
SUPPLY CHAIN DISTRIBUTION CHALLENGES AND SOLUTIONS: A CASE OF AN INDONESIAN CEMENT MANUFACTURING COMPANY



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Abstract

This study explores the distribution system of a major cement manufacturing company in Indonesia within the context of its supply chain operations. Utilizing a qualitative descriptive approach, data were gathered through participatory observation and in-depth interviews conducted during a four-month internship in the company's logistics division. The findings reveal that the company operates a structured and technology-supported distribution network, employing ERP, GPS, and RFID systems while collaborating with third-party transporters. The distribution process involves order handling, delivery planning, loading, and monitoring. Despite this, several challenges remain, including equipment failures, limited real-time stock visibility, and disruptions due to weather and infrastructure limitations. The study provides actionable recommendations to improve operational efficiency and delivery accuracy, offering valuable insights for both logistics practitioners and academics interested in supply chain management in complex geographic environments.

Keywords: Distribution System, Transporter, Supply Chain, ERP, Logistics

INTRODUCTION

In the increasingly competitive era of globalization, an efficient goods distribution system has become a critical factor in ensuring operational continuity and maintaining a company's competitive advantage. Distribution is no longer limited to delivering products to customers; it is a fundamental part of the supply chain, directly affecting cost structure, lead times, and service quality. This becomes particularly significant in contexts characterized by complex geography and fluctuating market demand.

The subject of this study is a major cement manufacturing company in Indonesia that operates an extensive and intricate distribution network. Its cement products are distributed across various regions through internal warehouse transfers and deliveries to end customers, including distributors and construction projects. The key challenges faced in managing distribution include Indonesia's archipelagic geography, limited transportation infrastructure, and unpredictable demand fluctuations.

The company primarily relies on land transportation—especially trucks—for deliveries within Java Island. To ensure operational flexibility and broader distribution coverage, it partners with third-party logistics providers. This outsourcing strategy helps maintain delivery continuity and scalability. According to Dwiyantri et al., (2021) improving logistics efficiency in Indonesia involves infrastructure enhancement, multimodal transport integration, reduced dwelling time, and digital technology adoption. This aligns with the company's commitment to safety and quality, which includes regular inspections, deviation tracking, and driver training programs. By integrating both land and sea transportation and utilizing GPS technology, the company seeks to ensure delivery accuracy and operational safety.

With technological advancements, logistics digitalization has become a necessary transformation across industries. The company has adopted GPS-based tracking systems for its fleet to improve transparency, timeliness, and transporter performance monitoring. According to Hasanah et al. (2023), integrating digital logistics tools—such as delivery software—can accelerate the distribution process, increase visibility, and enhance predictive accuracy. These improvements also contribute to higher levels of customer satisfaction.

This study uses a qualitative method with a descriptive approach, aiming to gain a comprehensive understanding of the goods distribution system within the supply chain of Cement Manufacturing Company in Indonesia. Specifically, the objectives of this study are to analyze the flow of the distribution system, assess the role of third-party transporters, evaluate the use of technology in logistics operations, and identify key operational challenges in the field. It also explores the operations of the implemented distribution network, the modes of transportation used, and the collaboration systems with third-party transporters. Furthermore, this study aims to explore the perspectives of distribution personnel on the existing system. Based on this background, the author is interested in conducting research entitled "Supply Chain Distribution Challenges and Solutions: A Case Study of an Indonesian Cement Manufacturing Company."

REVIEW OF LITERATURE

Supply Chain Management (SCM)

Supply Chain Management (SCM) includes all parties involved in fulfilling customer demand, both directly and indirectly (Chopra and Meindl, 2016). It encompasses not only

manufacturers and suppliers, but also transporters, warehouses, retailers, and customers. Within organizations, all divisions contributing to customer satisfaction—such as product development, logistics, and after-sales service—are part of the supply chain.

Mustofa et al. (2023) define a supply chain as a business network that collaborates to produce and deliver goods to customers. SCM typically involves coordination among suppliers, manufacturers, distributors, retailers, and logistics service providers to improve long-term performance through strategic and systematic integration of business operations.

This study refers to Turban et al. (2004), Mustofa et al. (2023), the supply chain is categorized into upstream, internal, and downstream segments. To ensure optimal results, material flow must be well-integrated across all segments. Procurement plays a vital role in selecting suppliers and building sustainable partnerships. Without reliable suppliers and effective procurement, the supply chain will fail to function efficiently.

Distribution System

Kotler (2002, as cited in Karundeng et al., 2018) defines distribution as the process of delivering goods or services from producers to end-users at the right time and place, thereby creating time and place utility. In today's highly competitive and globalized market, companies must adopt appropriate distribution strategies to maintain their competitive edge. Distribution plays a crucial strategic role, requiring precision at every step of the process. Key elements such as transportation, facilities, product availability, and sales levels must be managed carefully. Distribution effectiveness is also influenced by warehouse inventory levels. Inadequate stock can lead to repeat deliveries, increasing logistics costs and reducing efficiency. Therefore, distribution encompasses not only the physical movement of goods but also strategic planning, shipment scheduling, partnership development, service monitoring, and network design to ensure responsiveness to customer needs.

Logistics Management

Logistics is a key activity that supports the economic system, encompassing the processes of shipping, receiving, storing, and distributing goods. It also includes services at ports, such as transportation and storage. Zulkarnaen et al. (2020) describe logistics as a system that manages the entire physical flow of goods, including the planning and execution of distribution, which is central to logistics management. Similarly, Fahreza et al. (2023) define logistics as a series of activities involving the planning, implementation, and control of the flow of goods and services from the point of origin (supply) to the end consumer. Its scope includes transportation, warehousing, packaging, and distribution. Furthermore, logistics plays a critical role in ensuring that products and services are delivered to customers on time, in good condition, and at an efficient cost.

Modes of Transportation

Transportation modes refer to the means used to move goods or people from one place to another, including land, sea, and air transport (Kurnia and Aristriyana, 2022). According to Tang (2006, as cited in Mustofa et al., 2023), flexible transportation modes can help mitigate supply chain disruptions by enabling companies to quickly shift routes, change logistics providers, or switch between transport types depending on operational needs. Azis & Asrul (2018) classify transportation modes into five main categories, namely land, sea, air, pipeline, and intermodal transportation.

Third Party Logistics (TPL)

Third-Party Logistics (TPL) refers to outsourcing logistics activities—such as transportation, warehousing, and order fulfillment—to external providers. This allows companies to focus on core operations while leveraging the logistics expertise of specialized partners (Faraheni et al., 2011, as cited Adhana et al., 2023). Key drivers for adopting TPL include the need for operational efficiency, risk transfer, market adaptability, and technology-enabled coordination Gabriel & Parthiban (2020)

Technology in Logistics Management

Advancements in information and communication technology have significantly improved logistics operations. Integrated information systems enable better control over procurement, warehousing, inventory, and distribution (Kurniawan et al., 2023). Kristawan (2014, as cited in Zulfikar et al., 2023) emphasizes the importance of managing logistics data systems to support shipment tracking, inventory accuracy, and decision-making. As a result, various technological innovations have been implemented in distribution systems, including:

- **Radio Frequency Identification (RFID)**
RFID is an automatic tracking technology using radio waves, consisting of tags, readers, and a database system. It enables rapid and automatic identification without scanning items one by one, unlike barcodes. Commonly used in receiving, inventory counting, and tracking goods, RFID can reduce labor costs by up to 50% and operational costs by 71% (Chopra & Meindl, 2016; Kurniawan, 2017).
- **Warehouse Management System (WMS)**
WMS is an information system that manages warehouse operations such as receiving, storing, picking, and shipping. It improves stock accuracy, storage efficiency, and distribution speed, while providing real-time data for decision-making (Hasanah et al., 2023).
- **Warehouse Location and Number Optimization**
The strategic selection of warehouse locations and quantity impacts logistics cost and service speed. Using IT-based simulations, companies can evaluate optimal configurations by considering warehouse costs, transportation, storage capacity, and seasonal demand patterns (Prasetyo & Usman, 2023)
- **Global Positioning System (GPS)**
GPS enables real-time vehicle tracking, route optimization, and enhanced fleet safety and efficiency. It helps detect delays, improve preventive actions, and support maintenance planning. Real-time monitoring also allows for better fuel management and tire pressure tracking, contributing to cost efficiency and vehicle reliability (Rahayu et al., 2021).

Framework of Analysis

The analytical framework is developed by the researcher to examine the efficiency of the goods distribution system within the supply chain of PT. Indocement Tunggul Prakarsa Tbk., particularly in the delivery of bagged cement. Distribution efficiency is a critical element to ensure that products reach customers on time, in good condition, and at a controlled cost. This efficiency is influenced by several key interrelated factors, all of which contribute to enhancing customer satisfaction as the ultimate outcome.

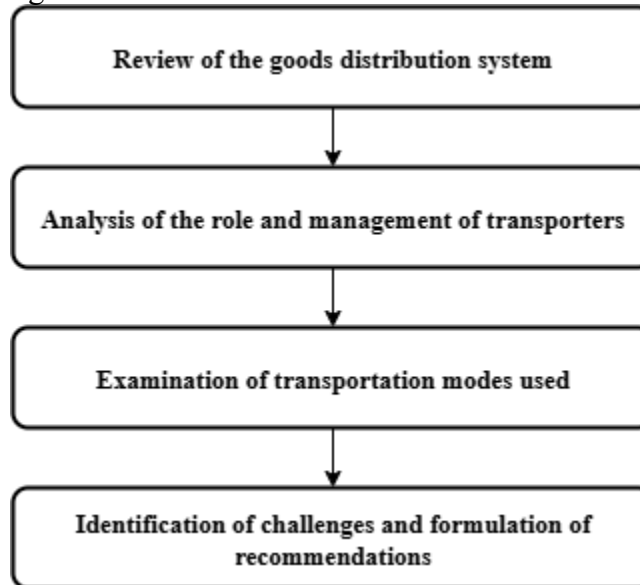


Figure 1.
Framework of Analysis

RESEARCH METHOD

This research adopts a qualitative approach aimed at gaining a deep and contextual understanding of complex operational processes within a logistics environment. The study relies on non-numerical data—including interviews, direct observation, and document analysis—to explore the distribution system from the perspective of those directly involved (Ardyan et al., 2023).

Data collection was supported by the researcher’s firsthand experience during a four-month internship, conducted from February to May 2024, at a leading cement manufacturing company in Indonesia. This immersive approach provided practical insights and allowed for direct engagement with distribution operations, forming the basis of this final internship project as part of undergraduate academic requirements.

Qualitative methods are well-suited for exploring operational phenomena in depth, producing contextually rich findings that may lead to theory development based on field data (Pahleviannur et al., 2022).

Unit of Analysis

The unit of analysis in this study consists of selected departments within the Logistics Division of the observed cement company, particularly the Central Dispatch, Delivery Bag, Safety, Health, and Environment (SHE), and East & Outside Java Area teams. These units were selected due to their central roles in managing product distribution.

Data Sources and Collection Methods

This study uses primary data obtained through interviews with key personnel and direct observation during a four-month internship at Indocement, as well as secondary data from internal documents and published company sources. These data support the analysis of distribution practices and transporter performance.

- **Observation:** Observation was conducted to gain direct insights into operational activities during the internship. Subakti et al. (2023) define observation as a method of carefully observing field conditions objectively to gather valid, real-time data.
- **Interviews:** Unstructured interviews were used to explore respondent perspectives without fixed questions, allowing deeper and more flexible discussions (Sugiyono, 2014; Subakti et al., 2023).

Data Triangulation

Data triangulation is applied in this study as a strategy to enhance the validity and credibility of qualitative findings. This method involves combining multiple sources such as interviews, direct observations, and document analysis to examine the research phenomenon from different perspectives. As suggested by (Nurfajriani et al., 2024), triangulation allows researchers to develop a more accurate and contextual understanding by not relying solely on a single method or viewpoint.

RESULTS AND DISCUSSION

This study was conducted to explore the implementation of the goods distribution system at an Indonesian cement manufacturing company. Data were collected through participatory observation during a four-month internship, supported by unstructured interviews and document analysis. Three informants holding strategic roles related to distribution operations were interviewed directly to gain a comprehensive understanding of the distribution process, operational challenges, and coordination with transport partners.

Table 1.
Informant Characteristics

Informant Code	Position	Interview Method
INF1	Head Office Delivery Bag Section	Face-to-Face
INF2	East & Outside Java Area	Face-to-Face
INF3	Safety, Health, and Environment	Face-to-Face

Source: Primary data compiled by the author, 2024

Overview of the Goods Distribution Mechanism

The distribution of bagged cement plays a pivotal role within the broader logistics system of the cement company under study. This process involves not only the physical movement of goods but also the integration of technology-driven systems—such as Enterprise Resource Planning (ERP), collaboration with third-party logistics providers, and continuous monitoring throughout each stage of delivery.

The distribution process includes several key phases: order intake, issuance of delivery orders, truck allocation, loading, and final delivery. Each step is recorded and tracked through the ERP system to ensure transparency and traceability. Figure 2 below illustrates the bagged cement distribution flow implemented by a major cement company in

Indonesia. It outlines each critical stage of the delivery process, from order initiation to final shipment to customers.

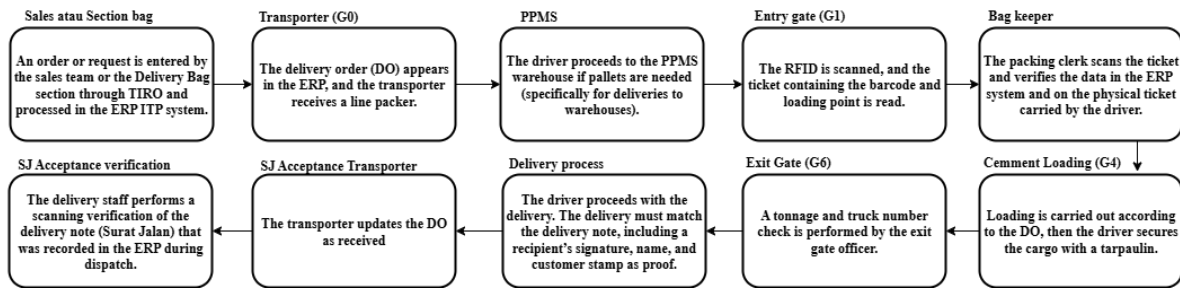


Figure 2.

Bag Cement Distribution Flow

Source: Primary and secondary data compiled by the author (2024)

In alignment with findings by Hasanah et al. (2023), the adoption of ERP technology enhances responsiveness to demand changes, reduces lead times, and improves distribution efficiency by providing real-time information and integration across logistics operations.

The distribution of bulk cement differs significantly from that of bagged cement. This process requires specialized bulk trucks, seal integrity verification, and precise volume control. The entire operation is managed via ERP and monitored using Radio Frequency Identification (RFID) technology for real-time tracking and control. This system allows for secure, high-volume shipments to key destinations such as industrial terminals, batching plants, and large construction sites, where precision and efficiency are critical.

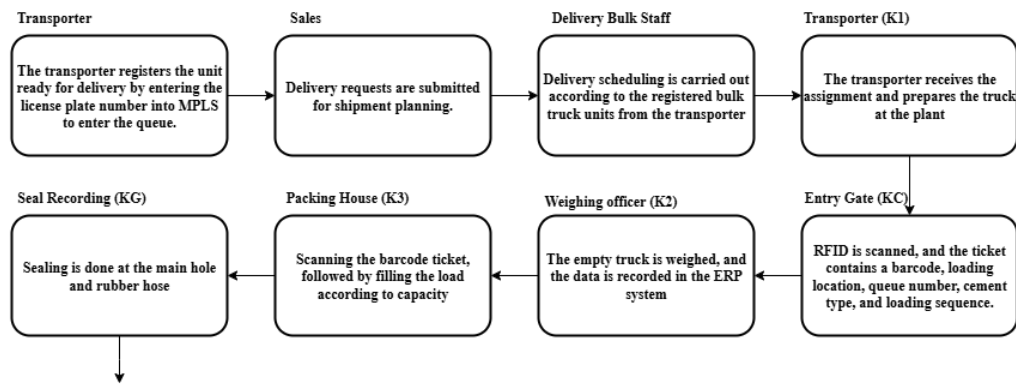


Figure 3.

Bulk Cement Distribution Flow (1)

Source: Primary and secondary data compiled by the author, 2024

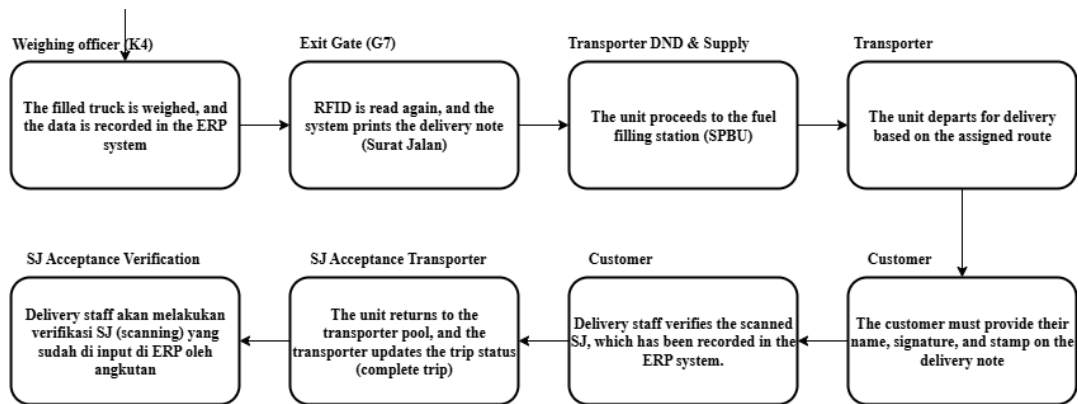


Figure 4.

Bulk Cement Distribution Flow (2)

Source: Primary and secondary data compiled by the author, 2024

The company’s distribution network includes multiple delivery channels, serving warehouse distributors, company-owned storage facilities, retail outlets, construction projects, and port terminals. Each channel is governed by distinct logistical priorities and coordination mechanisms.

Distribution scheduling is dynamic, adapting to real-time conditions such as loading bay queues, order urgency, and delivery constraints. A 24-hour, three-shift monitoring system ensures that performance standards and delivery accuracy are upheld.

One informant emphasized that consistency in service quality plays a central role in maintaining customer trust: “Customers will remain loyal even when prices are higher, as long as the product is always available and delivered reliably.” To ensure cost control and operational integrity, all shipments are prioritized based on contractual commitments and urgency—especially high-volume deliveries via sea transport, which must be dispatched punctually to avoid penalties such as demurrage fees. The integration of ERP and RFID systems supports this priority-based framework, enabling accurate and efficient delivery across a geographically dispersed market.

Role and Management of Transporters

The company collaborates with external transport service providers who play a strategic role in supporting day-to-day distribution operations. These third-party logistics partners are responsible for picking up goods from the plant, ensuring safe and timely delivery to their respective destinations, and maintaining the integrity of the cargo throughout transit. Although outsourced, transporter operations are closely monitored by the company's internal logistics and safety teams. This monitoring is conducted to ensure compliance with standard operating procedures (SOPs), delivery schedules, and quality benchmarks. Transporter performance is assessed regularly through a structured Performance Evaluation (PE) system, which considers three main dimensions is Input, Process, and Output. Evaluation criteria encompassed contract compliance, safety standards, delivery quality, timeliness, and cost efficiency. In 2023, the majority of transporters achieved "good" ratings (80–84), whereas those with scores below 75 were excluded from the partnership list. Meanwhile, 56 transporters with intermediate scores (78–79) were mandated to participate in targeted performance improvement programs. Notably, higher

scores were typically obtained by transporters managing larger fleets with more professional operational structures.

Beyond operational metrics, the company emphasizes safety and health through routine evaluations aligned with ISO 45001 standards. Monthly safety meetings are held with representatives from each transporter, focusing on findings from daily joint safety inspections, records of Defensive Driving Training (DDT) participation, and the attendance of safety officers. These efforts reflect the company's commitment to fostering a culture of continuous improvement in logistics safety and service quality.

Transportation Modes

Transportation modes play a crucial role in ensuring the timely and efficient delivery of cement from production facilities to various distribution points, including terminals, warehouses, retail outlets, and project sites. The company employs a range of transport methods tailored to destination types and product formats. These include land transport (bulk trucks, trailer trucks, and KALOG/railway), and sea transport (barge vessels), depending on operational needs and cost efficiency. For terminal deliveries, the product is always in bulk form, hence transported using bulk trucks. In certain regions—particularly outside Java Island—multimodal transportation is implemented. This involves combining truck and barge transportation to extend delivery reach, especially from plants located near ports. One example includes shipments from a South Kalimantan facility to eastern Indonesia, using a combination of road and sea transport.

To support maritime distribution, the company also utilizes floating terminals located in coastal regions such as Pontianak and Kuala Tanjung. These terminals allow for efficient offloading of bulk cement and help extend service coverage to otherwise inaccessible island regions. In specific cases, rail transport is deployed as a cost-effective and high-volume solution. For instance, before the commissioning of a new production plant in Central Java, cement was shipped via train from West Java to East Java with daily volumes ranging from 800 to 1,200 tons—depending on availability. The use of multiple transport modes reflects the company's adaptability to geographic constraints and its focus on maintaining service reliability across diverse regional markets.

Distribution Challenges

Despite having an established logistics infrastructure, the company's large-scale and geographically dispersed distribution system continues to face a range of internal and external challenges that affect delivery performance, cost efficiency, and customer satisfaction:

- **Weather and Terrain Disruptions**

Extreme weather conditions such as floods and landslides often delay deliveries. These conditions require quick rerouting by the logistics team to avoid prolonged delays.

- **Transportation Issue**

Transporter-related issues are common in company distribution operations. One major problem is storing, which occurs when trucks break down after loading, causing delays with a maximum tolerance of six hours. These incidents are monitored via GPS, and a replacement unit is dispatched if needed. Another issue involves unprepared units, where trucks scheduled for delivery fail to arrive due to technical issues or unavailable drivers detected through control tower systems. Additionally, in multi-drop deliveries, drivers

sometimes prioritize certain destinations, disrupting delivery sequences and reducing efficiency. These issues highlight the need for stricter monitoring and better coordination with transport partners.

- **Limited Retail Stock Information**

For store deliveries, stock levels are not directly monitored by the company. Deliveries rely solely on DOs and due dates, which can lead to rejections and delivery rescheduling when store space is full, creating inefficiencies and potential backlogs.

- **System Limitation**

High demand surges during sales promotions lead to congestion at loading zones, with queues of up to 25 trucks. Despite ERP system support, real-time stock monitoring remains limited. Manual data extraction delays warehouse stock alerts, as multiple data types must be pulled simultaneously. An automated system is needed to ensure faster, more accurate stock tracking and minimize stockout risks.

Recommendation

Based on the findings of this study, several strategic recommendations can be made to enhance the effectiveness and resilience of the company's distribution system. First, the company is advised to strengthen the integration of digital technologies across its logistics operations. The continued adoption and synchronization of systems such as Enterprise Resource Planning (ERP), GPS tracking, and Radio-Frequency Identification (RFID) into a unified, centralized dashboard would improve real-time visibility and operational accuracy. Moreover, automating processes related to fleet tracking and data extraction can reduce human errors and enable a faster response, particularly during periods of high demand. Second, the company should establish comprehensive contingency planning to address disruptions such as weather disturbances and vehicle breakdowns, which have been identified as recurring challenges. Formalized protocols should include predefined alternative delivery routes, deployment of standby transport units at high-risk points, and expanded collaboration with third-party logistics providers to ensure emergency coverage. These measures are essential to increase the flexibility and reliability of the distribution network. Lastly, improving coordination with distribution partners is also crucial. By integrating retailers and distributors into the company's logistics information system, mutual visibility over inventory levels and delivery planning can be achieved. This integration would reduce the frequency of rejected orders caused by stock overflow or scheduling mismatches, thereby streamlining the supply chain.

CONCLUSION

This study has analyzed the goods distribution system within the supply chain of a major cement manufacturing company in Indonesia. The findings indicate that the company has established a well-structured and relatively efficient distribution framework, supported by a dedicated logistics division, strategic partnerships with third-party transporters, and the adoption of modern digital technologies.

The distribution process is dynamically adjusted according to demand conditions and product availability at production sites, ensuring timely deliveries across multiple regions. Land-based transport remains dominant—particularly in Java—while multimodal and sea-

based transportation extends coverage to more remote areas through the use of barge vessels and floating terminals.

To ensure service consistency, the company partners with over 50 third-party transporters, most of whom undergo annual performance evaluations based on key metrics such as safety, delivery timeliness, responsiveness, and cost efficiency. Transporters are also closely monitored by logistics and Safety, Health, and Environment (SHE) teams to ensure compliance with operational and regulatory standards.

Despite its overall effectiveness, the distribution system continues to face several persistent challenges, including disruptions caused by extreme weather and difficult terrain, limited inventory visibility at retail endpoints, system limitations in real-time stock monitoring, and transport delays due to equipment failure or coordination issues. In response, the company has initiated improvements to its ERP and GPS tracking systems; however, further integration and automation are recommended to enhance operational visibility, support timely decision-making, and strengthen risk mitigation efforts.

It is important to acknowledge the limitations of this study. The analysis was based primarily on a four-month internship, with limited access to internal data and interviews confined to selected logistics personnel. As a result, several key operational indicators—such as shipment accuracy rates, average lead times, error frequency, and return volumes—were not evaluated in depth. Future research is encouraged to incorporate broader datasets and longer observation periods to provide a more comprehensive and quantitative assessment of distribution performance. In doing so, more robust conclusions can be drawn about long-term efficiency, scalability, and customer service outcomes in industrial supply chains.

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