

DEVELOPMENT OF A SUSTAINABLE CONSTRUCTION INDUSTRY IN THE BANGKOK METROPOLITAN AREA AND ITS VICINITY

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ABSTRACT

This research aimed to: (1) examine the level of sustainable construction industry development in the Bangkok Metropolitan Area and its vicinity; and (2) investigate the factors influencing sustainable construction industry development in the Bangkok Metropolitan Area and its vicinity. A questionnaire was employed as the research instrument to collect data from 400 managing directors of registered juristic-person construction firms located in Bangkok and its surrounding metropolitan areas. The statistical techniques used for data analysis included frequency, percentage, mean, standard deviation, and multiple regression analysis. The findings revealed that: (1) the managing directors of registered construction firms in Bangkok and its vicinity rated the level of sustainable construction industry development at a high level in terms of international competitiveness, market access, environmental friendliness, and zero-accident operations, respectively; and (2) government policy factors, entrepreneurial capability, construction material and equipment management, and construction management strategies significantly influenced sustainable construction industry development in the Bangkok Metropolitan Area and its vicinity.

Keywords: Construction Industry, Sustainability, Bangkok Metropolitan Area and Vicinity

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INTRODUCTION

The construction business is one of the key industries in the Thai economy due to its strong linkages with various related industries, such as construction materials and real estate development (Nirattisai Thumwongsa, 2019). Currently, there are more than 100,000 registered juristic construction entities in Thailand (Department of Business Development, 2020). Among these, large enterprises account for only about 1 percent of the total number of operators; however, they hold approximately 25 percent of the total construction market value.

The cost structure of the construction industry consists of approximately 60 percent construction materials (such as steel, concrete, and cement), 20 percent labor costs, and 20 percent other expenses. Construction material prices typically fluctuate according to exchange rates, global commodity prices—particularly metals—and fuel prices. The industry is also exposed to multiple risk factors, including political and economic uncertainty, local living conditions, regulatory requirements in project locations, volatility in steel prices, and labor shortages in both quantity and skill levels. In recent years, the industry has also been affected by Thailand's economic slowdown since 2019. (Bank of Ayudhya, 2022)

During 2023–2024, total construction investment accounted for an average of 8.1 percent of Thailand's gross domestic product (GDP). Construction projects are divided into public and private sectors. In 2021, public construction accounted for 59.41 percent of total construction value. Of this, 82 percent was infrastructure investment, 16 percent government building construction, and 2 percent official housing. Large contractors tend to have advantages in securing public infrastructure projects due to their expertise, financial capacity, and technological development. Small and medium-sized enterprises (SMEs) typically participate as subcontractors. In the private sector, residential construction represents 52 percent of total private construction value, followed by industrial and commercial buildings (20 percent) and other projects such as hotels and hospitals (28 percent) (NESDC, 2023)

In 2024, overall construction investment is expected to grow at a slower and uneven pace. Kasikorn Research Center projects total construction investment to reach approximately 1.40 trillion baht, expanding by around 1.9 percent year-on-year, but still below pre-COVID averages. The delay in public budget disbursement has resulted in project acceleration mainly in the second half of the year. Public infrastructure remains the core driver of construction investment, while private residential investment has slowed. For 2025, overall construction investment is expected to grow modestly at around 1.0–2.0 percent. Although public investment is projected to expand, private sector investment may decline slightly due to a weak property market and stricter credit conditions. However, foreign direct investment (FDI) relocation trends may stimulate demand for factory and warehouse construction.

Sustainable construction development goes beyond increasing project volume. It requires consideration of environmental, social, and governance (ESG) impacts throughout the entire supply chain—from design and procurement to construction, operation, demolition, and recycling. Globally, the building and construction sector is a major contributor to energy consumption and greenhouse gas emissions, particularly through embodied carbon in materials such as cement and steel (UNEP & GlobalABC, 2025). Thailand's 13th National Economic and Social Development Plan (2023–2027) emphasizes sustainable growth, livable cities, and environmental resilience. Policies such as the Bio-Circular-Green (BCG) Economy Model and the Building Energy Code (BEC) aim to enhance energy efficiency and environmental performance in construction projects.

In Bangkok and its metropolitan region, environmental challenges such as PM2.5 pollution, urban flooding, and climate-related risks further highlight the importance of sustainable construction practices. Therefore, construction firms must adapt through compliance with government policies, research and development, enhanced managerial capability, improved material management, and strategic construction management approaches. Effective construction management strategies should integrate cost, time, quality, safety, and environmental considerations to ensure resilience, reduce community impact, and strengthen long-term competitiveness.

Accordingly, this study aims to investigate “Sustainable Construction Industry Development in Bangkok and Its Metropolitan Region” in order to provide policy recommendations and strategic guidelines that support business success and long-term sustainability.

LITERATURE REVIEWS

1) Concepts and Theoretical Frameworks Related to Sustainability in the Construction Industry
The concept of sustainable development aims to promote economic growth alongside environmental protection and social equity. This framework can be explained through the “Triple Bottom Line (TBL)” concept, which consists of three dimensions: economic, social, and environmental (Elkington, 1997). This aligns with modern management approaches that emphasize ESG (Environmental, Social, Governance) principles and stakeholder disclosure (Freeman, 2019). At the sectoral level, the building and construction sector is recognized as one of the largest consumers of energy and emitters of greenhouse gases. It is also associated with embodied carbon from major materials such as cement and steel. The Global Status Report for Buildings and Construction (2024/2025) indicates that buildings account for approximately 32% of global energy demand and about 34% of CO₂ emissions in 2023, highlighting the critical role of materials such as cement and steel in greenhouse gas emissions (UNEP & GlobalABC, 2025).

Therefore, sustainable construction industry development does not merely refer to increasing construction output, but to enhancing efficiency and responsibility throughout the value chain—from design, procurement, construction, operation and maintenance, to end-of-life demolition and recycling. The focus is on reducing environmental impacts, improving worker safety, and strengthening transparent and accountable governance (UNEP & GlobalABC, 2025).

Indicators of Sustainable Construction Industry Development

- 1) International Competitiveness
International competitiveness in the construction industry refers to the ability of firms to win contracts, maintain quality, deliver on time, control costs, and differentiate through innovation under global competition. Porter’s Diamond Model explains that competitiveness arises from factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry (Porter, 2019). In construction, this is reflected in skilled labor readiness, specialized expertise, supply chain systems, capital access, technology adoption (e.g., BIM and industrialized construction), and compliance with safety and environmental standards.
- 2) Stock Market Listing
Stock market listing reflects corporate institutionalization in finance, governance, and transparency. Being publicly listed enhances governance requirements, performance reporting, and sustainability disclosure. In Thailand, regulatory authorities emphasize ESG disclosure in the 56-1 One Report and align guidelines with international standards such as ISSB/IFRS S1–S2.
- 3) Zero Accident / Zero Harm
The Zero Accident Vision emphasizes eliminating workplace injuries and losses through proactive safety culture, systematic risk assessment, worker participation, and continuous improvement (Zwetsloot et al., 2017). ISO 45001 provides an international framework for occupational health and safety management systems.
- 4) Environmental Friendliness
Environmental friendliness includes reducing energy consumption and greenhouse gas emissions, minimizing pollution, improving resource efficiency, reducing waste, and using low-carbon materials, addressing both operational and embodied carbon (UNEP & GlobalABC, 2025).

Factors Influencing Sustainable Construction Industry Development

- 1) Government Policy
Government policy functions as both a direction-setting mechanism and regulatory/incentive framework influencing business behavior. Under institutional theory, policies act as coercive pressures requiring organizational adaptation (DiMaggio & Powell, 2020).
- 2) Entrepreneurial Capability
Explained through the Resource-Based View (RBV) and Dynamic Capabilities, sustainable development requires valuable, rare, inimitable, and well-managed resources (Barney, 2019).
- 3) Construction Materials and Equipment Management
Materials management links cost, quality, time, safety, and environmental impacts, particularly due to embodied

carbon in cement and steel (UNEP & GlobalABC, 2025) 4) Construction Management Strategy Construction management strategy integrates cost, time, quality, safety, and environmental objectives across project phases. Key strategies include sustainable design, preventive safety management, pollution control, climate resilience, and stakeholder engagement (UNEP & GlobalABC, 2025).

Hypothesis: H1 : Government policy, entrepreneurial capability, materials and equipment management, and construction management strategy significantly influence sustainable construction industry development in Bangkok and its metropolitan area. the conceptual framework is illustrated in Figure 1.

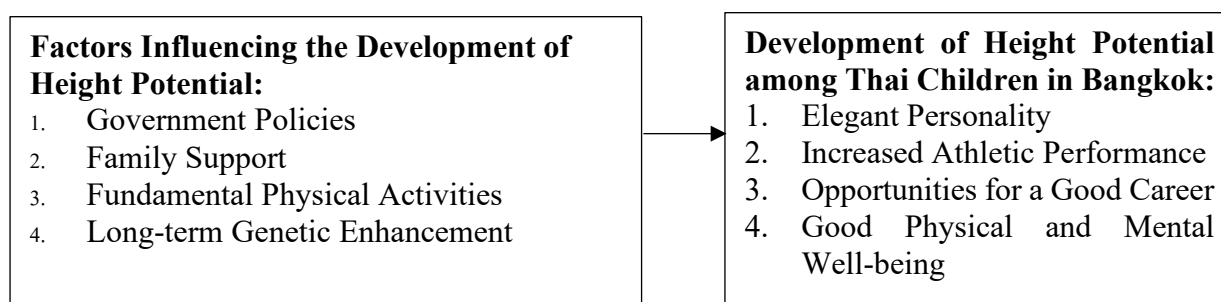


Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

The population consisted of 52,940 managing directors of registered construction firms located in Bangkok and its metropolitan area (Department of Business Development, 2024). Using 20 observed variables (Grace, 2008), the appropriate sample size was 400, selected through stratified sampling.

The research instrument was a questionnaire comprising three sections: personal factors; influencing factors measured using a 5-point Likert scale; and sustainable construction industry development, also measured on a 5-point Likert scale.

Instrument validity (IOC = 0.812) and reliability (Cronbach's alpha = 0.918) confirmed adequacy (Polit & Beck, 2006; Hair et al., 2012). Data were analyzed using descriptive statistics and multiple regression analysis.

RESEARCH RESULTS

1) Most respondents were male (65%), aged 41–55 (63.33%), held bachelor's degrees (69%), and had monthly incomes between 5,000,001–10,000,000 Baht (56.67%).

2) The development of the sustainable construction industry was found to be at a high level, as reflected in international competitiveness, market access, environmental friendliness, and accident-free operations, respectively, as shown in Table 1.

Table 1 Mean and standard deviation of Sustainable Construction Industry Development in Bangkok and its Metropolitan Area

Aspect	Description	\bar{X}	S.D.	Result
1	International Competitiveness	3.81	0.61	Much
2	Stock Market Listing	3.65	0.47	Much
3	Zero Accident Operations	3.52	0.42	Much
4	Environmental Friendliness	3.68	0.51	Much
Total		3.67	0.42	Much

3) Government policy ($\beta = 0.232$), entrepreneurial capability ($\beta = 0.317$), materials and equipment management ($\beta = 0.142$), and management strategy ($\beta = 0.231$) were found to have positive effects on sustainable construction industry development in Bangkok and its metropolitan area, with statistical significance at the 0.05 level. The significance (Sig.) values were 0.001, 0.000, 0.007, and 0.000, respectively, which supports the proposed hypothesis.

The correlation coefficient (R) was 0.856, indicating a strong relationship between the group of independent variables and the dependent variable. The coefficient of determination was 0.641, showing that the independent variables collectively explained 64.1% of the variance in sustainable construction industry development in Bangkok and its metropolitan area.

The regression equation can be written as follows:

$$Y = 0.947 + 0.317X_2 + 0.232X_1 + 0.231X_4 + 0.142X_3$$

The regression coefficient analysis further revealed that government policy, entrepreneurial capability, materials and equipment management, and management strategy jointly predicted sustainable construction industry development in Bangkok and its metropolitan area. Among these factors, government policy had the strongest predictive effect (Beta = 0.123), followed by management strategy (Beta = 0.121), materials and equipment management (Beta = 0.092), and entrepreneurial capability (Beta = 0.043), as presented in Table 2.

Table 2 Multiple Regression Analysis of Factors Influencing Sustainable Construction Industry Development in Bangkok and its Metropolitan Area

Factors	Unstandardized (b)	SE	Standardized (β)	t	Sig.
(Fixed value)	1.121	0.106		10.632	0.000
Government Policies	0.123	0.023	0.232	8.662*	0.001
Entrepreneurial Capability	0.043	0.021	0.317	7.865*	0.000
Materials and Equipment Management	0.092	0.042	0.142	2.402*	0.007
Management Strategyt	0.121	0.106	0.231	10.632*	0.000
R = 0.856	Adjusted R ² = 0.641				
R ² = 0.730	SE = 0.142				

* Statistical significance at the 0.05 level

DISCUSSION & CONCLUSION

This study on sustainable construction industry development in Bangkok and its metropolitan area discusses the key findings in accordance with the research objectives as follows:

1) The development of the sustainable construction industry was found to be at a high level. This was reflected in international competitiveness, market access, environmental friendliness, and accident-free operations, respectively. The findings indicate that sustainable construction industry development in Bangkok and its metropolitan area has reached a high level across these dimensions. These results reflect the adaptation of construction entrepreneurs to competitive pressures and international sustainability standards. This is consistent with Olanrewaju et al. (2023), who found that integrating sustainable construction management concepts into project management systems significantly enhances competitiveness and improves operational performance in construction organizations. Similarly, Zhang et al. (2022) reported that implementing environmental management practices and safety management systems in construction projects can reduce accident risks and environmental impacts, while strengthening corporate image in the global market. These

findings align with the present study, which found that environmental friendliness and accident-free operations were rated at a high level in Bangkok and its metropolitan area.

2) Government policy, entrepreneurial capability, construction materials and equipment management, and construction management strategy were found to have statistically significant influences on sustainable construction industry development in Bangkok and its metropolitan area. The findings indicate that these factors significantly affect sustainable construction industry development. This is consistent with Li et al. (2024), who found that government policy particularly energy and environmental measures play a crucial role in driving construction organizations toward sustainable operations. Furthermore, Nguyen et al. (2021) reported that entrepreneurial capability and effective resource management are key factors influencing sustainability performance in the construction industry, especially in materials management, waste reduction, and strategic project planning. These practices enhance cost efficiency and elevate environmental standards within organizations. Therefore, the results of this study support the conclusion that structural and strategic factors play a significant role in advancing sustainable construction industry development in Bangkok and its metropolitan area.

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