



THE MODERATING EFFECT OF BUSINESS ENVIRONMENT ON THE
SUPPLY CHAIN MANAGEMENT PRACTICES AND COMPETITIVE
ADVANTAGE OF THE CHINESE CONSTRUCTION INDUSTRY
IN KUNMING, THE PEOPLE'S REPUBLIC OF CHINA

By
Mrs. Linxin YANG

A Thesis Submitted in Partial Fulfillment of the Requirements
for Master of Engineering ENGINEERING MANAGEMENT
Department of INDUSTRIAL ENGINEERING AND MANAGEMENT

Silpakorn University

Academic Year 2023

Copyright of Silpakorn University



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรวิศวกรรมศาสตรมหาบัณฑิต

สาขาวิชาการจัดการงานวิศวกรรม แผน ก แบบ ก 2 ปริญญามหาบัณฑิต

ภาควิชาวิศวกรรมอุตสาหกรรมและการจัดการ

มหาวิทยาลัยศิลปากร

ปีการศึกษา 2566

ลิขสิทธิ์ของมหาวิทยาลัยศิลปากร

THE MODERATING EFFECT OF BUSINESS ENVIRONMENT ON
THE SUPPLY CHAIN MANAGEMENT PRACTICES AND
COMPETITIVE ADVANTAGE OF THE CHINESE
CONSTRUCTION INDUSTRY IN KUNMING,
THE PEOPLE'S REPUBLIC OF CHINA



By
Mrs. Linxin YANG

A Thesis Submitted in Partial Fulfillment of the Requirements
for Master of Engineering ENGINEERING MANAGEMENT
Department of INDUSTRIAL ENGINEERING AND MANAGEMENT

Academic Year 2023

Copyright of Silpakorn University

Title THE MODERATING EFFECT OF BUSINESS ENVIRONMENT
ON THE SUPPLY CHAIN MANAGEMENT PRACTICES
AND COMPETITIVE ADVANTAGE OF THE CHINESE
CONSTRUCTION INDUSTRY IN KUNMING,
THE PEOPLE'S REPUBLIC OF CHINA

By Mrs. Linxin YANG

Field of Study ENGINEERING MANAGEMENT

Advisor Sitichai Saelem, Ph.D.

Faculty of Engineering and Industrial Technology, Silpakorn University in
Partial Fulfillment of the Requirements for the Master of Engineering

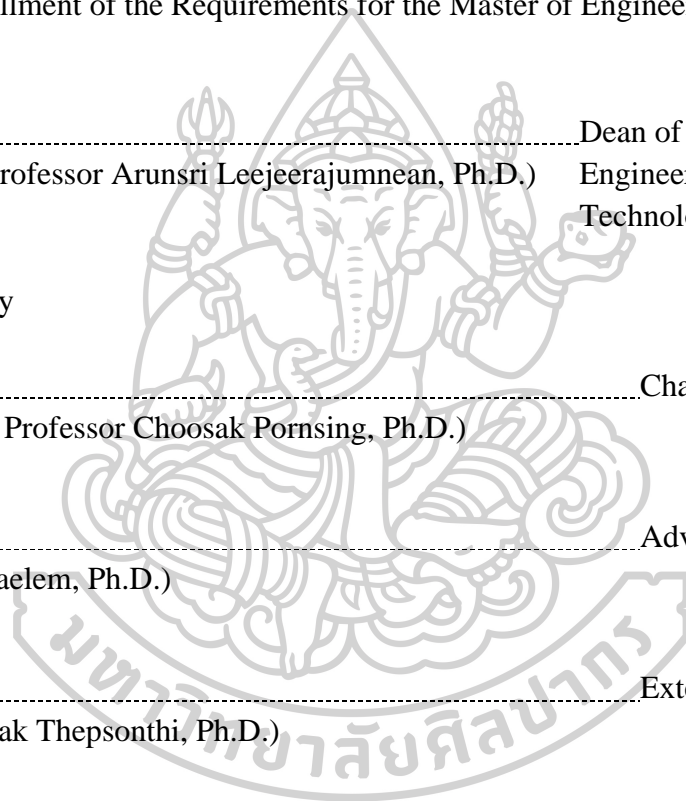
..... Dean of Faculty of
(Assistant Professor Arunsri Leejeerajumnean, Ph.D.) Engineering and Industrial
Technology

Approved by

..... Chair person
(Associate Professor Choosak Pornsing, Ph.D.)

..... Advisor
(Sitichai Saelem, Ph.D.)

..... External Examiner
(Thanongsak Thepsonthi, Ph.D.)



650920035 : Major ENGINEERING MANAGEMENT

Keyword : supply chain management practices, business environment, competitive advantage, construction enterprises

Mrs. Linxin YANG : THE MODERATING EFFECT OF BUSINESS ENVIRONMENT ON THE SUPPLY CHAIN MANAGEMENT PRACTICES AND COMPETITIVE ADVANTAGE OF THE CHINESE CONSTRUCTION INDUSTRY IN KUNMING, THE PEOPLE'S REPUBLIC OF CHINA Thesis advisor : Sitichai Saelem, Ph.D.

The purpose of this study was 1) to study the importance level of supply chain management practices, business environment, and competitive advantage of construction enterprises, 2) to study the effect of supply chain management practices, and business environment toward the competitive advantage of the Chinese construction industry, and 3) To test the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China. It is quantitative research. The sample consisted of 300 business owners registered with the Kunming City Commercial Office, China in 2023. The research tool is an online questionnaire. Collect data through websites, WeChat, and applications. Data were analyzed by descriptive statistics, including mean and standard deviation. Inferential statistics were analyzed with SEM.

The results showed that all factors were high important. It should be arranged from the most important to the least important. including competitive advantage (4.51), business environment (4.49), and supply chain management practices (4.40). The result of the effect of supply chain management practices had a direct effect on competitive advantage, with a path coefficient equal to 0.829, followed by the business environment, is the moderating effect of supply chain management practices to competitive advantage, with a path coefficient equal to 0.007. The results of a study moderating the effect of the business environment on supply chain management practices and competitive advantage were found to be statistically significant at the 0.01 level. This means that the Chinese construction industry must consider the business environment, especially since external conditions can be unpredictable and can impact their competitive advantage in Kunming.

ACKNOWLEDGEMENTS

I would like to acknowledge and give my warmest thanks to my supervisor, Dr. Sitichai Saelem. who made this work possible. His guidance and advice carried me through all the stages of writing my thesis. I would also like to thank my committee members for letting my defense be an enjoyable moment, and for your brilliant comments and suggestions, thanks to you.

I would also like to give special thanks to my friends, classmates, and my family as a whole for their continuous support and understanding when undertaking my research and writing my These.

Finally, I would like to thank my benefactor, for letting me through all the difficulties. I have experienced your guidance day by day. You are the one who let me finish my master's degree. I will keep on trusting you for my future.

Linxin YANG

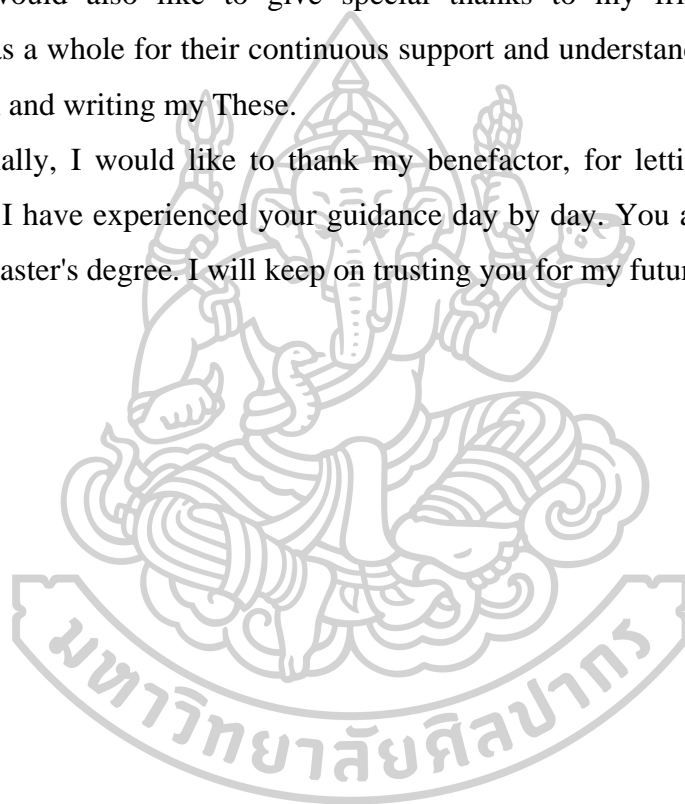


TABLE OF CONTENTS

	Page
ABSTRACT.....	D
ACKNOWLEDGEMENTS.....	E
TABLE OF CONTENTS.....	F
List of Tables	I
List of Figures.....	J
CHAPTER 1 INTRODUCTION.....	1
1.1 Motivation.....	1
1.2 Research Objectives.....	3
1.3 Research Scope.....	4
1.4 Expected Results.....	4
1.5 Research Contributions.....	5
1.6 Definition of Terms	5
CHAPTER 2 LITERATURE REVIEW	7
2.1. Chinese context for the construction industry	7
2.2 Types of construction industries in China	9
2.3. The dimensions of supply chain management practices.....	10
2.4 Supply chain management practices.....	11
2.5 Business Environment	14
2.6 Competitive Advantage	16
2.7 The Direct Effect SCMP on Competitive Advantage.....	17
2.8 Moderating effect of business environment on supply chain management practice to competitive advantage	18

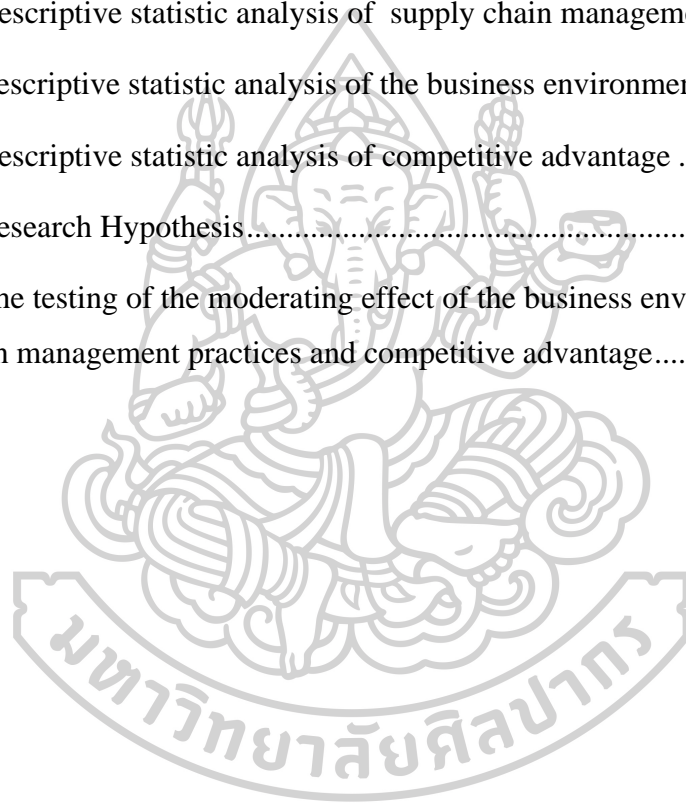
2.9 Conclusions.....	19
CHAPTER 3 RESEARCH METHODOLOGY	20
3.1 Population and Sample	20
3.1.1 Population.....	20
3.1.2 Sample	20
3.2 Research Method	20
3.3 Research Tools.....	21
3.4 Collection of Information.....	25
3.5 Data Analysis.....	25
3.6 Conceptual Framework.....	28
3.7 Research Hypothesis.....	29
3.8 Research Procedure.....	29
3.9 Conclusion.....	31
CHAPTER 4 RESULTS AND ANALYSIS	32
4.1. Part 1 Result.....	32
4.2 Part 2 Result.....	35
4.2.1 Research Objective 1	35
4.3 Part 3 Result.....	41
CHAPTER 5 CONCLUSIONS	44
5.1 The Results of Research Objective 1	44
5.2 The Results of Research Objective 2	45
5.3 The Results of Research Objective 3	45
5.4 Conclusion and Discussion.....	46

5.5 Suggestions for Future Study.....	47
5.6 Implications	48
5.6.1. Operational impact	48
5.6.2. Social impact	48
REFERENCES	49
APPENDIX.....	54
VITA.....	62



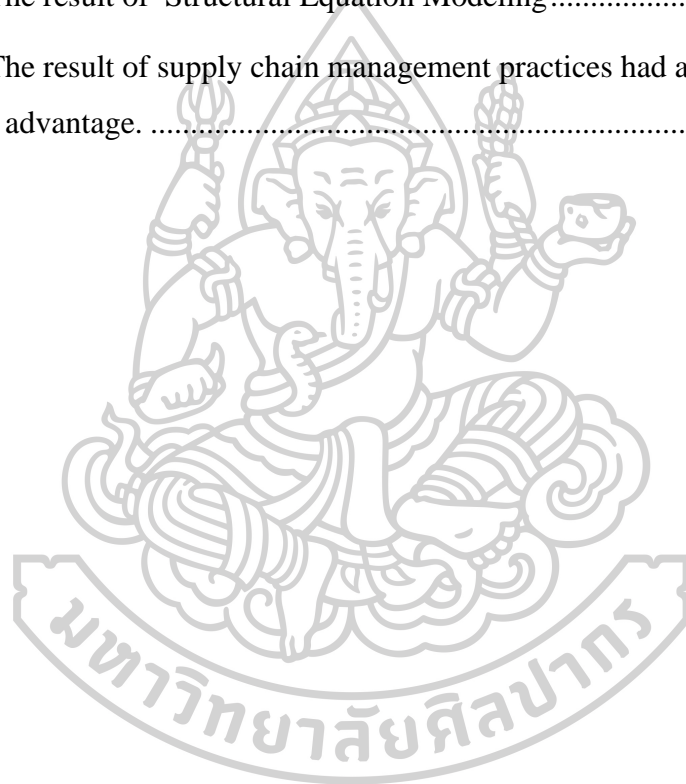
List of Tables

	Page
Table 3.1 Content validity of the scale	22
Table 3.2 Rang of average	26
Table 4.1 Demography of entrepreneurs' construction industries in Kunming.	33
Table 4.2 Descriptive statistic analysis of supply chain management practices.....	36
Table 4.3 Descriptive statistic analysis of the business environment	37
Table 4.4 Descriptive statistic analysis of competitive advantage	39
Table 4.5 Research Hypothesis.....	42
Table 4.6 The testing of the moderating effect of the business environment on the supply chain management practices and competitive advantage.....	43



List of Figures

	Page
Figure 2.1 Five basic components of supply chain management practice.....	14
Figure 3.1 Conceptual Research Framework.....	29
Figure 3.2 Research Process Flow Chart	30
Figure 4.1 The result of Structural Equation Modeling.....	41
Figure 4.2 The result of supply chain management practices had a direct effect on competitive advantage.	42



CHAPTER 1

INTRODUCTION

1.1 Motivation

As global competition becomes more intense, companies must develop and maintain a competitive strategy to stay ahead (Hains & Sharif, 2006; Lori, Cook & Sengupta, 2011). This applies to all organizations, including those in China's construction sector, who must adapt to stay competitive in the market. To succeed both locally and internationally, businesses must understand the importance of the business environment and how it affects strategic management. The environment is constantly changing, and this can have a significant impact on a company's success or failure. Therefore, it's essential to analyze both the macro and micro-environment. The macro-environment includes factors such as the economy, technology, innovation, politics, legislation, regulations, societal values, lifestyles, and population demographics. The micro-environment includes internal management, customers, marketing, finances, production, suppliers, labor supply, partnerships, and competitors, all of which can have positive or negative impacts. Business owners should assess the business's strengths, weaknesses, opportunities, and threats to establish a competitive advantage.

The construction industry needs supply chain management practices as an important mechanism to drive the country's economy. Because it is the source of the most efficient use of resources in the area, employment generates income for stakeholders and distributes resources to various sectors thoroughly, so logistics is an activity related to the delivery system, company items, or resources. The process of planning, processing, storage, control, and packaging. The movement of both back and forth from the point of production to the point of use. Accurately and appropriately, including time, quality, quantity, cost, and place. To meet the needs of customers and create maximum satisfaction for all stakeholders. Therefore, successful entrepreneurs must know that implementing a fully integrated supply chain management practice is a key success factor of businesses that allow operations that can adapt to keep up with the ever-changing needs of customers resulting in a competitive advantage as well (Ibrahim, and Hamid, 2014).

The management of the supply chain is crucial to ensure customer satisfaction. It acts as a central component that drives various operations within a business to meet customer expectations. Proper planning is required to achieve this goal by utilizing logistics management within the organization. Failing to have good logistics management or logistics activities may result in negative consequences for the company, such as delayed delivery or dissatisfied customers. Additionally, transporting goods on the same route multiple times could lead to excessive transportation costs for businesses (Ali et al. 2020).

Supply chain management practices play a crucial role in the construction industry for various reasons. The construction industry involves the complex coordination of materials, equipment, labor, and other resources to complete projects efficiently, on time, and within budget. Effective supply chain management can significantly impact the success of the construction industry. Here are some reasons why supply chain management practices are important in the construction industry.

According to the China Government Network, the construction industry in China is projected to grow by 3.6% in real terms in 2023, mainly due to a surge in infrastructure and energy and utilities construction. The industry's business activity index rose to 63.9 in March 2023, indicating growth, up from 60.2 in February and 56.4 in January. Out of 31 Chinese provinces, 28 provinces reported year-on-year growth in construction output during Q1 2023, with Jiangsu, Zhejiang, and Guangdong recording the highest growth rates. The construction industry is expected to maintain an average annual growth rate of 4.4% between 2024 and 2027, supported by investment in infrastructure projects under the 14th Five-Year Plan (2021-2025). The plan outlines 20 quantitative targets in five categories: economic development, innovation, people's well-being, green development, and food and energy security (Dublin, 2023).

China Evergrande, a significant player in the real estate development industry, has recently applied for U.S. bankruptcy to reorganize its debt. The company faced a default on \$300 billion of debt in 2021, indicating one of the initial major indications of China's real estate sector's distress. Moreover, the sector's difficulties are extending to China's financial trust firms, which provide investment opportunities with greater returns than typical bank deposits and frequently invest in real estate initiatives. A

study conducted by Benhong Peng, Yinyin Zhao, and Ehsan Elahi (2023) revealed that both the legal environment and market environment have a positive influence on entrepreneurship and the competitiveness of business start-ups. The research also found that cross-border ability plays a significant role in moderating the relationship between the legal environment and entrepreneurship, but not in moderating the market environment and entrepreneurship. Moreover, the study identified entrepreneurship as a partial mediator between the business environment and the competitiveness of start-ups. These findings highlight the vital role of the business environment in the entrepreneurial ecosystem and offer new insights into enhancing the competitiveness of businesses.

The issue of business liquidity in the Chinese real estate sector continues to pose a significant challenge to the country's economy. This problem has impacted economic recovery after the Chinese government lifted strict measures to control the spread of the COVID-19 virus. As a result, many real estate entrepreneurs in China rely heavily on borrowing funds to operate their businesses. This lack of analysis of the changing external environment and the expansion of the real estate sector, which has led to the creation of numerous projects, increases the risk of a potential bubble forming, which could ultimately result in a loss of competitiveness. This is the main reason for conducting this research.

1.2 Research Objectives

1. To study the importance level of efficient resource allocation, timely project completion, supplier relationships, inventory management, information sharing, adaptation to market changes, business environment, and competitive advantage of construction enterprises in Kunming, the People's Republic of China.

2. To study the effect of supply chain management practices, and business environment toward the competitive advantage of the Chinese construction industries in Kunming, the People's Republic of China.

3. To test the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China.

1.3 Research Scope

The studies on the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China. The study can be classified into 4 aspects as follows:

1. The scope of the population who have experts who are employed as supply chain managers in the different construction industries of Kunming, the People's Republic of China.

2 . The scope of content is to focus on the business environment (external), supply chain management practices, and competitive advantage of the construction industry in Kunming, the People's Republic of China.

3 . The area boundaries of research defined the area in this study as construction industry in Kunming, the People's Republic of China.

4. Scope of time data collection between October 2023 and March 2024.

1.4 Expected Results

In this study, the researcher classifies the results expected to receive 3 issues as follows:

1. To know the importance level of efficient resource allocation, timely project completion, supplier relationships, inventory management, information sharing, adaptation to market changes, business environment, and competitive advantage of construction enterprises in Kunming, the People's Republic of China.

2. To know the effect of the supply chain management practices, and business environment toward competitive advantage of the Chinese construction industrys in Kunming, the People's Republic of China.

3. To know the result of testing the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China.

1.5 Research Contributions

1. Construction industry owners can use the results of this research to evaluate their supply chain management practices and gain a competitive edge. To achieve this, they should concentrate on specific stakeholders within the industry, such as contractors, architectural and engineering consultants, real estate companies, raw material suppliers, and facility managers.

2. Some governments may provide subsidies or grants for the construction industry in order to promote specific types of projects, such as affordable housing or renewable energy installations. These incentives can assist in reducing some of the expenses and hazards linked to these projects.

3. Many governments provide support for training and educational programs that aim to develop a skilled workforce in the construction industry. Such support can take the form of funding for vocational schools or universities, related organization apprenticeship programs, and initiatives designed to attract younger individuals to the field.

1.6 Definition of Terms

The construction industry includes the planning, design, development, and building of structures, infrastructure, and facilities. It is vital for creating and maintaining physical infrastructure like homes, businesses, roads, bridges, dams, airports, and utilities. The construction industry is involved in activities such as project design, planning, construction, and management. With projects often involving multiple stakeholders, intricate planning, and the need to manage risks and uncertainties. Advances in technology, such as building information modeling, construction software, and automation, have led to increased efficiency and accuracy in project planning and execution.

The term business environment refers to the external factors and conditions that impact a business's operations, decisions, and overall success. Understanding and adapting to the business environment is essential for making informed strategic decisions and achieving sustainable growth. Here's a breakdown of the key components: economic, political, social and cultural, technological, legal, and

competitive. Flexibility and a proactive approach to environmental changes are key factors for success in today's dynamic business landscape.

Supply chain management practices refer to the strategic planning, coordination, and optimization of all activities involved in sourcing, procurement, production, distribution, and logistics to ensure the efficient flow of goods, services, information, and finances from suppliers to customers. Effective supply chain management practices are crucial for businesses to enhance competitiveness, reduce costs, and improve customer satisfaction. Here are some key supply chain management practices: efficient resource allocation, timely project completion, supplier relationships, inventory management, information sharing, and adaptation to market changes.

Competitive advantage refers to the unique set of attributes, resources, or capabilities that a company possesses, allowing it to outperform its competitors and achieve superior business performance. This advantage enables a company to create more value for its customers, generate higher profits, and maintain a strong position within its industry or market. Competitive advantage can be achieved through various means and strategies. Here are some common types of competitive advantage: cost leadership, differentiation, and focusing.

The moderating refers to the effect of the business environment that supply chain management practices on the competitive advantage of the construction industry.

CHAPTER 2

LITERATURE REVIEW

The research focuses on the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, The People's Republic of China. The related literature will be reviewed carefully. The rest of this chapter is organized as follows. Section 2.1 describes the Chinese context for the construction industry. Section 2.2 explains the theories and measurement of supply chain management practices. Section 2.3 describes the analysis business environment. Section 2.4 describes the competitive advantage concept. The conclusions of this chapter are drawn in Section 2.5.

2.1. Chinese context for the construction industry

In recent times, there has been a surge in innovation within the construction materials industry. However, this has led to a rise in energy consumption during the production process. To combat this, organizations are researching, developing, and utilizing technologies that are energy-efficient and reduce carbon emissions. For example, some cement factories are implementing such technologies. The Tongchuan City cement factory in Shaanxi Province has built the world's first digital multi-data twin factory. This factory can analyze different data in real time, including production, safety, energy-saving, and emissions-reducing measures. As a result, the factory is able to minimize emissions, recycle waste by 100%, and avoid releasing wastewater, ensuring environmental protection.

In the province of Anhui, the city of Bang Pu boasts buildings equipped with thin-film solar cells. However, the world's largest implementation of this technology is found in buildings that use special materials in their glass production, replacing most exterior wall and roof materials. This technology allows for the efficient conversion of solar electricity even in low-light conditions, such as cloudy days. As a result, it can help reduce carbon dioxide emissions by approximately 10,600 tons per year, which can increase investor awareness of the business environment.

As a result, in August 2020, the People's Bank of China announced the so-called "Three Red Lines" rules aimed at reducing the risk of a real estate bubble. And to reduce the expansion of debt in the real estate business strictly. At that time, only 6.3% of real estate businesses across the country met all criteria. As a result, almost all real estate businesses are unable to borrow more money for use in circulation within the business coupled with declining sales during the outbreak of the COVID-19 virus. As a result, many businesses lack financial liquidity greatly. One of them is giant evergrande, with more than 1,300 projects, accounting for nearly a quarter of China's economy. and is the most indebted real estate business in the world (Dublin,2023).

The Chinese real estate industry has a major impact on the country's economy. It contributes around 29% to the GDP, making real estate issues a significant factor in China's economic recovery. In August 2020, economists from Barclays Bank revised their 2020 economic growth forecast for China to 4.5% due to the government's fiscal and monetary policies being ineffective in stimulating the real estate sector. Although the overall economy grew by 0.8% in the second quarter of 2023 compared to the first quarter, the financial status of people was affected as more than 70% of the population lives in urban areas and create wealth by investing in real estate. When housing prices drop significantly, investors incur significant losses and this also affects the labor market, particularly the construction sector, which accounts for over 62 million jobs. The industry contracted by 8.5% in July 2023 due to lower demand for housing. In addition, this problem also affects the retail sector. According to the National Statistical Office of China retail economic report found that the retail sector of goods related to real estate, such as retail sales in the category of home furnishings Only during January-July of this year 2023, contracted by 7.3 percent (Dublin,2023).

Infrastructure plays a crucial role in driving economic growth. Yunnan Province boasts a well-developed transportation and logistics system that connects South and Southeast Asia. Kunming, the capital city of Yunnan Province, must focus on accelerating the development of transportation routes in all dimensions. A comprehensive, efficient, and high-quality multimodal transportation route is necessary to support various industrial sectors and reduce logistics costs. This will

further strengthen Kunming's position as a hub for complete connectivity with South Asia and Southeast Asia.

2.2 Types of construction industries in China

The construction industry in China, like in many other countries, can be broadly categorized into various sectors based on the types of construction projects and activities they involve. Some of the main types of construction industries in China include:

1. **Residential Construction:** This sector includes the construction of residential buildings such as apartments, houses, and condominiums. It's a significant part of the construction industry due to China's rapid urbanization and population growth.
2. **Commercial Construction:** This sector involves the construction of commercial buildings such as offices, retail stores, malls, hotels, and restaurants.
3. **Industrial Construction:** Industrial construction pertains to the development of manufacturing facilities, factories, warehouses, and other industrial structures.
4. **Infrastructure Construction:** This sector focuses on building and maintaining essential infrastructure such as roads, bridges, highways, railways, airports, ports, and other transportation-related facilities.
5. **Energy and Power Plant Construction:** China's energy demands have led to the construction of various power plants, including coal, natural gas, hydroelectric, nuclear, and renewable energy facilities.
6. **Public and Institutional Construction:** This category covers the construction of public buildings like schools, hospitals, government offices, libraries, and cultural institutions.
7. **Civil Engineering Construction:** Civil engineering projects involve large-scale construction projects that often require specialized engineering skills. This includes projects like dams, tunnels, water supply and sewage systems, and more.
8. **Urban Development and Real Estate:** This sector involves comprehensive urban planning and development projects, including the creation of new towns and urban areas, as well as real estate development.

9. **Environmental Construction:** With increasing awareness of environmental issues, this sector encompasses projects related to pollution control, waste management facilities, and sustainable construction practices.

10. **Tourism and Leisure Construction:** China's booming tourism industry has led to the construction of resorts, theme parks, entertainment complexes, and other leisure facilities.

11. **Renovation and Retrofitting:** As existing structures age, there are demand for renovation, remodeling, and retrofitting projects to modernize and improve safety and functionality.

12. **Specialty Construction:** This includes specialized construction projects such as sports venues, cultural landmarks, and unique architectural structures.

It's important to note that these categories often overlap, and the construction industry is diverse and ever-evolving. China's massive infrastructure development, urbanization, and economic growth have contributed to the expansion and diversification of its construction industry. The types of construction projects and industries can also change over time in response to economic, technological, and societal trends.

2.3. The dimensions of supply chain management practices

Many authors studied supply chain management practice, and there are various elements and dimensions have been measured or used to measure the supply chain practice; for more exploration, in the following table, some of them. The research of Chin et al. (2011) suggests that dimensions of supply chain management practices are information sharing, customer relationship, strategic supplier partnership, material flow management, and corporate culture, Tan, Lyman, and Wisner, (2002) found that dimensions of supply chain management practices are Six elements of supply chain practice (using factor analysis) supply chain integration, information sharing supply chain characteristics customer service management, geographical proximity and Jus-In-Time capability.

2.4 Supply chain management practices

The supply chain management practices (SCMP) factors may also enhance the competitive advantage of the organizations. Furthermore, the manager support may provide insight to manage the SCM activities which could aid in enhancing firm performance (FP). (Waiyawuththanapooma et al. 2023)

According to Chau (1997), the OP, on the basis of practice, supply chain management is divided into three categories. The first is efficiency in terms of output. This means providing a high level of customer satisfaction and service. The second is resource efficiency. This means efficient use of the resources available to the company. The third is flexibility. and the extent to which the Company can satisfy the terms and conditions of the market. In the 1990s, the competitive landscape became more intense, and the challenge was to deliver products at lower cost to the right stakeholders. at the right time and in the right place due to the global market (Anderson & Gerbing 1988). But it also needs to make all SCs competitive both locally and globally. Because nowadays there is global competition as a result of the globalization era.

SCMP are used to integrate all the processes to supply goods and services to add value for consumers and to manage the supply chain, effectively (Jermsittiparsert et al. 2019; Somjai, & Jermsittiparsert, 2019). The constant flow of processes, sharing through information technology, and supplier partnership is the latest advancement of the SCMP (Zhao & Lee, 2009). They are used in the list of supply chain practices such as quality of product, customer relationship, and purchasing of product. They also focus on the main competencies; maintaining the inventory levels and controlling excessive inventory by postponing customization methods and the system of shared information in their organization in the list of supply chain practices (Zhao & Lee, 2009). Factor analysis is normally used to identify different facets of SCMP such as integration, management of customer service, just-in-time ability, supply chain features, and geographical nearness (Srimai et al. 2013). Some studies use long-term relationships of suppliers and customers, an association of suppliers, the role of multi-functional teams, and the level of communication to evaluate the supplier and customer relationship (Tyteca et al. 2002).

Some previous studies approved supply chain leadership, process integration, collaboration, appraisals, award distribution, decided goals and missions, and risk management in SCMP. In the previous literature, SCMP has been discussed from different angles but the goal of all practices is finally to improve the firm performance. While analyzing the previous literature, we have found five distinctive nature elements chosen to analyze the SCMP: the relationship of suppliers with customers, deliberated partnership of suppliers, postponement, and quality and level of information sharing. By analyzing the previous literature, all important characteristics of supply chain management like upstream and downstream of supply chain management, control of inventory level by using postponement technique, the flow of information sharing like quality, accuracy, and level of information sharing within and outside the organization and to across all supply chain management are covered by these five elements (Wagner, Grosse-Ruyken, & Erhun, 2012).

Although the five elements covered in this research paper are significant components of supply chain management planning (SCMP), it is important to note that they do not provide a complete overview of the subject. Other crucial elements such as just-in-time potential, the influence of multi-functional teams, geographical proximity, established goals, vision, and missions, and effective supply chain leadership are also discussed in the literature and play a significant role in SCMP. However, these additional elements are not explored in this particular research paper.

The concept of strategic partnership (SP) in business literature refers to a collaborative relationship between two industries, the suppliers and the firm, who work together on projects and enter into contracts for mutual benefit. The aim is to establish a long-term relationship (Demeter et al. 2011; Mason-Jones & Towill, 1999; Rajeev et al. 2017). The supply chain is designed to utilize the strategic and tactical abilities

of individuals to yield significant returns for organizational activities (Zhao and Lee, 2009). When developing a partnership strategy, factors such as information flow, its sharing and quality, market performance (Lambert and Enz, 2017), customer relationship, financial performance, competitive advantage, customer feedback, cost and quality of product, material procurement, product delivery, and innovation are taken into account (Jie et al. 2013). An effective supply chain strategy involves

creating long-term relationships and mutual understanding with partners to establish common goals for problem-solving that will effectively achieve organizational goals (Kroes & Ghosh, 2010).

Here are some reasons why supply chain management practices are important in the construction industry, and present five basic components of supply chain management practice:

1. **Efficient Resource Allocation:** Proper supply chain management ensures that the right materials and resources are available at the right time and in the right quantity. This reduces delays caused by shortages or overstocking of materials, leading to more efficient project execution. Effective supply chain management helps control costs by optimizing procurement processes, negotiating favorable contracts with suppliers, and minimizing wastage. This can contribute to higher profitability and competitive pricing for the construction industry.

Sharing knowledge effectively and efficiently with supply chain partners is crucial for efficient resource allocation. The ability to share information is considered one of the most important aspects of the supply chain process. Resource allocation is a key tool in achieving an integrated and coordinated supply chain. According to Lee (2002), interoperability between systems is essential for efficient resource allocation. Zailani and Rajagopal (2005) suggest that the technological advancements in the internet and e-commerce provide an opportunity to create a smart, integrated supply chain.

2. **Timely Project Completion:** Delays in the supply chain can lead to project delays, which can have cascading effects on timelines and budgets. Coordinating the supply of materials, equipment, and labor allows for smoother project progression and timely completion.

3. **Inventory Management:** Managing construction materials and equipment inventory efficiently helps avoid unnecessary costs associated with storage, maintenance, and depreciation. Just-in-time inventory practices can minimize excess inventory and associated carrying costs.

4. **Supplier Relationships:** Building strong relationships with Suppliers and subcontractors foster long-term partnerships and can lead to better terms, pricing, and access to innovative products or services. The construction industry involves various

stakeholders, including suppliers, contractors, subcontractors, and clients. Supplier relationship management facilitates collaboration and communication among these parties, leading to better project coordination and reduced misunderstandings.

5. Adaptation to Market Changes: Effective supply chain management allows the construction industry to respond quickly to changes in market conditions, regulatory requirements, or unexpected events.

In summary, supply chain management practices are vital in the construction industry to optimize resources, control costs, ensure timely completion, manage risks, adapt to market changes, inventory management, supplier relationships, maintain quality, and foster collaboration. By improving supply chain processes, the construction industry can achieve greater efficiency, profitability, and customer satisfaction, see Fig 2.1.

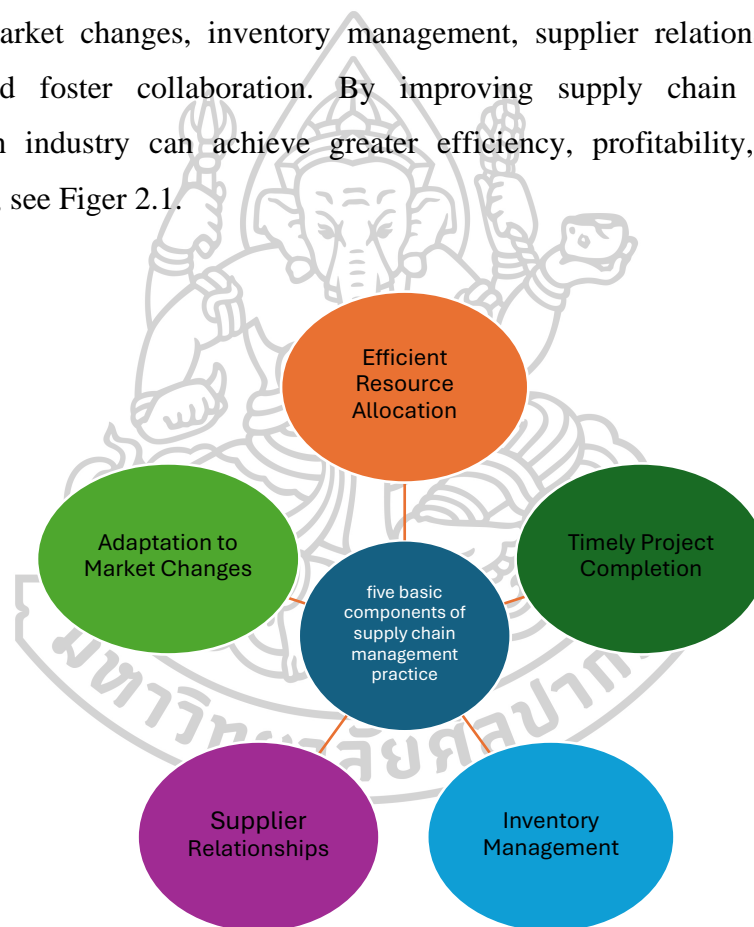


Figure 2.1 Five basic components of supply chain management practice.

2.5 Business Environment

The business environment refers to the external factors and conditions that influence a company's operations, decisions, and overall success. It plays a crucial role in shaping a company's strategies, performance, and ability to adapt to changes.

The importance of the business environment, specifically the external factors, can be understood through the following points:

1. The economy plays a pivotal role in shaping the business environment and influencing the operations, strategies, and overall performance of businesses. Here's why the economy is crucial to businesses. The economic state often determines interest rates set by central banks. Businesses' borrowing costs for loans and credit can be significantly impacted by these rates. Low interest rates can encourage borrowing for growth initiatives, while high rates might limit investment.

2. Competitive Landscape: The external environment provides insights into competitors' actions, strengths, weaknesses, and strategies. Understanding the competitive landscape allows businesses to position themselves effectively, differentiate their offerings, and create a unique value proposition.

3. Social factors are crucially important to businesses as they provide insights into the values, attitudes, behaviors, and demographics of the society in which the business operates. These factors shape consumer preferences, employee dynamics, market trends, and even regulatory frameworks. Here's why the social aspect is significant to businesses: consumer behavior and preferences, cultural sensitivity, and ethical and social responsibility.

4. Regulatory and Legal Compliance: Laws and regulations within the external environment can impact how businesses operate. Staying informed about legal requirements ensures compliance, avoiding legal disputes, fines, and reputational damage.

5. Technological Advancements: External factors include technological advancements that can disrupt industries and markets. Embracing new technologies can lead to efficiency improvements, innovation, and enhanced customer experiences.

6. Stakeholder Expectations: External factors encompass the expectations of various stakeholders, such as investors, shareholders, customers, employees, and the community. Meeting these expectations is vital for maintaining positive relationships and a strong reputation.

7. Globalization and Trade: The global business environment is shaped by international trade agreements, economic alliances, and geopolitical developments. Understanding these factors is crucial for businesses engaged in global operations or trade.

In summary, the business environment's external factors significantly influence a company's success, growth, and sustainability. By staying attuned to changes and trends in this environment, businesses can make informed decisions, mitigate risks, capitalize on opportunities and remain competitive in an ever-evolving marketplace.

2.6 Competitive Advantage

Having a competitive advantage is crucial for achieving business sustainability. This advantage is created by formulating a strategy that provides value to customers, whether through cost leadership, product/service differentiation, or speedy customer service in a particular market niche. Competitive advantage is defined as a firm's ability to stand out from its competitors (Sultan and Mason, 2010). Jones (2003) outlined three generic strategies for achieving competitive advantage: cost leadership, differentiation, and focus. These strategies are widely used by firms and are effective in meeting business objectives.

A competitive advantage means having a strong and defensible position over similar businesses and competitors (Cachon & Fisher, 2000; Kroes & Ghosh, 2010). Making effective management decisions and having unique capabilities can help differentiate a business from its competition (Cachon & Fisher, 2000). In previous literature, flexibility, pricing, delivery, and competitive capabilities have been frequently discussed (Robb et al. 2008). More recent studies have highlighted the importance of time-based competition. Competitive capabilities can include pricing, quality, production innovation, reliable delivery, and premium pricing, as described in various studies (Bukh, Johansen, & Mouritsen, 2002; Karimi & Rafiee, 2014; Kronmeyer Filho et al. 2004).

2.7 The Direct Effect SCMP on Competitive Advantage

For a company to maintain sustainability, having a competitive advantage is essential. However, simply increasing company efficiency does not create a sustainable competitive advantage. The entire supply chain related to the company must also create a competitive advantage. Therefore, having an understanding and practice of Supply Chain Management practice now a prerequisite to gaining an advantage in global competition and increasing overall competitiveness. A company can have one or more competitive advantages over its competitors, such as lower prices, higher quality, and quick response. Ultimately, a company's competitive advantage will enhance its overall performance (Mentzer et al., 2000).

One effective way for a company to gain a competitive edge is by implementing Supply Chain Management Practices. SCMP involves a series of actions that a company takes to ensure efficient management of its supply chain. According to a study referenced as Ashish et al. (2013). When suppliers and consumers collaborate at all levels in the supply chain, the company is more likely to gain a competitive advantage. The impact of SCMP is not limited to the overall performance of the company but also extends to its competitive advantage. By focusing on factors such as price/cost, quality, response time to market, and product innovation, the company can enhance its competitive advantage (Linda and Thabrani, 2021).

Competitive advantage is the ability of an organization to establish a defensible position against its competitors. According to Porter (1985) and McGinnis and Vallopra (1999), firms can achieve competitive advantage by pursuing a cost leadership or differentiation strategy. Other authors have suggested various dimensions of competitive advantage. Koufteros et al. (1997) proposed five dimensions, including competitive pricing, premium pricing, value-to-customer quality, dependable delivery, and production innovation. Li et al., (2006) found that SMEs commonly use dimensions such as price/cost, quality, delivery dependability, product innovation, and time to market to achieve competitive advantage. On the other hand, SCM practices refer to the activities that a firm undertakes to efficiently manage its supply chain (Li et al., 2006; Koh et al., 2007).

2.8 Moderating effect of business environment on supply chain management practice to competitive advantage

The dynamic business environment plays a crucial role in the success of innovation initiatives undertaken by organizations to enhance their performance (Tajeddini, Martin & Ali, 2020). From a contingency perspective, the stability and dynamism of the business environment are key factors that determine the company's performance. The studies by Chemma (2021) and Lumpkin and Dess (2001) suggest that competitive dynamics put pressure on companies to innovate in order to survive and thrive. This means that in a highly unpredictable environment, companies must adopt a strong entrepreneurial posture, particularly focused on innovation, to survive. Kraus et al., (2012) also found that innovative companies perform better in turbulent environments.

The uncertain business environment motivates companies to focus more on innovation. This leads to gaining a competitive advantage by offering goods and services that meet customer needs and expectations (Palazzeschi, Bucci, & Di Fabio, 2018: 1). Through innovation, companies can produce and sell goods that meet consumer expectations. By continuing to innovate, companies build a better position to expand their market share, sell more, and consistently satisfy their customers amidst environmental uncertainty (Ruba et al. 2023).

The presence of environmental uncertainty, as seen in environment dynamics, is a significant factor in driving innovation and ultimately achieving sustainable company performance. In a dynamic environment, companies must strive to balance the discrepancies caused by an unstable environment, as noted by Prajogo (2016) and Zehir & Balak (2018). However, it is wise to minimize risk by avoiding projects with high levels of risk and unlikely economic outcomes.

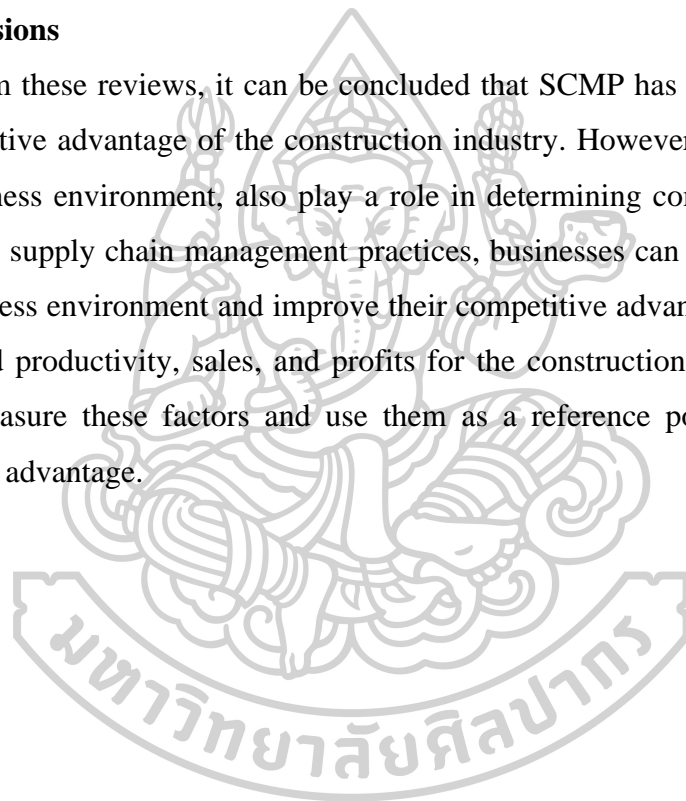
However, there are some scholars who have reached opposite conclusions. For example, Agyapong et al. (2021) and Taghizadeh et al. (2021) have stated that the impact of product innovation on business performance is weakened in an ever-changing business environment. This means that in a highly dynamic business environment, taking too many innovation initiatives may lead to counterproductive company performance. Therefore, it should be acknowledged that the business environment in the north-eastern DRC and the entire country is highly unstable,

creating more constraints than new opportunities for companies. Despite being called upon to respond creatively and innovatively (Shah, Shah, & El-Gohary, 2022), companies are experiencing tough working conditions.

After conducting a literature review, it was discovered that supply chain management practices have an impact on competitive advantage. Additionally, various business environment factors can either enhance or hinder this impact. This forms the basis of the conceptual framework for this research.

2.9 Conclusions

From these reviews, it can be concluded that SCMP has a positive impact on the competitive advantage of the construction industry. However, other factors, such as the business environment, also play a role in determining competitive advantage. By utilizing supply chain management practices, businesses can moderate the effects of the business environment and improve their competitive advantage. This can result in increased productivity, sales, and profits for the construction industry. The study aims to measure these factors and use them as a reference point for determining competitive advantage.



CHAPTER 3

RESEARCH METHODOLOGY

In this chapter, the research design and its methods are introduced. The research design can be developed on the basis of the research objectives.

3.1 Population and Sample

3.1.1 Population

The population studied consists of who are owners, entrepreneurs, managers, and experts employed as supply chain managers in the different construction industries of Kunming, the People's Republic of China. in Kunming, the People's Republic of China. The questionnaire is only intended for consumers who have experience using an express delivery company, as indicated by the screening questions.

3.1.2 Sample

In Kunming, the People's Republic of China, there are supply chain managers employed in various construction industries. The number of these managers is 1,284 companies (Data from Kunming City Commercial Office, China, 2023). The sample size was determined based on the criteria of Hair et al. (2010), which suggested 15-20 samples per parameter. As this research had 30 measurement variables, the chosen criterion was 10 times the measurement variable, resulting in a sample size of 300 cases.

3.2 Research Method

This research methodology is divided into 3 parts as follows:

First of all, the study reviews the related competitive advantage in the construction industry in Kunming, the People's Republic of China, supply chain management practices, business environment, and competitive advantage measurement. Then, the questionnaire about elements of supply chain management practices, external business environment, and competitive advantage of owners in the construction industry will be used as a data collection tool.

The population has experts who are owners, managers, and employed as supply chain managers in the different construction industries of Kunming, the People's Republic of China.

The survey focuses only on business owners registered with the Kunming City Commercial Office, China in 2023 and does not cover sole proprietorships. Because the number of employees is relatively small, organizational management is not possible, so it is described as 1,284 companies (Data from Kunming City Commercial Office, China, 2023).

Then, existing questionnaire online delivery modes in perspectives of all owners of the construction industry by asking for opinions or priorities that have been taken in the company to an ideal solution of who are employed as supply chain managers in the different construction industries about elements of supply chain management practices, external business environment, and competitive advantage of the construction industry in Kunming.

Secondly, research tools, the questionnaires are developed from supply chain management practices measures, external business environment, and measures of competitive advantage in the construction industry.

Finally, Data analysis for statistics

In this study, the researcher used descriptive statistics and inferential statistics to analyze the data with the following:

1. Descriptive statistics in the analysis of percentage, mean, and standard deviation.
2. Inferential statistics with Multiple Regression Analysis (MRA.) and Structural Equation Model: SEM, and test moderating effect of business environment by Sobel test.

The dependent variable is the competitive advantage in the construction industry in Kunming. Finally, the summary of quantitative research results.

3.3 Research Tools

The research tool is an online questionnaire developed from the literature review to check the validity of the contents of the questionnaire. The validity of the content is consistent between the question and the objective. (Index of Item -

Objective Congruence; IOC) for three-point were (1) supply chain management practices, 6 elements, but there are 10 questions; (2) business environment, 5 elements, but there are 10 questions; and (3) competitive advantage, 3 elements, but there are 10 questions in the construction industry in Kunming, the People's Republic of China. The average index of compliance IOC is between 0.66-1.00. The total average for content validity is equal to 0.96. Table 3.1 provides further details.

Table 3.1 Content validity of the scale

Scale	Content validity
Supply chain management practices	Average total 0.93
1.1 Effective allocation of resources enables construction industries to earn profits	1.00
1.2 The construction industry's project operations were completed on time	0.66
1.3 The supply chain members work together effectively by forecasting customer demands and coordinating their efforts accordingly	1.00
1.4 Cost information sharing customer	1.00
1.5 Efficient construction operations depend on proper inventory management	1.00
1.6 Participation in customer marketing is essential to understand the future needs of customers	1.00
1.7 The design should prioritize the usability of the product part, making repairs easier, and increasing efficiency	1.00
1.8 Your company often collaborates with its suppliers to find solutions to problems	1.00
1.9 Your company often engages with customers to establish its reliability, responsiveness, and other standards	1.00
1.0 The company focuses on reducing business costs while ensuring the efficiency and satisfaction of all parties involved, including organizational partners	0.66

Table 3.1 Content validity of the scale (continued)

Scale	Content validity
The business environment	Average total 0.99
1.1 The performance of the construction industry is influenced by the prevailing economic conditions	1.00
1.2 To plan strategically in the construction industry, one needs to analyze the unpredictable external environment	0.66
1.3 The continuous advancement of technology leads to the constant creation of new products and services	1.00
1.4 In today's fiercely competitive market, businesses must continually innovate and develop to stay ahead	1.00
1.5 As customer behavior is constantly evolving, businesses need to continuously adapt to keep up with the changes	1.00
1.6 The company strictly adheres to the rules and regulations set forth by the government policies	1.00
1.7 The economy has a significant impact on the operations and strategies of businesses	1.00
1.8 International factors can have both direct and indirect impacts on the management of construction industries	1.00
1.9 Construction industry owners must adapt to changes in consumer behavior to keep up with the situation	0.66
1.10 The construction industry has become highly competitive due to the impact of digital transformation	0.66

Table 3.1 Content validity of the scale (continued)

Scale	Content validity
Competitive Advantage	Average total 0.97
1.1 The focus is on maintaining the quality of service to a high standard so that our customers are continuously impressed	1.00
1.2 It is important to differentiate your service from competitors in order to maximize customer satisfaction	1.00
1.3 The company has strategically reduced its costs to gain a long-term competitive advantage over its rivals	1.00
1.4 The company has consistently improved its ability to meet the demands of its customers	1.00
1.5 The company emphasizes the importance of promptly responding to our customers and business partners who use our services	1.00
1.6 The company has implemented several strategies to make it difficult for new competitors to enter the market	1.00
1.7 Your company utilizes cutting-edge software and equipment to enable employees to quickly provide excellent customer service	1.00
1.8 Your company utilizes network systems to facilitate the flow of information between departments, which helps to ensure efficient workflow	0.66
1.9 Your company has a database that efficiently collects, analyzes, stores, and retrieves information as needed	1.00
1.10 Your company prioritizes delivering high-quality services within the expected timeframe	1.00

3.4 Collection of Information

This study was a questionnaire survey. A questionnaire is a tool for collecting information as follows:

3.4.1 Data collected from the population managers of construction Industry in Kunming.

3.4.2. The period of data collection for this study. Data collection from October 2023 to March 2024, totaling 6 months.

3.5 Data Analysis

3.5.1. The data from the first part of the questionnaire were analyzed by descriptive statistics. The aim was to identify the demographic entrepreneurs or owners of construction industries in Kunming. The data were then interpreted in terms of frequency and percentage.

3.5.2. Analyze the operation level of supply chain management practice factors of construction industries in Kunming, the People's Republic of China., totaling 6 areas, namely (1) efficient resource allocation (2) timely project completion (3) supplier relationships (4) inventory management (5) information sharing, and (6) adaptation to market changes. This follows by analyzing the operation level of the business environment, totaling 10 areas, namely (1) economic conditions, (2) technology, (3) customer behavior, (4) competitive market, (5) digital transformation, (6) regulation and government policy, (7) the economy has a significant impact on the operations, (8) international factors can have both direct and indirect impacts on the management of construction, (9) Construction industry owners must adapt to changes, and (10) competitive. Statistics used in data analysis are mean (\bar{x}), and standard deviation (S.D.). Interpreting the mean scores is divided into five levels. The criteria for dividing the average scores in each period will be determined by the criteria for interpreting the mean together with the principles of rounding decimals to integers according to the method of Ferguson (1976), that is, the width of the class intersection of the table, meaning of the average score in each period. The range of very high and very low scores is smaller than other levels. The range of very high and very low scores is approximately half a point (0.50), while the other levels are approximately 1 point as follows:

Table 3.2 Rang of average

Rang of average	Meaning of the average score for the operated level of supply chain management practice and business environment.
4.51-5.00	Supply chain management practice (1. efficient resource allocation, 2. timely project completion, 3. supplier relationships, 4. inventory management, 5. information sharing, and 6. adaptation to market changes) and business environment (1. economic conditions, 2. technology, 3. customer behavior, 4. regulation and government policy, and 5. digital transformation) are operated at the very high level)
3.51-4.50	Supply chain management practice (1. efficient resource allocation, 2. timely project completion, 3. supplier relationships, 4. inventory management, 5. information sharing, and 6. adaptation to market changes) and business environment (1. economic conditions, 2. technology, 3. customer behavior, 4. regulation and government policy, and 5. digital transformation) are operated at the high level)
2.51-3.50	Supply chain management practice (1. efficient resource allocation, 2. timely project completion, 3. supplier relationships, 4. inventory management, 5. information sharing, and 6. adaptation to market changes) and business environment (1. economic conditions, 2. technology, 3. customer behavior, 4. regulation and government policy, and 5. digital transformation) are operated at the moderate level)

Table 3.2 Rang of average (continued)

Rang of average	Meaning of the average score for the operated level of supply chain management practice and business environment.
1.51-2.50	Supply chain management practice (1. efficient resource allocation, 2. timely project completion, 3. supplier relationships, 4. inventory management, 5. information sharing, and 6. adaptation to market changes) and business environment (1. economic conditions, 2. technology, 3. customer behavior, 4. regulation and government policy, and 5. digital transformation) are operated at the low level)
1.00-1.50	Supply chain management practice (1. efficient resource allocation, 2. timely project completion, 3. supplier relationships, 4. inventory management, 5. information sharing, and 6. adaptation to market changes) and business environment (1. economic conditions, 2. technology, 3. customer behavior, 4. regulation and government policy, and 5. digital transformation) are operated at the very low level)

3.5.3 Analyze data about the competitive advantage of the construction industry in three areas: 1) cost leadership, 2) difference business, and 3) focusing. Statistics used in data analysis are mean (\bar{x}) and standard deviation (S.D.). Interpreting the mean scores is divided into 5 levels. The criteria for dividing the average scores in each period will be determined by the criteria for interpreting the mean together with the principles of rounding decimals to integers according to the method of Ferguson (1976) that is, the width of the class intersection of the table, meaning of the average score in each period. The range of very high and very low scores is smaller than other

levels. The range of very high and very low scores is approximately half a point (0.50), while the other levels are approximately 1 point as follows:

Rang of average	Meaning of the average score for operated level of competitive advantage
4.51-5.00	The construction industry of cost leadership, different businesses, and focus has operated at a very high level.
3.51-4.50	The construction industry of cost leadership, different businesses, and focus has operated at a high level.
2.51-3.50	The construction industry of cost leadership, different businesses, and focus has operated at the moderate level
1.51-2.50	The construction industry of cost leadership, different businesses, and focus has operated at a low level.
1.00-1.50	The construction industry of cost leadership, different businesses, and focus has operated at a very low level.

3.6 Conceptual Framework

The result of the concept review, theory, and related research. The authors concluded that supply chain management practices has 6 components, developed from the scales of Lambert and Enz (2017), business environment has 5 components, and competitive advantage has 3 components, developed from the scales of Porter (1980), The construction industry's prospects for success can be divided into 3 types, cost leadership, business difference, and focusing factors. See Figure 3.1 Conceptual Framework.

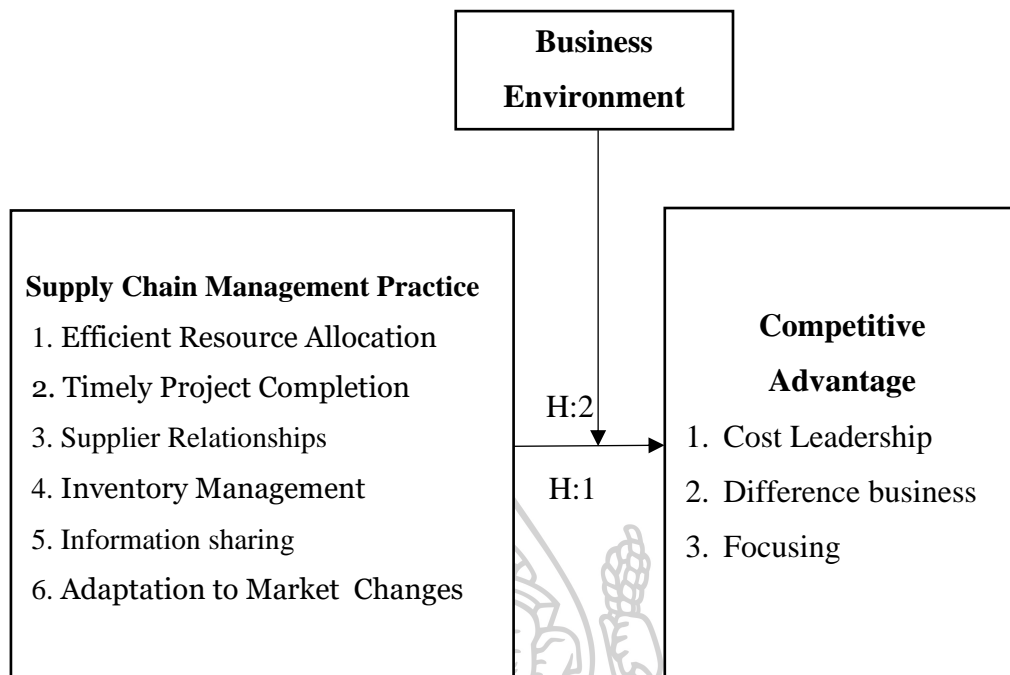


Figure 3.1 Conceptual Research Framework

3.7 Research Hypothesis

H:1 Supply chain management practice had a direct effect toward competitive advantage.

H:2 The moderating effect of the business environment on the supply chain management practices and competitive advantage.

3.8 Research Procedure

Before presenting the competitive advantage model of the construction industry in Kunming, China. As shown in Figure 3.2, therefore, the possible scenarios are divided into the following:

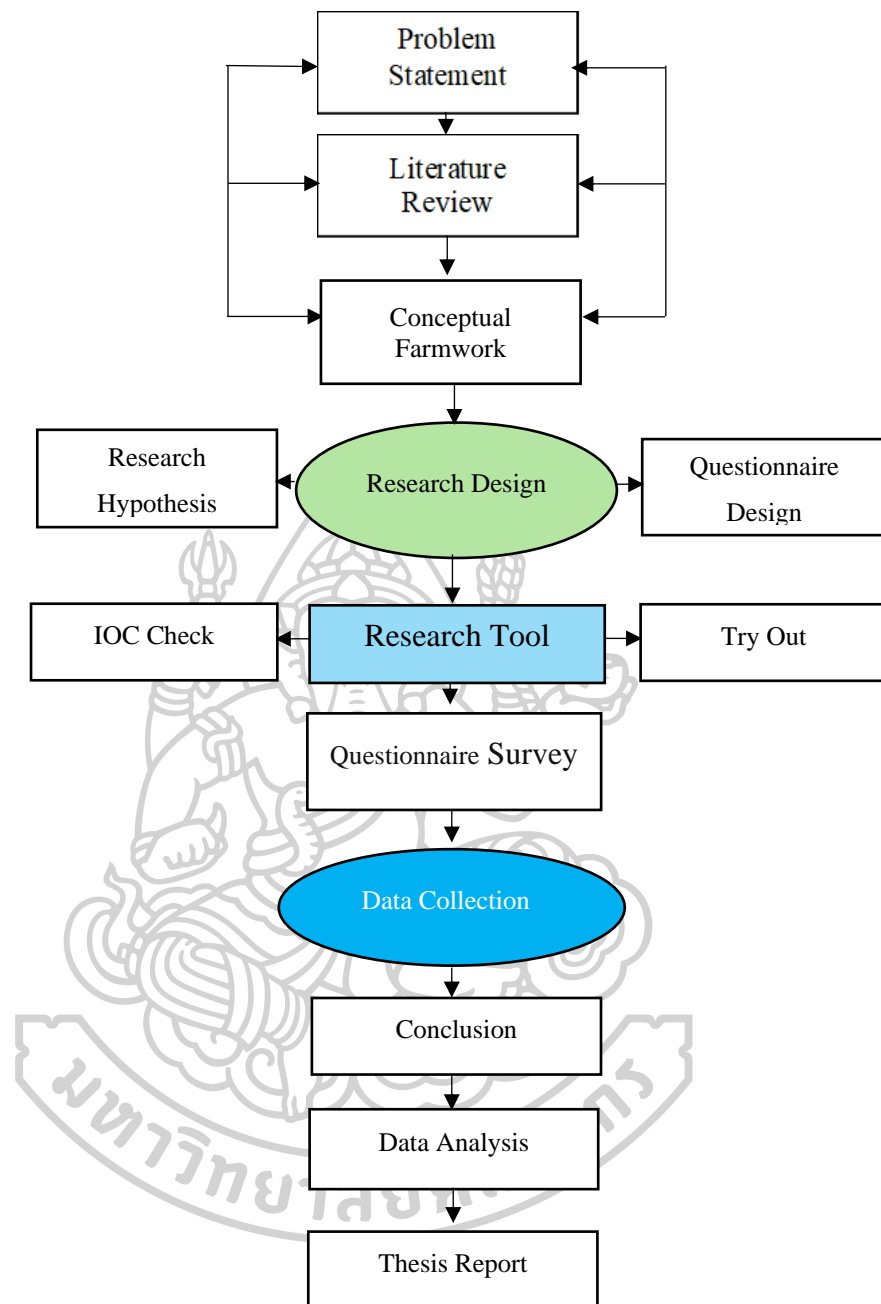


Figure 3.2 Research Process Flow Chart

3.9 Conclusion

This chapter outlines the research methodology used in this study. Firstly, the researcher presented the research questions and framework. They also discussed the research design and survey instrument, including the population, sampling, and sample size, as well as the data collection procedures used in all three phases of the study. The statistical methods used, such as the index of item-objective congruence (IOC), factor analysis with common factor analysis, and structural equation modeling, were also explained. The researcher presented the measurement model and constructs used to assess the competitive advantage of the Chinese construction industry in Kunming and demonstrated the validity and reliability of the measurement scales. Finally, the indices for assessing and testing the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, The People's Republic of China, were discussed.



CHAPTER 4

RESULTS AND ANALYSIS

The key points are to study the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China, and the People's Republic of China. The research objectives were (1) To study the importance level of efficient resource allocation, timely project completion, supplier relationships, inventory management, information sharing, adaptation to market changes, business environment, and competitive advantage of construction enterprises in Kunming, the People's Republic of China. (2) To study the effect of supply chain management practices and business environment toward competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China. And (3) To test the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry in Kunming, the People's Republic of China. The research results are summarized, as follows:

4.1. Part 1 Result

4.1.1 Demography of entrepreneurs, owners, and managers of construction industries in Kunming.

The respondent profile is shown in Table 4.1; The table shows information about the demography of entrepreneurs who have experts, and employed as supply chain managers in the different construction industries of Kunming by providing the frequency and percentage of each. The research results are summarized, as follows:

Table 4.1 Demography of entrepreneurs' construction industries in Kunming.

(n=300)

General	Demography	Number	Percentage
Gender	Males	216	71.99
	Females	84	28.01
Age	31 – 40 Years	81	27.00
	41 – 50 Years	135	45.00
	51 – 60 Years	76	25.33
	60 years or older	8	2.67
Status	Single	49	16.33
	Merited	235	78.33
	Separated	10	3.33
	Divorce	6	2.00
Education	Below bachelor's Degree	18	6.00
	Bachelor's Degree	107	35.67
	Master's Degree	170	56.67
	Doctoral Degree	5	1.66
Position	Entrepreneurs	213	71.00
	Manager	87	29.00
Investment in construction industries	Individual investors	18	6.00
	Individual investors and family offices	45	15.00
	Individual investors and corporate investors	36	12.00
	Individual investors, corporate Investors, and financial institution	117	39.00
	Individual investors and financial institution	84	28.00

Table 4.1 Demography of entrepreneurs' construction industries in Kunming (continued)
(n=300)

General	Demography	Number	Percentage
Number of employees	Fewer than 1,000 peoples	259	86.33
	1,001-2,000 people	41	13.67
Age of the construction industries	Less than 5 years	72	24.00
	5-10 Years	148	49.33
	11-15 Years	57	19.00
	16-20 Years	16	5.34
	21 Years or More	7	2.33
Types of construction industries	Residential or housing	67	22.34
	Industrial	13	4.33
	Commercial	148	49.34
	Civil works for public utilities	72	23.99
Size of construction industries	Large-sized	45	15.00
	Small-sized	168	56.00
	Mini-sized	87	29.00
Construction industries	Fewer than 30 million yuan	179	59.67
	30-70 million yuan	68	22.66
	71-110 million yuan	53	17.67

Table 4.1 Demography of entrepreneurs' construction industries. According to the research, the majority of individuals who undertake construction industries are male, accounting for 71.99% of the respondents. The age group with the highest representation is between 41 and 50 years old, accounting for 45.00%, followed by the 31-40 age group with 27.00%, and the 51-60 age group with 25.33%. The majority of respondents are married, accounting for 78.33%, followed by single individuals with 16.33%, and separated at 3.33% respectively. Most of the respondents have a master's degree 56.67 %, followed by those with a bachelor's degree 35.67%. The majority of respondents are individuals who are entrepreneurs in the construction industry, 71.00%, followed by managers, 29.00%.

The investment in the business is mostly from Individual investors, corporate Investors, and financial institutions 39.00%), followed by Individual investors and financial institutions 28.00%, and Individual investors and family offices 15.00%.

The majority of companies in this construction industry have fewer than 1,000 employees, accounting for 86.33% of the sector. The next most common employee count is between 1,001 and 2,000, making up 13.67%. In terms of company age, 49.33% have been operating for 5-10 years, with 24.00% less than 5 years old, and 15.00% have been operating for 11-15 years. Commercial operations make up the largest percentage of construction projects at 49.34%, followed by civil works for public utilities at 23.99% and residential or housing at 22.34%. Large-sized construction industries are the most common, making up 42.45%, followed by small-sized at 56.00% and mini-sized at 29.00%. When it comes to the construction industry's income, the majority involves investments of less than 30 million yuan, accounting for 59.67%. The next most common income bracket is 30-70 million yuan at 22.66%, followed by 71-110 million yuan at 17.67%.

4.2 Part 2 Result

4.2.1 Research Objective 1

To study the importance level of supply chain management practices (efficient resource allocation, timely project completion, supplier relationships, inventory management, information sharing, adaptation to market changes), business environment, and competitive advantage of construction industries in Kunming, the People's Republic of China.

Table 4.2 Descriptive statistic analysis of supply chain management practices

1. Supply chain management practices	Mean	S.D.	Level of importance
1.1 Effective allocation of resources enables construction industries to earn profits	4.57	0.680	Very high
1.2 The construction industry's project operations were completed on time	4.60	0.666	Very high
1.3 The supply chain members work together effectively by forecasting customer demands and coordinating their efforts accordingly	4.58	0.680	Very high
1.4 Cost information sharing customer	4.09	0.684	High
1.5 Efficient construction operations depend on proper inventory management	4.57	0.679	Very high
1.6 Participation in customer marketing is essential to understand the future needs of customers	4.32	0.666	High
1.7 The design should prioritize the usability of the product part, especially when it comes to extending its use, making repairs easier, and increasing efficiency	4.49	0.731	High
1.8 Your company often collaborates with its suppliers to find solutions to problems	4.50	0.720	High
1.9 Your company often engages with customers to establish its reliability, responsiveness, and other standards	3.96	0.895	High
1.0 The company focuses on reducing business costs while ensuring the efficiency and satisfaction of all parties involved, including organizational partners	4.35	0.664	High
Total average	4.40	0.527	High

According to Table 4.2, supply chain management practices is high important. The total average score was 4.40 with a standard deviation of 0.527. which indicates a high level of importance. When analyzing the factors, it was found that the construction industry's project operations completed on time were the most important factors, with a mean score of 4.60 and a standard deviation of 0.666. Following this, The supply chain members work together effectively by forecasting customer demands and coordinating their efforts accordingly, with a mean score of 4.58 and a standard deviation of 0.680. Lastly, effective allocation of resources enables construction industries to earn profits and efficient construction operations depend on proper inventory management in the same proportion, with a mean score of 4.57 and a standard deviation of 0.680, 0.679.

Table 4.3 Descriptive statistic analysis of the business environment

1. Business environment	Mean	S.D.	Level of importance
1.1 The performance of the construction industry is influenced by the prevailing economic conditions	4.53	0.716	Very high
1.2 To plan strategically in the construction industry, one needs to analyze the unpredictable external environment	4.46	0.715	high
1.3 The continuous advancement of technology leads to the constant creation of new products and services	4.52	0.714	Very high
1.4 In today's fiercely competitive market, businesses must continually innovate and develop to stay ahead	4.56	0.688	Very high

Table 4.3 Descriptive statistic analysis of the business environment (continued)

1. Business environment	Mean	S.D.	Level of importance
1.5 As customer behavior is constantly evolving, businesses need to continuously adapt to keep up with the changes	4.53	0.709	Very high
1.6 The company strictly adheres to the rules and regulations set forth by the government policies	4.34	0.673	High
1.7 The economy has a significant impact on the operations and strategies of businesses	4.52	0.714	Very high
1.8 International factors can have both direct and indirect impacts on the management of construction industries	4.49	0.732	High
1.9 Construction industry owners must adapt to changes in consumer behavior to keep up with the situation	4.51	0.721	Very high
1.10 The construction industry has become highly competitive due to the impact of digital transformation	4.47	0.729	High
Total average	4.49	0.640	High

According to Table 4.3, the business environment is high important. The total average score was 4.49 with a standard deviation of 0.640. which indicates a high level of importance. When analyzing the factors, it was found that in today's fiercely competitive market, businesses must continually innovate and develop to stay ahead was the most important factor, with a mean score of 4.56 and a standard deviation of 0.688. Following this, the performance of the construction industry is influenced by the prevailing economic conditions, and as customer behavior is constantly evolving, businesses need to continuously adapt to keep up with the changes, with a mean score of 4.53 in the same proportion, a standard deviation of 0.716, 0.709. Lastly, the

continuous advancement of technology leads to the constant creation of new products and services, and the economy has a significant impact on the operations and strategies of businesses, with a mean score of 4.52 and a standard deviation of 0.714.

Table 4.4 Descriptive statistic analysis of competitive advantage

1. Competitive advantage	Mean	S.D.	Level of importance
1.1 The focus is on maintaining the quality of service to a high standard so that our customers are continuously impressed	4.57	0.687	Very high
1.2 It is important to differentiate your service from competitors in order to maximize customer satisfaction	4.61	0.666	Very high
1.3 The company has strategically reduced its costs to gain a long-term competitive advantage over its rivals	4.43	0.630	High
1.4 The company has consistently improved its ability to meet the demands of its customers	4.59	0.672	Very high
1.5 The company emphasizes the importance of promptly responding to our customers and business partners who use our services	4.58	0.673	Very high
1.6 The company has implemented several strategies to make it difficult for new competitors to enter the market	4.41	0.631	High

Table 4.4 Descriptive statistic analysis of competitive advantage (continued)

1. Competitive advantage	Mean	S.D.	Level of importance
1.7 Your company utilizes cutting-edge software and equipment to enable employees to quickly provide excellent customer service	4.38	0.605	High
1.8 Your company utilizes network systems to facilitate the flow of information between departments, which helps to ensure efficient workflow	4.36	0.618	High
1.9 Your company has a database that efficiently collects, analyzes, stores, and retrieves information as needed	4.54	0.652	Very high
1.10 Your company prioritizes delivering high-quality services within the expected timeframe	4.72	0.656	Very high
Total average	4.51	0.526	Very high

According to Table 4.4, the competitive advantage is very high important. The total average score was 4.51 with a standard deviation of 0.526. which indicates a very high level of importance. When analyzing the factors, it was found that the company prioritizes delivering high-quality services within the expected timeframe, with a mean score of 4.72 and a standard deviation of 0.656. Following this, it is important to differentiate your service from competitors in order to maximize customer satisfaction, with a mean score of 4.61 and a standard deviation of 0.666. Lastly, the company has consistently improved its ability to meet the demands of its customers, with a mean score of 4.59 and a standard deviation of 0.672.

4.3 Part 3 Result

4.3.1 To analyze the effect of supply chain management practices and business environment toward the competitive advantage of the Chinese construction industry.

The result found that supply chain management practices had a direct effect on the competitive advantage of owners in the construction industry, with path coefficients equal to 0.829. The moderating effect of business environment on supply chain management practice to competitive advantage, with path coefficients equal to 0.007. The researcher has removed certain questions from the supply chain management practices (SCMP) variable, namely scmp7, scmp8, scmp9, and scmp10, as their loading value was less than 0.7. Similarly, for the business environment variables, the researcher has removed be6, be7, be8, be9, and be10 questions due to their loading values being lower than 0.7. Lastly, the dependent variable was a competitive advantage, and the researcher eliminated questions ca6, ca7, ca8, ca9, and ca10 because their loading values were less than 0.7. These criteria were based on the work of Hair et al. As Figure 4.1.

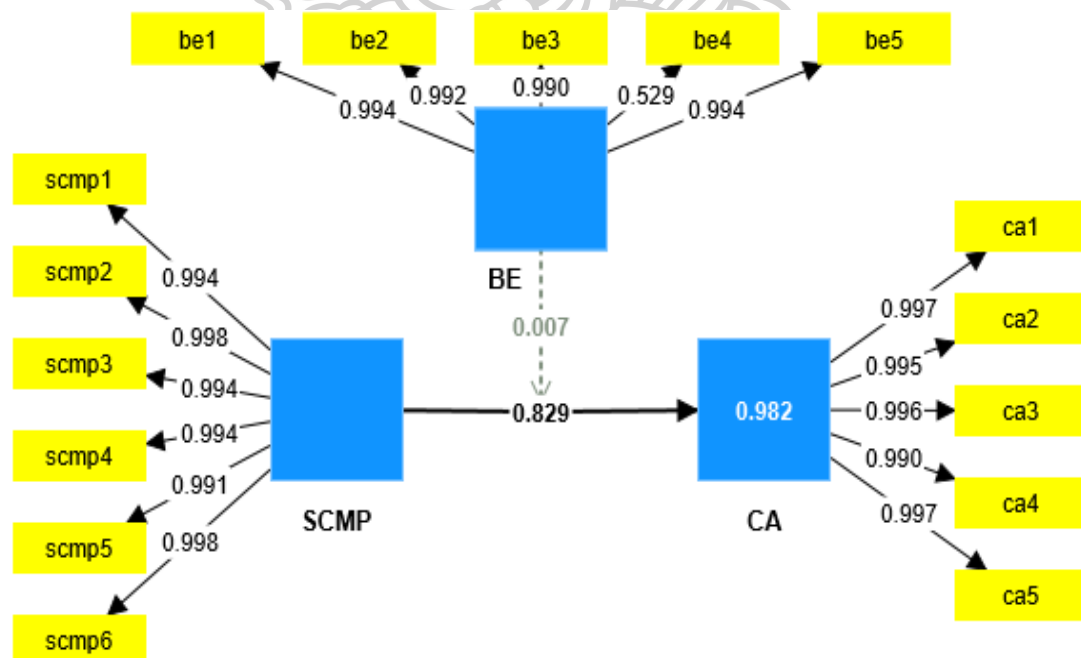


Figure 4.1 The result of Structural Equation Modeling

The conclusion of supply chain management practices had a direct effect on competitive advantage, with path coefficients equal to 0.007. Before an intermediary factor, the business environment has a relatively high path coefficient. See Table 4.5

Table 4.5 Research Hypothesis

Hypothesis	Path coefficients	T-stat	The Result
SCMP -> CA (before)	0.991	14.979	support
BE x SCMP -> CA	0.007	12.656	support
SCMP -> CA (after)	0.829	17.673	support

Remark: $|t| \geq 1.645$ mean $p\text{-value} \leq 0.10$, $|t| \geq 1.96$ mean $p\text{-value} \leq 0.05$, $|t| \geq 2.58$ mean $p\text{-value} \leq 0.00$

4.3.2 The result of testing the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry. as Figure 4.2.

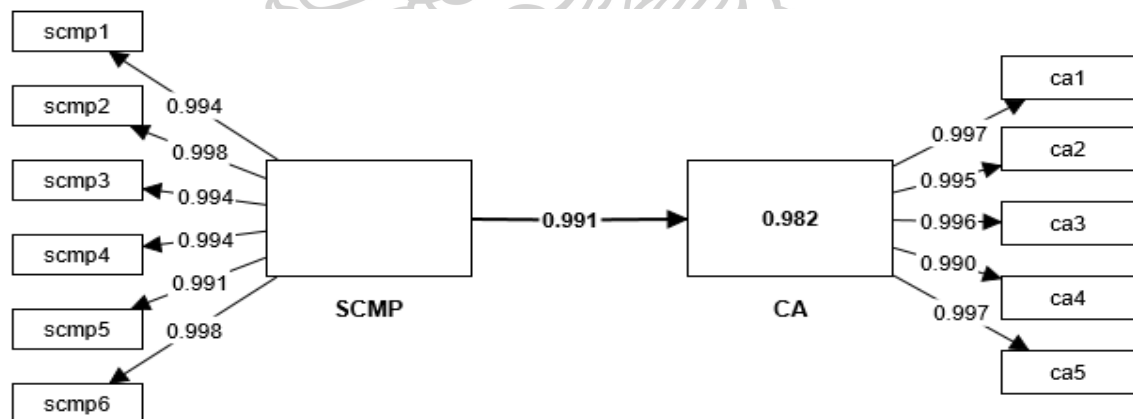


Figure 4.2 The result of supply chain management practices had a direct effect on competitive advantage.

Table 4.6 The testing of the moderating effect of the business environment on the supply chain management practices and competitive advantage

Business Environment	Effect	HTMT	p-value	LLCI	ULCI
-1.0714 (low)	0.829	0.993	0.000	0.5206	0.6905
-0.0019 (moderated)	0.834	0.999	0.000	0.5498	0.6679
0.9488 (high)	0.991	0.612	0.000	0.5302	0.6931

From Figure 4.2, According to Table 4.6, it has been discovered that there is a hidden factor, business environment (BE), which creates a relationship between supply chain management practices (SCMP) and competitive advantage (CA). However, the interaction between SCMP and BE is significant, meaning that overall, BE does have a significant impact on SCMP that leads to a competitive advantage. Instead, BE has a pick a point. It has been found that as more BE is analyzed in business operations, SCMP will gradually have more influence on competitive advantage, but the effect is not significant. Therefore, entrepreneurs should pay attention to the environment, especially the external environment, which is volatile and can significantly affect competitive advantage.



CHAPTER 5

CONCLUSIONS

This final chapter will cover the summary of this study and seek to propose some recommendations for future studies that can be conducted to expand on this research.

5.1 The Results of Research Objective 1

To study the importance level of efficient resource allocation, timely project completion, supplier relationships, inventory management, information sharing, adaptation to market changes, business environment, and competitive advantage of construction industries in Kunming, the People's Republic of China. From the perspective of business owners, or managers of the construction industry as follows:

1) The supply chain management practices is high important. The total average score was 4.40 with a standard deviation of 0.527. which indicates a high level of importance. When analyzing the factors, it was found that the construction industry's project operations completed on time were the most important factors, with a mean score of 4.60 and a standard deviation of 0.666. Following this, The supply chain members work together effectively by forecasting customer demands and coordinating their efforts accordingly, with a mean score of 4.58 and a standard deviation of 0.680. Lastly, effective allocation of resources enables construction industries to earn profits and efficient construction operations depend on proper inventory management in the same proportion, with a mean score of 4.57 and a standard deviation of 0.680, 0.679.

2) The business environment is high important. The total average score was 4.49 with a standard deviation of 0.640. which indicates a high level of importance. When analyzing the factors, it was found that in today's fiercely competitive market, businesses must continually innovate and develop to stay ahead was the most important factor, with a mean score of 4.56 and a standard deviation of 0.688. Following this, the performance of the construction industry is influenced by the prevailing economic conditions, and as customer behavior is constantly evolving, businesses need to continuously adapt to keep up with the changes, with a mean score

of 4.53 in the same proportion, a standard deviation of 0.716, 0.709. Lastly, the continuous advancement of technology leads to the constant creation of new products and services, and the economy has a significant impact on the operations and strategies of businesses, with a mean score of 4.52 and a standard deviation of 0.714.

3) The competitive advantage is very high important. The total average score was 4.51 with a standard deviation of 0.640. which indicates a high level of importance. When analyzing the factors, it was found that in today's fiercely competitive market, businesses must continually innovate and develop to stay ahead was the most important factor, with a mean score of 4.56 and a standard deviation of 0.688. Following this, the performance of the construction industry is influenced by the prevailing economic conditions, and as customer behavior is constantly evolving, businesses need to continuously adapt to keep up with the changes, with a mean score of 4.53 in the same proportion, a standard deviation of 0.716, 0.709. Lastly, the continuous advancement of technology leads to the constant creation of new products and services, and the economy has a significant impact on the operations and strategies of businesses, with a mean score of 4.52 and a standard deviation of 0.714.

5.2 The Results of Research Objective 2

To analyze the effect of supply chain management practices, and business environment toward the competitive advantage of the Chinese construction industry.

The result found that supply chain management practices had a direct effect on the competitive advantage of owners in the construction industry, with path coefficients equal to 0.829. The moderating effect of business environment on supply chain management practice to competitive advantage, with path coefficients equal to 0.007.

5.3 The Results of Research Objective 3

The result of testing the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry.

The research results concluded that supply chain management practices had a direct effect on competitive advantage, with path coefficients equal to 0.991. After

having a complicating factor, namely the business environment, came to influence the value of supply chain management practices had a direct effect toward competitive advantage. decreased, with path coefficients equal to 0.829. It has been discovered that there is a hidden factor, the business environment, which creates a relationship between supply chain management practices and competitive advantage. However, the interaction between supply chain management practices and the business environment is significant, meaning that overall, the business environment does have a significant impact on supply chain management practices that lead to a competitive advantage. Instead, the business environment has a pick a point. It has been found that as the business environment is analyzed in business operations, supply chain management practices will gradually have more influence on competitive advantage, but the effect is not significant. Therefore, entrepreneurs should pay attention to the environment, especially the external environment, which is volatile and can significantly affect competitive advantage.

5.4 Conclusion and Discussion

According to the research, Chinese entrepreneurs in the construction industry consider competitive advantage to be of great importance. The average score was 4.51 with a standard deviation of 0.640. This is because achieving competitive advantage leads to better performance results in the industry and helps achieve set goals. Moreover, the business environment is also critical because it affects the operations of supply chain management practices, which can help reduce operating costs and maximize business resources. Building a network of partners who work together to deliver products or services as per the market's demand and on time is also an essential aspect of maintaining a competitive advantage. Lastly, the supply chain management practices are crucial, because they enable efficient operations from upstream to downstream, leading to timely delivery of products and services to customers.

According to the research, supply chain management practices have a direct impact on the competitive advantage of construction industry owners. The path coefficients were found to be 0.829. Therefore, it is advisable for construction enterprise owners to focus on supply chain management practices to reduce costs

systematically. This can be achieved by promoting cooperation between organizations and partner networks, and closely monitoring the work process. Additionally, production planning, warehouse storage, freight, shipping, returns handling, and inventory management should be effectively managed. By adopting flexible and reliable supply chain management practices, businesses can quickly improve and create new products or services in response to market demand. This approach also minimizes the risk of doing business in the supply chain, including transportation security, and ultimately helps businesses become more competitive and reach new customers.

The result of testing the moderating effect of the business environment on the supply chain management practices and competitive advantage of the Chinese construction industry. The construction industry is a complex one that is affected by various external factors such as economic systems, societal norms, and government policies. These factors can make supply chain management practices complicated, leading to a decreased competitive advantage from 0.991 to 0.829. Therefore, it is imperative to conduct a thorough analysis of the business environment before developing any strategies as it is constantly changing, leading to operational risks. Entrepreneurs can leverage their business strengths to develop their potential to be competitive, identify weaknesses, and find ways to mitigate them in a timely manner. The industry should look for opportunities to create benefits for the business and use them as a guide to developing cost-effective strategies or rapid services to drive growth in the construction industry.

5.5 Suggestions for Future Study

1. The focus of this research is on quantitative surveys. If researchers want to expand on this work, they should consider using qualitative research methods such as interviews or case studies. This will help gain a better understanding of the specific supply chain management practices utilized by the Chinese construction industry and how these practices contribute to their competitiveness. Qualitative research can provide more detailed and nuanced insights that may not be captured by quantitative methods.

2. It is important to conduct a study on the impact of collaborative networks and partnerships in supply chain management, and how they can enhance the competitive advantage of the Chinese construction industry. This study should focus on analyzing the relationships with suppliers, subcontractors, or industry associations, and how they contribute towards innovation, efficiency, and market competitiveness.

5.6 Implications

5.6.1. Operational impact

For construction industry entrepreneurs, please analyze how the policies and regulations implemented by the government influence the business environment of the Chinese construction industry. This analysis should include an evaluation of how policies related to trade, investment, infrastructure development, or environmental sustainability affect the supply chain management practices and competitive advantage of the construction industry.

5.6.2. Social impact

The construction industry plays a significant role in a country's economic, social, and environmental systems, promoting rapid economic growth. The exchange between cities and rural areas can enhance the living standards of rural communities. However, the construction industry has negative consequences, such as the land construction industry can also cause pollution in the form of exhaust gas and noise, affecting both the environment and the surrounding population. It's important to consider the various benefits of the construction industry while also being aware of possible social impacts. Governments and private agencies should take measures to prevent negative effects or collaborate on strategies related to construction industry on all levels.

REFERENCES

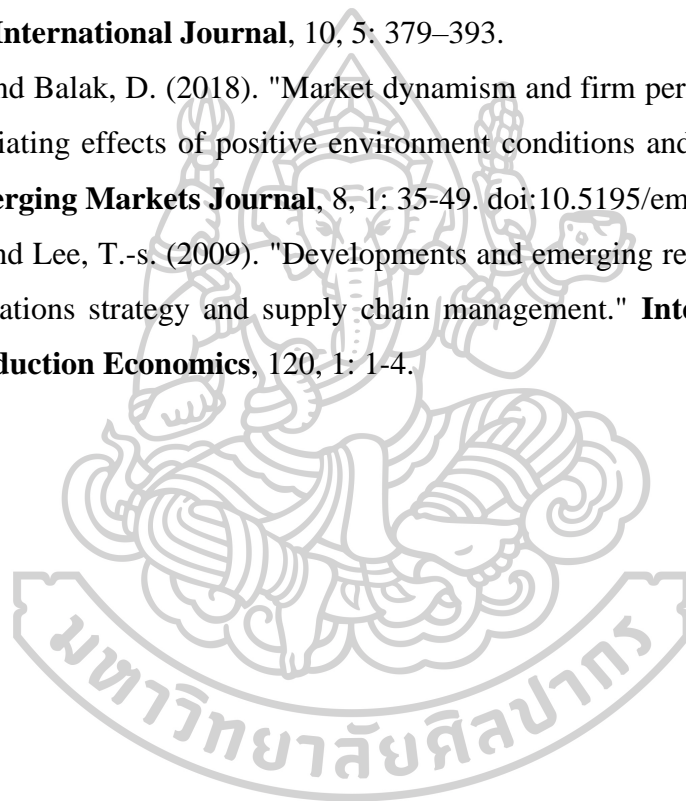
- Agyapong, A., Mensah, H., and Akomea, S. (2021). "Innovation-performance relationship: The moderating role of market dynamism." **Small Enterprise Research**, 28, 3: 350-372. doi:10.1080/13215906.2021.1967775
- Ali, Y., Saad, T. B., Sabir, M., Muhammad, N., Salman, A., and Zeb, K. (2020). "Integration of green supply chain management practices in construction supply chain of CPEC." **Management of Environmental Quality**, 31, 1: 185-200. doi:10.1108/MEQ-12-2018-0211
- Ashish, A., Thatte, S., Rao, S., and RaguNathan, T. S. (2013). "Impact of SCM practices of a firm on supply chain responsiveness and competitive advantage of a firm." **Journal of Applied Business Research**, 29, 2: 499-530. doi:10.19030/jabr.v29i2.7653
- Chemma, N. (2021). "Disruptive innovation in a dynamic environment: a winning strategy? An illustration through the analysis of the yoghurt industry in Algeria." **Journal of Innovation and Entrepreneurship**, 10, 34: 1-19. doi:10.1186/s13731-021-00150-y
- Demeter, K., Boer, H., Peng, D. X., Schroeder, R. G., and Shah, R. (2011). "Competitive priorities, plant improvement and innovation capabilities, and operational performance." **International Journal of Operations & Production Management**, 31, 5: 23-43.
- Dublin. (2023). **China Construction Industry Report 2023: Output to Expand by 3.6% in Real Terms in 2023, Owing to a Significant Increase in infrastructure and Energy and Utilities Construction - Forecast to 2027.** accessed. available from <https://uk.finance.yahoo.com/news/china-construction-industry-report-2023>
- Ibrahim, S. B., and Hamid, A. A. (2014). "Supply Chain Management Practices and Supply Chain Performance Effectiveness." **International Journal of Science and Research (IJSR)**, 3, 8: 187-195.

- Jernsittiparsert, K., Siriattakul, P., and Sangperm, N. (2019). "Predictors of Environmental Performance: Mediating Role of Green Supply Chain Management Practices." **International Journal of Supply Chain Management**, 8, 3: 877-888.
- Jie, F., Parton, K. A., and Cox, R. J. (2013). "Linking supply chain practices to competitive advantage." **British Food Journal**, 115, 7: 45-65.
- Jones, O. (2003). "Competitive advantage in SMEs: towards a conceptual framework." **Competitive advantage in SMEs: Organising for innovation and change**: 15-33.
- Koufteros, X. A., Vonderembse, M. A., and Doll, J. (1997). "Competitive capabilities: measurement and relationships." **Proceedings Decision Science Institute**, 3, 1: 1067-1068.
- Kraus, S., Rigtering, J., Hughes, M., and Hosman, V. (2012). "Entrepreneurial orientation and the business performance of SMEs: a quantitative study from the Netherlands." **Rev Manag Sci**, 6: 161–182. doi:10.1007/s11846-011-0062-9
- Kroes, J. R., and Ghosh, S. (2010). "Outsourcing congruence with competitive priorities: Impact on supply chain and firm performance." **Journal of operations management**, 28, 2: 124-143.
- Lambert, D. M., and Enz, M. G. (2017). "Issues in supply chain management: Progress and potential." **Industrial Marketing Management**, 62: 1-16.
- Lee, H. L. (2002). "Aligning supply chain strategies with product uncertainties." **California Management Review**, 44, 3: 105-110.
- Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., and Rao, S. S. (2006). "The impact of supply chain management practices on competitive advantage and organizational performance." **International Journal of Management Science, Omega**, 34, 2: 107-124.
- Linda, M. R., and Thabrani, G. (2021). **Supply Chain Management Practices on Competitive Advantage with Supply Chain Performance as Moderating Variable**. Paper presented at the Proceedings of the Seventh Padang International Conference On Economics Education, Economics, Business and Management, Accounting and Entrepreneurship (PICEEBA 2021).

- Lumpkin, G. T., and Dess, G. G. (2001). "Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment industry life cycle." **Journal of Business Venturing**, 16: 429–451. doi:10.1016/S0883-9026(00)00048-3
- Mason-Jones, R., and Towill, D. R. (1999). "Using the information decoupling point to improve supply chain performance." **The International Journal of Logistics Management**, 10, 2: 13-26.
- McGinnis, M. A., and Vallopra, R. M. (1999). "Purchasing and supplier involvement in process improvement: a source of competitive advantage." **Journal of Supply Chain Management**, 35, 4: 42-50.
- Mentzer, J. T., Min, S., and Zacharia, Z. G. (2000). "The nature of interfirm partnering in supply chain management." **Journal of Retailing. Advances in Economics, Business and Management Research**, volume 192 479 549–568. 4th Quarter, 76, 4. doi:10.1016/S0022-4359(00)00040-3
- Moreno, J. E. (2023). **China's economy was long dependent on a booming real estate sector, which has recently fallen on harder times**. accessed. available from <https://www.nytimes.com/2023/08/21/business/china-economy-real-estate-crisis.html>
- Peng, B., Zhao, T., and Elahi, E. (2023). "Does the business environment improve the competitiveness of start-ups? The moderating effect of cross-border ability and the mediating effect of entrepreneurship." **Corporate Social Responsibility and Environment Management**, 29, 5: 45-67.
- Porter, M. E. (1985). **Competitive Advantage: Creating and Sustaining Superior Performance**. New York: Free Press.
- Prajogo, D. (2016). "The strategic fit between innovation strategies and business environment in delivering business performance." **International Journal of Production Economics**, 171, 1: 241-249. doi:10.1016/j.ijpe.2015.07.037
- Rajeev, A., Pati, R. K., Padhi, S. S., and Govindan, K. (2017). "Evolution of sustainability in supply chain management: A literature review." **Journal of Cleaner Production**, 162: 299-314.

- Shah, S., Shah, S., and El-Gohary, H. (2022). "Nurturing Innovative work behaviour through workplace learning among knowledge workers of small and medium businesses." **Journal Knowledge Economic**. doi:10.1007/s13132-022-01019-5
- Somjai, S., and Jermsittiparsert, K. (2019). "Role of Pressures and Green Supply Chain Management Practices in Enhancing the Operational Efficiency of Firms: Evidence from Thailand." **International Journal of Supply Chain Management**, 8, 4: 437- 445.
- Srimai, S., Wright, C. S., and Radford, J. (2013). "A speculation of the presence of overlap and niches in organizational performance management systems." **International Journal of Productivity and Performance Management**, 62, 4: 364-386.
- Sultan, S., and Mason, M. (2010). **Competitive Advantage of SMEs**. accessed. available from <http://hdl.handle.net/20.500.11889/2427,2016-10-13T05:28:13Z>
- Taghizadeh, S., Nikbin, D., Alam, M., Rahman, S., and Nadarajah, G. (2021). "Technological capabilities, open innovation and perceived operational performance in SMEs: The moderating role of environmental dynamism." **Journal of Knowledge Management**, 25, 6: 1486-1507. doi:10.1108/JKM-05-2020-035
- Tajeddini, K., Martin, E., and Ali, A. (2020). "Enhancing hospitality business performance: The role of entrepreneurial orientation and networking ties in a dynamic environment." **International Journal of Hospitality Management**, 90, 102605: 1-15. doi:10.1016/j.ijhm.2020.102605
- Tan, K. C., Lyman, S. B., and Wisner, J. D. (2002). "Supply chain management: A strategic perspective." **International Journal of Operations and Production Management**, 22, 6: 614– 631.
- Tyteca, D., Carlens, J., Berkhout, F., Hertin, J., Wehrmeyer, W., and Wagner, M. (2002). "Corporate environmental performance evaluation: evidence from the MEPI project." **Business Strategy and the Environment**, 11, 1: 1-13.

- Wagner, S. M., Grosse-Ruyken, P. T., and Erhun, F. (2012). "The link between supply chain fit and financial performance of the firm." **Journal of operations management**, 30, 4: 340-353.
- Waiyawuththanapooma, p., Aunyawonga, W., Poolsawadb, K., Thumawongchaic, V., Boonrattanakittibhumid, C., and Jermsttiparsert., K. (2023). "Uncertain Supply Chain Management." **Uncertain Supply Chain Management**, 11, 3: 375–382.
- Zailani Suhaiza Premkumar Rajagopal. (2005). "Supply chain integration and performance: US versus East Asian companies." **Supply Chain Management: An International Journal**, 10, 5: 379–393.
- Zehir, C., and Balak, D. (2018). "Market dynamism and firm performance relation: The mediating effects of positive environment conditions and firm innovativeness." **Emerging Markets Journal**, 8, 1: 35-49. doi:10.5195/emaj.2018.152.45-51
- Zhao, X., and Lee, T.-s. (2009). "Developments and emerging research opportunities in operations strategy and supply chain management." **International Journal of Production Economics**, 120, 1: 1-4.



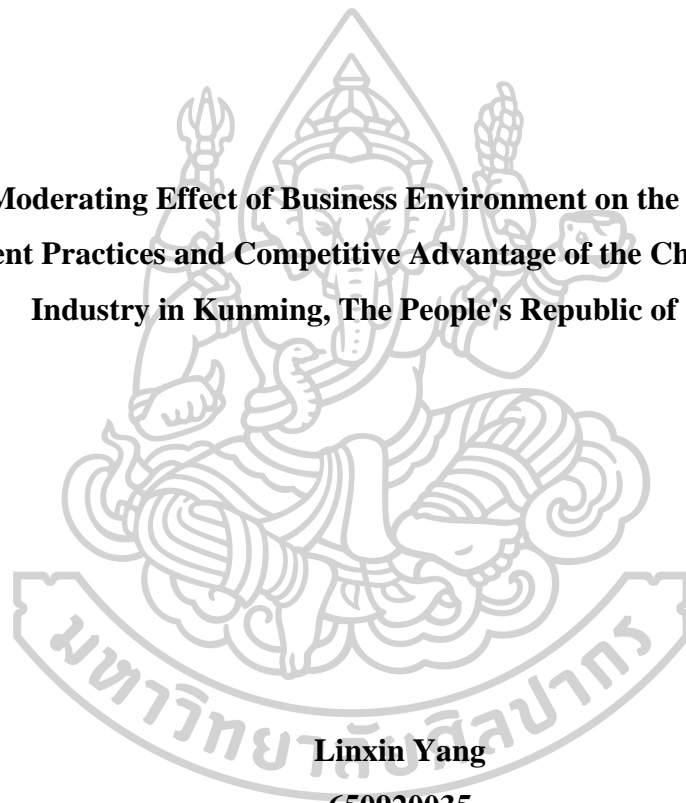


APPENDIX



Questionnaire

**The Moderating Effect of Business Environment on the Supply Chain
Management Practices and Competitive Advantage of the Chinese Construction
Industry in Kunming, The People's Republic of China**



Linxin Yang

650920035

**A Thesis Submitted in Partial Fulfillment of the Requirements
for Master of Engineering (ENGINEERING MANAGEMENT)
Department of INDUSTRIAL ENGINEERING AND MANAGEMENT**

Instruction: Please tick (✓) in the that represents the fact.

Part 1:

1. Gender 1. Males

- 2. Age**
1. 31 – 40 Years
 2. 41 – 50 Years
 3. 51 – 60 Years
 4. 60 years or older
 5. 60 years or older

3. Status

1. Single
2. Merited
3. Separated
4. Divorce

4. Education

1. Below Bachelor Degree
2. Bachelor's Degree
3. Master's Degree
4. Doctoral Degree

5. Position

1. Entrepreneurs
2. Manager

6. Investment in construction industries

1. Individual investors
2. Individual investors and family offices
3. Individual investors and corporate investors
4. Individual investors, corporate Investors, and financial institution
5. Individual investors and financial institution

7. Number of employees

1. Fewer than 1,000 peoples
2. 1,001-2,000 people

8. Age of the construction industries

1. Less than 5 years
2. 5-10 Years
3. 11-15 Years
4. 16-20 Years
5. 21 Years or More
6. Other (please specify).....

9. Types of construction industries

1. Residential or housing
2. Industrial
3. Industrial
4. Commercial
5. Civil works for public utilities

10. Size of construction industries

1. Large-sized
2. Small-sized
3. Mini-sized

11. Construction industries

1. Fewer than 30 million yuan
2. 30-70 million yuan
3. Hire purchase
4. 71-110 million yuan

Part 2:

Instruction: Please read each statement carefully and tick (✓) in the columns that represent the fact.

Supply chain management practices	Level of importance				
	5	4	3	2	1
1.1 Effective allocation of resources enables construction industries to earn profits					
1.2 The construction industry's project operations were completed on time					
1.3 The supply chain members work together effectively by forecasting customer demands and coordinating their efforts accordingly					
1.4 Cost information sharing customer					
1.5 Efficient construction operations depend on proper inventory management					
1.6 Participation in customer marketing is essential to understand the future needs of customers					
1.7 The design should prioritize the usability of the product part, especially when it comes to extending its use, making repairs easier, and increasing efficiency					
1.8 Your company often collaborates with its suppliers to find solutions to problems					
1.9 Your company often engages with customers to establish its reliability, responsiveness, and other standards					
1.0 The company focuses on reducing business costs while ensuring the efficiency and satisfaction of all parties involved, including organizational partners					

Business environment	Level of importance				
	5	4	3	2	1
1.1 The performance of the construction industry is influenced by the prevailing economic conditions					
1.2 To plan strategically in the construction industry, one needs to analyze the unpredictable external environment					
1.3 The continuous advancement of technology leads to the constant creation of new products and services					
1.4 In today's fiercely competitive market, businesses must continually innovate and develop to stay ahead					
1.5 As customer behavior is constantly evolving, businesses need to continuously adapt to keep up with the changes					
1.6 The company strictly adheres to the rules and regulations set forth by the government policies					
1.7 The economy has a significant impact on the operations and strategies of businesses					
1.8 International factors can have both direct and indirect impacts on the management of construction industries					
1.9 Construction industry owners must adapt to changes in consumer behavior to keep up with the situation					
1.10 The construction industry has become highly competitive due to the impact of digital transformation					

Competitive advantage	Level of importance				
	5	4	3	2	1
1.1 The focus is on maintaining the quality of service to a high standard so that our customers are continuously impressed					
1.2 It is important to differentiate your service from competitors in order to maximize customer satisfaction					
1.3 The company has strategically reduced its costs to gain a long-term competitive advantage over its rivals					
1.4 The company has consistently improved its ability to meet the demands of its customers					
1.5 The company emphasizes the importance of promptly responding to our customers and business partners who use our services					
1.6 The company has implemented several strategies to make it difficult for new competitors to enter the market					
1.7 Your company utilizes cutting-edge software and equipment to enable employees to quickly provide excellent customer service					
1.8 Your company utilizes network systems to facilitate the flow of information between departments, which helps to ensure efficient workflow					
1.9 Your company has a database that efficiently collects, analyzes, stores, and retrieves information as needed					

Competitive advantage	Level of importance				
	5	4	3	2	1
1.10 Your company prioritizes delivering high-quality services within the expected timeframe					

Part 3: Suggestion

.....

.....

.....

.....

.....



VITA

NAME

Linxin YANG

