STRATEGIC SUPPLY CHAIN COMPETENCE AND COLLABORATIONS ON INNOVATION CAPABILITY OF THE CONSTRUCTION INDUSTRIES IN MALAYSIA

CHEE HONG LEONG

ASIA e UNIVERSITY

2024

STRATEGIC SUPPLY CHAIN COMPETENCE AND COLLABORATIONS ON INNOVATION CAPABILITY OF THE CONSTRUCTION INDUSTRIES IN MALAYSIA

CHEE HONG LEONG

A Thesis Submitted to Asia e University in
Fulfilment of the Requirements for the
Doctor of Business Administration

September 2024

ABSTRACT

The construction industry constantly evolves, and innovation is critical to staying ahead. This study identifies effective strategies for achieving innovation capability and competence through supply chain collaboration. This research is crucial to the dynamic or adaptive capabilities theory, linking supply chain and dynamic or adaptive capabilities and identifying the factors that affect the relationship between supply chain collaboration and innovation capability. For the research, 351 construction industry members were surveyed using a quantitative methodology, and the data was analysed using Structured Equation Modelling (SEM). Nine hypotheses were tested on the correlation between supply chain partnerships, innovation capability, supplier involvement in new product development, supply chain competence, and absorptive capacity. The resulting data suggest that strategic partnerships with supply chain partners improve innovation capability and supply chain competence. Supplier involvement in new product development also positively affects supply chain competence. Supply chain competence positively correlates with innovation capability and mediates the relationship between supply chain partnerships and innovation capability. However, absorptive capacity does not moderate either of these relationships. The construction industry must recognise the importance of innovation, collaboration, and supply chain competence to stay competitive. The study's insights guide improving innovation capability and staying ahead of the competition.

Keywords: Innovation capability and competence, innovation absorptive capacity, new product developments, dynamic or adaptive capabilities.

APPROVAL

This is to certify that this thesis conforms to acceptable standards of scholarly presentation and is fully adequate, in quality and scope, for the fulfilment of the requirements for the Doctor of Business Administration.

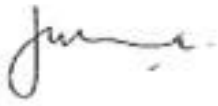
The student has been supervised by: **Professor Dr Noor Raihan Ab Hamid**

The thesis has been examined and endorsed by:

Assistant Professor Dr Dazmin Bin Daud
Assistant Professor
UCSI University
Examiner 1

Professor Dr Khairul Anuar Mohd Ali
Professor
Universiti Kebangsaan Malaysia
Examiner 2

This thesis was submitted to Asia e University and is accepted as fulfilment of the requirements for the Doctor of Business Administration



……
Professor Juhary Bin Ali
Asia e University
Chairman, Examination Committee
26 September 2024

DECLARATION

I hereby declare that the thesis submitted in fulfilment of the requirements for the Doctor of Business Administration is my own work and that all contributions from any other persons or sources are properly and duly cited. I further declare that the material has not been submitted either in whole or in part, for a degree at this or any other university. In making this declaration, I understand and acknowledge any breaches in this declaration constitute academic misconduct, which may result in my expulsion from the programme and/or exclusion from the award of the degree.

Name: Chee Hong Leong

Signature of Student: **Date**: 26 September 2024

Copyright by Asia e University

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude and appreciation to the individuals who have provided invaluable guidance, support, and assistance throughout the journey of completing this DBA thesis.

First and foremost, I am immensely grateful to my advisor, Professor Dr. Roland Xavier, for his unwavering guidance, advice, and encouragement. His expertise in the field, patience, and willingness to share his knowledge have been instrumental in shaping the direction and quality of this research. I am truly fortunate to have had such a dedicated and inspiring person.

I would also like to thank my thesis committee members, Prof Dr. Noor Raihan Ab Hamid, and all APEL team members for their valuable insights and critical feedback. Their constructive criticism helped refine my ideas and improve the overall quality of the thesis.

I also wish to record my appreciation and thanks to Prof Dato' Dr Ansary Ahmed, founder, president, and CEO, who expertly facilitated this programme and his team members, chiefly Mr. Justin Chong. Their dedication to postgraduate education and scholarly pursuits has been a constant source of inspiration.

I cannot overlook the support and encouragement from my friends and family. Their unwavering belief in my abilities and unconditional support have been my constant motivators. I am grateful for their patience, understanding, and the many sacrifices they made to ensure I had the time and resources to complete this thesis.

Lastly, I acknowledge Emeritus Professor Tan Sri Syed Jalaludin Syed Salim, who has encouraged me to pursue my DBA. He shares so much of his knowledge and wisdom

with many of us. I have always received much of his attention and guidance.

In conclusion, I would like to extend my heartfelt gratitude to all who contributed, big or small, to successfully completing this DBA thesis. Each contribution, whether intellectual, emotional, or financial, has impacted this work. I am genuinely grateful for the guidance and assistance I have received, and I am indebted to every individual who has supported me along this challenging yet rewarding journey.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATION

AMOS	Analysis of Moment Structures
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EVA	Exploratory Factor Analyses
IFI	Incremental Fit Index
KMO	Kaiser-Meyer-Olkin
ML	Maximum Likelihood
NFI	Normed Fit Index
NPD	New Product Development
R&D	Research and Development
RFI	Relative Fit Index
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
SV	Shared Variance
TLI	Tucker-Lewis Index
SPSS	Statistical Package for Social Sciences
VIF	Variance Inflation Factor

CHAPTER 1

INTRODUCTION

This chapter provides a comprehensive introduction regarding supply chain management (SCM) and its relevance in the construction industry. The construction supply chain (CSC) and a thorough analysis of its challenges are also discussed in detail. Furthermore, the chapter investigates the aim, objectives, research questions, research problems, and study significance, providing a detailed overview of each aspect.

1.0 Background and Overview of Supply Chain Management

A supply chain is a complex network that involves multiple entities, including organizations, individuals, and intermediaries, working together to transport goods, services, finances, and information from the point of origin to the final destination. This process includes various stages such as procurement, manufacturing, warehousing, transportation, and distribution. Each entity plays a crucial role in ensuring that the supply chain runs smoothly and efficiently, with the ultimate goal of delivering the desired products or services to the end customer or business. According to LeMay et al. (2017), this is the definition of a supply chain. Recently, Caniato et al. (2023) further highlighted that a supply chain facilitates the exchange of information, material, and knowledge among stakeholders, adding value for all parties involved. In light of the intense competition in the global market, corporations are integrating supply chains more deeply (Deng et al., 2023) and developing dynamic supply chains (Anderson et al., 2023). Chen and Paulraj (2004) defined a supply chain as a set of resources that aid in the delivery of products to purchasers and buyers. One way to

define a supply chain is as the link between inbound and outbound products in a value chain system as suggested by Bouacida (2023).

Chen and Paulraj (2004) and Anderson et al. (2023) define a supply chain as a network of direct and indirect stakeholders, such as providers, distributors, producers, retailers, wholesalers, and various customers. As technology and knowledge processes continue to evolve, it has become increasingly important for companies to expand their horizons and tap into external knowledge, as observed by Idrees et al. (2023). Collaboration leads to faster innovation, cost sharing, better economies of scale, risk mitigation, and improved market conditions. (Dissanayake & Pal, 2023).

Supply chain management is a vital aspect of any business, and it involves a complex web of processes and stakeholders. To ensure that goods reach the end consumer successfully, it's essential to consider the demand, display, and supply of goods, which requires a well-planned marketing communication strategy. Effective management and planning of activities like raw material sourcing, procurement, production, and logistics optimization play a crucial role in the overall success of the supply chain. By paying attention to these details, businesses can ensure that their supply chain runs efficiently, leading to greater customer satisfaction and long-term success (El et al., 2018; Caniato et al., 2023).

A supply chain is a critical component of the innovation process, as highlighted by various studies (Sumanarathna et al., 2023; Anderson et al., 2023). Through collaboration, the supply chain can facilitate innovation and product development in many ways. For instance, it can enable companies to exchange knowledge and work together to achieve continuous learning and growth (Dissanayake & Pal, 2023). This study focuses on the construction industry and will investigate this topic in the following sections.

1.1 Background and Overview of the Construction Industry

The construction industry plays a necessary and important role in the economy and encompasses a diverse range of activities. As Moavenzadeh (2019) and Dissanayake & Pal (2023) noted, this sector involves the planning, design, construction, maintenance, and repair of various structures, utilising a variety of resources to bring physical facilities to life. Recently, Atkinson, Tennakoon, & Wedawatta (2023) expanded on this idea, highlighting how the construction industry encompasses a vast array of projects, from residential to commercial, industrial, and civil constructions, resulting in the development of tangible structures such as buildings and infrastructure.

The management of infrastructure assessment, monitoring, and maintenance has become increasingly challenging and crucial due to the ever-changing nature of systems that continuously integrate new physical facilities into the existing built environment. The construction industry, which relies very much on manual labour, often faces disruptions in established processes, safety concerns, and productivity challenges (Dissanayake & Pal, 2023). For this reason, innovative and efficient solutions are necessary to enhance productivity and improve the quality of work.

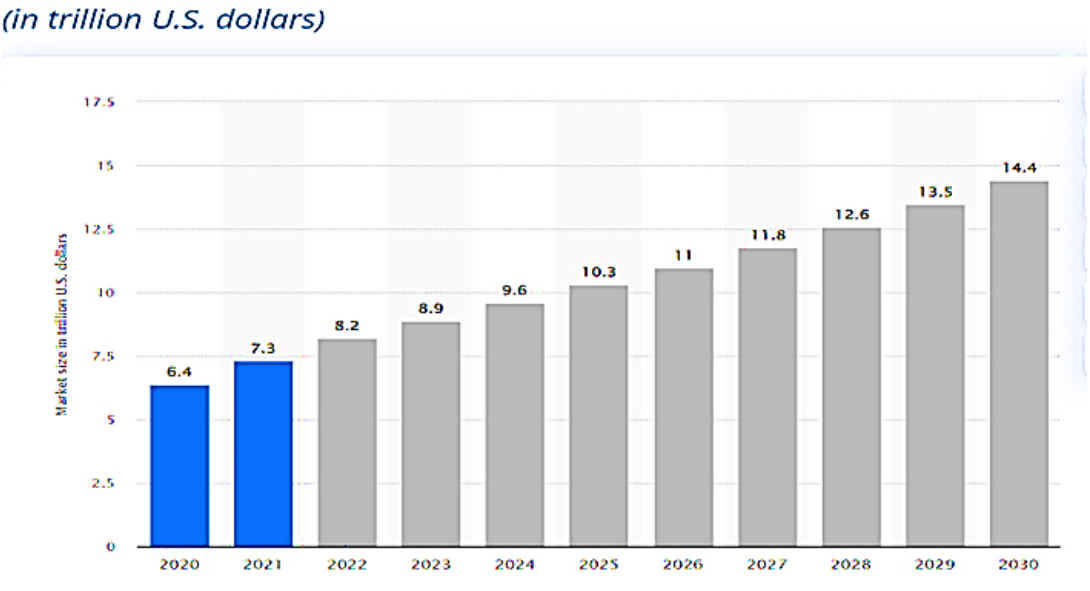
In developed countries, the rapid expansion of infrastructure and development has resulted in a shift from traditional construction methods to prefabricating components in workshops and assembling them on-site (Mohapatra et al., 2023). Despite the construction industry's economic significance, a lack of collaboration has long been an issue. (Atkinson et al., 2023).

The construction industry is one of the most substantial sectors in the global economy, accounting for 9% to 15% of most countries' GDP (Schlüchter & Retucci, 2023). Regrettably, inefficiencies have plagued the sector, and its productivity has remained below that of other sectors for decades. Additionally, the industry has

significant regional disparities and variations regarding global construction productivity performance.

The construction sector can be divided into large-scale companies involved in heavy construction and numerous specialized companies. The larger companies generally have 20% to 40% higher productivity than the specialized trades. (Mohapatra et al., 2023).

Figure 1.1: Global construction market - Forecasts from 2022 to 2030 (in Trillion US Dollars)



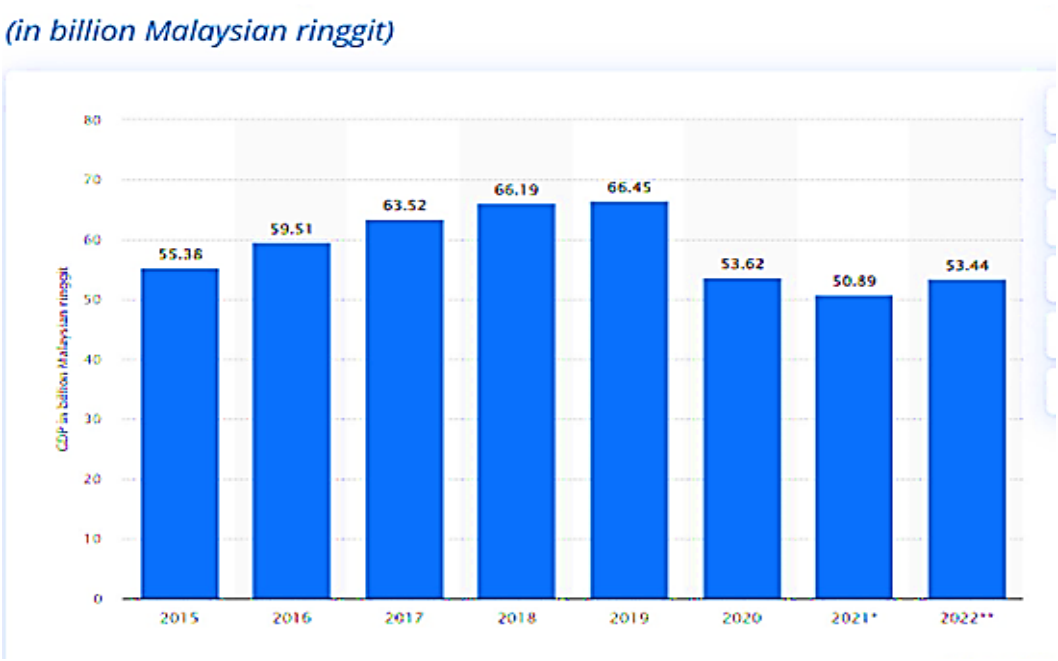
Source: Siddharta (2024)

According to industry experts, the construction sector is poised for a sustained profit increase in the years ahead. By 2030, it's estimated that revenue will surpass double the amount earned in 2020. Last year, the construction market generated 6.4 trillion US dollars revenue, with projections for that figure to hit 14.4 trillion by 2030. (Siddharta, 2024).

The construction industry serves a pivotal purpose in the economic expansion and progress of developing nations (Atkinson et al, 2023). While its contribution to the GDP may not be as significant as industries such as mining or agriculture, its

significance derives from its direct correlation to an extensive network of supply chain industries. This results in a considerable multiplier effect on the overall economy of a country (Mohapatra et al., 2023). Malaysia, for instance, benefits greatly from the construction sector as it is a key player in driving the country's economy forward.

Figure 1.2: Gross Domestic Product (GDP) from construction in Malaysia from 2015 to 2022



Source: Siddharta (2024)

In 2022, Malaysia's gross domestic product (GDP) was significantly boosted by the construction sector, which contributed around 53.44 billion Malaysian ringgit. This represents a positive change from the previous year's value of 50.89 billion. However, it is worth noting that the GDP from construction did experience a decline between 2020 and 2021, which is likely due to the pandemic-related restrictions that were implemented. As with most countries, the construction industry in Malaysia has been a vital sector that contributes to the country's economic development and infrastructure growth.

The market overview report as of 2023 reveals that the Malaysian construction market is currently estimated to be worth around USD 29 billion. Projections suggest that this figure could rise to USD 38.55 billion by the end of 2024 and reach USD 58.10 billion by 2029, indicating a compound annual growth rate (CAGR) of 8.55% during this period. Notably, in the first ten months of 2023, the total value of construction projects completed amounted to MYR 54.71 billion (equivalent to USD 11.47 billion), signalling a recovery from the adverse impacts of the COVID-19 pandemic (G.2024, April 3).

The growth in the construction sector is primarily driven by private sector initiatives, particularly in the development of high-rise residential properties and industrial projects aimed at optimizing supply chains. Additionally, the government's involvement in infrastructure projects, including the expansion of the MRT (Mass Rapid Transit) network and the rollout of a 5G network, is expected to not only spur real estate development but also generate numerous employment opportunities, instilling a sense of optimism for the future.

The construction industry encompasses various key segments, including residential construction, civil engineering, and commercial and industrial construction. Notably, residential construction has witnessed a rebound, registering a year-on-year growth rate of 6.9% as of mid-2023. On the other hand, growth in the civil engineering sector has been hampered by cautious government spending, although the introduction of the New Industrial Master Plan (NIMP) 2030 seeks to bolster the competitiveness of the manufacturing industry through improved infrastructure and the establishment of new industrial parks. Furthermore, investments in logistics infrastructure and data centers are anticipated to be the driving force behind growth in the commercial and industrial construction segments (G.2024, April 3).

The challenges and opportunities within the Malaysian construction industry are closely tied to the adoption of technology. While the industry is gradually embracing digital transformation and smart construction practices, factors such as cost concerns, regulatory issues, and cultural resistance to change are impeding the pace of adoption.

Looking ahead, the outlook for the construction industry appears promising, underpinned by both private investments and government initiatives aimed at enhancing infrastructure. The integration of advanced technologies is expected to improve productivity and efficiency across the sector. Moreover, significant infrastructure projects are on the horizon that align with national economic objectives, such as enhancing connectivity and supporting urbanization efforts.

In conclusion, the Malaysian construction industry is poised for robust growth, driven by private sector initiatives and government support for infrastructure development. Despite challenges related to technological adoption and market dynamics, strategic plans like NIMP 2030 are geared towards positioning Malaysia as a competitive player in the global construction landscape. With ongoing investments in residential, commercial, and civil engineering projects, the sector is expected to play a pivotal role in shaping Malaysia's economic future.

1.2 Challenges within the Construction Supply Chain

Efficient supply chain management (SCM) is indispensable for a construction project's success. It enhances communication and coordination among all stakeholders, ensuring quality and profitability. SCM has the potential to boost revenue, reduce costs, and positively impact the bottom line by streamlining operations and improving efficiencies. Although SCM primarily focuses on production and logistics, it aims to observe the entire supply chain's scope. However, the construction industry's fragmentation poses significant challenges to SCM's effective implementation. Supply

chain management (SCM) faces challenges such as interdependency, lack of standardized models, poor integration, and collaboration among parties. Other obstacles include design changes, inaccurate calculations, lack of trust among stakeholders, substandard materials, inadequate subcontractor training, and workforce turnover. Gaudenzi et al. (2023) note that there are no efficient tools to measure the performance of all parties involved in the project, worsening these challenges.

Organisational Culture Gap

Scholars have provided various definitions of organisational culture. Some define it as the behavioural patterns exhibited by an organisation, while others view it as a framework adopted to manage a firm's operations. Scholars like Pothukuchi et al. (2002) and Sørensen (2004) emphasise the practices and values exhibited by individuals within an organisation, while others like Stock et al. (2007) and Xue et al. (2010) view it as a tool or strategy for managing an organisation. However, what is clear is that organisational culture plays a crucial role in integrating employee behaviour and relating to the external environment. This makes it an essential component of Supply Chain Management (SCM), which relies on collaboration and integration (Han et al., 2018; Mustafa et al., 2014).

Table 1.1: Publications of culture

Publications that discuss the topic of organisational culture in the construction supply chain industry.

Author	Topic	Findings
Gaudenzi, et al (2023)	Organisational structures in the construction industry	The construction industry's organizational culture is being transformed by the growth of technology, as revealed in this study..
Haglund, & Rudberg (2023),	Architects and contractors: a comparative study of organisational culture	The study shows how proper organisational culture can overcome conflicts between architects and contractors.
Gerdoci, (2023)	Organisational culture profiles of construction enterprises in China	Hierarchy and clan culture dominate the organisational culture dimension in the Chinese construction industry. Understanding the organisational culture profile is crucial to its growth.
Cheng & Liu (2007) and Khosravi (2023)	The relationship between organisational culture and the implementation of total quality management in construction firms	To ensure the successful implementation of TQM, it is essential to align the organisational culture among all stakeholders involved. This study highlights the significant impact of organisational culture on TQM performance.
Liu & Fellows (2008) and Mohapatra et al. (2023),	The organisational culture of construction joint ventures case studies in Hong Kong	The study examined the organisational cultures of the UK, Hong Kong, and China. The national culture of a country greatly influences its organisational culture, while the culture of the management team is critical during a joint venture. This underscores the importance of building a strong, aligned management team culture for a successful joint venture.

Note: Adapted from Osunsanmi et al. (2022).

According to research by Culler (2010) and Iroanya (2012), organisational culture shapes a company's social responsibility. A company's commitment to corporate social responsibility is a defining characteristic of leading organisations, according to Loosemore and Lim (2017). De Mooij and Hofstede (2011) highlighted that a culture that does not align with corporate social responsibility could harm a company's reputation. Therefore, understanding organisational culture is vital for achieving success.