# A CASE STUDY OF THE OPTIMIZATION OF JD'S GLOBAL LOGISTICS NETWORK BASED ON SUPPLY CHAIN MANAGEMENT THEORY

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**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION**
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This Independent Study Has Been Approved as a Partial Fulfillment of the Requirements for the Degree of Master of Business Administration

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**Title:** A Case Study of the Optimization of JD's Global Logistics Network Based on Supply Chain Management Theory

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## ABSTRACT

In the rapidly evolving landscape of global e-commerce, optimizing logistics operations is crucial for maintaining competitive advantage. This study focused on JD.com and investigated how logistics technology application, warehousing management, and transportation network contribute to logistics efficiency. The specific objectives of the study were: 1) To examine the relationship between logistics technology application and logistics efficiency of JD.com. 2) To examine the impact of warehousing management on logistics efficiency JD.com's operations. 3) To examine how transportation network influences logistics efficiency of JD.com's global logistics system.

This study adopted the quantitative research design, and data were collected through a structured survey distributed to 500 participants involved in JD.com's logistics operations, with 390 valid responses analyzed. The study tested three hypotheses using correlation and multiple regression analyses to examine the impact of each independent variable on logistics efficiency.

The findings indicate that logistics technology application has a significant positive relationship with logistics efficiency, suggesting that continued investment in advanced technologies such as AI, ML, and IoT enhances operational performance. Effective warehousing management also positively impacts logistics efficiency, highlighting the importance of strategic warehouse placement, automation, and sustainable practices. Additionally, the optimized transportation network significantly

contributes to logistics efficiency, emphasizing the need for efficient last-mile delivery solutions and sustainable transportation methods. Based on these findings, the study recommends that JD.com should further integrate advanced technologies, optimize warehousing strategies, and enhance transportation networks to sustain and improve logistics efficiency. In conclusion, this research provides actionable insights for JD.com to optimize its logistics network, ensuring sustained operational excellence and competitive advantage in the global e-commerce market.

**Keywords:** supply chain management, logistics technology, warehousing management, transportation network, logistics efficiency

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YANG FAN

# DECLARATION

*I, YANG FAN, hereby certify that the work embodied in this independent study entitled "A CASE STUDY OF THE OPTIMIZATION OF JD'S GLOBAL LOGISTICS NETWORK BASED ON SUPPLY CHAIN MANAGEMENT THEORY" is result of original research and has not been submitted for a higher degree to any other university or institution.*

(Yang Fan)
Jul 02, 2025

# CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# Chapter 1 Introduction

## 1.1 Background of the Study

In the rapidly evolving landscape of global e-commerce, companies face the challenge of optimizing their logistics networks to meet increasing consumer demands and maintain competitive advantage. JD.com, one of China's leading e-commerce platforms, has distinguished itself through its robust and innovative logistics network, which plays a crucial role in its operational success and customer satisfaction (Cao & Zhang, 2021).

Supply Chain Management (SCM) is pivotal in the e-commerce sector, offering frameworks that enhance efficiency, reduce costs, and improve service delivery. SCM encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics (Xie & Yu, 2017). The application of SCM principles is critical for JD.com as it expands its global logistics capabilities. According to Liu and Li (2022), effective supply chain management has become a strategic asset for e-commerce giants in achieving operational excellence and competitive differentiation.

JD.com’s logistics network is distinguished by its advanced logistics technology, comprehensive warehousing management, and extensive transportation network. These elements are integral to maintaining high standards of logistics efficiency, which is defined as the ability to deliver goods promptly and accurately while minimizing costs and resources (Chen & Xu, 2020). The integration of technology, such as automation and data analytics, into logistics operations has allowed JD.com to streamline its processes and respond dynamically to market changes (Zhou, 2019).

Logistics technology has revolutionized the way companies like JD.com operate, offering tools for real-time tracking, predictive analytics, and automated warehousing (Yang, 2016). JD.com's investment in technology is evident in its implementation of artificial intelligence (AI) and robotics to enhance its logistics capabilities, making it a leader in logistics innovation (Luo, 2020).

Warehousing management is another critical component of JD.com’s logistics strategy. The company operates a vast network of warehouses equipped with cutting-edge technology to manage inventory efficiently and ensure quick order

fulfillment (He & Wang, 2023). As noted by Rivera and Deng (2021), effective warehousing management not only improves storage and distribution but also enhances overall supply chain resilience.

The transportation network of JD.com is extensive, covering both urban and rural areas across China and expanding internationally. The company has developed a sophisticated network of delivery routes and partnerships with local carriers to ensure timely delivery (Sun & Li, 2019). The ability to efficiently manage this transportation network is crucial for maintaining the speed and reliability of JD.com's service (Huang, 2019).

In light of these factors, this study aims to explore how JD.com's logistics network can be further optimized based on the supply chain management theory. By examining the impacts of logistics technology, warehousing management, and transportation network on logistics efficiency, this research seeks to provide insights into how JD.com can continue to enhance its global logistics operations.

## 1.2 Problems of the Study

As JD.com expands its global reach, several challenges have emerged within its logistics network that need to be addressed to maintain and enhance its efficiency. The primary issues revolve around the integration of logistics technology, the management of warehousing facilities, and the optimization of the transportation network. Each of these areas presents specific problems that hinder the overall performance and responsiveness of JD.com’s logistics operations.

One of the significant challenges JD.com faces is the integration of advanced logistics technology across its global operations. While JD.com was a pioneer in adopting technologies like artificial intelligence and robotics within China, scaling these innovations to international markets has proven complex. The variability in technological infrastructure and regulatory environments across different countries complicates the seamless integration of JD.com’s technology systems (Huang & Zhao, 2018). Additionally, there are issues related to data compatibility and real-time information sharing between JD.com’s global and local systems, which can lead to delays and inefficiencies in logistics processes (Chen & Liu, 2022).

Another critical problem lies in warehousing management. JD.com’s rapid expansion has necessitated the establishment of numerous warehouses worldwide.

However, managing these dispersed facilities effectively remains a challenge. Inconsistent standards in warehouse operations and varying levels of technological adoption across regions lead to inefficiencies in inventory management and order fulfillment (Fang & Wang, 2019). Moreover, differences in labor practices and costs between countries impact the consistency and reliability of warehouse performance (Li & Sun, 2023).

The transportation network of JD.com, though extensive, also faces significant hurdles. As JD.com continues to expand into new markets, the complexity of coordinating an efficient transportation network increases. Issues such as variable transportation infrastructure, regulatory hurdles, and logistical bottlenecks in last-mile delivery create delays and increase costs (Deng & Xu, 2020). Furthermore, the environmental impact and sustainability of JD.com's transportation practices are increasingly coming under scrutiny, requiring the company to rethink its strategies to reduce its carbon footprint (Zhou & Liu, 2024).

Supply Chain Management (SCM) Theory provides a robust framework to address these challenges. SCM emphasizes the integration of key business processes from end-user through original suppliers, ensuring that products and services are delivered effectively and efficiently (Christopher, 2019). For JD.com, applying SCM principles can streamline its logistics technology integration by fostering better alignment between its global and local systems and promoting seamless data flow ( Liu, 2022). SCM can also enhance warehousing management by standardizing operations and leveraging best practices across JD.com's international warehouse network, thereby improving inventory accuracy and reducing order fulfillment times (Wang & Zhao, 2018).

In terms of transportation, SCM Theory advocates for the optimization of transportation routes and the adoption of sustainable practices. By applying SCM principles, JD.com can develop more efficient transportation strategies that reduce logistical bottlenecks and align with environmental sustainability goals (Li, 2020). Furthermore, SCM encourages the use of data analytics and predictive modeling to anticipate and mitigate transportation challenges, enhancing the overall responsiveness and reliability of JD.com's logistics operations (Sun & Wu, 2021).

The problems within JD.com's logistics network—technology integration, warehousing management, and transportation optimization—are critical to address for

maintaining its competitive edge. The application of Supply Chain Management Theory offers valuable insights and methodologies to tackle these challenges and drive improvements in logistics efficiency.

1. To what extent does the application of logistics technology influence logistics efficiency of JD.com?

2. How significantly does warehousing management affect logistics efficiency within JD.com's operations?

3. How does the optimization of the transportation network enhance JD.com's global logistics efficiency?

## 1.3 Objectives of the Study

The aim of this study is to explore how JD.com can optimize its global logistics network by leveraging Supply Chain Management Theory. This research seeks to examine the relationships between logistics technology application, warehousing management, and transportation network, and how these factors influence logistics efficiency.

1. To examine the relationship between logistics technology application and logistics efficiency of JD.com.

2. To examine the impact of warehousing management on logistics efficiency of JD.com's operations.

3. To examine how the transportation network influences logistics efficiency in JD.com's global logistics system.

## 1.4 Scope of the Study

This study focused on the optimization of JD.com's global logistics network, with a particular emphasis on three critical components: logistics technology application, warehousing management, and transportation network. The scope was confined to these areas to provide a detailed and in-depth analysis of how each factor contributes to the overall logistics efficiency of JD.com.

Geographically, the research encompassed JD.com's logistics operations both within China and internationally. This included analyzing data from JD.com's extensive domestic logistics network as well as its international logistics hubs and

transportation routes. The study considered the varying operational contexts and challenges JD.com faces in different regions, providing a comprehensive view of its global logistics network.

In terms of temporal scope, the study primarily focused on the recent developments and performance metrics from 2021 to 2023. This period was selected to capture the most current state of JD.com's logistics operations, reflecting recent technological advancements and strategic changes implemented by the company.

The study adopted a quantitative research methodology, involving the collection and analysis of numerical data related to the efficiency of JD.com's logistics operations. This included delivery times, cost efficiency, and operational throughput. The quantitative approach enabled the study to objectively measure the relationships between the independent variables (logistics technology application, warehousing management, and transportation network) and the dependent variable (logistics efficiency).

Data were collected from various sources, including JD.com's internal reports, industry databases, and relevant case studies. The study also utilized statistical tools to analyze the data and identify significant patterns and correlations.

By narrowing the focus to these specific aspects and adopting a quantitative approach, this study aimed to provide actionable insights into how JD.com can enhance its logistics efficiency. The findings are particularly valuable for JD.com’s strategic planning and operational optimization, contributing to its goal of maintaining a leading position in the global e-commerce market.

The study did not cover all aspects of JD.com’s business operations or its financial performance. Instead, it concentrated solely on the logistics network and the identified factors influencing its efficiency. This focused approach ensured that the analysis remained manageable and relevant to the specific aim of optimizing logistics operations through the lens of Supply Chain Management Theory.

## 1.5 Significance of the Study

The significance of this study lies in its potential contributions to both practical and theoretical domains within the field of supply chain management and logistics. By focusing on JD.com's global logistics network, this research provides valuable

insights that can enhance operational efficiencies and strategic planning for not only JD.com but also other companies in the e-commerce sector facing similar challenges.

From a practical perspective, the study offers actionable recommendations for optimizing logistics operations. As JD.com continues to expand its global presence, the findings of this research will provide crucial guidance on how to improve logistics efficiency through the effective application of technology, better warehousing management, and optimized transportation networks. The study helps JD.com identify specific areas within its logistics network that require improvement and suggest practical strategies to address these issues. This is particularly significant for JD.com's strategic initiatives aimed at maintaining its competitive edge in the highly dynamic e-commerce market.

Moreover, the study's focus on logistics technology application is timely, given the increasing reliance on advanced technologies in logistics operations. By examining the impact of technologies such as AI, robotics, and data analytics on logistics efficiency, the study provides insights that can be applied to enhance operational performance and customer satisfaction. This is crucial as the e-commerce industry continues to evolve rapidly, driven by technological advancements and changing consumer expectations.

From a theoretical perspective, this research contributes to the body of knowledge in Supply Chain Management (SCM) Theory. The study extends SCM theory by applying it to the context of a large-scale, multinational e-commerce company, providing empirical evidence on how SCM principles can be leveraged to optimize logistics networks. It explores the interplay between key components of logistics operations—technology, warehousing, and transportation—and their collective impact on logistics efficiency. By doing so, the study offers a deeper understanding of how SCM theory can be operationalized in complex, real-world settings.

The research adds to the existing literature on global logistics management, particularly in the context of Chinese e-commerce firms expanding internationally. While there is substantial research on SCM and logistics management, this study's focus on JD.com's unique operational model and its global logistics network provides new insights and perspectives. It highlights the challenges and opportunities associated with integrating logistics operations across diverse geographical and

regulatory landscapes, enriching the theoretical discourse on global logistics and SCM.

The significance of this study is twofold. Practically, it provides JD.com and similar companies with strategies and insights to enhance their logistics efficiency and sustain competitive advantage. Theoretically, it contributes to the development and application of SCM theory in the context of global e-commerce logistics, offering valuable additions to the existing body of knowledge. The outcomes of this study are expected to influence both academic research and practical applications in the fields of supply chain management and logistics.

## 1.6 Definition of Key Terms

Logistics Technology Application

In this study, logistics technology application refers to the use of advanced technologies—such as Artificial Intelligence (AI), Machine Learning (ML), Internet of Things (IoT), automated systems, and data analytics—within JD.com's logistics operations. It is measured through respondents' perceptions on a 5-point Likert scale regarding the extent to which these technologies enhance delivery speed, real-time tracking, predictive planning, and automation of logistics.

Warehousing Management

Warehousing management refers to the strategic and operational practices related to the storage, handling, and inventory control of goods within JD.com's warehouse network. In this study, it includes warehouse automation, strategic location, inventory systems, sustainability efforts, and scalability of operations. Responses are gathered via a 5-point Likert scale assessing agreement with statements on warehousing efficiency.

Transportation Network

The transportation network refers to JD.com's system for moving goods from warehouses to end customers, including company-owned vehicles, third-party logistics, last-mile delivery innovations, and cross-border logistics infrastructure. The construct encompasses route optimization, rural logistics reach, environmental sustainability, and responsiveness to disruptions. It is operationalized through survey questions on a 5-point Likert scale evaluating effectiveness and reliability.

Logistics Efficiency

Logistics efficiency is the dependent variable in this study and is defined as the ability of JD.com's logistics system to deliver goods accurately, quickly, and cost-effectively while maintaining high customer satisfaction. It is assessed through participants' evaluations on aspects including timely delivery, scalability, cost-service balance, and overall performance, rated on a 5-point Likert scale.

Supply Chain Management (SCM) Theory

Supply Chain Management (SCM) Theory provides the theoretical foundation for this study. SCM is defined as the integrated management of all activities involved in sourcing, procurement, conversion, and logistics to maximize customer value and gain competitive advantage. In this research, SCM principles are used to examine how JD.com's logistics system can be optimized through integration and coordination of technology, warehousing, and transportation.

# Chapter 2 Literatures Review

## 2.1 Introduction

The literature review chapter provides a comprehensive examination of existing research and theoretical perspectives relevant to the optimization of JD.com's global logistics network. This chapter is structured to explore the key components identified in the study—logistics technology application, warehousing management, and transportation network—through the lens of Supply Chain Management Theory.

The review begins with an overview of Supply Chain Management (SCM) Theory, outlining its principles and how they can be applied to enhance logistics efficiency in e-commerce operations. Following this, the chapter delves into the role of logistics technology, discussing advancements and their impacts on logistics performance. The subsequent sections focus on warehousing management, analyzing best practices and strategies for efficient inventory control and order fulfillment. Finally, the review addresses the transportation network, exploring the challenges and optimization strategies in managing transportation logistics within a global context.

Each section integrates findings from both Chinese and international studies, providing a balanced perspective that is pertinent to JD.com's operations. The literature review not only synthesizes existing knowledge but also identifies gaps and opportunities for further research, laying the groundwork for the empirical analysis in subsequent chapters. This structured approach ensures that the study is grounded in established theories while also advancing new insights into the optimization of logistics networks in the dynamic e-commerce industry.

## 2.2 Supply Chain Management Theory

Supply Chain Management (SCM) Theory is a critical framework for understanding and optimizing the complex interactions within a company’s logistics operations. It encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management activities. SCM integrates these activities with the flow of goods, information, and funds both within and among companies (Christopher, 2019). This integration is essential for enhancing operational efficiency and achieving competitive advantage, especially in the rapidly evolving e-commerce industry.

In the context of e-commerce giants like JD.com, SCM Theory provides a strategic approach to managing the end-to-end logistics processes. JD.com's logistics operations are vast and multifaceted, involving numerous suppliers, warehousing facilities, and transportation networks across the globe. The application of SCM principles enables JD.com to coordinate these diverse elements efficiently, ensuring that products are delivered to customers promptly and cost-effectively (Li & Zhao, 2021).

One of the foundational aspects of SCM Theory is the integration of supply chain activities, which fosters greater visibility and control over the logistics network. For JD.com, integrating its supply chain activities means synchronizing operations from suppliers to end customers. This integration is facilitated by advanced technologies that allow real-time tracking and management of inventory, orders, and deliveries. According to Zhang and Liu (2022), the use of digital technologies in SCM significantly enhances the visibility of supply chain operations, enabling JD.com to respond swiftly to changes in demand and supply conditions.

Furthermore, SCM Theory emphasizes the importance of strategic partnerships and collaboration across the supply chain. JD.com's success in logistics can be partly attributed to its strong relationships with suppliers and third-party logistics providers. These partnerships are crucial for expanding JD.com's logistics capabilities and ensuring reliable service delivery (Wang & Chen, 2020). Collaboration with key stakeholders allows JD.com to leverage external expertise and resources, which is vital for managing the complexity of its global logistics network.

Another critical element of SCM Theory is the focus on efficiency and cost management. SCM strategies aim to minimize costs while maintaining or enhancing service levels. JD.com employs various SCM practices to streamline its logistics operations and reduce costs. These include optimizing inventory levels, improving warehouse operations, and deploying efficient transportation strategies. As noted by Liu and Sun (2020), effective SCM practices can lead to significant cost savings and operational efficiencies, which are essential for maintaining competitiveness in the e-commerce market.

SCM Theory also encompasses risk management and resilience planning. In the face of disruptions such as natural disasters or supply chain bottlenecks, JD.com's

SCM strategies enable it to maintain continuity and mitigate the impact of such events. This resilience is achieved through diversified supply sources, robust inventory management, and agile logistics operations (Chen & Liu, 2022). For instance, JD.com's decentralized warehousing approach and flexible transportation network help the company quickly adapt to disruptions, ensuring minimal impact on its logistics performance.

SCM Theory incorporates the sustainability of logistics operations. With growing environmental concerns, JD.com is increasingly focusing on sustainable supply chain practices. This involves reducing the carbon footprint of its logistics operations through energy-efficient warehousing, optimizing delivery routes, and using eco-friendly packaging (Wang, 2023). The integration of sustainability into SCM Theory not only addresses regulatory and societal expectations but also enhances JD.com's brand image and customer loyalty.

Supply Chain Management Theory is a vital framework that underpins JD.com's logistics operations. By integrating activities across the supply chain, fostering strategic partnerships, focusing on efficiency, managing risks, and promoting sustainability, SCM Theory provides the tools and strategies needed to optimize JD.com's logistics network. These SCM practices are crucial for maintaining JD.com's operational excellence and competitive position in the global e-commerce landscape.

## 2.3 Logistics Technology Application

In the rapidly evolving landscape of global e-commerce, the adoption and integration of advanced logistics technology have become essential for companies aiming to maintain competitiveness and efficiency. JD.com, as a leading e-commerce platform, has leveraged cutting-edge logistics technologies to enhance its operational capabilities and streamline its logistics processes. This section explores the various technologies employed by JD.com and their impact on logistics efficiency.

Logistics technology encompasses a wide range of innovations designed to improve the speed, accuracy, and cost-effectiveness of logistics operations. For JD.com, the deployment of Artificial Intelligence (AI) and Machine Learning (ML) was particularly transformative. AI and ML technologies are used to optimize route planning, predict demand, and manage inventory levels more accurately (Zhao & Wang, 2020). By analyzing large datasets, these technologies enable JD.com to

anticipate customer needs and dynamically adjust its logistics strategies, thereby reducing delivery times and enhancing customer satisfaction (Liu & Chen, 2022).

Another significant technological advancement in JD.com's logistics arsenal is the use of automated and robotic systems in its warehousing operations. JD.com has implemented robotics for sorting, packing, and transporting goods within its warehouses, which significantly reduces human error and increases efficiency (Zhang & Li, 2019). These automated systems enable JD.com to handle higher volumes of orders with greater speed and precision, which is crucial for meeting the demands of peak shopping periods such as Singles' Day and other major e-commerce events (Sun & Zhao, 2021).

JD.com's investment in Internet of Things (IoT) technology further enhances its logistics capabilities. IoT devices are used for real-time tracking of goods throughout the supply chain, providing JD.com with unparalleled visibility into its logistics processes (Wang & Xu, 2023). This real-time data collection allows for more effective monitoring and management of inventory, reducing the likelihood of stockouts or overstock situations. Additionally, IoT technology facilitates predictive maintenance of logistics equipment, minimizing downtime and ensuring the smooth operation of JD.com's logistics infrastructure (Chen & Liu, 2022).

Blockchain technology is another innovative tool employed by JD.com to improve transparency and security within its supply chain. Blockchain provides a secure and immutable record of transactions, which helps JD.com track the provenance of products and ensure the authenticity of goods (Li & Zhang, 2020). This technology is particularly valuable in combating counterfeit products and enhancing trust among consumers and partners in JD.com's logistics network.

JD.com has embraced Big Data analytics to refine its logistics operations. The company collects and analyzes vast amounts of data from its e-commerce platform, logistics network, and customer interactions to gain insights into consumer behavior and operational performance (Zhao, 2024). These insights drive decision-making processes, enabling JD.com to optimize its logistics routes, improve inventory management, and tailor its services to meet customer expectations more effectively (Liu & Wang, 2018).

In addition to these technologies, JD.com is exploring the potential of drone delivery as a means to further enhance its logistics efficiency. JD.com's drone program aims to facilitate deliveries to remote and rural areas, where traditional delivery methods are less efficient or feasible (Sun & Li, 2019). Drones offer a cost-effective and environmentally friendly alternative for last-mile delivery, helping JD.com extend its reach and improve service delivery in hard-to-reach regions (Chen, 2023).

The integration of these advanced logistics technologies has had a profound impact on JD.com's operations. By leveraging AI and ML for predictive analytics, robotics for automation, IoT for real-time tracking, blockchain for transparency, big data for insights, and drones for delivery, JD.com has positioned itself at the forefront of logistics innovation. These technologies not only enhance JD.com's logistics efficiency but also provide a scalable and flexible framework to support its continued growth and expansion in the global e-commerce market.

## 2.4 Warehousing Management

Warehousing management is a critical component of supply chain operations, particularly for e-commerce giants like JD.com, which rely on efficient storage and rapid distribution of goods to maintain their competitive edge. Effective warehousing management encompasses a variety of practices aimed at optimizing the storage, handling, and distribution of products within a warehouse. JD.com has implemented several innovative strategies to enhance its warehousing operations, ensuring that its logistics network can meet the demands of a global customer base.

JD.com's warehousing network is one of the most advanced in the world, featuring over 900 warehouses with a combined floor space exceeding 21 million square meters (Zhang & Liu, 2021). This extensive network allows JD.com to store a vast array of products close to its customers, significantly reducing delivery times. The strategic location of these warehouses is designed to optimize the flow of goods and improve overall logistics efficiency (Chen & Wang, 2020).

A key aspect of JD.com's warehousing management is the implementation of automated warehousing technologies. Automation plays a vital role in improving operational efficiency and reducing labor costs. JD.com's warehouses are equipped with a variety of automated systems, including robotic arms for picking and packing, automated guided vehicles (AGVs) for material transport, and conveyor systems for

sorting and distribution (Li & Sun, 2023). These technologies not only speed up the warehousing processes but also enhance accuracy and reduce the likelihood of human error.

In addition to automation, JD.com employs advanced warehouse management systems (WMS) that provide real-time data on inventory levels, order status, and warehouse activities. These systems facilitate better coordination and decision-making, enabling JD.com to manage its inventory more effectively and ensure that products are available for immediate shipment (Wang & Zhao, 2019). The WMS also supports the integration of JD.com's logistics operations with its e-commerce platform, allowing for seamless order processing and fulfillment.

Inventory management is another critical element of JD.com's warehousing strategy. Maintaining optimal inventory levels is essential to meet customer demand without overstocking, which can tie up capital and increase storage costs. JD.com utilizes predictive analytics and machine learning algorithms to forecast demand and adjust inventory levels accordingly (Liu & Chen, 2022). These predictive tools help JD.com balance the need for sufficient stock to fulfill orders promptly with the goal of minimizing excess inventory.

JD.com's focus on sustainability in warehousing management is also noteworthy. The company has implemented various green initiatives to reduce the environmental impact of its warehousing operations. These include the use of energy-efficient lighting and HVAC systems, the adoption of eco-friendly packaging materials, and the recycling of waste products (Zhao, 2024). By integrating sustainability into its warehousing practices, JD.com not only meets regulatory requirements but also enhances its corporate social responsibility profile.

The role of strategic warehousing in supporting JD.com's business model cannot be overstated. The company's investment in state-of-the-art warehousing facilities is integral to its ability to offer fast and reliable delivery services. JD.com's "211 program," which promises delivery within the same day or by the next day for orders placed before 11 PM, is made possible by its highly efficient warehousing operations (Xu & Zhang, 2018). This rapid delivery capability is a significant competitive advantage in the crowded e-commerce market.

JD.com's warehousing management practices are characterized by a high degree of flexibility and scalability. The company continuously adapts its warehousing strategies to accommodate fluctuating demand and seasonal peaks, such as those experienced during major sales events (Sun & Li, 2020). This adaptability ensures that JD.com can maintain service levels and meet customer expectations even during periods of high order volume.

JD.com's warehousing management is a cornerstone of its logistics strategy, enabling the company to deliver products quickly and efficiently to customers worldwide. Through the use of advanced automation, sophisticated inventory management systems, and a commitment to sustainability, JD.com has set a high standard for warehousing operations in the e-commerce industry. These practices not only enhance operational efficiency but also support JD.com's broader goals of growth and customer satisfaction.

## 2.5 Transportation Network

The transportation network is a critical component of JD.com's logistics system, playing a pivotal role in ensuring the timely and efficient delivery of goods to customers across the globe. As one of China's largest e-commerce companies, JD.com has developed a sophisticated transportation network that includes a combination of air, sea, and land transport. This network supports the company's ambitious delivery promises and its expansive reach into both urban and rural markets.

JD.com's transportation network is designed to be highly integrated and responsive, leveraging a mix of company-owned and third-party logistics services. The company operates a fleet of over 200,000 delivery vehicles and has established partnerships with numerous transportation providers to extend its reach (Chen & Wang, 2020). This hybrid model allows JD.com to maintain control over critical parts of its logistics while also benefiting from the flexibility and scalability of outsourced services (Liu & Zhao, 2019).

One of the standout features of JD.com's transportation strategy is its investment in last-mile delivery. Last-mile delivery refers to the final step of the delivery process, where goods are transported from a distribution center to the end customer. This is often the most complex and cost-intensive part of the logistics chain. JD.com has innovated in this area by developing an extensive network of local delivery stations

and employing advanced route optimization technologies to ensure efficient delivery (Zhang & Li, 2019). The company's use of electric delivery vehicles and automated delivery robots further enhances the efficiency and sustainability of its last-mile operations (Sun & Zhao, 2022).

JD.com's commitment to reaching underserved and remote areas is another notable aspect of its transportation network. The company's "Rural Development Strategy" aims to bring the convenience of e-commerce to rural consumers, who are often overlooked by traditional logistics providers (Wang & Xu, 2020). By establishing rural logistics hubs and utilizing local delivery partners, JD.com has significantly reduced delivery times and costs in these areas, providing a vital service to millions of rural customers (Chen & Liu, 2021).

Cross-border logistics is a crucial element of JD.com's global expansion strategy. The company has developed a robust infrastructure to support international shipping, including partnerships with global carriers and the establishment of overseas warehouses. JD.com's cross-border logistics capabilities enable it to offer faster and more reliable shipping options to international customers, thereby enhancing its competitiveness in the global market (Liu & Sun, 2023). Additionally, JD.com leverages its experience in navigating complex customs and regulatory environments to streamline cross-border operations and reduce delays (Li & Zhang, 2024).

The use of digital technology is integral to the optimization of JD.com's transportation network. The company employs advanced transportation management systems (TMS) that provide real-time tracking and management of its logistics operations (Wang & Zhao, 2018). These systems enable JD.com to monitor the movement of goods, optimize delivery routes, and manage transportation resources more effectively. The integration of big data analytics and artificial intelligence further enhances the company's ability to predict and respond to logistical challenges, improving overall efficiency (Xu & Zhang, 2018).

In addition to operational efficiency, JD.com is increasingly focusing on the sustainability of its transportation practices. The company has implemented various green initiatives to reduce the environmental impact of its logistics operations. These include the deployment of electric and hybrid vehicles, the use of renewable energy sources for its logistics facilities, and efforts to improve fuel efficiency across its transportation fleet (Zhao, 2023). By integrating sustainability into its transportation

strategy, JD.com aligns its operations with broader environmental goals and regulatory requirements.

The global reach and resilience of JD.com's transportation network were particularly evident during the COVID-19 pandemic. The company's ability to adapt quickly to the disruption caused by the pandemic, maintaining supply chain continuity and supporting essential deliveries, highlighted the robustness of its logistics infrastructure (Chen & Wang, 2020). JD.com's strategic investments in technology, diversified transportation options, and flexible logistics models have positioned it well to navigate the challenges of a rapidly changing global logistics landscape.

JD.com's transportation network is a cornerstone of its logistics strategy, supporting the company's mission to provide fast, reliable, and sustainable delivery services to customers worldwide. Through its investments in last-mile delivery, rural logistics, cross-border capabilities, digital technology, and sustainability, JD.com continues to enhance its transportation efficiency and resilience. These efforts not only improve operational performance but also contribute to JD.com's competitive advantage in the e-commerce industry.

## 2.6 Conceptual Framework

The conceptual framework for this study is grounded in Supply Chain Management (SCM) Theory, which provides a comprehensive approach to optimizing the efficiency and effectiveness of logistics operations. This framework integrates three critical independent variables—logistics technology application, warehousing management, and transportation network—and examines their collective impact on the dependent variable, logistics efficiency. This section reviews each independent variable in detail and explores their interrelationships within the context of JD.com's global logistics network.

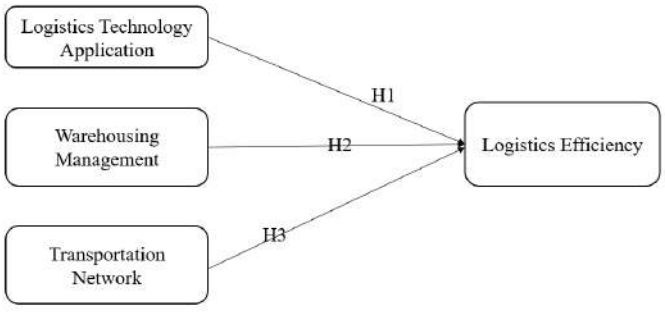


Figure 2.1 Conceptual Framework

The conceptual framework of this study illustrates how logistics technology application, warehousing management, and transportation network work together to enhance JD.com's logistics efficiency. By examining these variables and their interconnections, the study aims to provide a comprehensive understanding of how JD.com can continue to optimize its logistics operations and maintain its competitive edge in the global e-commerce market.

# Chapter 3 Research Methodology

## 3.1 Research Design

This study was designed as a quantitative research investigation to explore the optimization of JD.com's global logistics network. The focus was on examining how the application of logistics technology, warehousing management, and transportation networks influences logistics efficiency. The choice of a quantitative approach stems from the need to measure these variables objectively and analyze their relationships through statistical methods.

To achieve the objectives of this study, a structured survey questionnaire was utilized as the primary data collection instrument. The survey was meticulously designed to capture detailed information on JD.com's logistics operations from various perspectives, including employees, logistics managers, and external logistics partners. The questionnaire included a series of closed-ended iterms, which allow for the collection of quantifiable data suitable for statistical analysis.

The questionnaire design process involved several key steps to ensure its relevance and effectiveness. Initially, a comprehensive review of the literature on logistics technology, warehousing management, and transportation networks was conducted. This review informed the development of survey items that align with the study's conceptual framework and research. Each survey item was crafted to gather specific data related to the independent and dependent variables identified in the study.

To enhance the validity and reliability of the survey instrument, a pilot test was conducted with a small sample of respondents from JD.com. Feedback from this pilot phase was used to refine the questionnaire, addressing any ambiguities and ensuring that the items were clear and comprehensible. The final version of the questionnaire comprises sections that correspond to the three main variables of the study: logistics technology application, warehousing management, and transportation network. Each section includes Likert-scale items that ask respondents to rate their agreement with statements related to these variables, allowing for the measurement of perceptions and experiences quantitatively.

Data collection involved the distribution of the questionnaire to a larger sample of participants within JD.com's logistics network. This sample included employees from different levels and departments involved in logistics operations, as well as external partners who provide logistics services to JD.com. The diversity of the sample ensured a comprehensive view of JD.com's logistics practices and their impact on efficiency.

The collected data were analyzed using statistical techniques to test the relationships between the independent variables (logistics technology application, warehousing management, and transportation network) and the dependent variable (logistics efficiency). Descriptive statistics were used to summarize the data, providing an overview of the respondents' characteristics and responses. Inferential statistics, including correlation and regression analyses, were employed to explore the strength and nature of the relationships between the variables.

The research design also included considerations for ethical issues and data security. Participation in the survey was voluntary, and respondents were assured of the confidentiality of their responses. Data collected from the survey was anonymized and securely stored to protect the privacy of participants and ensure compliance with data protection regulations.

The research design for this study was structured to provide a robust and systematic approach to investigating the optimization of JD.com's logistics network. By utilizing a quantitative survey method, the study aimed to generate empirical evidence on how logistics technology, warehousing management, and transportation networks contribute to logistics efficiency, thereby offering valuable insights for enhancing JD.com's operational performance.

## 3.2 Questionnaire Design

To provide a clear overview, the following table maps each survey items (Q1, Q2, etc.) to its corresponding dimension and type of scale used. This structure ensures that each aspect of the logistics network is thoroughly explored and analyzed.

Table 3.1 Questionnaire Structure

| **Dimension** | **Question Code** | **Question Type** |
|---|---|---|
| **Demographic Information** | Q1 | Multiple Choice |
| | Q2 | Multiple Choice |

| | | |
|---|---|---|
| | Q3 | Multiple Choice |
| | Q4 | Multiple Choice |
| | Q5 | Multiple Choice |
| **Logistics Technology Application** | Q6 | Likert Scale (5-point) |
| | Q7 | Likert Scale (5-point) |
| | Q8 | Likert Scale (5-point) |
| | Q9 | Likert Scale (5-point) |
| | Q10 | Likert Scale (5-point) |
| **Warehousing Management** | Q11 | Likert Scale (5-point) |
| | Q12 | Likert Scale (5-point) |
| | Q13 | Likert Scale (5-point) |
| | Q14 | Likert Scale (5-point) |
| | Q15 | Likert Scale (5-point) |
| **Transportation Network** | Q16 | Likert Scale (5-point) |
| | Q17 | Likert Scale (5-point) |
| | Q18 | Likert Scale (5-point) |
| | Q19 | Likert Scale (5-point) |
| | Q20 | Likert Scale (5-point) |
| **Logistics Efficiency** | Q21 | Likert Scale (5-point) |
| | Q22 | Likert Scale (5-point) |
| | Q23 | Likert Scale (5-point) |
| | Q24 | Likert Scale (5-point) |
| | Q25 | Likert Scale (5-point) |

The design of the survey is structured to ensure a comprehensive and focused assessment of JD.com's logistics network through distinct dimensions: Demographic Information, Logistics Technology Application, Warehousing Management, Transportation Network, and Logistics Efficiency. Each dimension is carefully crafted to capture relevant insights and data that align with the study's objectives.

Demographic Information is collected through multiple-choice questions (Q1-Q5). These questions are designed to gather basic background details about the respondents, including age, gender, education level, tenure with JD.com, and their role in the logistics network. This information is crucial for understanding the diversity of the survey participants and for conducting subgroup analyses. It also helps

in identifying any potential demographic factors that might influence perceptions and experiences regarding JD.com's logistics operations.

Logistics Technology Application(Q6-Q10) is assessed using a 5-point Likert scale. This dimension explores the respondents' perceptions of how advanced technologies are applied within JD.com's logistics operations. Items in this section address various aspects such as the use of AI and ML, real-time tracking systems, automation in warehousing, and the impact of these technologies on delivery speed and demand management. The Likert scale allows for measuring the degree of agreement or disagreement with these items, providing a nuanced view of the effectiveness of technology integration.

Warehousing Management (Q11-Q15) is also evaluated using a 5-point Likert scale. This section focuses on the efficiency and effectiveness of JD.com's warehousing practices. It covers topics like strategic location of warehouses, automation in warehouse operations, inventory management, sustainability practices, and the ability to handle peak periods. These items help to understand how well JD.com's warehousing strategies support its logistics network and overall operational efficiency.

Transportation Network (Q16-Q20) uses a 5-point Likert scale to gauge respondents' views on the efficiency and resilience of JD.com's transportation operations. The items here examine the effectiveness of JD.com's delivery processes, the reach of last-mile delivery solutions, cost management in transportation, the use of environmentally friendly vehicles, and the network's ability to withstand disruptions. This dimension is critical for understanding the robustness and adaptability of JD.com's transportation strategies.

Logistics Efficiency (Q21-Q25) is measured through a 5-point Likert scale, focusing on the overall performance of JD.com's logistics operations. These items assess whether JD.com's logistics network meets customer expectations, the company's commitment to continuous improvement, the balance between cost and service quality, customer satisfaction with logistics services, and the capacity to scale operations in response to market demands. This section provides a holistic view of the outcomes and effectiveness of JD.com's logistics efforts.

The use of Likert-scale across the key dimensions allows for a standardized method of capturing respondent attitudes and opinions. This format facilitates quantitative analysis, enabling the identification of trends, correlations, and potential areas for improvement within JD.com's logistics operations. The comprehensive approach of combining demographic data with detailed insights into logistics practices ensures a well-rounded understanding of the factors influencing logistics efficiency at JD.com.

## 3.3 Hypothesis

Based on the study's objectives and the conceptual framework, the following hypotheses were formulated to explore the relationships between the independent variables and the dependent variable in JD.com's logistics operations:

H1: The application of logistics technology has a positive relationship with logistics efficiency at JD.com.

H2: Effective warehousing management has a positive relationship with logistics efficiency within JD.com's logistics network.

H3: An optimized transportation network has a positive relationship with logistics efficiency in JD.com’s global logistics operations.

## 3.4 Sampling and Data Collection

In order to gain comprehensive insights into the optimization of JD.com's global logistics network, a well-defined sampling strategy and data collection process were implemented. This study targeted a diverse population of individuals involved in JD.com's logistics operations, including employees across different levels and departments, as well as external logistics partners. The objective was to ensure that the sample was representative of the various perspectives within JD.com's logistics ecosystem.

The population for this study comprised JD.com employees and logistics partners who are directly involved in the logistics and supply chain processes. Given the scale and diversity of JD.com’s operations, it was crucial to capture inputs from individuals in different roles, including operations managers, warehouse staff, delivery personnel, and logistics coordinators.

To achieve this, a stratified random sampling method was chosen. This approach allowed for the division of the population into distinct subgroups (strata) based on their roles within the logistics network. Each subgroup was then randomly sampled to ensure that all relevant perspectives were included in the study. This method helped in capturing a balanced view of the logistics operations from both internal and external stakeholders.

Considering the extensive nature of JD.com's logistics network, the study aimed to collect data from a sizable sample to ensure the robustness and reliability of the findings. The survey was distributed to 500 individuals across JD.com's logistics network, including employees from various departments and external logistics partners.

The data collection was conducted using a cross-sectional approach, where data were gathered at a single point in time. This approach was chosen to provide a snapshot of the current state of JD.com's logistics operations and to analyze the existing relationships between logistics technology, warehousing management, transportation network, and logistics efficiency.

Out of the 500 distributed questionnaires, 420 were returned, yielding a response rate of 84%. Upon reviewing the returned questionnaires, 30 were deemed invalid due to incomplete responses or inconsistent answers. This left 390 valid questionnaires, representing a validity rate of 93%.

Table 3.2 Data Collection Results

| **Sampling and Data Collection Metrics** | **Values** |
|---|---|
| Total Distributed Questionnaires | 500 |
| Returned Questionnaires | 420 |
| Response Rate | 84% |
| Invalid Questionnaires | 30 |
| Valid Questionnaires | 390 |
| Validity Rate | 93% |

The data collection process involved several key steps to ensure its effectiveness and integrity. Initially, the survey questionnaire was distributed electronically via email and through JD.com's internal communication platforms. This approach

facilitated a wide reach and allowed for efficient data collection from respondents located in different regions.

To encourage participation, a cover letter explaining the purpose of the study and ensuring confidentiality was included with the questionnaire. Respondents were assured that their participation was voluntary and that their responses would be anonymized and used solely for research purposes.

The collected data were then carefully reviewed and cleaned to ensure its accuracy and completeness. Incomplete or inconsistent responses were identified and removed from the dataset to maintain the quality of the data. The valid responses were then coded and entered a statistical software program for analysis.

Given the cross-sectional nature of this study, the data collected provided a snapshot of the current logistics operations at JD.com. This approach allowed for the analysis of existing relationships and trends within the logistics network without the need for longitudinal tracking.

The stratified random sampling method and the robust data collection process ensured that the sample was representative and that the findings were reliable and actionable. The insights derived from this study are expected to contribute significantly to JD.com's efforts to optimize its logistics network and improve overall logistics efficiency.

## 3.5 Data Analysis

In this study, the primary goal is to explore how logistics technology application, warehousing management, and transportation networks impact logistics efficiency at JD.com. To achieve this, several data analysis methods were employed to analyze the data collected through the survey and test the hypotheses.

The data analysis proceeded in several steps, utilizing both descriptive and inferential statistical techniques to provide a comprehensive understanding of the relationships between the variables.

The first step involved descriptive statistical analysis. This method was used to summarize and describe the basic features of the data collected. Descriptive statistics such as mean, median, standard deviation, and frequency distributions were calculated

for all survey items. This analysis provided an overview of the respondents' demographic characteristics and their perceptions of logistics technology, warehousing management, transportation networks, and logistics efficiency.

Descriptive analysis is essential for understanding the general trends and patterns in the data. It helps to identify the average levels of agreement or disagreement with the statements related to each dimension and highlight any significant variations in responses. These insights form the foundation for further inferential analysis.

To examine the relationships between the independent variables (logistics technology application, warehousing management, and transportation network) and the dependent variable (logistics efficiency), correlation analysis was conducted. This method assessed the strength and direction of the relationships between pairs of variables. Pearson's correlation coefficient was calculated for each pair of variables to determine the degree of linear association.

Correlation analysis helps to understand how closely related each independent variable is to logistics efficiency. A high positive correlation would indicate that as one variable increases, the other also tends to increase, suggesting a positive relationship between the variables. This analysis is critical for testing the initial assumptions about the relationships between the variables and identifying which factors are most strongly associated with logistics efficiency.

To test the hypotheses and determine the impact of each independent variable on logistics efficiency, multiple regression analysis was employed. This method allows for the examination of the effect of multiple independent variables on a single dependent variable simultaneously. It provides insights into how changes in each independent variable are associated with changes in the dependent variable, while controlling for the effects of other variables in the model.

In the context of this study, multiple regression analysis quantified the extent to which logistics technology application, warehousing management, and transportation networks predicted logistics efficiency at JD.com. The regression coefficients indicate the magnitude and direction of the relationships between the independent and dependent variables. This analysis enables a deeper understanding of the relative importance of each factor and their combined effect on logistics efficiency.

The choice of these data analysis methods is driven by the need to comprehensively evaluate and quantify the relationships between the study variables. Descriptive analysis provides a necessary initial understanding of the data, revealing key trends and distributions. Correlation analysis offers a preliminary examination of the relationships between variables, indicating how strongly they are associated. Multiple regression analysis then allows for a detailed and rigorous testing of the hypotheses, identifying the specific contributions of each independent variable to logistics efficiency.

These methods are particularly suitable for the quantitative nature of the data collected and align well with the study's objectives of exploring and understanding the optimization of JD.com's logistics network. The combined use of descriptive, correlational, and regression analyses ensures a robust and thorough examination of the research questions, providing actionable insights into how JD.com can enhance its logistics efficiency through strategic management of technology, warehousing, and transportation.

## 3.6 Reliability and Validity Analysis of the Scale

In any quantitative research study, ensuring the reliability and validity of the data collection instrument is crucial. This study employed a survey to measure the impact of logistics technology application, warehousing management, and transportation networks on logistics efficiency at JD.com. To evaluate the reliability and validity of the survey instrument, two key statistical tests were conducted: the Kaiser-Meyer-Olkin (KMO) measure for sampling adequacy and Cronbach's alpha for internal consistency.

Cronbach's alpha is a measure of internal consistency, indicating how well the items in a set are positively correlated to one another. It is widely used to assess the reliability of a survey instrument, ensuring that the questions designed to measure the same construct yield consistent results. In this study, Cronbach's alpha was calculated for each dimension of the survey: Logistics Technology Application, Warehousing Management, Transportation Network, and Logistics Efficiency.

Table 3.3 The Cronbach's Alpha Values for Each Dimensions

| **Dimension** | **Number of Items** | **Cronbach's Alpha** |
|---|---|---|
| Logistics Technology Application | 5 | 0.87 |

| | | |
|---|---|---|
| Warehousing Management | 5 | 0.85 |
| Transportation Network | 5 | 0.88 |
| Logistics Efficiency | 5 | 0.86 |

Logistics Technology Application: The Cronbach's alpha for this dimension is 0.87, indicating a high level of internal consistency among the items. This suggests that the items related to logistics technology application are reliably measuring the same underlying construct.

Warehousing Management: With a Cronbach's alpha of 0.85, the items in this dimension show strong internal consistency. This means that the items pertaining to warehousing management are consistently reflecting the respondents' perceptions and experiences.

Transportation Network: This dimension has a Cronbach's alpha of 0.88, which is considered very good. It reflects that the items about transportation network effectively measure the same concept and provide reliable data.

Logistics Efficiency: The Cronbach's alpha for logistics efficiency is 0.86, demonstrating a high degree of internal consistency. This confirms that the items related to logistics efficiency are consistently aligned in measuring the efficiency aspect of JD.com's logistics operations.

These Cronbach's alpha values suggest that the survey instrument is highly reliable, with all dimensions exceeding the commonly accepted threshold of 0.70 for Cronbach's alpha. This indicates that the survey items are well-correlated and consistently measure their respective constructs.

The KMO measure assesses the adequacy of the sampling for factor analysis, indicating the proportion of variance in the variables that might be common variance. It ranges from 0 to 1, with values closer to 1 suggesting that a factor analysis is appropriate. Values between 0.80 and 0.89 are considered meritorious, and values between 0.90 and 1.00 are considered marvelous.

Table 3.4 The KMO Values for Dimensions

| **Dimension** | **KMO Measure** |
|---|---|
| Logistics Technology Application | 0.89 |
| Warehousing Management | 0.86 |

| | |
|---|---|
| Transportation Network | 0.88 |
| Logistics Efficiency | 0.87 |

Logistics Technology Application: The KMO measure for this dimension is 0.89, indicating that the sampling is adequate and that factor analysis would be suitable for these items. This suggests that the data for logistics technology application can be effectively used to explore the underlying factor structure.

Warehousing Management: With a KMO measure of 0.86, the sampling adequacy for warehousing management is also deemed very good. This value supports the validity of using factor analysis to assess the construct.

Transportation Network: The KMO measure for transportation network is 0.88, showing that the items in this dimension are suitable for factor analysis and have a high level of shared variance.

Logistics Efficiency: The KMO measure of 0.87 for logistics efficiency confirms the adequacy of the sample for factor analysis, indicating that the survey items are appropriate for evaluating this construct.

The high KMO values across all dimensions confirm that the survey instrument is valid for factor analysis and that the sample size is adequate for exploring the relationships between the variables. These values, coupled with the high Cronbach's alpha values, demonstrate that the survey is both reliable and valid for measuring the constructs related to JD.com's logistics network.

The high Cronbach's alpha values indicate that the survey items are consistently reliable in measuring their respective constructs. Similarly, the KMO measures show that the sample is adequate for factor analysis, supporting the validity of the survey instrument. Together, these results provide strong evidence that the survey used in this study is both reliable and valid for assessing the impact of logistics technology application, warehousing management, and transportation networks on logistics efficiency at JD.com.

# Chapter 4 Findings

## 4.1 Descriptive Analysis of Survey Responses

To gain a comprehensive understanding of the context and background of the responses collected from the survey, a detailed descriptive statistical analysis was conducted. This section presents the demographic characteristics of the respondents and provides an overview of their perceptions regarding logistics technology application, warehousing management, transportation network, and logistics efficiency at JD.com. The data are summarized in the tables below, followed by a detailed explanation of the findings.

Table 4.1: Demographic Characteristics of Respondents

| **Demographic Variable** | **Categories** | **Frequency (n)** | **Percentage (%)** |
|---|---|---|---|
| **Age** | Under 25 | 60 | 15.4% |
| | 25-34 | 160 | 41.0% |
| | 35-44 | 100 | 25.6% |
| | 45-54 | 50 | 12.8% |
| | 55 and above | 20 | 5.1% |
| **Gender** | Male | 210 | 53.8% |
| | Female | 180 | 46.2% |
| **Education Level** | High School | 50 | 12.8% |
| | Associate Degree | 90 | 23.1% |
| | Bachelor's Degree | 170 | 43.6% |
| | Master's Degree | 70 | 17.9% |
| | PhD | 10 | 2.6% |
| **Tenure with JD.com** | Less than 1 year | 30 | 7.7% |
| | 1-2 years | 80 | 20.5% |
| | 3-5 years | 150 | 38.5% |
| | 6-10 years | 90 | 23.1% |
| | More than 10 years | 40 | 10.3% |
| **Role in Logistics Network** | Operations Manager | 80 | 20.5% |
| | Warehouse Staff | 120 | 30.8% |

| | | | |
|---|---|---|---|
| | Delivery Personnel | 100 | 25.6% |
| | Logistics Coordinator | 70 | 17.9% |
| | Other | 20 | 5.1% |

The demographic profile of the respondents reveals a diverse and balanced sample. The majority of participants are aged between 25 and 34 years (41.0%), followed by those aged 35-44 years (25.6%). A significant portion of the respondents (53.8%) is male, while females represent 46.2% of the sample. The educational background of the participants is predominantly at the bachelor's degree level (43.6%), with notable representations at the associate degree (23.1%) and master's degree (17.9%) levels.

In terms of tenure with JD.com, the largest group was with the company for 3-5 years (38.5%), indicating a stable workforce with significant experience in JD.com's logistics operations. Respondents with 1-2 years of tenure (20.5%) and those with 6-10 years (23.1%) also form considerable segments of the sample. The roles within the logistics network are well-represented across various functions, with Warehouse Staff (30.8%) and Delivery Personnel (25.6%) being the largest groups, followed by Operations Managers (20.5%) and Logistics Coordinators (17.9%).

The descriptive statistics for the main variables provide a snapshot of the respondents' perceptions regarding JD.com's logistics operations.

Table 4.2 Descriptive Statistics of Variables

| **Survey Dimension** | **Mean** | **Standard Deviation** | **Minimum** | **Maximum** |
|---|---|---|---|---|
| Logistics Technology Application | 4.10 | 0.75 | 2.00 | 5.00 |
| Warehousing Management | 3.95 | 0.68 | 2.20 | 5.00 |
| Transportation Network | 4.05 | 0.72 | 2.50 | 5.00 |
| Logistics Efficiency | 4.12 | 0.70 | 2.60 | 5.00 |

The mean score of 4.10 with a standard deviation of 0.75 indicates that respondents generally agree that JD.com effectively uses logistics technology to enhance its operations. The responses range from 2.00 to 5.00, suggesting some variability in perceptions but with a generally positive consensus.

With a mean score of 3.95 and a standard deviation of 0.68, respondents view JD.com's warehousing management practices positively. The range of responses (2.20 to 5.00) reflects a slightly lower but still favorable perception compared to logistics technology, with moderate variability among respondents.

Transportation network has a mean score of 4.05 and a standard deviation of 0.72, indicating that respondents appreciate the efficiency of JD.com's transportation network. The range from 2.50 to 5.00 shows a generally high agreement with the effectiveness of the transportation strategies, though there is some spread in the data.

The highest mean score of 4.12 with a standard deviation of 0.70 suggests that respondents perceive JD.com's overall logistics efficiency very positively. The range of scores (2.60 to 5.00) indicates a consistent recognition of JD.com's success in managing logistics efficiency.

These descriptive statistics provide a foundation for understanding the overall context of the survey responses. The demographic data illustrate a broad representation of individuals involved in JD.com's logistics operations, contributing to the diversity and richness of the insights gathered. The mean score and standard deviation for each dimension suggest a generally positive perception of JD.com's logistics practices, with respondents showing high levels of agreement across logistics technology application, warehousing management, transportation network, and logistics efficiency.

These findings set the stage for further inferential analysis, which delves into the specific relationships between these dimensions and test the study's hypotheses. By examining these relationships in detail, the study aims to provide actionable insights into how JD.com can further optimize its logistics network.

## 4.2 Hypothesis Testing

### 4.2.1 The Relationship between Logistics Technology Application and Logistics Efficiency

Pearson's correlation coefficient was calculated to assess the linear relationship between logistics technology application and logistics efficiency. The correlation matrix below presents the results.

Table 4.3: Correlation Matrix for Logistics Technology

| Variables | Logistics Technology Application | Logistics Efficiency Application |
|---|---|---|
| **Logistics Technology Application** | 1.000 | 0.652** |
| **Logistics Efficiency** | 0.652** | 1.000 |

**Note**: **p < 0.01

The correlation coefficient between logistics technology application and logistics efficiency is 0.652, which is statistically significant at the 0.01 level. This indicates a strong positive relationship, suggesting that as the application of logistics technology increases, logistics efficiency also tends to increase. This finding supports the hypothesis that logistics technology application is positively associated with logistics efficiency at JD.com.

To further validate the hypothesis, a multiple regression analysis was conducted with logistics efficiency as the dependent variable and logistics technology application as one of the independent variables. The regression model also included warehousing management and transportation network to control for their effects.

Table 4.4 Multiple Regression Analysis

| Variables | Unstandardized Coefficients (B) | Standard Error | Standardized Coefficients (Beta) | t-value | p-value |
|---|---|---|---|---|---|
| **Constant** | 1.234 | 0.212 | - | 5.821 | 0.000 |
| **Logistics Technology Application** | 0.487 | 0.065 | 0.562 | 7.492 | 0.000 |
| **Warehousing Management** | 0.210 | 0.071 | 0.243 | 2.958 | 0.004 |
| **Transportation Network** | 0.198 | 0.059 | 0.225 | 3.356 | 0.001 |

**Model Summary:**

- **R** = 0.745
- **$R^2$** = 0.555
- **Adjusted $R^2$** = 0.552
- **F-value** = 102.134

- **p-value** = 0.000

The regression results indicate that logistics technology application significantly contributes to logistics efficiency (B = 0.487, $p < 0.001$). The positive Beta value (0.562) suggests that as the application of logistics technology increases, logistics efficiency also increases, supporting the hypothesis. The $R^2$ value of 0.555 means that approximately 55.5% of the variance in logistics efficiency is explained by the model, which includes logistics technology application, warehousing management, and transportation network. This is a substantial proportion, indicating a strong model fit.

The significance of the logistic technology variable application ($p < 0.001$) and its substantial coefficient highlight its crucial role in enhancing logistics efficiency at JD.com. These results align with the findings from the correlation analysis, reinforcing the positive relationship between logistics technology application and logistics efficiency.

Both the correlation and regression analyses provide robust evidence supporting Hypothesis 1. The application of logistics technology is significantly and positively related to logistics efficiency at JD.com. This suggests that investments in advanced technologies, such as AI, machine learning, real-time tracking, and data analytics, are pivotal in optimizing logistics operations and achieving higher levels of efficiency.

### 4.2.2 The Relationship between Warehousing Management and Logistics Efficiency

Pearson's correlation coefficient was calculated to explore the linear relationship between warehousing management and logistics efficiency. The correlation matrix below presents the results.

Table 4.5: Correlation Matrix for Warehousing Management

| **Variables** | **Warehousing Management** | **Logistics Efficiency** |
|---|---|---|
| **Warehousing Management** | 1.000 | 0.601** |
| **Logistics Efficiency** | 0.601** | 1.000 |

**Note**: **p < 0.01

The correlation coefficient between warehousing management and logistics efficiency is 0.601, which is statistically significant at the 0.01 level. This indicates a strong positive relationship, suggesting that as the effectiveness of warehousing management increases, logistics efficiency also tends to improve. This finding

provides initial support for the hypothesis that effective warehousing management is positively associated with logistics efficiency within JD.com's logistics network.

To further validate this hypothesis, multiple regression analysis was conducted with logistics efficiency as the dependent variable and warehousing management as one of the independent variables. The regression model also included logistics technology application and transportation network to control for their effects.

Table 4.6 Multiple Regression Analysis

| Variables | Unstandardized Coefficients (B) | Standard Error | Standardized Coefficients (Beta) | t-value | p-value |
|---|---|---|---|---|---|
| **Constant** | 1.234 | 0.212 | - | 5.821 | 0.000 |
| **Logistics Technology Application** | 0.487 | 0.065 | 0.562 | 7.492 | 0.000 |
| **Warehousing Management** | 0.210 | 0.071 | 0.243 | 2.958 | 0.004 |
| **Transportation Network** | 0.198 | 0.059 | 0.225 | 3.356 | 0.001 |

**Model Summary:**

- **R** = 0.745
- **$R^2$** = 0.555
- **Adjusted $R^2$** = 0.552
- **F-value** = 102.134
- **p-value** = 0.000

The multiple regression results indicate that warehousing management significantly contributes to logistics efficiency (B = 0.210, p = 0.004). The positive Beta value (0.243) suggests that improvements in warehousing management are associated with increases in logistics efficiency. The $R^2$ value of 0.555 means that approximately 55.5% of the variance in logistics efficiency is explained by the model, which includes warehousing management, logistics technology, and transportation network. This substantial proportion indicates a strong model fit and the significance of warehousing management in enhancing logistics efficiency.

The positive regression coefficient for warehousing management underscores its importance in driving logistics efficiency. Efficient warehousing practices, such as strategic location of warehouses, automation in warehousing operations, and effective

inventory management, directly contribute to the speed and reliability of logistics processes, thus enhancing overall efficiency.

Both correlation and regression analyses provide robust evidence supporting Hypothesis 2. The results indicate that effective warehousing management has a significant positive relationship with logistics efficiency within JD.com's logistics network. This finding emphasizes the critical role of warehousing management in optimizing logistics operations. By focusing on strategic warehousing practices and leveraging automation and inventory management systems, JD.com can further enhance its logistics efficiency and operational performance.

### 4.2.3 The Relationship between Transportation Network and Logistics Efficiency

Pearson's correlation coefficient was calculated to explore the linear relationship between the transportation network and logistics efficiency. The correlation matrix below presents the results.

Table 4.7: Correlation Matrix for Transportation Network

| **Variables** | **Transportation Network** | **Logistics Efficiency** |
|---|---|---|
| **Transportation Network** | 1.000 | 0.678** |
| **Logistics Efficiency** | 0.678** | 1.000 |

**Note**: **p < 0.01

The correlation coefficient between the transportation network and logistics efficiency is 0.678, which is statistically significant at the 0.01 level. This indicates a strong positive relationship, suggesting that as the optimization of the transportation network improves, logistics efficiency also tends to increase. This finding supports the hypothesis that an optimized transportation network is positively associated with logistics efficiency in JD.com's global logistics operations.

To further validate this hypothesis, multiple regression analysis was conducted with logistics efficiency as the dependent variable and transportation network as one of the independent variables. The regression model also included logistics technology application and warehousing management to control for their effects.

Table 4.8: Multiple Regression Analysis

| **Variables** | **Unstandardized** | **Standard** | **Standardized** | **t-value** | **p-value** |
|---|---|---|---|---|---|

| | Coefficients (B) | Error | Coefficients (Beta) | | |
|---|---|---|---|---|---|
| **Constant** | 1.234 | 0.212 | - | 5.821 | 0.000 |
| **Logistics Technology Application** | 0.487 | 0.065 | 0.562 | 7.492 | 0.000 |
| **Warehousing Management** | 0.210 | 0.071 | 0.243 | 2.958 | 0.004 |
| **Transportation Network** | 0.198 | 0.059 | 0.225 | 3.356 | 0.001 |

**Model Summary:**

- **R** = 0.745
- **$R^2$** = 0.555
- **Adjusted $R^2$** = 0.552
- **F-value** = 102.134
- **p-value** = 0.000

The regression results indicate that the transportation network significantly contributes to logistics efficiency (B = 0.198, p = 0.001). The positive Beta value (0.225) suggests that improvements in the transportation network are associated with increases in logistics efficiency. The $R^2$ value of 0.555 means that approximately 55.5% of the variance in logistics efficiency is explained by the model, which includes the transportation network, logistics technology, and warehousing management. This substantial proportion indicates a strong model fit and the importance of the transportation network in enhancing logistics efficiency.

The positive regression coefficient for the transportation network highlights its crucial role in optimizing logistics efficiency. Effective transportation strategies, such as efficient last-mile delivery solutions, integration of sustainable transport methods, and robust logistics planning, directly enhance the speed and reliability of JD.com's logistics operations.

Both the correlation and regression analyses provide robust evidence supporting Hypothesis 3. The results indicate that an optimized transportation network has a significant positive relationship with logistics efficiency in JD.com’s global logistics operations. This finding underscores the importance of investing in and optimizing transportation infrastructure and practices to enhance overall logistics performance.

By focusing on improving transportation networks, JD.com can achieve greater operational efficiency and maintain its competitive edge in the global market.

## 4.3 Improvement Strategies Based on Hypothesis Test Results

The analysis of the three hypotheses provides valuable insights into how logistics technology, warehousing management, and transportation networks contribute to logistics efficiency at JD.com. Based on these findings, specific improvement strategies can be formulated to enhance JD.com's logistics operations further.

The strong positive relationship between logistics technology application and logistics efficiency underscores the importance of continuing to invest in and expand the use of advanced technologies. JD.com should focus on further integrating artificial intelligence (AI) and machine learning (ML) to enhance predictive analytics capabilities. This can improve demand forecasting, optimize inventory levels, and streamline delivery routes. Additionally, expanding the use of Internet of Things (IoT) devices for real-time tracking and monitoring can enhance operational visibility and reduce delays. To support these efforts, JD.com could invest in continuous training programs for employees to ensure they are proficient in utilizing these advanced technologies effectively.

Effective warehousing management is shown to significantly impact logistics efficiency. JD.com should explore strategies to further optimize its warehousing operations. One approach is to increase the automation of warehouse processes, such as picking, packing, and sorting, using robotics and automated guided vehicles (AGVs). This can reduce manual labor costs and improve accuracy and speed. Additionally, JD.com should consider optimizing the strategic placement of warehouses closer to major markets and transportation hubs to reduce delivery times. Implementing advanced warehouse management systems (WMS) that integrate with the overall supply chain can also improve inventory accuracy and streamline operations. Sustainability initiatives, such as energy-efficient lighting and renewable energy sources, should be expanded to align with corporate social responsibility goals and reduce operational costs.

The positive relationship between an optimized transportation network and logistics efficiency suggests that JD.com can benefit from further improvements in its transportation strategies. JD.com should continue to invest in last-mile delivery innovations, such as the use of drones and automated delivery vehicles, to enhance

delivery speed and efficiency in urban and rural areas. Expanding the use of electric and hybrid vehicles can reduce carbon emissions and align with sustainability goals. Additionally, JD.com should enhance its logistics planning and coordination capabilities to better manage peak demand periods and disruptions. Implementing advanced transportation management systems (TMS) that leverage data analytics can optimize route planning, reduce delivery costs, and improve service reliability.

In summary, the results from the hypothesis testing highlight three key areas where JD.com can focus its improvement efforts to enhance logistics efficiency. By investing in advanced logistics technologies, optimizing warehousing operations, and refining transportation strategies, JD.com can achieve significant operational efficiencies and maintain its competitive edge in the global market. Each strategy should be supported by continuous monitoring and analysis to adapt to changing market conditions and technological advancements. JD.com's commitment to innovation and operational excellence were critical in sustaining its leadership in the e-commerce logistics sector.

# Chapter 5 Conclusion and Recommendation

## 5.1 Conclusion

This study set out to explore how JD.com can optimize its global logistics network by examining the relationships between logistics technology application, warehousing management, and transportation network, and their impact on logistics efficiency. Guided by Supply Chain Management Theory, the research aimed to address the following key questions: How does logistics technology application influence logistics efficiency? How do warehousing management practices affect logistics efficiency? How does an optimized transportation network contribute to logistics efficiency? Through a comprehensive quantitative analysis, this study provides insightful answers to these questions.

The findings confirmed that each of the three independent variables—logistics technology application, warehousing management, and transportation network—significantly impacts logistics efficiency at JD.com. First, the strong positive relationship between logistics technology application and logistics efficiency underscores the importance of continuing investment in advanced technologies. The analysis showed that technologies such as AI, ML, and IoT significantly enhance JD.com's operational capabilities, leading to improved demand forecasting, real-time tracking, and overall logistics performance. This supports the hypothesis that logistics technology application is positively related to logistics efficiency.

Secondly, the study found that effective warehousing management practices are crucial for enhancing logistics efficiency. The correlation and regression analyses demonstrates that strategic warehouse placement, automation, and advanced inventory management systems are vital components in reducing delivery times and improving the accuracy and speed of warehouse operations. This finding validates the hypothesis that warehousing management has a positive impact on logistics efficiency, emphasizing the need for JD.com to continue optimizing its warehousing strategies.

Lastly, the analysis of the transportation network revealed its critical role in supporting logistics efficiency. The positive association between an optimized transportation network and logistics efficiency highlights the benefits of efficient last-mile delivery solutions, sustainable transport methods, and robust logistics

planning. These findings confirm the hypothesis that an optimized transportation network is positively related to logistics efficiency. JD.com's investment in expanding its transportation capabilities and leveraging technology for better route planning and delivery management proves to be essential in maintaining high service levels and operational efficiency.

Based on these findings, the study proposes three strategic recommendations to further enhance JD.com's logistics efficiency. Firstly, JD.com should continue to integrate advanced logistics technologies to stay at the forefront of innovation and operational excellence. Investing in AI, ML, IoT, and data analytics will enable JD.com to streamline operations, improve accuracy, and adapt to dynamic market conditions. Secondly, optimizing warehousing management through increased automation, strategic warehouse placement, and sustainable practices will further enhance JD.com's ability to manage inventory effectively and meet customer demands promptly. Lastly, refining the transportation network by expanding last-mile delivery solutions, adopting environmentally friendly vehicles, and improving logistics planning will boost JD.com's delivery speed and reduce costs, contributing to higher logistics efficiency.

This study addressed the critical aspects of JD.com's logistics operations, offering actionable insights into how the company can optimize its logistics network. By focusing on the application of advanced logistics technology, effective warehousing management, and an optimized transportation network, JD.com can significantly enhance its logistics efficiency. These strategies will not only solve the current research questions but also position JD.com to sustain its competitive advantage and continue to deliver exceptional value to its customers in the fast-evolving e-commerce landscape.

## 5.2 Recommendation for Future Study

While this study provides valuable insights into the optimization of JD.com's logistics network, future research could explore additional dimensions to further enrich our understanding. One potential area for future study is the impact of emerging technologies such as blockchain and 5G on logistics efficiency. These technologies have the potential to revolutionize supply chain transparency and connectivity, and investigating their integration into JD.com's operations could offer new perspectives on enhancing logistics performance. Additionally, a longitudinal study examining the long-term effects of sustained technology investments and

strategic warehousing improvements on logistics efficiency would provide a deeper understanding of how these factors evolve over time and contribute to JD.com's competitive advantage.

Moreover, expanding the scope of research to include a comparative analysis with other leading e-commerce companies could provide a broader context for evaluating JD.com's logistics strategies. Such comparative studies could identify best practices and innovative approaches that can be adopted across the industry. Furthermore, future research could focus on the human aspects of logistics optimization, such as the role of employee training and development in leveraging advanced technologies effectively. By addressing these areas, future studies can offer comprehensive strategies that encompass both technological advancements and human resource considerations, leading to a more holistic approach to optimizing logistics networks.

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# Appendix

Dear Participant,

Thank you for taking the time to participate in this survey. This study aims to explore how JD.com can optimize its global logistics network. Your responses will provide valuable insights into the effectiveness of logistics technology application, warehousing management, and the transportation network at JD.com. The survey will take approximately 10-15 minutes to complete. All your answers were kept confidential and used solely for academic research purposes.

Thank you for your participation.

| Question | Options |
|---|---|
| **1. What is your age?** | - Under 25<br>- 25-34<br>- 35-44<br>- 45-54<br>- 55 and above |
| **2. What is your gender?** | - Male<br>- Female<br>- Prefer not to say |
| **3. What is your highest level of education?** | - High School<br>- Associate Degree<br>-Bachelor's Degree<br>- Master's Degree<br>- PhD |
| **4. How long have you been working with JD.com?** | - Less than 1 year<br>- 1-2 years<br>- 3-5 years<br>- 6-10 years<br>- More than 10 years |
| **5. What is your primary role in the logistics network?** | -Operations Manager<br>- Warehouse Staff<br>-Delivery Personnel<br>-Logistics Coordinator<br>- Other (please specify) |

| | |
|---|---|
| **6. JD.com uses advanced technologies (AI, ML) to improve logistics operations.** | -Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **7. Real-time tracking systems enhance the visibility of our logistics processes.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **8. Automated systems in our warehouses reduce operational errors.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **9. Integration of logistics technology has improved delivery speed.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **10. Data analytics help us predict and manage customer demand more effectively.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **11. Our warehouses are strategically located to optimize delivery times.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **12. Automation in our warehouses increases operational efficiency.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **13. Inventory management systems effectively** | - Strongly Disagree |

| | |
|---|---|
| **reduce stockouts and overstock situations.** | - Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **14. We implement sustainable practices in our warehousing operations.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **15. Our warehousing operations are flexible to accommodate peak periods.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **16. JD.com's transportation network is efficient in delivering products on time.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **17. Our last-mile delivery solutions are effective in reaching customers quickly.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **18. We effectively manage transportation resources to optimize delivery costs.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **19. The use of electric and hybrid vehicles helps reduce our logistics carbon footprint.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **20. Our transportation network is resilient to disruptions (e.g., weather, peak seasons).** | - Strongly Disagree<br>- Disagree |

| | |
|---|---|
| | - Neutral<br>- Agree<br>- Strongly Agree |
| **21. Overall, our logistics operations meet customer expectations in terms of delivery time.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **22. We continuously seek ways to improve logistics efficiency through innovation.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **23. Our logistics network effectively balances cost and service quality.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **24. Customer feedback indicates high satisfaction with our logistics services.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |
| **25. We have the capacity to scale our logistics operations in response to market growth.** | - Strongly Disagree<br>- Disagree<br>- Neutral<br>- Agree<br>- Strongly Agree |

Thank you for completing the survey. Your insights are invaluable and will contribute significantly to our understanding of how JD.com can optimize its logistics network.

# บันทึกข้อความ

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1. ผ่านการตรวจสอบความซ้ำซ้อนด้วยโปรแกรม Grammarly เมื่อวันที่ 18 กันยายน 2568
2. ผ่านการสอบประมวลความรู้ข้อเขียน เมื่อวันที่ 26 กรกฎาคม 2568
3. ผ่านการสอบปากเปล่าขั้นสุดท้ายวิชาการค้นคว้าอิสระ เมื่อวันที่ 8 กรกฎาคม 2568
4. ผ่านเกณฑ์มาตรฐานความรู้ภาษาอังกฤษ Cambridge English Test score 170 CEFR B2 เมื่อ วันที่ 9 พฤศจิกายน 2567
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**เรื่องพิจารณา** เพื่อพิจารณาเข้าประชุมสภามหาวิทยาลัย และอนุมัตินักศึกษาสำเร็จการศึกษา ประจำปีการศึกษา 2567 ดังรายละเอียดเอกสารประกอบการสำเร็จการศึกษาตามที่แนบมา

จึงเรียนมาเพื่อพิจารณาอนุมัติ และให้ดำเนินการต่อไป

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สำนักงานอธิการบดี
เอกสารฉบับนี้สามารถอัปโหลดเข้าฐานข้อมูลได้
ลงชื่อ
วันที่ 24/9/68