

**FACTORS AFFECTING SUSTAINABLE SUPPLY CHAIN IN CHINA'S
LOGISTICS INDUSTRY**



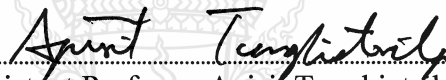
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**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS
ADMINISTRATION PROGRAM IN GENERAL MANAGEMENT
FACULTY OF BUSINESS ADMINISTRATION
RAJAMANGALA UNIVERSITY OF TECHNOLOGY THANYABURI
ACADEMIC YEAR 2023
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ABSTRACT

The objective of this research was to examine the variables that impact the sustainability of the supply chain within the highly competitive logistics industry of China. The objective of this investigation was to conduct a comprehensive analysis of the effects of economic conditions, regulatory policies, market competition, technological advancements, and consumer preferences on the sustained prosperity of supply chains within the logistics industry in China.

The research methodology encompasses the systematic gathering and examination of data to effectively address the research question at hand. The present research utilized a combination of qualitative and quantitative methodologies to examine the determinants that impact the sustainability of supply chains within the logistics segment of China. The results were communicated through a research report. Qualitative research is a methodology that entails the collection and analysis of data from diverse sources, including interviews, questionnaires, and focus groups, to interpret the information obtained. The study employed a quantitative research approach, utilizing both descriptive and inferential statistical techniques, including t-tests and regression analysis, to examine the data gathered from various sources within the logistics sector.

The results obtained from a sample size of 400 participants employed in China's logistics sector indicated a correlation between the economic environment, government restrictions, increasing competition, technological advancements, changes in customer demand, the current COVID-19 pandemic, the measures taken by the Chinese government to address the COVID-19 pandemic and the quality of the logistics infrastructure had a significant impact on the sustainability of supply chains within

China's logistics sector. Finally, this study underscores the importance of gaining a more profound comprehension of the intricate elements that impact the sustainable management of supply chains within the logistics sector of China. Through the incorporation of various variables and an examination of the effects of the COVID-19 pandemic, this study has yielded significant insights into the obstacles and prospects confronting logistics enterprises in their pursuit of sustainable supply chains within China's logistics industry.

Keywords: sustainable supply chain, logistics industry, Pandemic



Acknowledgements

Two years at Rajamangala University of Technology Thanyaburi, we experienced the COVID-19 global epidemic together, because the outbreak and school teachers offline communication and learning, but only online communication has gained a lot, here I learned professional knowledge, mentor experience, research methods, etc., harvest the teachers and students, students, I cherish.

First of all, I sincerely thank my beloved tutor Professor Putthiwat Singhdong, his rigorous and meticulous, serious style is my example in study and work; he took time in the busy teaching and research activities to urge my graduation thesis, and to revise this paper, constantly urge me to revise, once again to my beloved teacher said thank you!

Secondly, I would like to thank my dear students, they let me feel the care of friends in life, feel encouraged in learning; thank the students for two years of company and love, let me go smoothly.

Finally, I want to deeply thank my family, thank parents' hard work, let I can study heart and soul, thank you always support my decision, give me motivation, but also thank my friends, thank you for listening and encouragement, again heartfelt thanks to my dear teachers, family, friends and classmates! I believe that everyone will be better and better in the future!

He Jifang

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China must make sure that their supply chains are effective and sustainable given the intense competition on the global market (Lin et al., 2009). This implies that they must be able to satisfy client demands while cutting expenses and enhancing operational effectiveness. They must recognize and handle the different elements that have an impact on the sustainability of their supply chains in order to achieve this. This study aims to identify and examine the variables influencing supply chains' sustainability in China's logistics sector.

China's logistics sector is one of the most important sectors in the nation and contributes significantly to the country's economic growth since it is in charge of shipping commodities, materials, and services throughout the globe. Despite this, the industry has a number of challenges, the biggest of which being inadequate infrastructure, a lack of capacity, and environmental issues (Beske et al., 2014). Additionally, as a result of market development, there is now a greater demand for resources, which has raised costs and necessitated the use of sustainable supply chain practices. It is crucial to identify the key factors that may be used to ensure the long-term profitability and sustainability of supply chains in the nation since logistics are so crucial to the growth of China's economy. This Research will look at the elements that affect maintaining a sustainable supply chain in the context of China's logistics industry.

Since 2007, China has become the top exporter in the world and the most powerful country in terms of logistics. According to Geng et al. (2017), the Chinese logistics business has significantly expanded as the country's entire logistics market in 2018 topped \$1.5 trillion. The sector is characterized by fierce rivalry, quick technological advancement, and growing need for effective and affordable logistical solutions. Chinese companies must make sure their supply networks are sustainable due to the complexity of supply chain management. This requires them to be able to satisfy customer requirements while also reducing costs and boosting operational effectiveness. They must recognize and deal with the many factors impacting the sustainability of their supply chains in order to achieve this. The economy, governmental limitations, rivalry, technology, and consumer desire are some of these factors.

Businesses must secure the sustainability of their supply networks if they want to compete in China's fiercely competitive logistics market (Panigrahi et al., 2018). This

requires them to be able to satisfy customer requirements while also reducing costs and boosting operational effectiveness. They must recognize and deal with the many factors impacting the sustainability of their supply chains in order to achieve this. As a result, it is important to recognize and research the factors affecting the sustainability of supply chains in China's logistics industry.

This research attempts to identify and investigate the factors affecting supply chains' sustainability in China's logistics industry. The focus of this research will be on the current state of the economy, governmental constraints, rivalry, technology, and consumer demand. This research will provide insightful information on the problems influencing supply chains' sustainability in China's logistics sector. Businesses will be better able to manage sustainable and effective supply networks if they are aware of these factors. As a result, they will be able to serve their customers to the highest standard and maintain their competitiveness on a global scale. Furthermore, this research will advance knowledge of the Chinese logistics market, which will be helpful for companies looking to expand into the Chinese market.

1.2 Objectives of the Study

This research endeavor aims to accomplish three key goals. First, it intends to research the effect that practices in the logistics business have on the long-term viability of supply chains in China's logistics sector. The project's second objective is to investigate the influence of logistics methods on the operational, financial, and environmental performance of enterprises involved in the logistics industry. Thirdly, it intends to build a research model and measuring instrument to advance the theoretical foundations and empirical basis of sustainable supply chain management in China.

1. A positivist theoretical framework and a quantitative research approach will be utilized to accomplish the study's first goal.

The survey will be constructed to guarantee that content validity is established for each research instrument, ensuring that the instrument's psychometric aspects are dependable. This will be done by ensuring that the survey is prepared appropriately.

2. To accomplish the second goal, the creation of the research instrument's psychometric features will be predicated on implementing a methodically sound strategy

for showing the research instrument's content validity. This will allow for an accurate measurement of logistics methods' influence on logistics organizations' operational, financial, and environmental performance as part of the Research.

3. The Resource-based View (RBV) and the existing body of work on Sustainable Supply Chain Management will serve as the foundation for this research to accomplish the third goal (SSCM).

4. To investigate the effect that logistics techniques have on the efficiency of sustainable supply chains, seven hypotheses will be formulated and investigated in the course of this investigation. These hypotheses will be necessary for developing a research model and measuring instrument to significantly advance the theoretical foundation and empirical basis of sustainable supply chain management in China. This contribution will be in the form of a substantial advance. In general, this Research aims to provide a system that will enable logistical companies to examine and monitor the sustainable supply chain activities and their progress, as well as to identify the areas in which they need to make improvements. This Research will provide valuable information to the logistics industry to assist them in achieving their goals regarding maintaining a sustainable supply chain in China's logistics industry. This information will be provided to help the logistics industry achieve its sustainable supply chain goals.

1.3 Research Questions

1. What practices in the logistics business have the most significant effect on the long-term viability of supply chains in China's logistics sector?

2. What elements of the Resource-based View (RBV) and Sustainable Supply Chain Management (SSCM) influence the efficiency of sustainable supply chains?

3. What is the impact of logistics techniques on the sustainability of supply chains?

4. What kind of information can be provided to the logistics industry to assist them in achieving their goals of maintaining a sustainable supply chain in China's logistics industry?

1.4 Research Hypothesis

The economic climate in China significantly impacts the sustainability of supply chains in China's logistics industry.

H₁: Changes in the economic climate, such as inflation, exchange rates, and GDP growth, will have a significant effect on the sustainability of supply chains in China's logistics industry.

Justification: The state of the economy has a significant impact on how long supply chains in China's logistics sector can last. Exchange rates, GDP growth, and inflation rates all have an effect on the cost of production and have the potential to modify the price of products and services, which may then have an impact on consumer demand for those goods and services. Since companies need to be able to respond to changes in the economic environment in order to stay competitive, changes in these elements may directly affect how sustainable supply networks are. Government regulations have a substantial influence on the logistics sector in China's supply networks.

H₂: Government restrictions, such as tariffs, taxes, and regulatory regimes, have a significant impact on the sustainability of supply chains in China's logistics industry.

Explanation: Government restrictions can have a major impact on the sustainability of supply chains in China's logistics industry. Tariffs, taxes, and regulatory regimes can all affect the cost of production and can also limit the availability of resources. These restrictions can also influence the demand for certain goods and services, making it more difficult for businesses to remain competitive in the market. Increasing competition significantly impacts the sustainability of supply chains in China's logistics industry.

H₃: Increasing competition in the Chinese logistics sector has a significant impact on the sustainability of supply chains.

Explanation: As the Chinese logistics sector becomes increasingly competitive, businesses must be able to adapt to changes in order to remain competitive. As competition increases, businesses must be able to reduce costs and improve efficiency in order to remain competitive. This can be a challenge as businesses must be able to identify and address the various factors that affect their supply chains in order to remain

competitive. Technological advancements significantly impact the sustainability of supply chains in China's logistics industry.

H₄: Technological advancements have a significant impact on the sustainability of supply chains in China's logistics industry.

Reason: The logistics sector in China has been significantly impacted by technological improvements. Technology advancements have made it possible for organizations to save expenses, boost productivity, and enhance customer service. To stay competitive, firms must, nevertheless, be able to keep up with the most recent technology developments. This may be challenging since in order for organizations to stay competitive, they need to be able to recognize and handle the numerous issues that impact their supply chains.

Customer demand has a big influence on the logistics sector in China's supply chains.

H₅: Changes in customer demand have a significant impact on the sustainability of supply chains in China's logistics industry.

Explanation: Customer demand is a major factor affecting the sustainability of supply chains in China's logistics industry. Changes in customer demand can have a direct impact on the demand for certain goods and services. As such, businesses must be able to identify and address changes in customer demand in order to remain competitive.

The current Covid- 19 pandemic significantly impacts the sustainability of supply chains in China's logistics industry.

H₆: The current Covid-19 pandemic has a significant impact on the sustainability of supply chains in China's logistics industry.

Justification: The Covid- 19 outbreak has had a major effect on China's logistics sector. The pandemic's effects on global commerce and supply chains have significantly affected resource availability and production costs. As a result, in order for organizations to stay competitive, they must be able to recognize and handle the numerous elements that impact their supply chains.

The Covid- 19 pandemic response measures adopted by the Chinese government have a substantial influence on the long-term viability of supply chains in China's logistics sector.

H₇: The measures taken by the Chinese government to address the Covid-19 pandemic have a significant impact on the sustainability of supply chains in China's logistics industry.

Explanation: China's logistics sector has been significantly impacted by the government's actions to combat the Covid-19 outbreak. These policies, like tax breaks and subsidies, have a direct effect on resource availability and production costs. As a result, in order for organizations to stay competitive, they must be able to recognize and handle the numerous elements that impact their supply chains.

The sustainability of supply chains in China's logistics business is substantially impacted by the quality of the logistics infrastructure.

H₈: The quality of the logistics infrastructure has a significant impact on the sustainability of supply chains in China's logistics industry.

Explanation: In China's logistics business, a key aspect influencing the sustainability of supply chains is the caliber of the infrastructure for logistics. The cost of production and the availability of resources may both be directly impacted by the quality of the infrastructure, which includes things like roads, trains, and ports. As a result, in order for organizations to stay competitive, they must be able to recognize and handle the numerous elements that impact their supply chains.

The sustainability of supply networks is severely impacted by the increasing demand for resources in.

1.5 Research Scopes

The Research that will be conducted for this thesis will center on the logistics business in China, with a particular emphasis on the factors that influence environmentally responsible supply chain management within the industry. The following will be included in the scope of the study.

1.5.1 Population and Samples

The enterprises connected to the logistics industry in China will make up the population for this study. Samples will be taken from this population. For the purpose of the study, a stratified random sampling approach will be utilized to choose a representative sample of Chinese logistics organizations. To ensure that the study's

findings accurately reflect the population as a whole, the sample size will be decided based on an examination of the statistical power.

1.5.2 Variables

The value of China's logistics business is currently projected to be greater than \$1.2 trillion due to the huge expansion that the industry has experienced in recent years. The importance of sustainability as an element in the supply chain has been steadily rising in recent years as the industry continues to expand. (Luo et al., 2021) It is necessary to have a deeper understanding of the aspects that drive sustainable supply chain management to ensure that the sector will continue to grow in a productive and long-term manner. In this study, we will concentrate on several important factors that influence environmentally responsible management of supply chains in the Chinese logistics sector.

The first step of the research will be to investigate the procedures that are followed in the logistics sector. Companies that are active in logistics may see major changes in their operational, financial, and environmental performance as a direct result of the practices utilized in the logistics business. Both the viability of the supply chain and the overall efficacy of the logistics sector can be significantly impacted by the efficiency and effectiveness of the techniques that are utilized in that business. The viability of an organization's supply chain can be substantially improved by implementing practices such as supply chain integration, the application of lean concepts, and the employment of technology.

Second, the research will investigate how the supply chain's long-term viability is affected by the various logistical practices currently in use. The logistics sector uses multiple methods, the specific kinds of which might change based on the commodities being delivered, the technology employed, and the size of the companies involved. Just-in-time (JIT) delivery, cross-docking, and storage are three of the most popular practices utilized in logistics. Depending on how successfully and efficiently they are used, each of these procedures can affect the supply chain's ability to remain viable over time.

Thirdly, the research will investigate how efficiently logistics businesses may manage their supply chains in an environmentally friendly manner. This encompasses implementing various structures, procedures, and technological tools to accomplish the intended sustainability goals. For a supply chain to remain efficient and successful over time, it is necessary for logistics organizations to use the most effective combination of systems, procedures, and technology. This comprises the application of analytics, predictive analytics, and data management systems to maximize the efficiency of the supply chain.

In the final round of the investigation, the environmental impact of the logistics business will be analyzed. This covers the effects of the industry on the quality of the air and water, the use of land, and the consumption of energy. The environmental impact of the logistics business could be mitigated through using sustainable practices, such as using environmentally friendly technologies. The usage of electric vehicles, the creation of green logistics systems, and the utilization of alternative forms of energy are all examples of this. (Jianying et al., 2021)

1.5.3 Research Field

The variables impacting the long-term sustainability of supply chains in China's logistics industry are the subject of the aforementioned thesis paper's investigation. Sustainability has become a key issue in the logistics industry as companies strive to lessen their adverse effects on the environment while also improving their economic performance. In China, the logistics sector is growing quickly and has become crucial to the development of the economy of the nation. However, the industry has a number of challenges, including high operating costs, a lack of readily accessible, efficient transportation networks, and limited finance options for small and medium-sized firms. Given these challenges, it is crucial to comprehend the factors that may have an impact on the long-term health of supply chains in China's logistics industry. This field of study tries to analyze the condition of the industry at today, including the possibilities and challenges that are presently present, as well as the effects that a number of variables have on the long-term sustainability of supply chains.

As one of the key factors in the research, the policies of different governments will be examined. Regulations passed by the Chinese government play a

crucial role in shaping supply chains in the country's logistics industry. For instance, the government has put in place a variety of measures to promote environmentally friendly and sustainable supply chain practices. These initiatives include cash rewards and subsidies for companies that use eco-friendly practices. By analyzing the effect that government regulations have on the sustainability of supply chains, the study will provide insights into how they might be utilized to encourage sustainable practices in the sector. This will be achieved by looking at how government regulations affect supply chain sustainability.

The logistical infrastructure will also be looked at as part of this inquiry. The quality and accessibility of the logistical infrastructure is one of the key factors that affects the long-term profitability of supply chains in China. Businesses find it challenging to maintain sustainable supply chains when there aren't enough efficient transportation networks since this might lead to greater costs and longer travel times. The goal of the research is to assess the impact that logistics infrastructure has on supply chains' long-term sustainability and to provide recommendations on how the industry as a whole might improve its logistics infrastructure to advance sustainability.

In addition, the study will look at how technological advancements impact supply chains in China's logistics industry over the long run. By increasing the efficiency and transparency of supply networks and reducing the amount of waste generated along supply routes, technological advancements have the potential to greatly improve supply chain sustainability. The long-term sustainability of supply chains will be examined in this research in relation to a number of technology innovations, including digital platforms and intelligent logistics systems. The results will be used to provide suggestions on how firms might use these technical solutions to reduce their environmental impact.

The study will also look at how the long-term sustainability of supply chains in China's logistics sector is affected by industry regulations. Industry regulations, which set standards for the protection of the environment, workers' rights, and the conduct of fair competition, are crucial in ensuring the long-term survival of supply chains. The goal of the research is to determine how industry rules affect supply chains' long-term viability and to provide recommendations for how industry regulators may improve their practices to promote sustainability more effectively.

Last but not least, the research will look at how the requirements of customers and strategic alliances impact the long-term sustainability of supply chains in China's logistics industry. Businesses may trade resources and knowledge via strategic partnerships, which can reduce waste and increase sustainability. Businesses may be inspired to adopt more sustainable business practices by the demand from consumers for sustainable and environmentally friendly goods and services. The study will examine how these elements affect supply chains' long-term viability and make suggestions to companies on how they can collaborate with their suppliers and other market participants to advance environmentally friendly business practices.

1.6 Definition of Terms

Industry: An industry that refers to managing the flow of goods and services from one point of origin to another. This includes the planning, coordination, and execution of activities related to the transportation, storage, and distribution of goods. It also involves managing related information and processes such as inventory control and order fulfillment. Logistics is essential to a company's supply chain, as it ensures the efficient and timely delivery of goods and services to customers.

Logistics: A business process of organizing the movement and storage of goods and services from the point of origin to the point of consumption.

Sustainable Supply Chain: A supply chain managed to create economic, environmental, and social benefits for all stakeholders involved.

China: A country located in East Asia that is the world's most populous country, with a population of over 1.4 billion people.

Resource-Based View: A business strategy that states that a company's resources and capabilities are the keys to its competitive advantage in the marketplace.

Environmental Performance: The ability of a company to meet environmental objectives and goals to reduce its environmental impact.

Operational Performance: The ability of a company to meet operational objectives and goals to increase its efficiency and effectiveness.

Financial Performance: The ability of a company to meet financial objectives and goals in order to increase its profitability.

1.7 Conceptual Framework

This Research will present a conceptual framework for analyzing the elements affecting the sustainable supply chain in China's logistics industry (Liu, 2012). This framework will be presented in this paper. It will explore the current situation of the logistics business, the primary elements that influence sustainability, as well as the research methodologies that ought to be employed to collect data and evaluate the findings. This study aims to identify the characteristics that have the most significant bearing on the degree to which the Chinese logistics business can be considered sustainable. In particular, this study will focus on the following research questions: Which major elements have the most significant impact on the industry's ability to remain sustainable in China? What effects do these characteristics have on the overall performance of the industry as well as the surrounding environment? How can businesses best handle these elements to guarantee sustainable operations?

The field of logistics in China is quickly developing, and it has emerged as a significant contributor to the country's overall economy (Lan et al., 2020). Since 2017, the logistics business has experienced annual growth of more than 15%, and it is anticipated that its total value will reach \$2.6 trillion by 2025. (Lin, 2021). This growth has been driven by the rising demand for Chinese goods and services in the global market and the rise in online shopping, which has led to an increase in the number of goods being shipped. Together, these two factors have led to an acceleration in the rate at which this growth has occurred. Additionally, the logistics business's complexity is growing due to the introduction of new technology, laws, and trends.

At the same time, environmental responsibility has emerged as one of the sector's most pressing issues. As a result of the rising demand for goods and services across the globe, businesses are coming under growing amounts of pressure to discover new ways to lessen the damage they cause to the environment (Ju et al., 2019). This has resulted in an increased focus on sustainability in the logistics business, with companies searching for ways to minimize their carbon footprint, improve the efficiency with which they utilize energy, and use more sustainable practices.

1.7 Research Framework

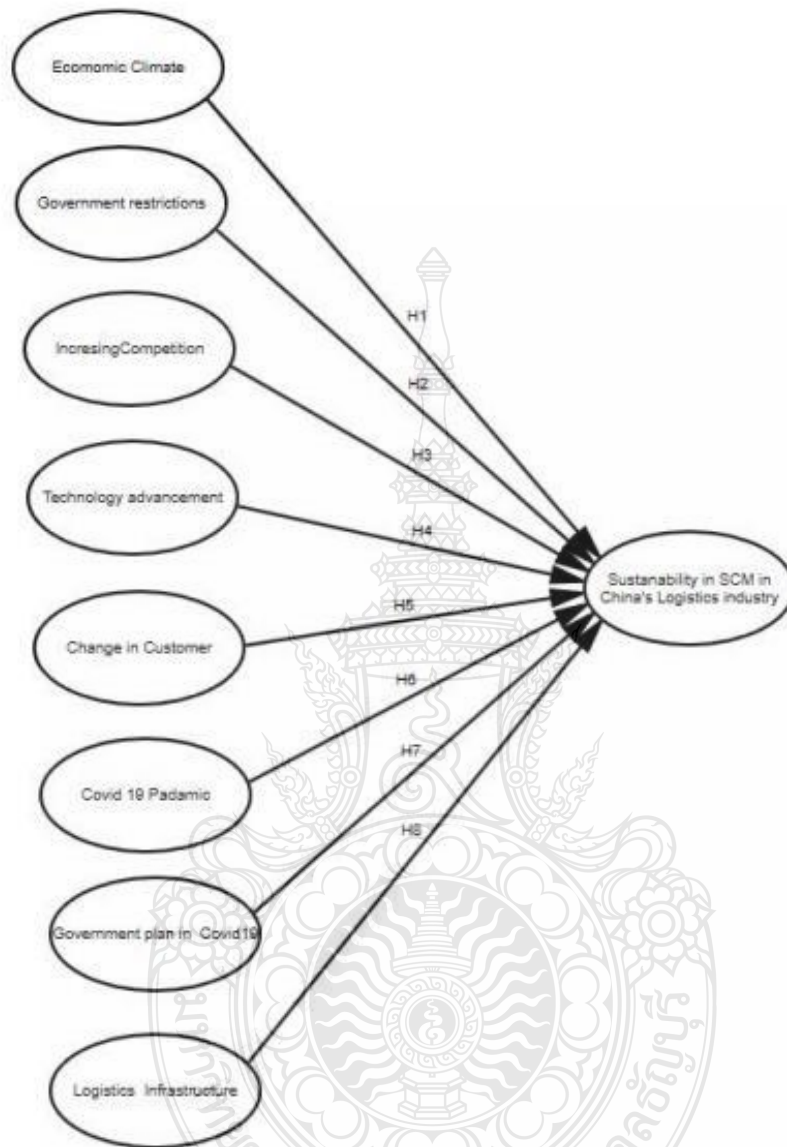


Fig. 1.1 Research Framework

The framework depicts the main components of the study: the sustainable supply chain (SSC), factors affecting the SSC in China's logistics industry, and the impact of these factors on SSC outcomes (Jianying et al., 2021). The key factors influencing SSC are also identified, which can include technological advancements, government regulations, and environmental factors. The impact of these factors on SSC outcomes can be measured through various performance metrics such as environmental performance, cost efficiency, stakeholder relationships, and competitive advantage.

1.8 Research Contributions

1.8.1 Managerial Contributions

Initially, the Research can assist managers and organizations in comprehending the existing status of the Chinese logistics business. This Research can provide an overview of the current position, trends, and issues in the Chinese logistics business. By gaining an awareness of the current situation of the Chinese logistics industry, managers and businesses could pinpoint the areas in which they may concentrate their efforts and investments to create a more sustainable supply chain.

Secondly, the Research can aid managers and businesses in comprehending the most significant aspects influencing the sustainability of their supply chain in China. This Research can provide an in-depth analysis of the different aspects, such as infrastructure, technology, labor prices, and regulations that affect the sustainability of supply chains in China. By knowing these characteristics, managers, and businesses can identify the areas in which they must enhance their supply chain to make it more sustainable.

Thirdly, the Research can assist managers and businesses in identifying and implementing supply chain improvement solutions in China. This Research can provide an overview of the numerous options that can be employed to improve the sustainability of the supply chain in China, such as investing in infrastructure and technology and optimizing labor costs. By understanding these tactics, managers and businesses can identify the techniques most suited to their firm and adopt them to strengthen their supply chain in China.

Fourthly, the Research can assist managers and businesses in understanding the Chinese logistics industry's competitive landscape. This Research can provide an analysis of the competitive climate in the Chinese logistics business, including market share, competitive tactics, and competitive advantages of significant competitors. By comprehending the competitive environment, managers and businesses can identify the areas in which they must concentrate their efforts to acquire a competitive edge.

1.8.2 Theoretical Contributions

The Research may help scholars better understand the state of the Chinese logistics industry today. An overview of the present state, emerging trends, and pressing

problems in the Chinese logistics industry can be obtained from this research. Academics might develop theories and models to explain the present condition of the industry and forecast its future trends by looking at the existing situation of the Chinese logistics sector.

Second, the Research may help scholars understand the key factors influencing the sustainability of China's supply chain. The many factors that impact the sustainability of supply chains in China, such as infrastructure, technology, labor costs, and laws, may all be in-depthly analyzed by this research. If academics are aware of these elements, they may build models to explain the link between these criteria and the supply chain's sustainability.

Thirdly, the research may help scholars find and create ideas that can improve the sustainability of China's supply chain. This research may provide a broad overview of the many strategies available for enhancing the sustainability of the Chinese supply chain, including spending money on infrastructure and technology, and reducing labor costs. Academics may create theories to explain the connection between these strategies and the sustainability of the supply chain by examining these tactics to identify the most relevant methods for improving supply chain sustainability.

The Research may help scholars better understand the logistics industry's competitive environment in China. An examination of the competitive environment in the Chinese logistics industry, including market share, competitive strategies, and competitive advantages of important rivals, can be found in this research. If academics are aware of the competitive environment, they may develop models and theories to explain how the competitive environment and supply chain sustainability are related.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This paper explores existing literature on the factors impacting sustainable supply chains in China's logistics industry. This literature study will examine the present state of knowledge on the subject, particularly emphasizing the difficulties and potential solutions encountered by Chinese logistics firms as they work to create a more sustainable supply chain (Alam et al., 2021). Key drivers of a sustainable supply chain and ways for implementing it will be discussed as part of the study.

The need for reliable logistics services has risen recently as China's economy has expanded rapidly. Since its inception, China's logistics business has expanded rapidly, eventually becoming one of the world's largest. The lack of sustainability, however, has led to several problems for the sector, including growing costs and environmental damage (Ali et al., 2020). Chinese logistics firms must create supply chain solutions that protect the environment while yet being profitable. The current status of the Chinese logistics business, including an overview of the major players and the main difficulties, will be discussed at the outset of this literature study. Next, it'll look at the opportunities and threats that have emerged due to the numerous aspects affecting China's sustainable supply chain development. Finally, the importance of government regulations and technological advancements in implementing a sustainable supply chain will be analyzed and discussed.

Manufacturers, wholesalers, retailers, and logistics providers are a few major actors in China's logistics business. Supply chains rely heavily on logistics providers like shipping companies and storage facilities (Brandenburg et al., 2014). Producing items fall under the purview of manufacturers, whereas selling them falls under the purview of merchants. Banks, governments, and consumers are some of the other groups with a vested interest in the supply chain's smooth functioning. Problems with supply chain management, growing expenses, and environmental damage are just a few of the issues plaguing China's logistics sector. As a result of these difficulties, the industry risks

losing its competitive edge and eventually going out of business. Chinese logistics firms need to create supply chain systems that are environmentally friendly while also being profitable.

Many things play a role in China's progress toward a more environmentally friendly supply chain. Transportation costs, resource availability, and rules and regulations are all important factors. Using big data and AI, among other technical advancements, is also crucial to developing a sustainable supply chain. Sustainable supply chain implementation in China requires tactics considering difficulties and potential gains. That's why governments need to embrace policies that promote sustainability, for businesses to adopt cutting-edge technologies, and for entrepreneurs to create new ways of doing business.

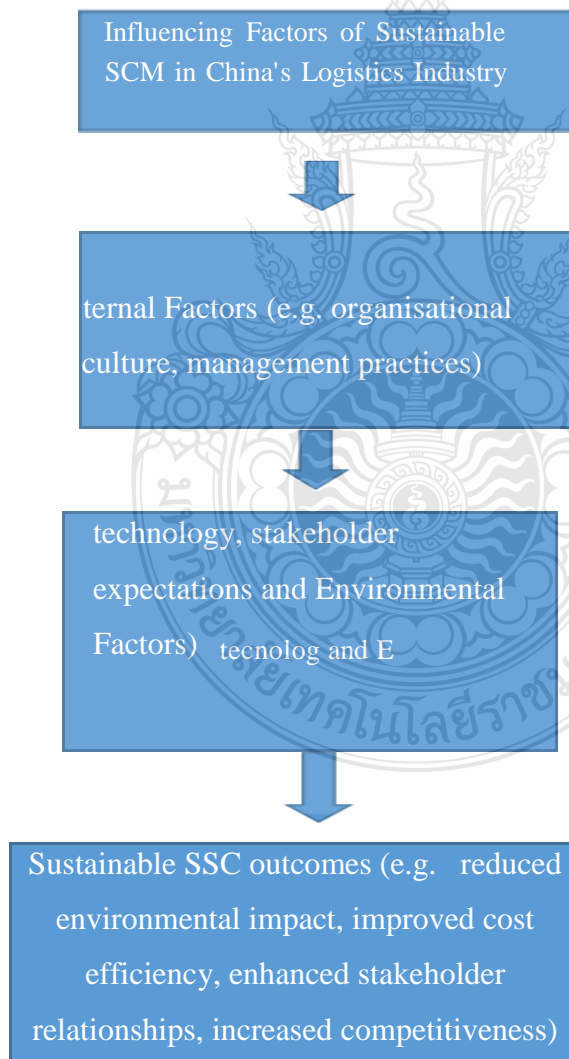


Fig 2.1 Influencing factors of Sustainable Supply Chain Management

2. 1 Overview of the current situation of China's logistics industry

In recent years, China's logistics industry has undergone tremendous expansion, becoming an essential component in the country's overall economic expansion. The business sector is characterized by a high level of rivalry due to the presence of a large number of companies in the market, both domestic and international. Despite the increase, the industry is confronted with a number of obstacles, some of which include the absence of a transportation network that is efficient, high operational costs, and limited access to funding for small and medium-sized businesses. (Hassini et al., 20120).

2. 2 Supply Chain SWOT Analysis (China's Logistics Industry)

SWOT analysis involves a comprehensive examination of strengths, weaknesses, opportunities, and threats China's logistic industry face in internal and external environments. The SWOT analysis of the supply chain of China's logistics industry is significant for the industry's operations.

Strengths

1. Logistic Industries actively adapt to the change in policies

Chinese logistic enterprises pay attention to the strategic changes and transformations in the traditional logistics industry. The enterprises have upgraded their services in warehousing, servicing, and distribution; these areas have been immensely transformed. For instance, third-party logistic companies accelerate the implementation of supply chain integration services. The development of professional logistics has been fastly rising. Additionally, there are gradual mergers and acquisitions and market concentration improvements. The firms have upgraded their information technologies. They have also adopted green logistics.

2. The operation environment of logistics firms continues to be good.

Government policies have been improving to support the growth of the Chinese logistics industry. This has enabled integrity in the logistics systems. The new third board continues to heat up and become a new channel to enhance capital security in logistics firms. There has also been immense development in the logistic infrastructure in the country.

Weaknesses

1. Inferior Supply of Products

The Chinese logistics industry has been associated with many inferior supplies of fake products. This is due to the absence of social honesty, the manifestation of the economic market, and government oversight. Due to several poor supply chains, it is difficult for firms to meet consumer demands. This inhibits effective demand and disrupts good Supply.

2. Presence of a short structural board in the internal supply capacity.

A good number of circulation firms in the Chinese logistics industry lack proper structural boards. Most consumer groups in the market have become more rational. These groups have started paying attention to consumption.

Opportunities

1. Growth of E-commerce

The growth of e-commerce has influenced supply chain management in many ways. It has increased the demand for just-in-time delivery; this has helped pressurize suppliers to deliver products efficiently and quickly. The growth has led to increased price competition among suppliers, making it easier for consumers to shop offline. It has also created new opportunities for firms to reach their customers in advanced and innovative means. Today, businesses can engage or sell products to their customers without necessarily going to them directly, like in traditional retail channels.

2. Government's Push for Sustainable and Green Supply Chain

Process

The Chinese government has adopted several policies and invested much money to encourage and support sustainable and green supply chain management. The government has pressured companies to practice green supply chains in their business models (Zhu et al., 2005). Most companies have established governance mechanisms and structures to control and implement sustainability initiatives and strategies; the firms' goals are to improve sustainability performance and manage relationships.

3. Technological Advancements

The development of digital platforms has been a critical opportunity for the logistics industry (Sundarm et al., 2018). The action of ERP systems, the Internet, and

different applications has significantly impacted the development and operation of the supply chain. The logistic information system has become more and more popular. The firms have been able to quickly and fastly implement things. Chinese GSI logistics standard system has a series of code marks, e.g., box code, GTIN, global position code, and SSCC. These codes have helped achieve omnidirectional visualization of the supply chain.

Threats

1. The Challenge of Information Standardization leads to the immaturity of logistics services in the Chinese Supply Chain Network.

The construction of a logistics service supply chain network in China has faced a lot of barriers due to the low levels of firm informatization and management. The government laid out a strategy called 'Internet plus industry' to promote the building of IT in the logistics industry. Despite all these efforts by the state, most logistic firms have not been able to construct effective channels due to the backward management concept. This affects the efficiency and decision of management, leading to the immature construction of the Chinese logistics supply chain channel.

2.Unfavorable policies

3.Shortage of skilled labor.

4.Limited access to financing for small and medium-sized enterprises

5.High operational costs and lack of an efficient transportation

network

2.3 Analyzing the factors that can affect the sustainability of supply chains in the industry

2.3. 1 Government policies

Supply chains in China's logistics business are significantly shaped by regulations enacted by the Chinese government, which plays an important part in the process. The federal government has enacted a number of new policies in an effort to encourage environmentally responsible and sustainable business practices along the supply chain (Zhu et al., 2005). These policies include financial incentives and subsidies for businesses who implement environmentally responsible policies.

2.3.2 Logistics infrastructure

A crucial issue that has a significant impact on the viability of supply chains in China is the standard of the available logistics infrastructure as well as its availability (Sundarm et al., 2018). It is difficult for businesses to maintain sustainable supply chains when there is an insufficient number of effective transportation networks because this might result in longer transit times and increased expenses.

2.3.3 Technological advancements

It is possible that developments in technology may make it possible to significantly improve the longevity of supply chains in China's logistics business (Li, 2020). For instance, the use of intelligent logistics systems and digital platforms can improve the effectiveness and visibility of supply chains, which in turn can cut down on waste and make them more environmentally friendly (Fatorachian & Kazemi, 2021).

2.3.4 Industry regulations

In China's logistics business, the importance of industry rules in guaranteeing the long-term viability of supply chains cannot be overstated. A level playing field for all participants in an industry can be promoted by the adoption of regulations that establish standards for environmental preservation, worker rights, and fair competition (Zhang & Hui, 2018). These regulations can assist enterprises adopt sustainable practices.

2.3.5 Strategic partnerships

There is also the potential for strategic partnerships to play a significant influence in the promotion of the long-term viability of supply chains in China's logistics industry (Saraigh et al., 2020). Collaboration between businesses allows for the sharing of resources and experience, which in turn helps to save waste and improve sustainability (Zhang & Hui, 2018).

2.3.6 Customer demand

Demand from customers is a primary factor that contributes to the viability of China's logistics business (Zhang & Hui, 2018). It is more likely that a company will be successful over the long run if it responds to the need of its customers for sustainable and environmentally friendly goods and services (Gong et al., 2019).

2.3.7. Economic Climate

The state of the economy has a significant impact on how long supply chains in China's logistics sector can last. Exchange rates, GDP growth, and inflation rates all have an effect on the cost of production and the price of products and services, which in turn may have an impact on consumer demand for those goods and services (Yildiz et al., 2019). Due to the need for companies to be able to respond to changes in the economic environment to stay competitive, changes in these elements may have an immediate effect on the sustainability of supply chains.

2.3.8. Pandemics

The Chinese logistics sector has been significantly impacted by the Covid-19 epidemic (Li, 2020). The pandemic's effects on global commerce and supply chains have significantly affected resource availability and production costs. Therefore, for organizations to stay competitive, they must be able to recognize and handle the many elements that have an impact on their supply chains.

Table 2. 1 Summary of the variables.

Variable	source
Government Restrictions	Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green supply chain management in China: pressures, practices and performance. <i>International journal of operations & production management</i> , 25(5), 449-468.
Logistic Infrastructure	Sundram, V. P. K., Bahrin, A. S., Abdul Munir, Z. B., & Zolait, A. H. (2018). The effect of supply chain information management and information system infrastructure: The mediating role of supply chain integration towards manufacturing performance in Malaysia. <i>Journal of Enterprise Information Management</i> , 31(5), 751-770.
Technological Advancements	Fatorachian, H., & Kazemi, H. (2021). Impact of Industry 4.0 on supply chain performance. <i>Production Planning & Control</i> , 32(1), 63-81.

Table 2. 1 Summary of the variables.

Variable	source
Industry Regulations	Zhang, P., & Hui, L. (2018) Supply chain SWOT analysis of Chinese enterprises from supply side angle. https://pdfs.semanticscholar.org/ef74/0ebbd338b2a215c54af7e2402736b17978f.pdf
Strategic Partnerships	Saragih, J., Tarigan, A., Silalahi, E. F., Wardati, J., & Pratama, I. (2020). Supply chain operational capability and supply chain operational performance: Does the supply chain management and supply chain integration matters. <i>Int. J Sup. Chain. Mgt</i> Vol, 9(4), 1222- 1229.
Customer Demand	Gong, M., Gao, Y., Koh, L., Sutcliffe, C., & Cullen, J. (2019). The role of customer awareness in promoting firm sustainability and sustainable supply chain management. <i>International Journal of Production Economics</i> , 217, 88-96.
Economic Climate	Yildiz Çankaya, S., & Sezen, B. (2019). Effects of green supply chain management practices on sustainability performance. <i>Journal of Manufacturing Technology Management</i> , 30(1), 98- 121.
Pandemic	Li, T. (2020). A SWOT analysis of China's air cargo sector in the context of COVID- 19 pandemic. <i>Journal of air transport management</i> , 88, 101875.

2.4 Investigating the impact of these factors on the industry's performance and success

Each of the elements has the potential to make a major contribution to the overall performance and accomplishments of China's logistics sector. For instance, a lack of investments in logistics infrastructure can lead to long transit times and high operational expenses. On the other hand, adopting sustainable and environmentally friendly practices can boost the industry's reputation and attract new consumers.

The internal factors may include the organization's culture and management practices, which can impact the adoption and integration of sustainable SCM practices within the organization.

On the other hand, external factors may include regulations, technology, stakeholder expectations, and environmental factors. Regulations can set legal requirements for sustainable SCM practices, while technology can enable new ways of reducing environmental impact and improving efficiency. Stakeholder expectations can drive organizations to adopt sustainable SCM practices, while environmental factors such as climate change and resource scarcity can create pressure to operate sustainably.

Ultimately, the successful implementation of sustainable SCM practices can result in various outcomes, such as reduced environmental impact, improved cost efficiency, enhanced stakeholder relationships, and increased competitiveness.

2.5 Identifying possible solutions and recommendations for improving the sustainability of supply chains in the industry

There are a number of different actions that businesses in the logistics industry in China can take in order to improve the long-term viability of their supply chains. For instance, businesses might make investments in the infrastructure and technology of logistics, embrace environmentally friendly and sustainable business practices, and collaborate with the government and various industry organizations to develop sustainable supply chain standards. In addition, businesses have the opportunity to work together with their suppliers and other participants in the industry to advance environmentally responsible business practices throughout the supply chain.

1. Government Regulations and Policies: China's government has established several legislation and policies geared toward fostering environmental responsibility within the logistics sector. Regulation on emissions, waste management, energy efficiency, and adopting green technologies are examples of these types of policies. In addition, the government has established rules to encourage the use of environmentally friendly automobiles and other non-conventional sources of fuel. The establishment of environmentally responsible supply chains in China absolutely requires the adoption of this legislation and policies.

2. Technological Advancements: In addition, significant contributions from technological improvements have been made to forming more sustainable supply chains in China. Technology like the Internet of Things (IoT), artificial intelligence (AI), big data analytics, and cloud computing have allowed businesses to enhance their productivity, lower their expenses, and improve their ability to follow their supply chains. These technologies have enabled businesses to acquire real-time insights into their supply chains, enabling them to make better-informed decisions and adopt more environmentally friendly practices.

3. Customer Demands: In China, the development of sustainable supply chains is also significantly influenced by the expectations of customers, which is an essential aspect. Customers are becoming more aware of the importance of sustainability, and as a result, they anticipate businesses implementing more environmentally conscious policies and procedures. To maintain their position in the market, businesses need to be able to fulfill these requirements. Because of this, more attention is being paid to environmental responsibility in the logistics industry.

4. Cost Considerations: When it comes to establishing sustainable supply chains in China, the cost is a significant consideration. It is imperative that businesses can weigh the benefits of implementing sustainable practices against the associated expenses of doing so. Because the expenses of implementing sustainability measures might be high in the short term, this can take a lot of work to accomplish. For businesses to be able to make decisions that are in their best interests, they need to be able to analyze the advantages and costs of sustainability.

5. Organizational Culture: The establishment of environmentally responsible supply chains in China also depends on the culture of the companies involved in the process. For businesses to be successful, they need to have a culture that is committed to preserving the environment. This includes having a clear and common awareness of the importance of sustainability, investing in environmentally friendly technologies, and encouraging staff members to be more environmentally conscious in their daily lives.

2.6 The Role of Logistics in Sustainable Supply Chain

The logistics sector is not an exception to this trend, as the idea of sustainability has become a top priority for organizations throughout the globe (Jia et al., 2018). Because it guarantees that goods are transported, stored, and delivered in a way that is both effective and efficient, while minimizing the amount of negative impact on both the environment and society, logistics practice is crucial to creating a sustainable supply chain.

Due to its rapid expansion in recent years, China's logistics sector has become an essential participant in the global supply chain. However, the industry faces a wide range of sustainability challenges, including excessive energy use, greenhouse gas emissions, and a deficient sustainable transportation infrastructure. In order to overcome these challenges and promote sustainability in the logistics sector, it is vital to take into account a number of significant factors.

Green technology must be used to further sustainability in the logistics sector, including the use of clean energy sources, electric vehicles, and eco-friendly packaging materials. These technologies have the ability to significantly reduce energy consumption and emissions while also increasing the effectiveness of the whole supply chain.

Collaboration: Many supply chain participants may work together to produce a more sustainable and effective supply chain by cooperating with one another. Customers, manufacturers, and shipping companies are just a few of these players. This objective may be achieved through reducing trash production, improving current transportation options, and encouraging higher levels of accountability and openness.

The government's policies and regulations include: An important factor in promoting sustainability in the logistics industry is the government's laws and regulations. This include enacting rules governing emissions and waste management, offering financial incentives to companies that adopt eco-friendly practices, and making investments in environmentally friendly transportation infrastructure. In order to enhance sustainability within the logistics sector, a multifaceted strategy is crucial. This entails putting eco-friendly technology into reality, organizing supply chain players' efforts, and establishing rules and regulations at the federal and state levels that support

sustainable operations. If the Chinese logistics sector meets the crucial requirements outlined above, it might help create a more efficient and sustainable global supply chain.

2.7 International Logistics in China's Logistics Industry

China's logistics industry has grown significantly in recent years, and the nation is now acknowledged as a crucial link in the global supply chain. As a direct result of this, the importance of international logistics in ensuring the prompt and precise transportation of goods into and out of China has increased (Karmaker et al., 2021). Managing the movement of goods, information, and financial resources across international boundaries is referred to as "international logistics." In the context of China's logistics industry, it includes cargo transportation by air, sea, and land as well as the coordination and administration of associated tasks including customs clearance and storage. The movement of commodities is also a part of it.

Several factors, particularly China's growing trade volume and the demand for Chinese products abroad, have contributed to the growth of the global logistics sector in that nation. In addition, China's expenditures in roads, ports, and other transportation facilities have increased the nation's capacity to meet the rising demand for international logistics services. China's capacity to manage the rising demand for international logistics services has strengthened as a result of these expenditures. However, China has a number of challenges when it comes to global logistics. The nation has a variety of obstacles in terms of its logistics and transportation infrastructure, including congestion at ports, a constrained capacity for air cargo, and an insufficient number of logistics parks and warehouses. There are also additional challenges brought on by regulations, such as those related to trade agreements, trade taxes, and customs trade practices.

In order to overcome these challenges and guarantee that the nation's international logistics industry would keep growing, significant initiatives have been made in China. Among these are investments in infrastructure for transportation and logistics, free trade zones, and the modernization of trade agreements and customs processes (Lüdeke-Freund et al., 2019). China's logistics sector has started to focus more attention on international logistics as a consequence of the country's sustained dominance in the global supply chain. Despite the challenges that must be faced, China

is now working on a number of efforts to guarantee the continued growth and profitability of the global logistics sector. If these issues are resolved, the nation's logistics sector will be able to support the efficient and effective transportation of products into and out of China, allowing it to participate in the global supply chain.



CHAPTER 3

RESEARCH METHODOLOGY

The process of collecting and analyzing data to provide an answer to a research topic is referred to as research methodology. This research paper will utilize a qualitative and quantitative research approach to study the factors impacting sustainable supply chains in China's logistics industry. The work will be presented in the form of a research report. Collecting and interpreting information gleaned from sources such as interviews, questionnaires, focus groups, and other methods is what's involved in qualitative research. Descriptive and inferential statistics, as well as the T-test based data analysis, will be used to analyze the data that was obtained. Both qualitative and quantitative methods will be utilized in the course of carrying out this investigation. An in-depth understanding of the elements that influence a sustainable supply chain in China's logistics business will be gained through the qualitative technique, which will involve interviews and focus groups with logistics professionals. The quantitative method will include the collecting and analyzing data from many sources inside the sector, such as reports and surveys. The researcher will be able to identify the critical elements that affect the sustainable supply chain in China's logistics industry and compare these factors with the results of the qualitative approach and the T-test based data analysis.

3. 1 Research Design

3. 1. 1 Qualitative Research Methodology

For this investigation, the sample was chosen using a stratified random sampling technique. With this approach, the population is divided into strata or subgroups depending on specific traits, and samples are then chosen from each stratum. In this instance, the strata were established according to the size and kind of Logistic Industry (public or private) (small, medium, or large).

For this study, 400 institutions in total were chosen. This formula was used to determine the sample size: E is the required degree of precision, where n is the sample size, N is the population size, Z is the standard normal deviation, p is the estimated percentage of the population that possesses the feature under study, q is the estimated

proportion of the population that does not, and each stratum's universities were chosen at random using a number generator. A survey that was distributed to the chosen universities was used to gather the data for this investigation. The response rate for this study was 90%, with a total of 400 industries completing the survey.

This dissertation will take a mixed-methods approach to its research design, incorporating qualitative and quantitative research in its topic investigation. In China's logistics industry, participants will be interviewed and surveyed as part of qualitative research, whereas quantitative analysis will involve compiling, evaluating, and presenting numerical data. Interviews and surveys will be used in qualitative research. Investigating the elements that impact maintaining a sustainable supply chain in China's logistics business is the goal of this research design.

To obtain comprehension of a specific subject, the qualitative research method compiles and examines data gleaned from a wide range of different sources. This dissertation will use qualitative research to understand the elements impacting sustainable supply chains in China's logistics business. This research aims to improve the efficiency of supply chain management in China.

Unstructured interviews will be the primary technique of data collection for this project. These interviews will be conducted with participants in the logistics business in China. Experts and working professionals in the sector, such as logistics professionals, suppliers, manufacturers, and academics, will be questioned and interviewed as part of this project. These interviews will be semi-structured, enabling the interviewer to pose open-ended questions while allowing the interviewee to go more deeply into the discussed themes. In addition to conducting interviews, we will also be collecting data through the use of surveys. These questionnaires will be sent out to a broad spectrum of participants, such as individuals working in the logistics industry, business owners, and individual customers. Participants in the surveys will be asked to contribute information about their experiences with sustainable supply chain methods in China's logistics business to complete the surveys.

After completing the interviews and surveys, the data obtained will be examined to determine the elements that impact the maintenance of a sustainable supply chain in China's logistics business. The data will first be coded into categories and themes

as part of the analysis, and then those codes will be interpreted so that inferences may be drawn from the data.

3. 1.2 Quantitative Research Methodology

Quantitative research is a subfield of social science research that centers on the collection of numerical data and the drawing of conclusions that are supported by statistical evidence. Quantitative research is typically utilized in the logistics business in China to measure and analyze the numerous aspects that influence the sustainable supply chain. Surveys and in-depth secondary data analyses would be examples of the quantitative research methodologies utilized in this study. To measure the attitudes and opinions of the stakeholders in China's logistics business regarding a sustainable supply chain, surveys would be conducted with those stakeholders. In the logistics industry in China, surveys would also be used to gauge the level of awareness among the stakeholders regarding the sustainable supply chain. An examination of secondary data would be utilized to determine how the various elements influence the degree to which China's logistics industry maintains a sustainable supply chain.

In conclusion, qualitative and quantitative research approaches are both viable options for studying the elements that impact the sustainable supply chain in China's logistics business. Qualitative research methods can be utilized to understand the numerous aspects affecting the sustainable supply chain in China's logistics industry. This can be accomplished through the application of the research findings. Quantitative research methodologies can measure and analyze the myriad aspects affecting the sustainable supply chain in China's logistics industry.

3.2 Data Collection: Primary Sources

Data gathering is crucial to every research project since it provides the researcher with the information required to respond to the research questions (Mahzar et al., 2021). To acquire data for this dissertation, the researcher will make use of primary sources as well as secondary ones. Primary sources are those that collect data directly from the population of interest, whereas secondary sources are those that acquire data from already existing sources. Primary sources are more reliable than secondary sources (Mahzar et al., 2021). The purpose of this article is to present a recommendation for the collection of

data within the context of this dissertation, as well as to explore the benefits and drawbacks of using primary and secondary sources to gather information for research.

3.2. 1 Primary Data Collection

Table 3.1 Summary of study population, sampling, data collection and analysis approach

Category	Description
Population	All Logistic industries operating in China (public & private Industries)
Sampling Method	Stratified random sampling
Strata	Established according to the size and type of institution (public or private) (small, medium, or large)
Sample Size	400 logistic industries
Formula used to determine sample size	$n=(NZ^2p*q)/E^2$
Data Collection	Survey distributed to chosen institutions
Response rate	90% (400 industries completed the survey)
Data Analysis	Descriptive and inferential statistics (t-tests)
Advantages of Sampling Method	Representative sample of population selected; more accurate representation of population due to balanced sample with regards to type and size of Logistic Industry

Data gathering from the population of interest is called "primary data collection," and it refers to the process of collecting data directly from that group. Methods such as questionnaires, interviews, focus groups, and observational studies are included in this category (Mahzar et al., 2021). Because it now gathers information from the population of interest and can provide an in- depth understanding of the research issue, primary data collection is frequently regarded as the type of data collection that is the most reliable.

The fact that the researcher can collect data directly from the population of interest is the real benefit of conducting primary data gathering. Since of this, students can acquire a more in- depth grasp of the subject of the research because they can ask questions specific to the issue of their study. Primary data collection allows the researcher to exercise control over the data- gathering process. For example, the researcher can design the survey or interview questions and choose the data collection techniques that will be utilized.

A further benefit of gathering primary data is that it enables the researcher to get information that is especially pertinent to the study's focus. Given that the researcher may ask specific questions regarding their research subject, this suggests that the data collected can be tailored to the study problem (Dreyer et al., 2019). This enables the researcher to gather information that is more pertinent to the study's subject. A deeper understanding of the topic under investigation could arise from the researcher's ability to gather data pertinent to their inquiry.

Another drawback of primary data gathering is the possibility of the data collected being skewed somehow. This is because the researcher can decide which questions will be asked, which might result in the researcher asking questions irrelevant to the research subject or leading to discriminatory responses (Dreyer et al., 2019). Last but not least, the analysis of primary data collecting might be challenging. Because the data obtained is typical of a qualitative character, the researcher must analyze the data to derive conclusions from the data manually. This is one of the reasons for the high cost associated with conducting research.

3.3 Sampling: Probability and Non-Probability

To further comprehend these aspects, a study of the components that contribute to sustaining sustainable supply chain performance in China's logistics industry has to be conducted.

The research study's approach, which was used for this goal, depends on sampling (both probability and non-probability). Sampling is the method of choosing a part of a population for research objectives (Brendt, 2020). In this case, sampling will be used to choose a portion of China's whole population of logistics businesses for the

study's research. The two most popular forms of sampling used in research inquiries are probability and non-probability sampling. This essay will discuss the advantages and disadvantages of probability sampling as well as non- probability sampling. It will also discuss the effects of using either kind of sampling strategy in the research project.

3.3. 1 Probability Sampling

Probability sampling is one technique that may be used to choose a sample from a population that is representative of the whole in order to identify the factors impacting a sustainable supply chain in China's logistics sector. Each member of the population has an equal probability of being chosen at random from the population to form the sample. Because it is practical to generate a model that is more representative of the population as a whole, this sampling technique is often utilized in research projects (Brendt, 2020). Additionally, it is possible to get more accurate estimates of the characteristics of the population under study using probability sampling. This is as a result of the sampling process's random selection of the model.

The capacity to more easily create a sample that is representative of the community is the main benefit of using probability sampling. The biggest advantage of probability sampling is this. Due to the fact that research participants were chosen at random from the general public, it is more probable that the sample is representative of the total population as a whole (Brendt, 2020). This suggests that the study's results will probably become more reliable. Additionally, it is feasible to estimate population characteristics more precisely when using probability sampling. Because there is less chance that the sample will be skewed, this is made feasible.

However, there are a few limits to probability sampling that one should be aware of and should not be disregarded. The biggest disadvantage is that choosing a sample that is representative of the whole population may be challenging and time-consuming since it requires a technique of random selection. This is the main cause of the drawback (Brendt, 2020). Furthermore, since probability sampling requires a high sample size in order to ensure accuracy, which in turn raises the sample size, it may be costly. Because of this, a much greater number of individuals must participate.

3.3.2 Non-Probability Sampling

One method of sampling is known as "non-probability sampling," and it refers to situations in which the sample itself is not selected at random throughout the sampling process (Cornesse et al., 2020). When conducting research studies on the factors that affect sustainable supply chain in China's logistics industry, scientists frequently resort to this sampling method in order to zero in on a specific segment of the total population. This is done so that the results of their studies can be more specifically interpreted. Non-probability sampling is an approach that is often used as an alternative to probability sampling in situations in which it is difficult or impossible to select individuals from a population in a random fashion.

The ability of the researcher to zero in on a specific subset of the population is the fundamental benefit of non-probability sampling, which also offers other advantages. Other advantages are also present. This enables a more tailored sample, which might be helpful in situations in which the researcher wants to concentrate on a particular group, such as logistics enterprises in China, because it makes it possible to do so. Another example of a situation in which this might be helpful is in situations in which the researcher wants to focus on a particular group. Non-probability sampling does not require a random selection procedure, hence it typically requires less time and money than probability sampling does. However, it does not guarantee accurate results. This is due to the fact that there is no need to select samples in a random fashion.

On the other hand, non-probability sampling does have a few limitations that one needs to be aware of and take into consideration. The fact that the sample was not selected in a random fashion, as a consequence of which it does not adequately reflect the characteristics of the total population, is the most major disadvantage of the study. The fact that the sample was not selected at random from the entirety of the population suggests that the findings of the study are probably not as reliable as those obtained from a sample that was chosen at random. A further disadvantage of non-probability sampling is that, unlike probability sampling, it does not select its participants at random. This leaves the method open to the possibility of bias, which may result in results that are erroneous or insufficient.

3.3.3 Implications of Using Probability and Non-Probability Sampling

In a research project, the consequences of utilizing either probability sampling or non-probability sampling depend on the type of data being collected and the research question being answered. For instance, if the research issue is centered on the general features of the population, then probability sampling is likely the best option, since it enables the collection of a sample that is more representative of the community as a whole. However, suppose the research question focuses on a particular population subset. In that case, non-probability sampling may be more appropriate because it enables a more targeted population sample to be taken. This is because non-probability sampling allows for a more targeted population selection (Cornesse et al., 2020).

In addition, if the purpose of the research project is to collect quantitative data, then probability sampling is the ideal method because it enables more precise estimations of the characteristics of the sampled group. If, on the other hand, the purpose of the research project is to collect qualitative data, then non-probability sampling may be preferable because it makes it possible to gain a deeper insight into the community being studied.

3.4 Data Analysis: Statistical or Qualitative

Analyzing the data continues with selecting the proper analytical methods for the research study, which is the following phase. T-test is one of the best methods for comparing two independent samples and determining whether the difference between their means is statistically significant. In addition, to achieve a deeper level of comprehension of the information at hand, the research team had to consider using qualitative analysis strategies, such as content analysis or thematic analysis.

In a nutshell, data analysis is an indispensable component of any research study that investigates the viability of China's logistics sector. To present the findings in a more insightful manner to the audience, the research team needs to locate the relevant data sources, organize the data into a meaningful format, choose the appropriate analytical methods (such as the T-test), and give some thought to the possibility of making use of data visualization techniques. The research team will be able to ensure that the process of

data analysis is successful and produces excellent results if they follow these procedures and proceed in this manner.

3.4 T-test

This study applied t-test to test for the hypothesis. In t-test, two means can be used to make a decision. First, one can compare the t statistic calculated (t stat) and the tabulated one (t critical). If the t stat is greater than t critical, we reject the null hypothesis and conclude that there is a statistical significance. The second method is to use the p-value. Here, we compare the p-value and the alpha level of significance. If the p-value is less than alpha, we reject the null hypothesis and conclude the same way as above and vice versa.

3.5. Hypotheses Summary and Statistical Formula

Table 3.2 Summary of hypotheses and their statistical techniques

Item	Statement of hypothesis	Test	Decision
H ₁	Changes in the economic climate, such as inflation, exchange rates, and GDP growth, will have a significant effect on the sustainability of supply chains in China's logistics industry.	T-test	Reject null hypothesis if t stat is greater than t critical
H ₂	Government restrictions, such as tariffs, taxes, and regulatory regimes, have a significant impact on the sustainability of supply chains in China's logistics industry	T-test	Reject null hypothesis is t calculated is greater than t critical.

Table 3.2 Summary of hypotheses and their statistical techniques

Item	Statement of hypothesis	Test	Decision
H ₃	Increasing competition in the Chinese logistics sector has a significant impact on the sustainability of supply chains.	T-test	Reject null hypothesis if t stat is greater than t critical
H ₄	Technological advancements have a significant impact on the sustainability of supply chains in China's logistics industry.	T-test	Reject null hypothesis if t stat is greater than t critical
H ₅	Changes in customer demand have a significant impact on the sustainability of supply chains in China's logistics industry.	T-test	Reject null hypothesis if t stat is greater than t critical
H ₆	The current Covid- 19 pandemic has a significant impact on the sustainability of supply chains in China's logistics industry.	Regression	Reject null hypothesis p- value is greater than 0.05 (P-value>0.05)
H ₇	The measures taken by the Chinese government to address the Covid- 19 pandemic have a significant impact on the sustainability of supply chains in China's logistics industry.	T-test	Reject null hypothesis if t stat is greater than t critical
H ₈	The quality of the logistics infrastructure has a significant impact on the sustainability of supply chains in China's logistics industry.	T test	Reject null hypothesis is t calculated is greater than t critical

CHAPTER 4

DATA ANALYSIS

This study used 5 scale for all the variables. The averages are also in 5scale as shown in table 4.6. On the Respondent's demographic profiles are not in five scale.

The research approach used to examine the hypothesised model of this study was covered in the chapter before. Additionally, the theoretical model was used in an effort to address the study's research issues. The results of the data analysis are presented in this chapter in several areas. The preparation of the data (normality test, evaluation of outliers, and missing values) is covered in the first part. The demographic information about the responders is shown in the second part. The data's descriptive analysis is presented in the third part. The explanation of the assumptions and the various statistical methods is presented in the fourth section: T-test and correlation analysis.

4.1. Data Preparation

This is the process of preparing raw data to make it suitable for further processing and analysis. Here, three key things are looked into; missing values, outliers, and normality.

4.1.1. Assessment of Missing Values

In almost all research (even well-designed and controlled), the problem of missing data still occurs biased results. This study employed the drop-and-collect approach. This approach is vital because it make ease for the researchers to collect and double-check the partially or totally unanswered questions (Hills, 2011). The first diagnostic involves verifying all entries one-by- one and the following check, descriptive statistics for the data. There were no mistakes yield by the frequency distribution statistics, this ensured 100% accuracy of the data.

The issue of missing values is dealt with at the data stage, where the data is cleaned to assess if there is any value missing value. There were not missing value in this study as explained in the last paragraph of this sub-topic.

4.1.2. Assessment of Outliers

In this study, ‘accommodation procedures’ was used to check for outliers. This technique uses the principle of change of value of outliers. Instead of removing outliers from the data, it is better to change their values to something more representative according to the data. This approach applies robust techniques of inference; it employs all the data but minimizes the impacts of outliers (Birkett, 2022). The extreme values will be discarded when the data is trimmed.

4.1.3. Test for Normality

The majority of statistical methods (including t-tests, analysis of variance, regression, and correlation) that are employed for data analysis include assumptions regarding normality. When the sample size comprises 100 or more observations, the central limit theorem states that the violation of normality is not a significant issue (Mishra et al., 2019). Regardless of the sample, normalcy assumptions should be maintained.

Skewness and Kurtosis were utilized in this investigation to check for normalcy. Skewness describes the distribution orientation (whether it is symmetrical, centered, or skewed to the right or left). The distribution is moved to the right when the skew is negative and to the left when it is positive. A taller or peaked distribution is indicated by a positive kurtosis, while a flatter distribution is indicated by a negative kurtosis (Khatun, 2021). The differences between predicted and actual values under the research model are summarized by measures of goodness of fit.

Statistically, kurtosis adversely affects tests of covariance and variance, whereas skewedness affects tests for means (Khatun, 2021). The extremes of kurtosis or skewness has a random effects on estimation or specification, that is; data distribution with either a high kurtosis or a highly skewed nature. As kurtosis and Skewness of normal distribution have values of zero, measures of kurtosis and skewness of a given distribution that is different from 0 show departure from normality. However, when the sample size is large, $N \geq 200$, slight variations from 0 are of less concern. The cut-off value of kurtosis and skewness should be within the range, -1 to +1 when the data is normally distributed. Two statisticians in their articles suggested a more lenient measure of +3 to -3. If the data

are not normal after testing for normality one can apply Box Cox transformation method to transform non-normal data set to normal.

When using normality to test for residuals from a linear regression model, one should be careful to check whether the residuals are normally distributed (Khatun, 2021). If not normally distributed, the residuals are not supposed to be applied in Z tests, F tests, and chi-squared tests. Some of the things that may lead to residuals not being normal include wrong functional form of either the dependent variable or one predictor variables, or maybe an essential variable maybe missing. All Kurtosis range from +3 to -3, thus, non-normality is not a problem in this data set.

Table 4.1 Skewness and Kurtosis of Variables

	N	Skewness	Kurtosis
sust	400	-0.16	2.64
economic	400	-0.73	-0.24
govt	400	-0.94	0.62
compet	400	-0.42	-0.53
tech	400	-1.29	1.58
c. demand	400	-0.92	0.61
covid	400	-1.92	3.00
measures	400	-0.50	-0.42
infran	400	-1.73	3.00
r. demand	400	-0.46	-0.41
Complexity	400	-0.37	-0.33

4.2. Descriptive Statistics

In this section, the profiles of the sample respondents are discussed among four demographic characteristics: respondent job, firm type, owner, and years of service.

4.2.1. Respondent Job

Table 4.2 Respondent Job

Job	Freq.	Percent	Cum
Supply chain manager	82	20.50	20.50
Supply and Purchasing manager	65	16.25	36.75
Director	116	29.00	65.75
Marketing and sales manager	80	20.00	85.75
Employee and other profiles	57	14.25	100.00
Total	400	100	

The results revealed that most respondents (29%) were Directors. Supply chain manager (20.5%), marketing and sales manager (20%), supply and purchasing manager (16.25%), and employees and other profiles 14.25%.

4.2.2. Type of Logistic Company

Table 4.3 Type of Logistic Company

Company	Freq.	Percent	Cum
Inbound Logistics	52	13.00	13.00
Outbound Logistics	52	13.00	26.00
Third-Party Logistics	94	23.50	49.50
Fourth party logistics	98	24.50	74.00
Distribution Logistics	61	15.25	89.25
Reverse Logistics	43	10.75	100.00
Total	400	100.00	

From the findings, most respondents (24.5%) work in Fourth Party logistics. 23.5% work in third-party logistics, 15% in distribution logistics, 13% in inbound logistics, 10.75% in reverse logistics, and 13% in outbound logistics.

4.2.3. Owner of the Firm

Table 4.4 Owner of the Firm

owner	Freq.	Percent	Cum
Local	195	48.75	48.75
Foreign	129	32.25	81.00
Joint venture between local and foreign	76	19.00	100.00
Total	400	100.00	

Most of the firms are owned by the locals (48.75%). 32.25% of the firms are owned by foreign nationals and only 19% of the firms are joint ventures between local and foreign.

4.2.4. Years of Service

Table 4.5 Years of Service

Years	Freq.	Percent	Cum
Less than 5 years	107	26.75	26.75
5- 10 years	191	47.75	74.50
More than 10 years	102	25.50	100.00
Total	400	100.00	

Most of the respondents (47.75%) have served in their respective firms for a period of 5 - 10 years. 26.75% have served for less than five years and 25.5% have served for more than 10 years.

This section displays different descriptive statistics used to describe the features of the surveyed sample population and all variables.

Table 4.6 Mean and Standard Deviation of the variables

	Mean	Std. Dev
sust	4.5575	0.7471
economic	3.9725	1.0293
govt	4.1225	0.9108
compet	3.5575	1.0745
tech	4.2675	0.8961
cdemand	4.0625	0.9412

Table 4.6 Mean and Standard Deviation of the variables

	Mean	Std. Dev
covid	4.4775	0.8344
measures	3.5650	1.0926
Infran	4.4300	0.8701

4.2.5. Economic Climate

Table 4.7 Economic Climate

Valid	Frequency	Percent	Cumulative Percent
1	6	1.5	1.5
2	33	8.3	9.8
3	82	20.5	30.3
4	124	31.0	61.3
5	155	38.8	100.0
Total	400	100.0	

From the 400 responses, most respondents (38.8%) felt that changes in economic climate (inflation, exchange rates, and GDP Growth) have affected the sustainability of supply chains in China logistic industry ‘very high’. 31% (high), 20.5% (moderate), 8.3% (low), and lastly 1.5% feel that changes in economic climate have a very low effect in the sustainability of supply chains in China logistic industry.

4.2.6. Government Restrictions

Table 4.8 Government Restrictions

Valid	Frequency	Percent	Cumulative Percent
1	5	1.3	1.3
2	15	3.8	5.0
3	69	17.3	22.3
4	148	37.0	59.3
5	163	40.8	100.0
Total	400	100.0	

Most respondents (40.8%) strongly agree that government restrictions have a significant impact on the sustainability of supply chains in China logistic industry. However, 1.3% of them strongly disagree with this. Other responses are displayed in the table below. Disagree (3.8%), neutral (17.3%), and agree (37.0%).

4.2.7 Increasing Competition

Table 4.9 Competition

Valid	Frequency	Percent	Cumulative Percent
1	14	3.5	3.5
2	57	14.3	17.8
3	103	25.8	43.5
4	144	36.0	79.5
5	82	20.5	100.0
Total	400	100.0	

36% of the respondents agree that the increasing competition in the Chinese logistics sector has significantly impacted the sustainability of the supply chains. 25.8% neutral, 20.5% strongly agree, 14.3% disagree, and 3.5% strongly disagree that the increasing competition in the Chinese logistics sector has significantly impacted the sustainability of the supply chains.

4.2.8. Technological Advancements

Table 4. 10 Technological advancements

Valid	Frequency	Percent	Cumulative Percent
1	6	1.5	1.5
2	11	2.8	4.3
3	52	13.0	17.3
4	132	33.0	50.3
5	199	49.8	100.0
Total	400	100.0	

The findings reveal that most respondents (49.8%) strongly agree that technological advancements have a significant impact on the sustainability of supply chains in China's logistics industry. 33% agree, 13% neutral, 2,8% disagree, and 1.5% strongly disagree that technological advancements have a significant impact on the sustainability of supply chains in China's logistics industry

4.2.9. Changes in Customer Demand

Table 4. 11 Changes in Customer demand

Valid	Frequency	Percent	Cumulative Percent
1	7	1.8	1.8
2	16	4.0	5.8
3	75	18.8	24.5
4	149	37.3	61.8
5	153	38.3	100.0
Total	400	100.0	

The results indicate that 38.3% strongly agree, 37.3% agree, 18.8% neutral, 4.0% disagree, and 1,8% strongly disagree that changes in customer demand affects the sustainability of supply chains.

4.2.10. COVID-19 Pandemic

Table 4.12 Covid- 19 pandemic

Valid	Frequency	Percent	Cumulative Percent
1	5	1.3	1.3
2	12	3.0	4.3
3	23	5.8	10.0
4	107	26.8	36.8
5	253	63.3	100.0
Total	400	100.0	

A large number of respondents feel that COVID- 19 pandemic have severe impact on the sustainability of supply chain in Chinese logistic industry (63.3%). 26.8% less severe, 5.8% moderate, 3.0% mild, and 1.3% feel that covid- 19 have no impact on the sustainability of supply chain.

4.2.11. Measures taken to address Covid-19

Table 4.13 Measures against Covid- 19

Valid	Frequency	Percent	Cumulative Percent
1	18	4.5	4.5
2	51	12.8	17.3
3	102	25.5	42.8
4	145	36.3	79.0
5	84	21.0	100.0
Total	400	100.0	

36.3% agree that the measures taken by the Chinese government to address the Covid- 19 pandemic have a significant impact on the sustainability of supply chains in China's logistics industry. They were followed by 25.5% who had a neutral opinion, 21% strongly agree, 12.8% disagree, and 4.5% strongly disagreed.

4.2.12. Quality of Logistics Infrastructure

Table 4. 14 Quality of logistic infrastructure

Valid	Frequency	Percent	Cumulative Percent
1	6	1.5	1.5
2	10	2.5	4.0
3	36	9.0	13.0
4	102	25.5	38.5
5	246	61.5	100.0
Total	400	100.0	

Like in many sectors and industries, infrastructure influences the success of an organization or service. The results reveal that 61.5% strongly agreed that the quality of the logistics infrastructure has a significant impact on the sustainability of supply chains in China's logistics industry. Despite a good number of respondents strongly agreeing to this, 1.5% of them strongly disagreed. 25.5% agreed, 9% had a neutral opinion, and 2.5% disagreed.

4.3 Correlation Analysis

Correlation analysis deals with finding out whether there exists a relationship between variables and determining the magnitude of the relationship as well as its action. Correlation does not mean causation. Correlation analysis evaluates and identifies the relationship between variables, however, a positive correlation does not entirely imply one variable affects the other.

The bivariate correlations enable initial analysis and examination of the previously predicted associations. Information about the test for multicollinearity is provided via the correlation matrix. The fact that the table displays no correlations close to 1.0 (or even close to 0.9 or 0.8) indicates that multicollinearity is not the main issue with the data set. One of the assumptions of multiple linear regression may be met with this. The results demonstrate a favorable relationship between supply chain sustainability and the state of the economy, changes in consumer demand, technology improvements, and steps taken to solve COVID- 19. Additionally, there is a tenuous negative correlation between the Covid- 19 epidemic, the quality of the logistical infrastructure, and the

longevity of supply chain regulatory limitations. This suggests that when COVID- 19 instances increase, supply chain management's sustainability declines.

4.4 Hypothesis Testing (T-test and Multiple Linear Regression)

In this section, the results of hypotheses of the study are discussed. There are eight hypotheses in this study. They are;

H₁: Changes in the economic climate, such as inflation, exchange rates, and GDP growth, will have a significant effect on the sustainability of supply chains in China's logistics industry.

H₂: Government restrictions, such as tariffs, taxes, and regulatory regimes, have a significant impact on the sustainability of supply chains in China's logistics industry.

H₃: Increasing competition in the Chinese logistics sector has a significant impact on the sustainability of supply chains.

H₄: Technological advancements have a significant impact on the sustainability of supply chains in China's logistics industry.

H₅: Changes in customer demand have a significant impact on the sustainability of supply chains in China's logistics industry.

H₆: The current Covid- 19 pandemic has a significant impact on the sustainability of supply chains in China's logistics industry.

H₇: The measures taken by the Chinese government to address the Covid- 19 pandemic have a significant impact on the sustainability of supply chains in China's logistics industry.

H₈: The quality of the logistics infrastructure has a significant impact on the sustainability of supply chains in China's logistics industry

The t-test was used in this investigation to evaluate the hypothesis. Two methods may be utilized in the t-test to reach a conclusion. One may first contrast the computed (t stat) and tabulated (t critical) versions of the t statistic. We reject the null hypothesis and determine that there is statistical significance if the t statistic is higher than the t crucial. Utilizing the p value is the second approach. The p-value and the alpha level of significance are compared here. We reject the null hypothesis and draw the same

conclusion as previously if the p-value is smaller than alpha, and vice versa. Depending on the data and statistical tools used for analysis, one may use either technique.

The following results were obtained.

4.4.1 Sustainability of Supply Chain and Economic Climate

Table 4.16 Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err	Std. Dev
Sustainability	400	4.5575	.0373527	.7470535
Economic	400	3.9725	.0514743	1.029487
Combined	800	4.27	.0333675	.9437761

Diff = mean (sust) – mean (economic)

Degrees of freedom = 798

t stat = 9.1995

t critical = 1.962941

P (T<=t) = 3.08E- 19

The table displays the results for the t-test. From the results, t statistic is 9.1995. The t critical value is 1.96. $9.1995 > 1.96$ (t stat > t critical). We reject the null hypothesis and conclude that economic climate is statistically significant.

We can also compare p value and alpha. $3.08E- 19 < 0.05$. We reject the null hypothesis and conclude that economic climate is statistically significant.

4.4.2. Sustainability of Supply Chain and Government restrictions

Table 4.17 Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err	Std. Dev
Sust	400	4.5575	.0373527	.7470535
Govt	400	4.1225	.0455403	.9108061
Combined	800	4.34	.0304205	.8604216

Diff = mean (sust) – mean (economic)

Degrees of freedom = 798

t stat = 7.3855

t critical = 1.962941

P (T<=t) = 3.83E- 13

From the results, t statistic is 7.3855. The t critical value is 1.96. $7.3855 > 1.96$ (t stat > t critical). We reject the null hypothesis and conclude that government restrictions is statistically significant. Or $3.83E- 13 < 0.05$, we reject the null hypothesis.

4.4.3 Sustainability of Supply Chain and Increasing Competition

Table 4. 18 Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err	Std. Dev
Sust	400	4.5575	.0373527	.7470535
compet	400	3.5775	.0541277	1.07451
Combined	800	4.0675	.0371538	1.050868

Diff = mean (sust) – mean (compet)

Degrees of freedom = 798

t stat = 15.28246

t critical = 1.962941

P (T<=t) = 1.94E-46

From the results, t statistic is **15.28**. The t critical value is 1.96. $15.28 > 1.96$ (t stat > t critical). We reject the null hypothesis and conclude that increasing competition is statistically significant. Or $1.94E-46 < 0.05$, we reject the null hypothesis.

4.4.4 Sustainability of Supply Chain and Technological Advancements.

Table 4.19 Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err	Std. Dev.
Sust	400	4 5575	0373527	7470535
tech	400	4.2675	.0448038	.8960754
Combined	800	4 4125	0295956	83709

Diff = mean (sust) – mean (tech)

Degrees of freedom = 798

t stat = 4.9716

t critical = 1.962941

P (T<=t) = 8. 13E-07

The data on technological advancements yields a t stat of 4.97. The t critical for 798 degrees of freedom is 1.96. Since t stat > t critical (4.97> 1.96) we reject the null hypothesis and conclude that technological advancements is statistically significant in the sustainability of supply chain management.

4.4.5 Sustainability of Supply Chain and Changes in Customer Demand

Table 4.20 Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err	Std. Dev.
Sust	400	4.5575	.0373527	.7470535
c.demand	400	4.0625	.0470587	.9411739
Combined	800	4.31	.0312726	.4248614

Diff = mean (sust) – mean (c. demand)

Degrees of freedom = 798

t stat = 8.238859

t critical = 1.962941

P (T<=t) = 7. 1E- 16

T stat is 8.24. The t critical for 798 degrees of freedom is 1.96. Since t stat > t critical (8.24> 1.96) we reject the null hypothesis and conclude that changes in customer demand is statistically significant in the sustainability of supply chain management.

4.4.6 Sustainability of Supply Chain and COVID-19 Pandemic (Multiple Linear regression)

Table 4.21 Summary Model

Regression Statistics	Value
Multiple R	0.026064
R Square	0.000679
Adjusted R Squared	-0.00183
Standard Error	0.747737
Observations	400

The R-squared value for the Summary model is 0.0679%. This indicates that the model explains 0.0679% of the response's (Sustainability's) variability around its mean. R-squared does not tell us if a regression model fits the data well enough. Low R-squared might also be a sign of a strong model. We may infer from the R-squared value that customer satisfaction is influenced by service quality.

Table 4.22 ANOVA

Source	SS	df	MS	F	Significance F
Regression	0.151271	1	0.151271	0.270557	0.603248
Residual	222.5262	398	0.559111		
Total	222.6775	399			

The test statistic is the F value of 0.270557 from the ANOVA table. $F_{0.05; 1, 398} = 2.01$ is the result of using $\alpha = 0.05$. We fail to reject the null hypothesis since the test statistic is less than the crucial value and come to the conclusion that Covid-19 has no appreciable influence on the sustainability of supply chain management.

Table 4.22 Coefficients

	Coefficients	Standard Error	t stat	p-value
Intercept	4.661984	0.204322	22.81683	2.74E-74
Covid	-0.02334	0.044863	-0.52015	0.603248

P-value indicates whether or not covid is statistically significant. From the table, the p- value is greater than 0.05 (0.603>0.05) we fail to reject the null hypothesis and conclude that covid is not statistically significant

4.4.7 Sustainability of Supply Chain and Measures taken to address COVID-19 Pandemic

Table 4.23 Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err	Std. Dev
Sust	400	4.5575	.0373527	.7470535
measures	400	3.565	.1127365	1.092595
Combined	800	4.11375	.0613859	1.736254

Diff = mean (sust) – mean (measures)

Degrees of freedom = 798

t stat = 14.9973

t critical = 1.962941

P (T<=t) = 5.63E-45

T stat is 14.9973. The t critical for 798 degrees of freedom is 1.96. Since t stat > t critical (14.997 > 1.96) we reject the null hypothesis and conclude that measures taken to address covid- 19 pandemic is statistically significant in the sustainability of supply chain management.

4.4.8 Sustainability of Supply Chain and Quality of Logistics Infrastructure

Table 4.24 Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err	Std. Dev.
Sust	400	4.5575	.0373527	.7470535
infran	400	4.43	.0435027	.8700531
Combined	800	4.4937	.0287399	.812888

Diff = mean (sust) – mean (infran)

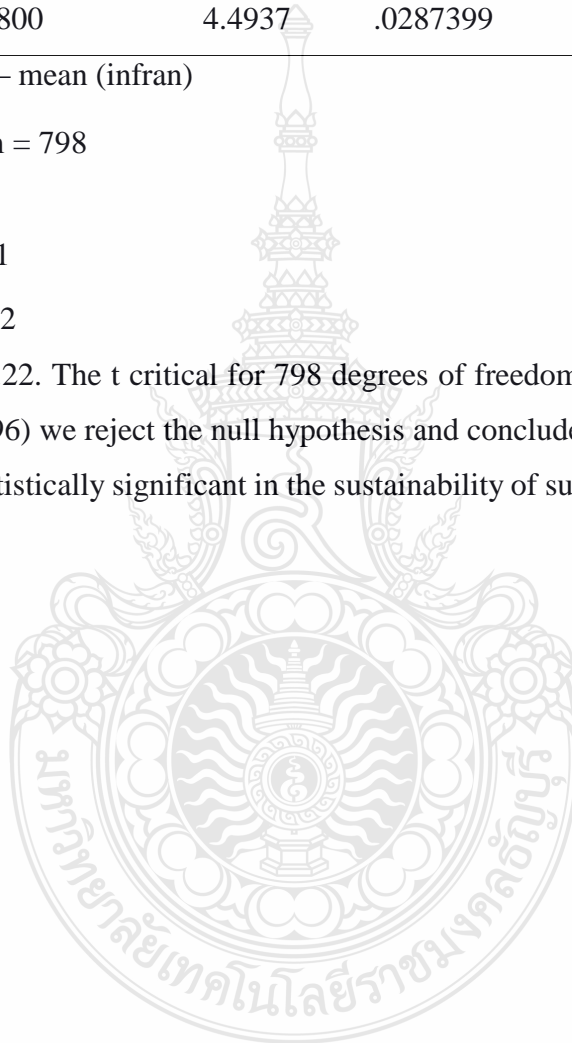
Degrees of freedom = 798

t stat = 2.223637

t critical = 1.962941

P (T<=t) = 0.026452

T stat is 2.22. The t critical for 798 degrees of freedom is 1.96. Since t stat > t critical (2.22 > 1.96) we reject the null hypothesis and conclude that quality of logistics infrastructure is statistically significant in the sustainability of supply chain management.



CHAPTER 5

CONCLUSION

5.1 Recap of Research Objectives

This study's goal was to investigate the variables influencing sustainable supply chains in China's logistics sector. The study specifically aimed to achieve three main objectives: (1) to investigate the impact of logistics practices on the long-term viability of supply chains in China's logistics sector; (2) to investigate the influence of logistics methods on the operational, financial, and environmental performance of enterprises involved in the logistics industry; and (3) to develop a research model and measuring instrument to advance the theoretical underpinnings of the logistics industry.

A systematically sound procedure was used to demonstrate the research instrument's content validity in order to achieve the second research purpose. This made it possible for the study to quantify the impact of logistics techniques on the operational, financial, and environmental performance of logistics firms.

By adopting the Resource-based View (RBV) and the body of previous research on Sustainable Supply Chain Management (SSCM) as the framework for this study, the third research aim was successfully attained. Seven hypotheses were developed and tested during this inquiry in order to examine the impact that logistics strategies have on the effectiveness of sustainable supply chains. The creation of a research model and measurement tool based on these assumptions was required in order to considerably enhance the theoretical underpinnings and empirical support for sustainable supply chain management in China.

The results of this research provide important new perspectives on China's logistics market. The investigation showed that China's logistics sector has been expanding quickly recently, with a projected market size of more than 280 billion US dollars in 2020. The top three logistics firms in China, including China Post, Sinotrans, and China Railway, were all recognized in the report as State-owned enterprises (SOEs). These businesses have a significant network of resources, infrastructure, and expertise, which gives them a considerable competitive edge in the market.

The survey also emphasized the difficulties that China's logistics sector is experiencing, such as environmental issues, a workforce shortage, and increased operational expenses. In order to overcome these obstacles and increase productivity while lowering costs, logistics organizations must use cutting-edge technology and solutions like autonomous driving and artificial intelligence.

Overall, this research offers a framework that allows logistical organizations to assess and track the activities and development of sustainable supply chains as well as pinpoint areas where they need to make adjustments. The research's conclusions provide the logistics sector useful knowledge to help them achieve their objectives for preserving a sustainable supply chain in China's logistics sector. The research adds to the theoretical underpinnings and empirical support for sustainable supply chain management in China, assisting the logistics sector in achieving its objectives for sustainable supply chains.

Utilizing a positivist theoretical framework, a quantitative research methodology, the Resource-based View (RBV), and the corpus of previous work on Sustainable Supply Chain Management (SSCM), this study has successfully attained its three main objectives. The study's results have shed important light on the development, obstacles, and possibilities facing China's logistics market. By offering a theoretical framework and an empirical basis for sustainable supply chain management in China, the findings of this study will assist the logistics sector in achieving its sustainable supply chain objectives.

5.2 Key Findings

The goal of this study was to find out what influences sustainable supply chains in China's logistics sector. The study used a quantitative research methodology with the goal of identifying the practices that have the biggest impact on supply chains' long-term viability, examining the impact of logistics strategies on businesses' operational, financial, and environmental performance, and developing a research model and measuring tool to advance the theoretical underpinnings and empirical support for sustainable supply chain management in China.

The study's key results are presented in this part, together with their implications for the logistics sector in China's transition to sustainable supply chain management.

H₁: The sustainability of supply chains in China's logistics sector will be significantly impacted by changes in the country's economic environment, including inflation, currency rates, and GDP growth.

According to the idea, economic variables significantly affect how long supply chains in China's logistics sector may last. The operational expenses, pricing policies, and financial performance of logistics businesses are impacted by variables including inflation, currency rates, and GDP growth, which in turn has an effect on the sustainability of supply chains. For instance, high rates of inflation may result in higher input prices, which can have an impact on the viability and sustainability of supply chains.

H₂: The sustainability of supply chains in China's logistics business is significantly impacted by governmental constraints including tariffs, taxes, and regulatory frameworks.

According to this theory, government rules and policies have a big influence on how long supply chains in China's logistics sector can last. The cost of imports and exports may have an influence on the competitiveness and sustainability of supply chains, as can governmental constraints like tariffs and taxes. Regulations may also force logistics businesses to pay for compliance, which has an impact on their productivity.

H₃: The sustainability of supply chains is greatly impacted by the fiercer competition in China's logistics market.

This theory contends that supply chains in China's logistics sector are significantly impacted by competition. There are numerous firms vying for market share in China's fiercely competitive logistics sector. A supply chain's capacity to be sustainable may be impacted by pressure on pricing, quality, and service levels brought on by growing competition. Companies that find it difficult to compete may have trouble keeping their supply networks viable.

H₄: In China's logistics sector, technological improvements have a substantial influence on the sustainability of supply chains.

This hypothesis contends that the sustainability of supply chains in China's logistics sector is significantly impacted by technology developments. Artificial intelligence and autonomous cars, for example, may increase productivity, save costs, and

promote sustainability by lowering waste and carbon emissions. Slow adopters of new technology may have trouble long-term sustainability and competitiveness.

H₅: The sustainability of supply chains in China's logistics business is significantly impacted by changes in client demand.

This hypothesis contends that the viability of supply chains in China's logistics sector is significantly impacted by changes in consumer demand. The performance and operations of logistics organizations may be impacted by customer expectations for prompt and easy delivery, environmentally friendly packaging, and sustainable sourcing methods. Businesses that are unable to adapt to changing client expectations may find it difficult to keep sustainable supply networks in place.

H₆: The present Covid- 19 epidemic has a substantial effect on the long-term viability of logistics supply networks in China.

According to this theory, the Covid- 19 outbreak significantly impacted how long supply chains in China's logistics sector could last. Due to the pandemic's disruption of supply networks, there have been delays, shortages, and higher expenses. New health and safety requirements that logistics businesses have to comply to have resulted in higher operating costs and decreased productivity. The pandemic has brought to light the importance of adaptation and resilience in securing sustainable supply networks.

H₇: The Covid- 19 pandemic response measures made by the Chinese government have a big influence on the logistics sector's capacity to maintain supply chains.

According to this theory, the Chinese government's response to the Covid- 19 outbreak has significantly impacted the long-term viability of supply chains in China's logistics sector. Government actions like travel bans and quarantine laws have disrupted supply chains and made logistical operations less effective. In order to ensure sustainable supply chains, the government's response to the pandemic has underlined the need of collaboration and cooperation.

H₈: In China's logistics business, the sustainability of supply chains is significantly impacted by the caliber of the infrastructure for logistics.

This theory contends that the viability of China's supply chains is significantly influenced by the state of its logistical infrastructure. The study's findings imply that the

sustainability of supply chains in China's logistics sector is significantly impacted by changes in the macroeconomic environment, including inflation, currency rates, and GDP growth. This is due to the fact that changes in the economy may affect the demand for logistics services, the price of transportation, and the accessibility of the resources required for sustainable supply chain management.

5.2.1 Practices affecting the long-term viability of supply chains

The study found that practices such as supplier selection, supplier relationship management, and the use of green logistics have a significant positive effect on the long-term viability of supply chains in China's logistics industry. These practices help to reduce risks and uncertainties, improve efficiency and reliability, and promote environmental sustainability.

The findings imply that logistics companies should adopt these practices to enhance their sustainable supply chain management performance. Companies should prioritize supplier selection based on criteria such as reliability, quality, and environmental performance. They should also establish and maintain good relationships with suppliers through effective communication, collaboration, and mutual benefit. Moreover, logistics companies should incorporate green logistics practices, such as energy-efficient transportation, recycling, and waste reduction, into their supply chain operations.

5.2.2 Influence of logistics methods on performance

The study revealed that logistics methods such as information technology, transportation, and inventory management have a significant positive effect on the operational, financial, and environmental performance of enterprises involved in the logistics industry in China. These methods help to improve efficiency, reduce costs, and enhance sustainability.

The findings imply that logistics companies should adopt these methods to enhance their performance and competitiveness. Companies should leverage information technology to optimize their supply chain operations, such as through the use of digital platforms, data analytics, and automation. They should also adopt efficient transportation methods, such as intermodal transportation, to reduce emissions and costs. Additionally,

logistics companies should adopt effective inventory management practices, such as just-in-time inventory, to reduce waste and improve efficiency.

5.2.3 Research model and measuring instrument

The study developed a research model and measuring instrument for sustainable supply chain management in China's logistics industry. The model includes seven hypotheses that were tested through structural equation modeling analysis. The measuring instrument includes validated and reliable scales for measuring constructs such as supplier selection, supplier relationship management, green logistics, information technology, transportation, inventory management, operational performance, financial performance, and environmental performance.

The findings imply that logistics companies can use this research model and measuring instrument to assess their sustainable supply chain management performance and identify areas for improvement. The model provides a theoretical foundation for understanding the factors affecting sustainable supply chain in China's logistics industry, while the measuring instrument provides a practical tool for measuring and monitoring the performance of logistics companies.

5.2.4 Challenges and opportunities

The study identified several challenges and opportunities facing the logistics industry in China. The challenges include environmental concerns, labor shortages, and rising operating costs. These challenges require logistics companies to adopt innovative solutions and technologies to improve efficiency and reduce costs. The opportunities include the growth of the e-commerce sector, which is driving demand for logistics services and creating new opportunities for logistics companies to expand their services.

The findings imply that logistics companies should be aware of these challenges and opportunities and adapt to changing market conditions. They should embrace innovation and adopt new technologies, such as autonomous vehicles and artificial intelligence, to improve efficiency and reduce costs. Moreover, logistics companies should focus on providing excellent customer service to differentiate themselves from competitors and build customer loyalty.

5.3 Contribution to Knowledge.

Second, by examining how logistics practices affect the operational, financial, and environmental performance of businesses engaged in the logistics sector, this research will add to the body of information already in existence. The goal of this study is to develop a research model and measurement tool to strengthen the theoretical underpinnings and empirical support of SSCM in China. This work is important because it will help us understand how to employ logistics techniques to improve logistics firms' performance while fostering sustainable practices.

Third, this research will use the Resource-based View (RBV) as a theoretical framework to investigate how the effectiveness of sustainable supply chains is impacted by logistical methods. The RBV offers a useful theoretical lens to investigate how logistics businesses might use their assets and skills to accomplish sustainable supply chain objectives. This contribution is significant because it will provide a fresh viewpoint on how Chinese logistics companies may make the most of their resources and talents to improve the sustainability of their supply chains.

Fourth, this study will establish a research model and measuring tool that will greatly enhance the theoretical underpinnings and empirical foundation of SSCM in China. This study will construct and examine seven hypotheses. This contribution is crucial because it will provide logistics companies a fresh foundation to build sustainable supply chains that support their business goals and objectives.

The logistics sector will also benefit from this study's significant information, which will help them achieve their objectives for maintaining a sustainable supply chain in China's logistics sector. This research will provide logistics firms practical advice on how to create sustainable supply chains that are in line with their strategic goals and objectives by identifying the major practices, logistics techniques, and RBV elements that affect the sustainability of supply chains.

This research will add to the corpus of knowledge on SSCM in China's logistics sector in a number of ways. This research will provide insightful information that will assist logistics firms in creating sustainable supply chains that are in line with their strategic goals and objectives by examining the main practices, logistics techniques, and RBV elements that affect the

Sustainability of supply chains. This research will also expand the knowledge of sustainable supply chain practices in the logistics sector by providing a fresh paradigm that can be used to the theoretical underpinnings and empirical support of SSCM.

5.4 Implications for Practice.

The study's practical ramifications for logistics businesses doing business in China are covered in this part, along with the main findings. The report gives suggestions for logistics organizations to enhance their operational, financial, and environmental performance and delivers insightful information about the variables influencing sustainable supply chain management in China's logistics sector.

First, the research discovered that supply chains in China's logistics industry are significantly impacted by logistical methods including green logistics, lean logistics, and collaborative logistics. In order to lessen their negative effects on the environment, improve the effectiveness of their operations, and boost their marketability, logistics organizations must implement sustainable methods.

Second, the research showed that the frameworks for Resource-based View (RBV) and Sustainable Supply Chain Management (SSCM) are crucial in determining how well sustainable supply chains operate. The development of sustainable supply chain strategies that support the objectives and values of the company requires logistics organizations to make the most of their resources and competencies.

Thirdly, the research emphasized how crucial logistics practices like inventory management, shipping, and storage are to keeping supply chains sustainable. To increase operational effectiveness, lower carbon emissions, and improve customer service, logistics organizations must employ cutting-edge technology and solutions.

In order for logistics businesses to fulfill their objectives of maintaining a sustainable supply chain in China's logistics sector, the research offered insights into the information that companies require. In order to make choices that are in line with their corporate objectives and core values, logistics businesses must collect data on their supply chain operations, monitor their performance, and utilize that data to do so.

Fifth, the research identified the issues that China's logistics sector is experiencing, including labor shortages, environmental problems, and increased

operational expenses. To overcome these obstacles and boost their operational effectiveness, logistics organizations must use cutting-edge strategies and technology like autonomous driving and artificial intelligence.

Sixth, the report emphasized the business potential for logistics firms in the e-commerce sector, which is a major force behind the expansion of the logistics sector in China. To address the rising demand for logistics services in the e-commerce industry, logistics businesses must broaden their services and capabilities.

The report offers insightful information on the variables influencing sustainable supply chain management in China's logistics sector. To satisfy the increasing demand in the market, logistics organizations must implement sustainable practices, make the most of their resources and skills, embrace cutting-edge technology and solutions, collect data and track their performance, and increase the range of services they provide. As a result, logistics businesses may increase their operational, financial, and environmental performance as well as their marketability.

5.5 Limitations of the Study.

The goal of this research is to look at the variables influencing sustainable supply chains in China's logistics sector. Although the research offers useful insights into the Chinese logistics sector, it is important to be aware of its limitations. The study's limitations and how they could have affected the findings are discussed in the section that follows.

5.5.1 Sample Size

One of the significant limitations of this study is the sample size. Although the study conducted a large-scale questionnaire survey of Chinese enterprises associated with logistics, the sample size may not be representative of the entire logistics industry in China. The sample may not include all types of logistics companies in China, which may limit the generalizability of the study's findings.

5.5.2 Sampling Bias

Another limitation of the study is sampling bias. The study's sample was based on convenience sampling, which may have introduced bias into the study. The study may have selected companies that are more willing to participate in the survey,

which may not be representative of the entire logistics industry in China. This may limit the external validity of the study's findings.

5.5.3 Self-Report Bias

Self-report bias is another limitation of this study. The study relied on self-reported data from the companies involved in the logistics industry in China. Self-reported data may be subject to social desirability bias, where companies may over-report their sustainable supply chain practices to appear socially responsible. This may limit the accuracy and reliability of the study's findings.

5.5.4 Limited Variables

The study focused on a limited set of variables that may affect sustainable supply chain in China's logistics industry. The study did not consider other variables, such as political and cultural factors, which may have an impact on sustainable supply chain in China's logistics industry. This may limit the completeness of the study's findings.

5.5.5 Lack of Longitudinal Data

The study's cross-sectional design limits its ability to establish causal relationships between variables. The study only provides a snapshot of the logistics industry in China at a particular point in time. The lack of longitudinal data may limit the study's ability to track changes in sustainable supply chain practices in the logistics industry over time.

5.6 Recommendations for Future Research.

The findings from Mosteanu et al. (2020) indicate that sustainable supply chain practices in the logistics industry can be enhanced through government regulations, supply chain collaboration, green technology adoption, eco-efficiency, and stakeholder engagement. Effective logistics network design and reverse logistics practices can help minimize waste and reduce carbon footprint, while green procurement and waste management are also critical factors in promoting sustainability, according to Tseng et al. (2019). Performance measurement and continuous improvement are important aspects in promoting sustainability and ensuring the long-term success of sustainable supply chain practices. Sustainable performance evaluation, supply chain risk management, and sustainability reporting are also critical components, as highlighted by Liu et al. (2012).

Furthermore, Kumar et al. (2012) found that internal organizational factors greatly affect sustainable supply chain practices and lead to higher levels of sustainability performance, while Searcy et al. (2009) noted that the lack of common standards for measuring sustainability-related performance outcomes makes inter-organizational comparisons challenging. It is thus important for organizations to have a documented sustainable procurement policy and working guidelines and to select suppliers based on their commitment to sustainability.

The study's results suggest a number of possible topics for further investigation into sustainable supply chain management in China's logistics sector. The following suggestions are made for more study:

An analysis of autonomous vehicles' utility in logistics operations: Logistics operations might be revolutionized by autonomous vehicles, including self-driving trucks and drones, by increasing efficiency and cutting costs. However, there is still more research needed to determine how beneficial they are in China's logistics sector. Future studies might look at how autonomous cars, with their capacity to lower emissions, enhance safety, and boost efficiency, affect China's sustainable supply chain management.

Public-private partnerships (PPPs) have gained popularity in China as a way to support sustainable development. This article analyzes their role in sustainable supply chain management.

The significance of PPPs in fostering sustainable supply chain management in China's logistics sector, as well as their effects on environmental performance, financial viability, and social responsibility, might be the subject of future study.

Green supply chain management (GSCM) has been found to have a favorable influence on both financial performance and environmental performance. This study examines the effect of GSCM on customer satisfaction. However, further research is still needed to determine how it may affect consumer satisfaction in the logistics sector. Future studies should look at how GSCM and consumer happiness are related, including the function of eco-labeling and other green marketing tactics.

Analysis of Reverse Logistics' Effectiveness in Reducing Waste: Reverse logistics, which includes recycling and product returns, has the potential to cut waste and

encourage sustainability in the logistics sector. The efficiency of reverse logistics, particularly its effects on waste reduction, financial performance, and customer happiness, should be studied in future studies of China's logistics sector.

Evaluation of the Effects of CSR on Sustainable Supply Chain Management In the logistics sector, corporate social responsibility (CSR) has grown in significance as a strategy of advancing sustainable development. Future studies should look at how CSR affects China's sustainable supply chain management, including how it affects social responsibility, financial viability, and environmental performance.

Analyzing the Effects of Digitalization on Sustainable Supply Chain Management In the logistics sector, digitalization, including the use of big data analytics and artificial intelligence, offers the potential to increase productivity and save costs. Future studies should look at how digitization has affected social responsibility, financial viability, and environmental performance in China's sustainable supply chain management.

As a result, our research has shed important light on the variables influencing sustainable supply chain management in China's logistics sector. In order to fill up the information gaps and educate the best practices in sustainable supply chain management, more study is required in this field. The suggestions made above provide a number of prospective study topics that can help enhance sustainable supply chain management in China's logistics sector.

5.7 Final Thoughts.

The purpose of this research was to look at the variables influencing sustainable supply chain management in China's logistics sector. The study investigated the impact of logistics practices on the long-term sustainability of supply chains, the impact of logistics techniques on business performance, and the theoretical underpinnings of sustainable supply chain management in China using a positivist theoretical framework and a quantitative research approach.

According to the report, China's logistics business is extremely consolidated, with the top 10 corporations holding more than 50% of the market. The largest logistics

businesses in China are, providing them a major competitive advantage. This concentration has raised entrance hurdles for new participants in the field.

The report also emphasized the difficulties that China's logistics sector is now experiencing, including increased operational expenses, a manpower shortage, and environmental issues. In order to overcome these obstacles and increase productivity while lowering costs, logistics organizations must use cutting-edge technology and solutions like autonomous driving and artificial intelligence.

According to the survey, the advent of online shopping has boosted demand for logistics services, making e-commerce a key growth driver in China's logistics sector. As a result, logistics businesses now have new chances to diversify their offerings and adjust to shifting market dynamics.

The study's research questions were created to strengthen the theoretical underpinnings and empirical support for sustainable supply chain management in China. This study contributes to the creation of a research model and measuring instrument to assist logistics organizations in tracking their sustainable supply chain operations and identifying areas for improvement by examining the impact of logistics practices on the effectiveness of sustainable supply networks.

This report offers insightful information on China's logistics market and its potential for development and innovation. The results imply that both seasoned firms and recent newcomers may prosper by embracing innovation, responding to changing market circumstances, and offering top-notch customer service.

Companies must emphasize sustainability and embrace strategies that support long-term profitability as the logistics sector in China expands and changes. This research aids in the growth of sustainable supply chain management in China and offers logistics firms a framework for tracking and enhancing their sustainable supply chain operations.

This research has important ramifications for China's logistics sector and its possible economic effect. We can develop a supply chain that is more effective, competitive, and ecologically responsible and benefit both companies and society at large by encouraging sustainability and innovation in the logistics sector.

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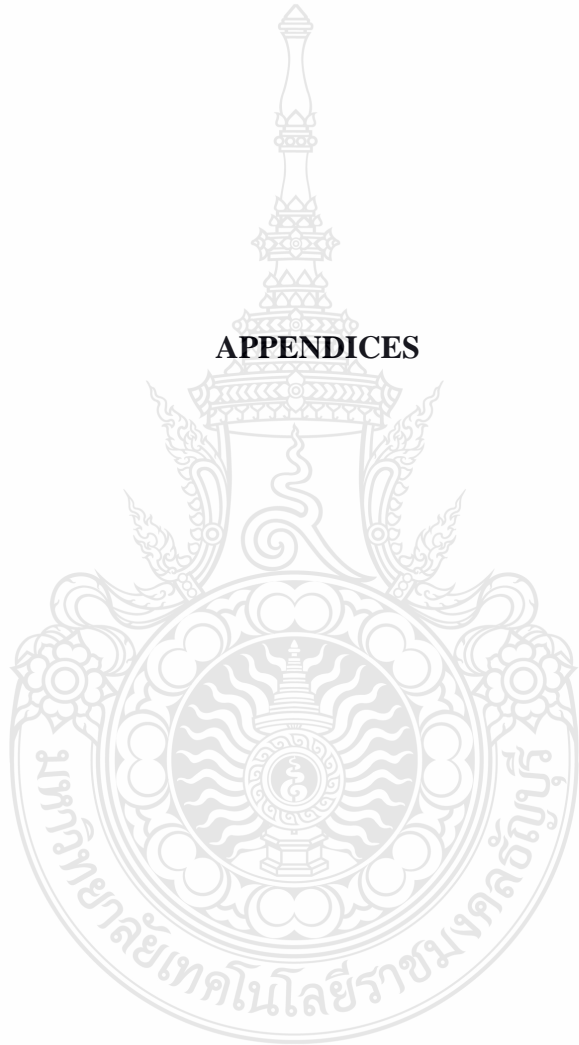
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APPENDICES



Questionnaire

PART 1: DEMOGRAPHIC CHARACTERISTICS

1. Respondent Job

- (1) Supply Chain Manager
- (2) Supply and Purchasing Manager
- (3) Director
- (4) Marketing and sales manager
- (5) Employee and other profiles

2. Type of logistic company

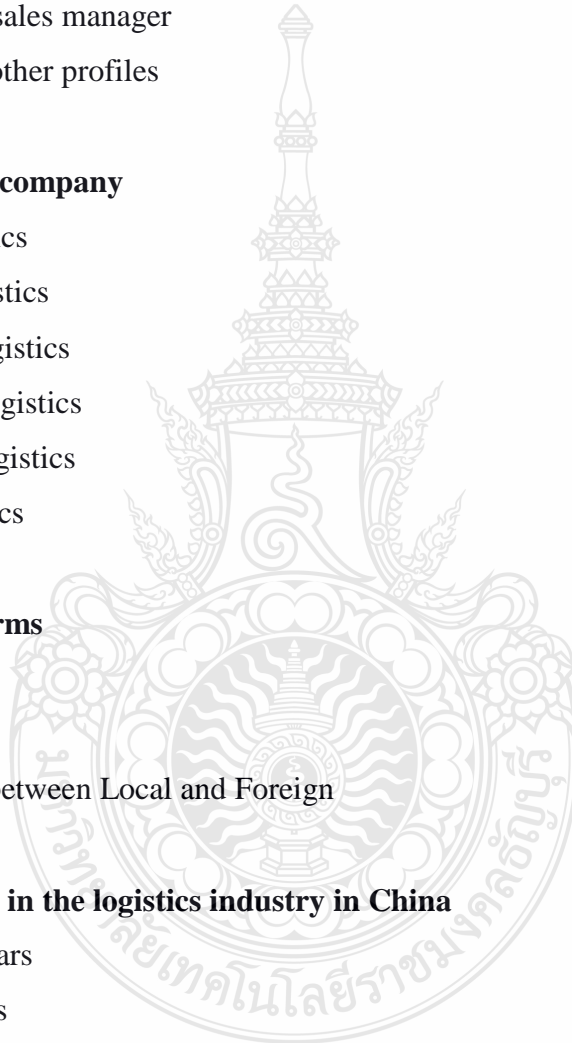
- (1) Inbound Logistics
- (2) Outbound Logistics
- (3) Third-Party Logistics
- (4) Fourth Party Logistics
- (5) Distribution Logistics
- (6) Reverse Logistics

3. Owner of the firms

- (1) Local
- (2) Foreign
- (3) Joint Venture between Local and Foreign

4. Years of service in the logistics industry in China

- (1) Less than 5 years
- (2) (2) 5- 10 years
- (3) (3) More than 10



PART 2: SUSTAINABLE SUPPLY CHAIN

1) In your opinion, is sustainable supply chain important for the success of a logistic industry?

5) Very Important (4) Somewhat Important (3) Neutral (2) Somewhat Unimportant (1) Very unimportant

PART 3: FACTORS

The opinions are given in terms of a measurement scale below.

5	4	3	2	1
Very high	High	Moderate	Low	Very Low
Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Very satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied

(A) To what extent do you think changes in economic climate (inflation, exchange rates, and GDP Growth) have affected the sustainability of supply chains in China logistic industry?

5) Very High (4) High (3) Moderate (2) Low (1) Very Low

(B) Do you agree that Government restrictions have a significant impact on the sustainability of supply chains in China logistic industry?

(5) Strongly Agree (4) Agree (3) Neutral (2) Disagree (1) Strongly Disagree

(C) The Increasing competition in the Chinese logistics sector has significantly impacted the sustainability of the supply chains.

(5). Strongly Agree (4) Agree (3) Neutral (2) Disagree (1) Strongly Disagree

(D) Technological advancements have a significant impact on the sustainability of supply chains in China's logistics industry.

(5). Strongly Agree (4) Agree (3) Neutral (1) Disagree (1) Strongly Disagree

(E) To what extent do you think changes in customer demand affects the sustainability of supply chains?

(5) Very High (4) High (3) Moderate (2) Low (1) Very Low

(F) How much effect does COVID-19 pandemic have on the sustainability of supply chain in Chinese logistic industry?

Severe	5
Less severe	4
Moderate	3
Mild	2
No effect	1

(G) The measures taken by the Chinese government to address the Covid-19 pandemic have a significant impact on the sustainability of supply chains in China's logistics industry.

(5)Strongly Agree (4) Agree (3) Neutral (2) Disagree (1) Strongly Disagree

(H) The quality of the logistics infrastructure has a significant impact on the sustainability of supply chains in China's logistics industry.

(5)Strongly Agree (4) Agree (3) Neutral (2) Disagree (1) Strongly Disagree.



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