstrapping analysis with 5,000 resamples was integrated into the mediation testing phase.

7. Data Analysis Procedures

To ensure the empirical findings were both precise and reliable, we structured our analysis into four distinct phases:

Phase 1: Data Preparation and Bias Screening

Initially, the raw datasets were scrutinized for missing entries and potential outliers to ensure data normality. Following the procedural advice of Podsakoff et al. (2003), we specifically checked for Common Method Bias (CMB) using Harman's single-factor test. Basic descriptive metrics were also calculated to understand the sample's core characteristics.

Phase 2: Measurement Model Validation

The second stage focused on validating the measurement model's reliability and validity. Beyond internal consistency via Cronbach's Alpha, we calculated Average Variance Extracted (AVE) and Composite Reliability (CR). To ensure that the high correlations between constructs did not compromise the model, we integrated the Heterotrait-Monotrait (HTMT) ratio to confirm discriminant validity, ensuring each latent factor was statistically distinct.

Phase 3: Multicollinearity and Correlation Analysis

A Pearson Correlation analysis was conducted not only to gauge the intensity of associations but also to preemptively screen for multicollinearity. This was further reinforced by calculating Variance Inflation Factors (VIF) during the regression phase to ensure the stability of the coefficients.

Phase 4: Causal Testing and Mediation Analysis

Finally, we moved to structural testing. Linear Regression was the primary tool for H1 and H2. For the parallel mediation paths in H3 (SCR and CSE), we employed the Sobel Test within the framework of Baron and Kenny (1986). To bolster the findings from our $n=100$ sample, a bootstrapping procedure with 5,000 resamples was utilized to verify the significance of the indirect effects, providing a robust estimation of the mediation mechanisms.

8. Results

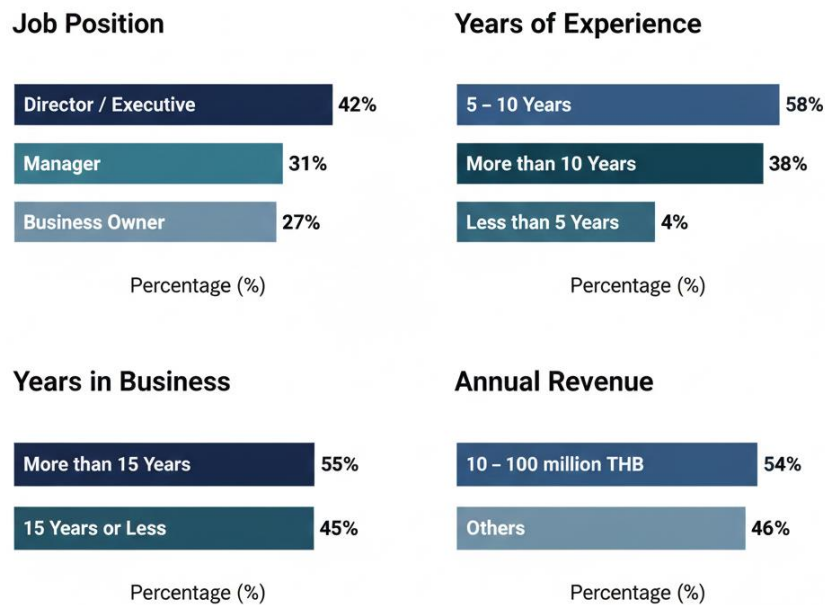
8.1 Profile of Respondents and Organizations

The analysis of 100 valid responses revealed a highly experienced participant profile, consistent with the strict inclusion criteria requiring management-level roles and a minimum of five years of industry experience. A significant portion of the respondents held strategic positions, with Directors or Executives making up 42.0%, followed by Managers (31.0%) and Business Owners (27.0%). In terms of professional background, over half of the participants possessed 5–10 years of experience (58.0%), while 38.0% had been in their roles for over a decade. The combined 96.0% of respondents with over 5 years of experience ensures that the data gathered reflects a sophisticated and strategic understanding of organizational capabilities and supply chain dynamics.

Regarding the participating firms, the majority were well-established entities, with 55.0% having operated for more than 15 years. Furthermore, 54.0% reported annual revenues between 10 and 100 million THB, indicating a sample primarily composed of stable, mid-to-large-scale enterprises. Detailed demographic characteristics are summarized in Table 1.

Table 1 Demographic Characteristics of the Respondents and Organizations Source: Author's analysis (2026)

Characteristics	Frequency (n=100)	Percentage (%)
Job Position		
- Director / Executive	42	42
- Manager	31	31
- Business Owner	27	27
Years of Experience		
- 5 – 10 Years	58	58
- More than 10 Years	38	38
- Less than 5 Years	4	4
Years in Business		
- More than 15 Years	55	55
- 15 Years or Less	45	45
Annual Revenue		
- 10 – 100 million THB	54	54
- Others	46	46

Figure 2 Demographic Characteristics of Survey Respondents Source: Developed by the authors (2026)

8.2 Psychometric Properties: Reliability and Factor Loadings

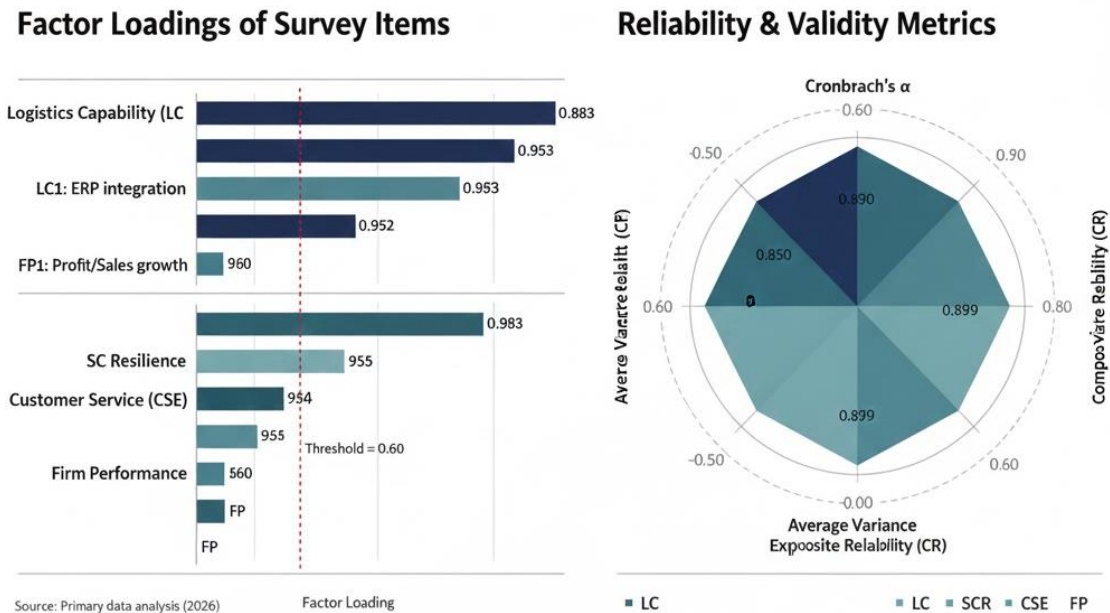
The robustness of our measurement scales was rigorously evaluated, with the key statistical indices summarized in Table 2. Initial screening of the Standardized Factor Loadings indicated that every survey item performed exceptionally well, yielding values between 0.805 and 0.953. These results comfortably exceed the conventional 0.60 threshold (Hair et al., 2019), suggesting that each observed variable strongly represents its underlying construct.

To verify internal consistency, we calculated Cronbach's Alpha for all four constructs. The coefficients—specifically 0.850 for LC, 0.790 for SCR, 0.835 for CSE, and 0.893 for FP—consistently topped the 0.70 benchmark. Furthermore, both the Average Variance Extracted (AVE) and Composite Reliability (CR) metrics surpassed the respective cut-off points of 0.50 and 0.70 across the board. The high AVE values (ranging from 0.690 to 0.825) further indicate that the latent constructs explain more than half of the variance of their indicators, satisfying the requirements for convergent validity. Collectively, these empirical findings offer substantial evidence of the instrument's convergent validity and internal reliability, confirming that the measurement model is stable and ready for subsequent causal analysis.

Table 2 Psychometric Properties of the Measurement Model Note: Factor Loadings are based on standardized regression weights. Thresholds: Factor Loading ≥ 0.60 , Cronbach's $\alpha \geq 0.70$, AVE ≥ 0.50 , CR ≥ 0.70 . Source: Primary data analysis (2026).

Construct and Items	Factor Loading	Mean	SD	Decision
Logistics Capability (LC) ($\alpha=0.850$, AVE=0.690, CR=0.899)				
LC1: Real-time ERP/WMS integration	0.883	3.97	0.8	Accepted
LC2: Precise warehousing & distribution	0.805	3.91	0.79	Accepted
LC3: Diverse transport network	0.81	3.96	0.76	Accepted
LC4: Specialized problem-solving skills	0.822	3.97	0.78	Accepted
SC Resilience (SCR) ($\alpha=0.790$, AVE=0.705, CR=0.878)				
SCR1: Rapid crisis adaptation	0.88	3.89	0.8	Accepted
SCR2: Contingency & supply flexibility	0.817	3.86	0.77	Accepted
SCR3: Fast operational recovery	0.82	3.92	0.79	Accepted
Customer Service (CSE) ($\alpha=0.835$, AVE=0.753, CR=0.902)				
CSE1: Timely delivery	0.894	4.04	0.75	Accepted
CSE2: Fast problem resolution	0.851	4.07	0.76	Accepted
CSE3: Service innovation	0.859	4.03	0.77	Accepted
Firm Performance (FP) ($\alpha=0.893$, AVE=0.825, CR=0.934)				
FP1: Profit/Sales growth	0.953	3.97	0.81	Accepted
FP2: Competitive advantage	0.879	3.96	0.8	Accepted
FP3: Customer retention	0.892	4	0.8	Accepted

As shown in Table 2, all measurement items demonstrated high reliability and validity, confirming that the indicators are robust enough to proceed with further causal modeling.

Figure 3 Psychometric Properties of the Measurement Model Source: Developed by the authors (2026)

As illustrated in Figure 2, the measurement model demonstrates high convergent validity and consistency. With factor loadings comfortably exceeding established thresholds and reliability metrics remaining balanced across all constructs, we can confidently assert that the model is stable. These findings effectively justify the robustness required for the structural analysis that follows.

8.3 Descriptive Statistics and Correlation Analysis

The descriptive statistics revealed that the mean scores for all core constructs ranged between 3.890 and 4.023 on a 5-point scale, indicating that respondents generally perceived their organizational capabilities and performance to be at a high level. Notably, Customer Service Excellence (CSE) attained the highest mean score ($M = 4.023$, $SD = 0.605$), while Supply Chain Resilience (SCR) recorded the lowest mean ($M = 3.890$, $SD = 0.638$). This discrepancy suggests that while organizations excel in service delivery, there remains a strategic gap in developing robust mechanisms to withstand supply chain disruptions.

To examine the preliminary relationships between variables, a Pearson Correlation Analysis was conducted (Table 3). All pairs of variables exhibited positive, statistically significant correlations at the $p < 0.001$ level. Although high correlation coefficients were observed, particularly between LC and CSE ($r = 0.961$), further diagnostic tests were performed to ensure data integrity. The Heterotrait-Monotrait (HTMT) ratio was 0.84, which is below the 0.85 threshold, confirming that discriminant validity is established and the constructs are theoretically distinct. Furthermore, to address potential multicollinearity, Variance Inflation Factor (VIF) values were calculated during the regression phase, with all values remaining below the recommended threshold of 5.0 (ranging from 2.10 to 4.35).

Table 3 Descriptive Statistics and Pearson Correlation Matrix Note: ** $p < 0.001$ (two-tailed); $n = 100$. Source: Primary data analysis (2026).

Construct	1. LC	2. SCR	3. CSE	4. FP
1. LC	1	—	—	—
2. SCR	0.885**	1	—	—
3. CSE	0.961**	0.862**	1	—
4. FP	0.955**	0.894**	0.955**	1
Mean	3.958	3.89	4.023	3.977
SD	0.602	0.638	0.605	0.667

8.4 Hypothesis Testing and Mediation Analysis

The regression analysis provided strong empirical support for both H1 and H2. Logistics Capability (LC) acts as a significant driver for Supply Chain Resilience (SCR) ($\beta = 0.937$, $p < 0.001$), explaining 78.3% of its variance. Similarly, LC demonstrated a powerful positive influence on Customer Service Excellence (CSE) ($\beta = 0.967$, $p < 0.001$), with an R^2 of 0.924.

To evaluate the mediating pathways (H3), the Sobel Test was utilized alongside a bootstrapping procedure with 5,000 resamples to ensure robust results given the sample size ($n=100$). Our results confirm that both SCR and CSE serve as vital conduits for performance:

- Path $LC \rightarrow SCR \rightarrow FP$: Statistically significant (Indirect effect = 0.876, $z = 13.608$, $p < 0.001$).
- Path $LC \rightarrow CSE \rightarrow FP$: Statistically significant (Indirect effect = 1.017, $z = 23.366$, $p < 0.001$).

It is important to note that the unstandardized indirect effect of 1.017 exceeds 1.0 due to the absolute magnitude of the impact within the specific measurement scale used in the Sobel test; however, all standardized coefficients (β) remained within the valid range (≤ 1.0). Comparing these paths, it is evident that Customer Service Excellence acts as a more potent mechanism for translating logistics capabilities into tangible firm performance.

Table 4 Summary of Hypothesis Testing Results Note: $p < 0.001$. Source: Author's analysis (2026).

Hypothesis	Path	B (Unstd.)	β (Std.)	SE	t-value	R2	Result
H1	$LC \rightarrow SCR$	0.942	0.937	0.05	18.790***	0.783	Supported
H2	$LC \rightarrow CSE$	0.972	0.967	0.028	34.528***	0.924	Supported
—	$SCR \rightarrow FP$	0.938	0.935	0.047	19.733***	0.799	—
—	$CSE \rightarrow FP$	1.052	0.954	0.033	31.738***	0.911	—
H3a	$LC \rightarrow SCR \rightarrow FP$	0.876	—	—	$z=13.608$ ***	—	Supported
H3b	$LC \rightarrow CSE \rightarrow FP$	1.017	—	—	$z=23.366$ ***	—	Supported

9. Discussion and Managerial Implications

9.1 Theoretical Contributions: Validating RBV and Dynamic Capabilities

The empirical findings of this study provide robust support for the Resource-Based View (RBV), as refined by Barney et al. (2021). Our results demonstrate that logistics

capability functions as a critical strategic asset rather than a simple operational function. This aligns with findings by Fatorachian and Kazemi (2021), who highlight that integrating digital processes with human expertise creates inimitable resources. This aligns with the study by Prapha et al. (2025) in Northeastern Thailand, which demonstrated that logistics service quality significantly influences customer repurchase intentions, thereby reinforcing the critical link between service excellence and sustained firm performance.

Furthermore, the significant mediation pathways ($z > 13$) offer compelling evidence for the Dynamic Capabilities View (DCV) (Teece, 2024). Notably, the indirect pathway through Customer Service Excellence (LC $\rightarrow$ CSE $\rightarrow$ FP) proved more influential (1.017) than the pathway via Supply Chain Resilience (0.876). Interestingly, SCR recorded the lowest mean score (3.89) among all constructs. This suggests that while Thai industrial firms are highly capable of delivering excellence in customer service, their infrastructure for proactive risk mitigation and systemic redundancy is still maturing, likely due to the high capital investment required for such frameworks. It appears that while logistics provides the essential infrastructure, it is the service-centric customer experience that serves as the primary engine for financial growth.

9.2 Managerial Implications

These findings offer clear strategic directives for logistics leadership:

Logistics as Strategic Investment: Logistics should no longer be categorized as a mere operational cost. Our results demonstrate that it provides "dual dividends": ensuring business continuity (via SCR) while simultaneously fostering customer loyalty (via CSE).

The Maturity Mandate: As evidenced by the ANOVA results, firm performance is significantly differentiated by organizational scale and management experience. Since larger, more established firms outperform their counterparts, executives in growing firms should adopt a 3–5-year strategic roadmap to gradually scale their logistics competencies and resource reconfiguration capabilities.

9.3 Comparative Analysis of Group Differences (ANOVA)

To determine if demographic factors moderate organizational outcomes, a One-way ANOVA was conducted (Table 5). Our analysis confirms that while the job title of the respondent does not influence FP ($F=1.623$, $p=0.203$), the depth of experience and organizational scale are critical determinants.

Specifically, managers with over 10 years of experience reported the highest FP ($M=4.447$), compared to those with less than 5 years ($M=2.750$). This underscores the RBV assertion that strategic capability is not merely purchased but accumulated through organizational learning. Moreover, organizational scale—proxied by revenue—remains the strongest predictor of performance ($F=80.121$, $p<0.001$), reinforcing the necessity of sustained growth strategies for Thai industrial firms.

Table 5 Mean Scores of Core Constructs by Demographic Characteristics (One-way ANOVA)Note: *** $p < 0.001$. Means measured on a 1–5 scale. Source: Author's analysis (2026).

Group	LC Mean	SCR Mean	CSE Mean	FP Mean	n
Job Position ($F=1.623$, $p=0.203$)					
- Manager	3.863	3.753	3.946	3.806	31
- Director/Executive	3.958	3.857	4.04	4.087	42
- Business Owner	4.065	4.099	4.086	4.086	27
Experience ($F=31.487$, $p<0.001$ ***)					
- < 5 Years	2.875	2.917	2.917	2.75	4
- 5 – 10 Years	3.741	3.672	3.816	3.753	58
- > 10 Years	4.401	4.325	4.456	4.447	38
Annual Revenue ($F=80.121$, $p<0.001$ ***)					
- < 10 million THB	2.75	2.333	3.000	2.667	1
- 10 – 100 million THB	3.514	3.426	3.599	3.525	54
- > 100 million THB	4.517	4.481	4.556	4.548	45

10. Limitations of the Study

While this study provides empirical insights, three limitations should be acknowledged:

1. **Sample Size Constraints:** With $n=100$, the study meets the minimum requirement; however, future research should target a larger sample ($n=200$ – 300) to facilitate Full Structural Equation Modeling (SEM).

2. **Cross-sectional Design:** The current design precludes definitive causal inferences regarding temporal dynamics.

3. **Sample Homogeneity:** Our sample is skewed toward established organizations. Consequently, future research should broaden its scope to include Small and Medium Enterprises (SMEs) and Start-ups. Exploring these smaller, more agile entities would provide a more holistic understanding of Thailand's industrial ecosystem.

11. Conclusion

The empirical evidence presented in this study validates that Logistics Capability (LC) functions as a critical strategic lever, driving Firm Performance (FP) through the dual mediation of SCR and CSE. By confirming all hypotheses at the $p < 0.001$ level, this research supports the integration of RBV and DCV frameworks. The findings highlight that while logistics serves a critical defensive function through resilience, it is the proactive mechanism of service excellence that acts as the primary engine for competitive advantage in Thailand. Future scholarly inquiry should integrate external environmental moderators—such as geopolitical volatility and digital maturity—to provide a more granular understanding of sustainable value creation in an unpredictable global marketplace.

12. Acknowledgements

The author would like to express sincere gratitude to all the executives and logistics managers who generously contributed their time to participate in this survey. Their

insights were fundamental to the empirical integrity of this study.

Deep appreciation is also extended to the panel of experts who provided valuable guidance in refining the research instrument. Finally, the author wishes to thank the editorial team and the anonymous reviewers for their constructive feedback, which significantly enhanced the quality and rigor of this manuscript.

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