

## RESEARCH ARTICLE

# Enhancing delivery efficiency through an ethical shipment tracking system in manufacturing operations

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**ABSTRACT** - This study aims to develop an ethical Shipment Tracking System using Microsoft Access to remedy the inefficiency problems of Sarojinics Sdn. Bhd. Some of the major issues include improper scheduling, lack of shipment visibility, and inadequate communication between departments. In addition, the study analyzes delivery trends over time, gathers ongoing feedback from stakeholders, identifies the main issues, and creates a system that works for the company. The system features centralized order tracking, priority-based resource allocation, and automated alerts for impending deadlines. Enhanced scheduling algorithms and data validation processes add further transparency to operations as well as decisions. This study demonstrates how a cost-effective and user-friendly tool, such as Microsoft Access, can enhance a company's delivery efficiency, mitigate future delays, and improve customer satisfaction in manufacturing operations. The proposed system is a scalable solution for similar industries, as this study suggests, including strong data validation procedures, improved scheduling computer programs, and real-time communication technologies. Limitations, such as the need for precise data and the absence of real-time tracking features, however, point to areas where the system needs improvement in the future.

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## 1. INTRODUCTION

In today's competitive manufacturing landscape, delivery efficiency is more crucial than ever. Customer expectations for timely and reliable deliveries have grown as e-commerce and just-in-time production systems become the industry standard. The production sector is particularly dependent on an uninterrupted flow of products, as well as raw materials, from suppliers to customers at the appropriate time. Nevertheless, there are occasions when the supply chain of an industry is hampered, causing major setbacks in the overall operations, raising costs, causing delays, and losses in work output (Hammi et al., 2023). In other words, a disruption in the supply chain occurs when there is no successful flow of products either forward or backward in any part of the supply chain. Such breakdowns can occur regardless of geography or time, due to natural disasters, wars, and, even to some extent, changes in economic conditions. The manufacturing sector experiences these disruptions chronically. While the focus has been largely on delays at customers' places, which are processing record volumes of goods, delays are also present in purely organizational transactions. Despite advances in other fields and management, many firms still face delivery delays, often due to inefficient scheduling, lack of shipment visibility, and poor communication across departments.

### 1.1 Case Company

This study is based on a manufacturing organization that has been experiencing repeated challenges in the timely delivery of its products, a situation that has become a constant thorn for customer relationships and cost management. Sarojinics Sdn. Bhd. is an organization that transforms raw materials into finished products with the help of machines or artisans in an organized way, which involves division of labor. In most cases, the manufacturing process is conducted on a larger scale, requiring the use of machinery and a skilled workforce. The main raw material used in the process of making corrugated cardboard at Sarojinics Sdn. Bhd. is paper. Due to the advent of the industrial age and mass production, modern marketing, or the art of selling and advertising, began to grow in leaps and bounds, especially because of the need for more attractive and presentable packaging. These situations provided a basis for mass markets to develop when containers and packing cases, such as cartons and bottles, were manufactured in bulk. The company's current manual system, when it comes to dimensioning deliveries and monitoring their performance, has several constraints that can be attributed to key inefficiencies. In addition, the absence of a central tracking system inhibits the firm's ability to track the progress of shipments in real-time and therefore hinders proactive measures such as anticipating possible delays or providing customers with updates on the status of their orders. Finally, the lack of effective communication and coordination between different sections of the business exacerbates the problem, with delays caused by misinterpretation or inadequate communication being compounded. In an environment where time is a crucial factor, these inefficiencies cannot be taken lightly.

The research aims to evaluate the effectiveness of the company's delivery system with the implementation of a shipment tracking system. In this area, implementing a tracking solution can help improve delivery operations within the

company, as well as foster a culture of active problem-solving and responsibility among employees involved in deliveries. Furthermore, it can also enhance interaction and coordination between the various areas of the company, such as production, logistics, and customer service. The system can help lower errors and increase overall productivity by improving information flow and reducing manual work. Considering this, the research seeks to develop a workable, user-friendly intervention using Microsoft Access to help the organization manage its shipments, track the delivery dates, and optimize the schedule. Such an advance can be achieved through efficient data collection, data analysis, and relevant data functions. The emphasis is placed on designing a system that is easily used and understood by all employees to ensure its uptake and leverage the benefits of the solution, giving practical recommendations that can be employed to amend the company's delivery processes and encourage growth over the years. The experiment starts by first examining the existing issues facing the company and then constructing an appropriate monitoring system that addresses these problems.

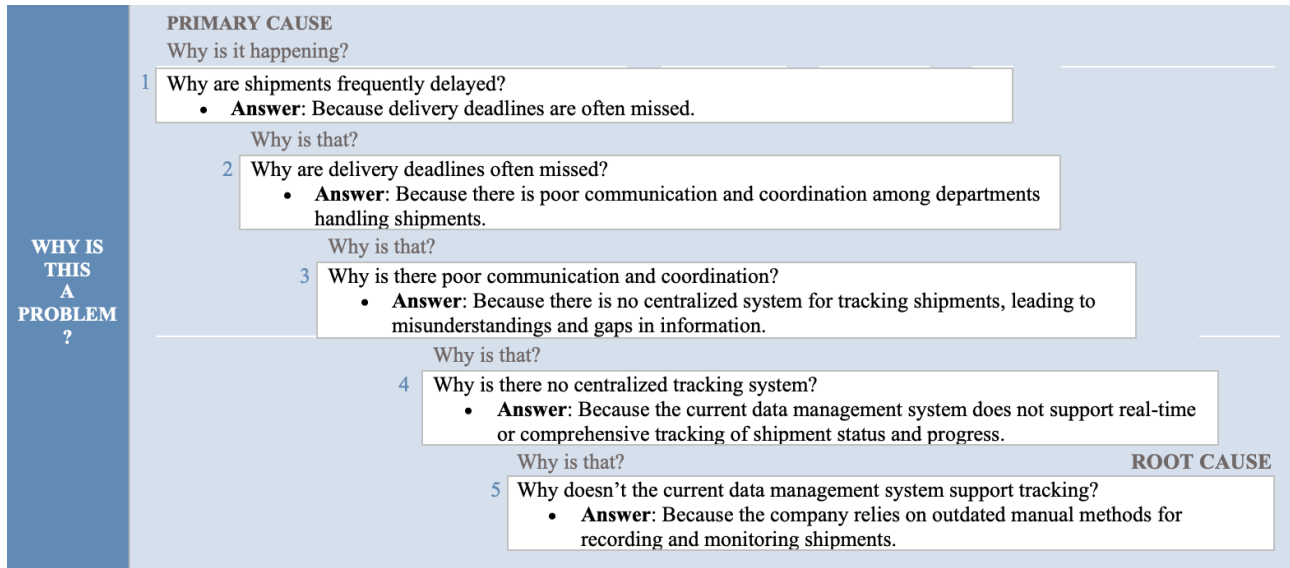


Figure 1. 5-Why root cause analysis

Source: Sarojinics (2024)

This part of the research discusses how the 5-Whys analysis can be applied in Sarojinics Sdn. Bhd and analyze its delivery inefficiencies, identifying the root causes of some delivery issues such as missed deliveries, coordination problems, dependence on outdated processes, and improper tracking systems. These analysis later forms the foundation of relevant, action-oriented countermeasures for sustainable improvement. A countermeasure is defined as a particular action or a set of actions taken to eliminate the possibility of recurrence of the problem. In comparison, a solution aims only to seek the removal of the problem's effects (Jonathan Hancock, 2022). By applying the 5-Why method, the company systematically identifies the root causes of the challenges and proposes countermeasures to resolve them. The last "why" provides the company with the answer to the root cause, which is its reliance on outdated manual methods. This root cause is the pillar ensuring that real-time tracking, coordination, and efficiency in delivery are far from reality.

The 5-Why root cause analysis places an emphasis on developing countermeasures that are not shortsighted reactive solutions but rather proactive in nature. The factor moves quickly, solving problems instead of establishing entirely automated tracking systems. These elevate the entire process, enhance coordination, reduce miscommunication, and afford teams the necessary efficiency in tracking delivery status. Upgrading data management technology ensures real-time data collection, analysis, and reporting, thereby making delays in the business easy to identify and respond to. The use of aging manual processes was identified as one of the most common root causes of inefficiency in logistics operations. Specifically, manual systems are often prone to errors, delays, and information silos. The reason is that manual means the system provides status updates on shipments, but does not promptly identify any delays or missing items, leading to misidentifying the root cause of the activity delays.

Long-term remedies differ from short-term ones in that they truly eliminate the root causes of problems, ensuring the sustainability of any improvements achieved. In contrast to developing quick-fix solutions that only mask the effects of various problems encountered, countermeasures identified through the 5-Whys will eliminate their root causes. Through this approach, it is possible for Sarojinics Sdn. Bhd. to modernize an organizational system in logistics by introducing present-day tracking systems, improving communication, and upgrading data management processes. Not only will this proactive method improve delivery performance, but it will also position the organization to be competitive in the future, as well as contribute to customer satisfaction.

This research aims to address persistent shipment delays and inefficiencies in a manufacturing company's delivery process by identifying root causes and implementing a customized tracking system. While many studies have explored supply chain delays broadly, there is a noticeable gap in practical, system-based interventions tailored for small to medium-sized manufacturers, particularly using accessible tools like Microsoft Access.

## 2. LITERATURE REVIEW

### 2.1 Logistics Management

Logistics management involves the foresight of the flow of goods, services, and information from the point of origin to consumption (Terese et al., 2024). It encompasses a range of activities, including transportation, inventory control, storage, material handling, packing, and safety management (Puri, K., 2022). A business exists mainly for the barter or sale of goods and services. Meanwhile, the logistics of the business involve the transport avenues that the goods and services take to complete the transaction. Goods move from one individual to another, while some items are transported in bulk, such as raw materials, and others are sent to the manufacturer. The difference between a single customer and an entire inventory is almost the same. The logistics affect how those goods and services make their way through the transaction. Bulk transport is the movement of goods, like raw goods, to a manufacturer. Sometimes the goods are moved to customers as individual beneficiaries or disbursed one at a time. Therefore, logistics must be robust and flexible due to the threats posed by delays during transportation or supplier shortages, which could significantly impact the production schedule. Some of the practitioners say that manufacturing enterprises will always depend on logistics, and this component alone takes up approximately 70% of the overall work in progress. This clearly shows the importance of logistics in terms of performance targets and competitiveness for manufacturing enterprises (Bugri Benjamin Adelwini et al., 2023).

The notion of logistics encompasses not just the management of goods but also involves the strategic management of information flow and the allocation of resources in an effective manner, which is a critical factor for the functioning of international supply chains (Lim et al., 2024). Visibility is provided to the supply chain through logistics management. It helps businesses in cost control, extracting efficiencies, detecting problems in the supply chain, conducting demand planning, and acquiring insights into opportunities. Delivering excellence in customer experience drives repeat sales for firms. Delivering orders on time enhances the customer's experience, increasing brand loyalty and driving future sales. When orders are delivered on time, as per the customer's expectations, it ensures good customer satisfaction, repeat orders, and a positive brand reputation. This, in turn, helps a company acquire new customers. Logistics management makes it possible for a company to always deliver or overdeliver on promises and sharpen its competitive edge. To remain competitive, manufacturers must invest in effective logistics systems and sophisticated technologies to enable them to deliver goods on time, while also supporting industry productivity and profitability.

Effective logistics management establishes the foundation for efficient delivery operations, which are directly linked to shipment timelines, resource allocation, and overall customer satisfaction. Literature suggests that optimized logistics processes, including scheduling, communication, and visibility, can help minimize delays and operational inefficiencies. Such findings directly support the research goal of diagnosing the primary causes of shipment delay and inefficiency. Hence, by addressing logistical problems, this study proposes designing a shipment tracking system aligned with best practices in logistics management to achieve greater delivery performance and operational transparency.

### 2.2 Delivery Efficiency

With the myriad of factors that influence supply chain management (SCM), the efficiency of deliverables remains one of the key aspects, considering its effect on client satisfaction, operational expenses, and the overall competitive edge. Logistics service quality is evaluated by factors such as timely delivery, safety, and customer service. One of the parameters that affects service quality is the reliability of the promised service performance, which is delivered and accurately achieved. The more efficiently the system is designed, the higher the likelihood of delivering the parcel on or before the indicated date (Surjandari et al., 2023). If delivery is not timely and properly executed, it leads to distress among customers, increased expenses, and the risk of losing customers and their market share. These aspects are particularly important in steering projects towards completion within the specified time frame, without detrimentally impacting both the cost and quality aspects (Adewale et al., 2024). Lean supply chain practices of just-in-time production have also been found to excel in improving delivery efficiency. Waste elimination and process streamlining enable medium-sized manufacturers to enhance their responsiveness to customer demands, allowing orders to be fulfilled faster. The other considerations are location and configuration in the supply chain network. Strategic positioning of production facilities, warehouses, and distribution centers would result in reduced distances and lead times for transportation, leading to faster and more reliable deliveries. Through the implementation of lean supply chain practices, such as just-in-time (JIT) production, improved delivery efficiency can be achieved. Moreover, by streamlining and eliminating waste along the processes, medium-scale manufacturers would be capable of reacting much more effectively to customer demands, shortening the time to fill orders. Additionally, the location and configuration of the supply chain network can also impact delivery efficiency. Production facilities, warehouses, and distribution centers strategically positioned and associated with the transportation system have reduced the distances and lead times required for transportation, thereby enabling faster and more reliable delivery.

Conclusively, improving delivery efficiency in the supply chain is critical for small manufacturing companies to compete and satisfy their customers. By embracing supply chain integration, leveraging digital technologies, adopting lean practices, optimizing network operations, and implementing risk management, small manufacturers can enhance their delivery performance and achieve better overall business success. Underpinning literature in robust tracking systems, appropriate scheduling, and proactive communication at the end of the pipeline mainly touch upon conditions that result

in effective delivery. This is further supported by the research objective of designing and implementing a shipment tracking system that enables orders to be monitored and managed. Such measures would help mitigate inefficiencies in the system and provide a data-driven solution that works towards increased delivery accuracy and reduced delays, ensuring improved on-time delivery and a positive impact on customer satisfaction.

### 2.3 Delays in Delivery

The issue of delivery delays, especially in the supply chain, is an important concern for Sarojinics Sdn. Bhd., as it affects the level of customer satisfaction and the operational performance of the firm. There is a great possibility that the customer will be dissatisfied if their shipment is delayed, a common problem for e-commerce users. One important cause for delayed deliveries is supply chain disruptions. According to Parast & Subramanian (2021), among the disruptions, process and supply disruptions affect supply chain performance. Similarly, demand interruptions also significantly impact performance. Dependable and effective addressing of uncertainty can prevent reputational damage to the importing organization, as the seller may be unable to deliver the item according to the requested specifications. Failing to meet buyer commitments would lead to the risk of losing sales contracts, market shares, and valued customer relationships. Moreover, the delivery performance would be significantly impacted by the frequency of disruption in the supply chain and by the firm's ability to respond to it. According to Li et al. (2023), frequent interruptions in the supply chain negatively impact firm performance. However, this issue can be mitigated by the company's exploitation, exploration, and ambidextrous capabilities within the supply chain. Nowadays, when a customer orders a product, they expect it to be delivered within days, if not hours. Unhappy consumers may consider abandoning the services and products altogether (Tom K., 2024). Factors leading to a delay in project timelines have been attributed to missed deadlines. Reasons for missed deadlines include poor scheduling and inadequate planning. This, in turn, affects other operations, creating a chain reaction. Within departments, there is a lack of communication and coordination, which worsens the situation as there is no proper way to inform stakeholders of the shipment's status. All aspects of supply chain disruptions, including structural complexity, flexibility, integration, and resilience against disruption, should be considered. Thus, through the use of effective strategies, the delivery efficiency of medium-scale manufacturing organizations can be improved, along with enhanced customer satisfaction and a competitive market position. This shows that undertaking specific interventions addressing these root causes, including adopting technology-driven solutions, can mitigate disruptions and enhance delivery reliability. This resonates with the research objective of pinpointing the main causes of shipment delays and inefficiencies within the delivery process of a manufacturing company. The research also sets the stage for developing a shipment tracking system to this end to eliminate delays.

### 2.4 Shipment Tracking System

Shipment tracking systems allow firms to observe the shipment of commodities from sources to final consumers as well as tackle different problems related to logistics and customer satisfaction management. A secure tracking system will solve all proactive shipment actions so that any complications while transporting goods will arise at the earliest stage possible, keeping content movement completely fluid all the time (Niemi et al., 2020). Logistics visibility means knowing the current stage of your shipments, whether in transit, at the warehouse, or on the dock, from the time they leave the origination point until they arrive at their destination. Such real-time visibility enables supply chain stakeholders to act in a timely manner with respect to inventory levels and reorder points, as well as to manage everyday operations that maximize efficiency and satisfy customer demand for quick and accurate service. The technology for monitoring the movement of goods along the supply chain is crucial for improving a company's visibility, accuracy, and timeliness in supply chain activities (Prakash et al., 2022). For instance, supply chains with a tracking component may help mitigate loss complications, such as waiting for re-confirmation of previously held information when working. Furthermore, incorporating decentralization into the system and eliminating some middlemen from specific supply chain channels may enhance system performance, particularly when the ownership or position of the parties involved is changing (Balfaqih et al., 2023). Efficient tracking mechanisms unify multiple data inputs, including but not limited to logistics companies, storage facilities, and transport vehicles, onto a single platform. Shipment status updates empower transportation teams to take corrective actions in real-time, such as rerouting shipments to avoid delays or adjusting inventory locations to meet sudden spikes in demand. Such proactive action minimizes operational disruptions, maximizes customer satisfaction, and keeps firms ahead in a competitive market (Seda Özcan et al., 2023). This makes it possible to monitor all activities, achieve better coordination, and analyze the data to identify abnormal trends or inefficiencies.

To maintain safety and effectiveness in movement, different transport means are incorporated, such as the use of lorries, vans, and other transport. After the shipment has reached its destination, the goods may be kept for processing and distribution. Various methods of controlling warehouse storage are employed, including camera and surveillance systems (Novitski & Leonov, 2024). Proper management of tracking prevents losses caused by untraceable shipments, enhances logistics solutions for tracking, and resolves customer issues. This means that, in the case of relying on automated tracking, there is a decrease in costs regarding the amount of time wasted idling, better management of vehicles in the transport fleet, and a reduction in the loss or damage of goods in transit (Nanda et al., 2023). Tracking systems for shipments are vital instruments for improving transparency, enhancing communication, and improving delivery work processes. Research literature emphasizes that real-time reporting, optimizing order management, and minimizing delays are hailed as the key roles of such systems. The goals of this research are consistent with the design and execution of a well-designed shipment-tracking system with Microsoft Access for efficient monitoring and management of orders. The

study aims to reduce shipment delays, improve on-time delivery rates, and, most importantly, increase operational excellence and customer satisfaction by implementing a tailor-made tracking system suited to the company's requirements.

### 2.5 Sustainability in Technological Solution through the Role of Governance and Ethics

In addition to operational performance, logistics literature increasingly underscores the role of governance, ethics, and sustainability in the design and adoption of technological solutions. Strong governance mechanisms ensure accountability and data integrity in shipment tracking systems, while ethical practices uphold transparency and fairness among supply chain partners. Moreover, sustainability considerations, such as reducing resource wastage, lowering carbon emissions through optimized routing, and promoting responsible consumption, are closely tied to the effectiveness of shipment tracking systems (Balfaqih et al., 2023). Integrating these elements ensures that digital tools not only enhance efficiency but also align with broader corporate responsibilities in sustainable and ethical supply chain management.

## 3. METHODOLOGY

### 3.1 Research Design

This research examines how the introduction of a tracking mechanism aids in creating more coordination between departments and improves overall performance in the delivery of services. Quantitative research refers to a formal, objective, systematic process used to obtain information about the relationships, behaviors, phenomena, or patterns, most often through statistical and numerical data (Creswell, 2018). This process includes the gathering and analysis of quantifiable data to detect patterns, evaluate propositions, and arrive at conclusions. This research adopted a mixed-methods approach of quantitative and qualitative methods to help a manufacturing company facing delivery delays due to non-adherence to timelines, lack of communication, and no visibility on shipments. The purpose is to develop a customized delivery-tracking system through Microsoft Access that would address unique challenges specific to the company while improving delivery. Identification accuracy, processing latency, data aggregation, and checkpoint configuration were all found to impact the tracking capacity of a product in the company when the tracking system was set up.

Subsequently, descriptive design is crucial for documenting and presenting the status of delivery inefficiencies. This creates a foundation for the use of clear, measurable evidence, which enables this study to draw vivid pictures of present problems. The design specifies data collection to describe the characteristics of the delivery processes, including delay time, error rates, or customer satisfaction levels. In short, the comprehension of the problems at hand is vital for stakeholders to recognize the importance of the issues raised and prioritize them for the improvement effort. Exploratory design brought about an inquiry into more specific aspects such as operational bottlenecks, inefficient resource allocation, and communication breakdowns. The exploratory stage is important for identifying gaps in knowledge and deriving hypotheses for subsequent testing. Among all the research designs that can be applied in this paper, the case study design was deemed the most complete for exploring the firm-specific environment of delivery inefficiencies. This type of design has been used by previous researchers to validate the proposed solutions in a real-world environment and offers a pragmatic view of their effectiveness. Besides, by looking into certain events in the company, the researchers were able to come up with actionable insights suited to the company's unique problems and concerns. Case studies can provide a rich understanding of the complexities and interrelationships of the different factors and help in validating the proposed interventions. These ensure that findings are relevant, useful, and propitious for improving the system in meaningful ways.

Most importantly, quantitative research can confirm or disprove the proposed assumption, making the findings valid to serve as the basis for possible improvements in manufacturing processes and service performance. This research aims to outline the current delivery inefficiency at Sarojinics Sdn. Bhd., which includes the analysis of historical data to quantify the delivery delays, identify patterns, and present the characteristics of such inefficiencies, such as missed deadlines, communication gaps, and shipment visibility issues. The research aims to investigate the root cause of inefficiency in the delivery system, though little consideration has been paid to this area in the past. Discussions with stakeholders and root cause analysis using the 5-Why technique were utilized to identify the factors causing delays. Interviews with staff and management were conducted to understand operational bottlenecks. In the initial stages, attempts were made to assess how effective it would be to implement a delivery tracking system using Microsoft Access within the company. This study made this experiment a single-case research design focusing mainly on Sarojinics Sdn. Bhd. to give a detailed, in-depth analysis of the logistics challenges of the company and their solutions tailored to its specific circumstances. A historical analysis of the data and historical inefficiencies of the company was also carried out. Afterward, the fabricated system was made using Microsoft Access for tracking, and its effectiveness was evaluated to test its impact on delivery and service quality for customers.

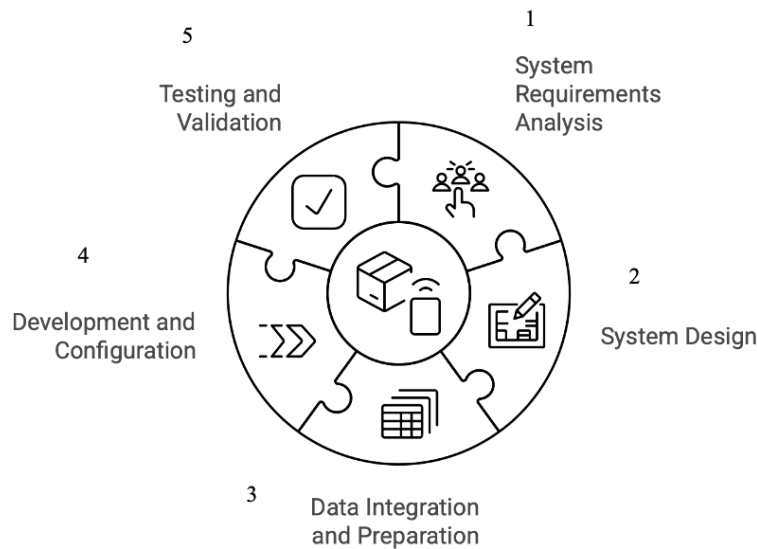


Figure 2. Shipment tracking system phases

The purpose of iterative phases in the development and implementation of the shipment tracking system is to make delivery efficient in a manufacturing environment. The phases are aligned with the specific objectives of this study, which is to provide a structured approach to address the identified issues related to delivery delays, inefficient scheduling, and miscommunication within the organization. This first phase began with identifying functional and non-functional requirements of the system. Stakeholder interviews and analysis of historical data were done to give value to some systems' features, such as real-time tracking for delivery, alerts for oncoming deadlines, and priority-based scheduling. The clear requirements document was delivered as the result of this phase, laying the foundation on which the future development stages would rest. The objective of the design phase is to develop a framework that can restructure the system. The user interface was made intuitive and accessible using Microsoft Access for data entry forms. Its function is to track dashboards and reports, ensuring a continuous flow of data and promoting operational efficiency through improved communication across departments. The proper data integration is vital for ensuring the effectiveness of the system. Historical delivery data was prepared and analyzed to find patterns that would later improve predictive scheduling. Data validation protocols were instituted to prevent errors during data entry from compromising the reliability of output and comparison-based insights derived by the system. In this phase, the building and configuration of the system were done according to the project's defined requirements. Microsoft Access forms, queries, and reports were developed to support the functionality of tracking deliveries and providing alerts. The system's reliability and dependability were confirmed in the final stage through comprehensive testing using both simulated and historical data.

### 3.2 Data Collection and Preliminary Analysis

Most of the data collection focused on information related to the performance of shipments and scheduling data within Sarojinics Sdn. Bhd. Notably, there were a few primary metrics considered when dealing with delivery efficiency. These data provided a reasonable extent of the parameters that would be assessed after the application of the tracking system. It enables businesses to analyze customer behavior, understand market dynamics, explore new possibilities, study the competition, experiment with marketing techniques, and enhance their marketing performance. Such advantages enrich the experience of clients, grow the business, and maintain a lead over the other players in the market (Baker, N., 2023). This research used both primary and secondary data sources to examine in depth the delivery inefficiencies faced by Sarojinics Sdn. Bhd. from the angles impeding as well as the effects. The modes of data collection were selected to include both quantitative and qualitative indicators about the phenomenon, providing a comprehensive understanding of the challenges facing the company.

#### 3.2.1 Primary Data Collection


The study elaborated on the delivery inefficiencies of Sarojinics Sdn. Bhd. by identifying the root cause. Out of the many methods used, interviewing key informants proved to be the most significant one. The interviews provided first-hand information and detailed insights into the organization's operational difficulties. Interviews, in general, have been the prime means of collecting data because they produce vibrant qualitative insights, which are seldom easily captured by surveys and external data sources. Logistics inefficiencies often occur within a complex, interdependent process, and gaining a clear understanding of them requires the direct perspectives of those involved every day. The primary data were collected from employees and the company's functional systems regarding the monitoring systems to obtain more realistic data on the shipment and delivery processes. As per the designed approach, the interviews conducted were semi-structured, a judicious means to follow a line of guided questioning and gather simple yet necessary background information. Interviews were conducted with stakeholders of Sarojinics Sdn. Bhd to unveil the root cause of delivery inefficiencies. The goal is to develop and suggest realistic solutions to address these issues by using the same findings to enable improvement in the delivery performance of the company. Finding recurrent themes, patterns, and areas of concern

raised throughout the interviews was made simpler by methodically organizing the data. After that, the emphasis switched to performing a thorough examination of the data. This entailed identifying gaps and inefficiencies by contrasting the business's current procedures and difficulties with industry best practices or standards. For instance, if the interviews reveal problems such as delays caused by imprecise scheduling or a lack of continuous tracking methods, these insights can be aligned with the project's objectives to suggest specific solutions.

### 3.2.2 Secondary Data Collection

This study also incorporated secondary data as one of the key components to provide a quantitative frame for understanding and solving delivery inefficiencies at Sarojinics Sdn. Bhd. The secondary data were obtained from internal records and customer feedback, which were helpful in identifying common trends, operational difficulties, and customer perspectives of the company. Additionally, historical shipment record analysis, customer feedback, and operational reports were utilized to form a backdrop for qualitative findings, with a focus on primary sources to improve the overall case analysis of the study in question. Delivery process observations were recorded, which included the workflows, time of the operations, as well as incidences of any interruptions or failures. Historical shipment data of Sarojinics Sdn. Bhd. were collected, including information such as delivery dates, delays, shipment status, and order priority. The analysis of historical shipment records laid a solid groundwork for determining priority interventions by measuring the extent and nature of delays.

An analysis of customer satisfaction revealed several recurring criteria, including late deliveries, incomplete deliveries, and inadequate updates regarding the order status. Customers often complained about broken promises of on-time delivery, a feature they deemed highly critical in their purchasing decisions. This dissatisfaction among customers highlights the external effects of internal inefficiencies, reflecting how every delay would impact the company's reputation and the trust of its clients. Customers have advised the company several times, suggesting that there should be some improvement in terms of communication. Most customers admitted that they were not informed in advance about the delays and consequently did not know when to expect their orders. It shows that the organization had to undertake proactive communication to manage customer expectations and reduce their dissatisfaction. By understanding the customers' perspective, the company aligns its improvement measures with the expectations that customers have, thus ensuring that any intended solutions directly address the proposed operational challenges and their outward impacts.



**SAROJINICS SDN.BHD SHIPMENT DATA**

Order ID	Planned Delivery Date	Actual Delivery Date	Delay Duration	Order Date	Delay Reason	Order Priority	Status	Customer Satisfaction
2410-0069	05/10/2023	08/10/2024	3	20/09/2023	Missed Deadline	High	Delivered	Dissatisfied
2410-0070	10/10/2023	12/10/2023	2	22/09/2023	Poor Communication	Medium	Delivered	Neutral
2410-0071	16/10/2023	20/10/2023	4	25/09/2023	Lack of transport	High	Delivered	Very Dissatisfied
2410-0072	20/10/2023	20/10/2023	0	28/09/2023	On Time	Medium	Delivered	Very Satisfied
2410-0073	23/10/2023	25/10/2023	2	02/10/2023	Human Error(Overlook)	High	Delivered	Neutral
2410-0074	25/10/2023	25/10/2023	0	04/10/2023	On Time	Medium	Delivered	Very Satisfied
2410-0075	25/10/2023	27/10/2023	2	05/10/2023	On Time	Low	Delivered	Neutral
2410-0076	27/10/2023	28/10/2023	1	07/10/2023	Missed Deadline	Medium	Delivered	Satisfied
2410-0077	28/10/2023	29/10/2023	1	10/10/2023	Lack of transport	Medium	Delivered	Satisfied

Figure 3. Secondary data from Sarojinics from Oct 2023- Oct 2024  
Source: Sarojinics (2023)

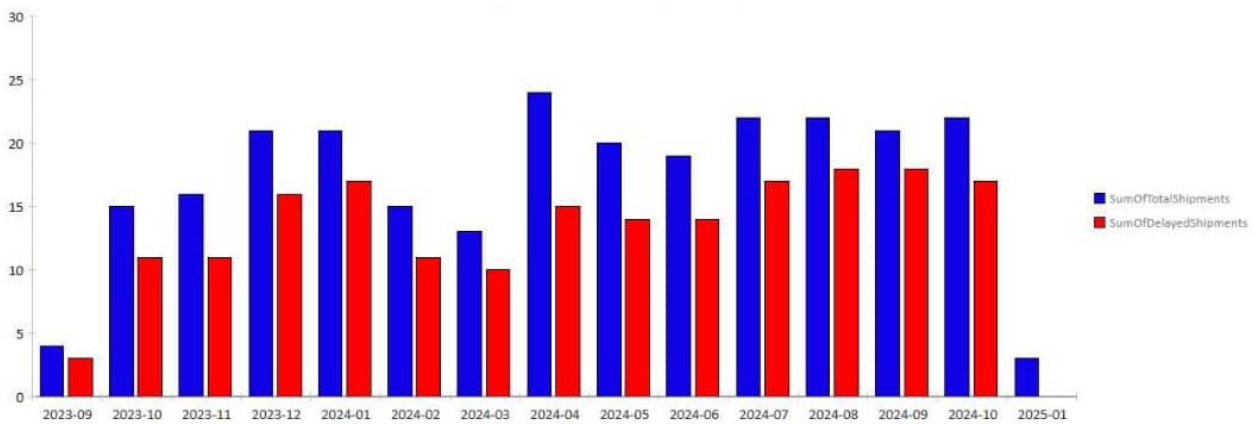


Figure 4. Monthly total and delayed shipment from Oct 2023 to Oct 2024  
Source: Author's work

The inclusion of primary and secondary data collection types ensured a thorough and multi-pronged approach to understanding delivery inefficiencies at Sarojinics Sdn. Bhd. The primary data had qualitative insights into experiences

and perceptions of employees, while the secondary data supplemented with quantitative evidence validated and contextualized these findings. These data sources complement one another to provide a holistic understanding of the problems faced by the company, thereby informing the formulation of tailored solutions. In addition to that, it also enabled the identification of recurring patterns and trends by integrating historical shipment records with customer feedback and operational reports. These findings lay a foundation for developing actionable recommendations to improve delivery efficiency at Sarojinics Sdn. Bhd. To surmise, the integration of primary and secondary data ensures that proposed solutions are evidence-based and contextually relevant in addressing the root causes of inefficiencies and improving logistics performance.

### 3.3 System Development

It is crucial to develop a consistent and efficient delivery system in manufacturing operations. On this note, modern technology has significantly aided many organizations in their daily activities, including tasks such as studying, working, communicating, and shopping, among others. As everyday life evolves, so does every aspect of the industrial world through the digitalization process (Rachmad et al., 2024). This research attempts to use Microsoft Access to develop a comprehensive database management solution for the common problems of tracking shipments, managing delivery schedules, and evaluating performance. The system developed incorporated tables, forms, queries, and reports to assist in the tracking process. All this was made possible using Microsoft Access, which gave collaborators the ability to monitor deliveries with the help of data captured by the system and make informed decisions as necessary within the operational delivery system. This significantly improves the overall efficiency of operations and reduces the possibility of wasting time and resources. The system was able to merge all the different components and present the users with relevant information in a simple and comprehensible manner. It also leveraged existing applications, such as Microsoft Word and Excel, to avoid recreating familiar features that are already in use.

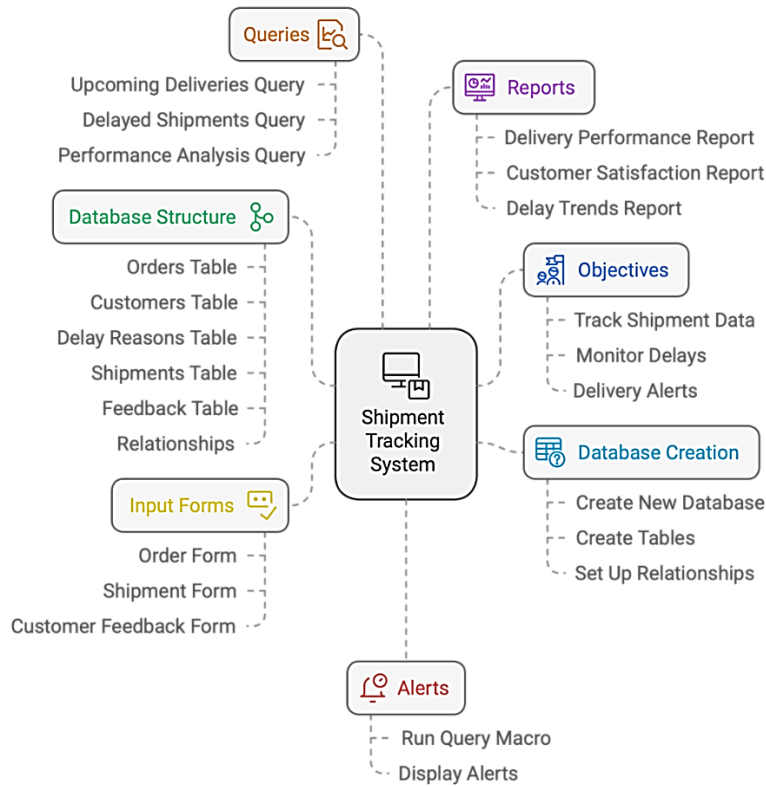


Figure 5. Visualization of the complete tracking system and its components

The first point of evolution in the system for tracking shipments is the scrutiny of the requirements within the system. The aim is to bring out the different specific needs of the stakeholders involved, such as those in the logistics management team, the manager, and the staff. In a series of interviews and discussions, the actual challenge points in the delivery process are highlighted by focusing on delays, shipment visibility, and inefficient scheduling. Additionally, an analysis of historical delivery data was conducted to understand the patterns of delay and prioritize the features of the new system. Such approaches help define the functional and non-functional requirements of the system, making sure that it incorporates the company's objectives.

The fundamentals of the shipment tracking system work through a properly designed database. Relational databases can be easily developed using Microsoft Access, which is particularly useful for storing and retrieving shipment-related data. The proposed database was made from several tabulated information that are related, and each table was designed to hold different types of information, such as order information, delivery dates, shipment progress, and delays. This

design ensures that all the information is filed in the respective categories where it can be accessed and utilized for further analysis within a short period of time. The schematic representation illustrates the fundamental components of the shipment tracking system, along with the key processes involved in managing deliveries and enhancing operational efficiency. The center of the diagram is the Shipment Tracking System, which serves as the central point connecting all important variables. Each component contributes to the overall process as a system to deal with challenges, such as delivery delays, mal-timings, and miscommunication. The database is the backbone of a system, organizing primary information in very structured tables. These interlinked tables have specific relationships that link them together while preparing to fetch data, reducing redundancies. The system responds fast with predefined queries for real-time data. These queries provide shipment-status tracking, bottleneck identification, and performance trend analysis. The system serves several major purposes, including tracking shipment data, monitoring delays, and providing alerts regarding deliveries. The objectives are aligned with the same overall purpose of improvement in the accuracy of delivery, transparency of activity, and overall operational efficiency. Overall, this visualization can effectively generalize the system's entire design, highlighting its ability to streamline shipment tracking, enhance decision-making, and improve operations.

#### 4. RESULTS AND DISCUSSION

The proposed solution, using Microsoft Access, tracked shipments in response to the need for improved delivery operations at a manufacturing firm. The objective of the system is to reduce delays and improve logistics management processes by enhancing scheduling accuracy, increasing shipment visibility, and enhancing communication. This section, however, describes the expected outcomes of the system, although it has been impossible to implement due to the system's functionalities and theoretical analysis. The tracking system incorporates organized planning by combining scheduled delivery dates with actual ones in a single data repository. The purpose is to reduce delays caused by missed delivery deadlines through automatic alerts sent a day in advance of the delivery date. A key aspect of the proposed system is its capability to monitor the movement of goods in transit over the internet. This allows the company to monitor its delivery system by placing 'in progress,' 'delivered,' and 'delayed' among other states about the deliveries made. It is anticipated that such visibility will help the management pinpoint problems at an early stage, e.g., certain delivery routes that are always congested or where orders of specific priorities are always problematic.

##### 4.2 Sarojinics Tracking System

When the requirements are established, the design phase begins to bring the system forward. Here, the structure and layout of the system were planned to suit the requirements as mentioned. In this process, mock-up designs were generated for the user interface, which was created in Microsoft Access. These features provide a guidance model on how users can interact with the system using different kinds of input forms regarding orders and delivery, and output as reports measuring progress.

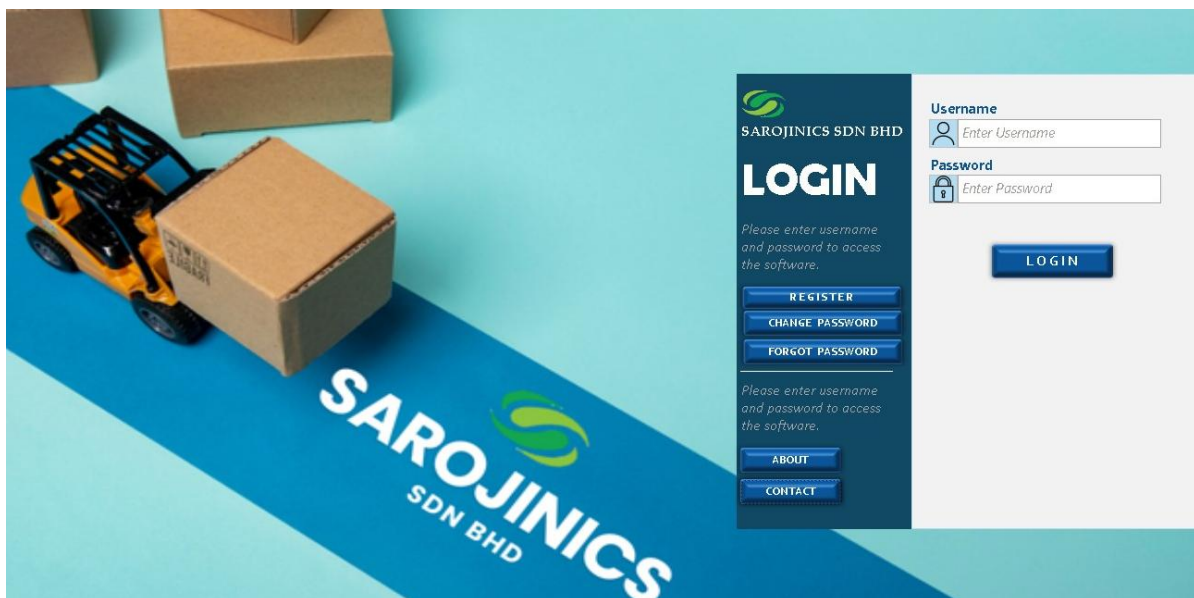
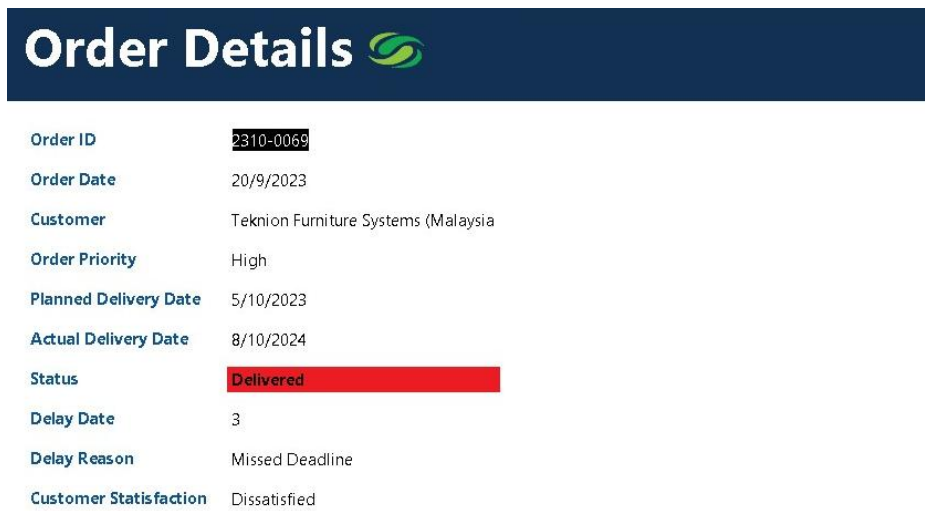


Figure 6. Login user interface of Sarojinics Sdn.Bhd delivery tracking system

The system also constitutes the design of the database structure, which holds the tables that store essential data such as order IDs, delivery dates, statuses, and shipment priority, forming a seamless connection between the tables to allow efficient data flow. This design template forms the basis on which the system was built, ensuring an entirely user-friendly and scalable solution. As we developed this phase, the system was created as per the design specification. The development process started with the creation of the database in Microsoft Access, the development of tables, the establishment of relations, and the design of input forms, all of which were to allow users easy data entry and updating for delivery-related orders and priority status. Queries were written to fetch specific data, such as overdue deliveries or

shipments due for delivery soon, to create reports that the user would use in tracking the status of deliveries. Also, to notify the users, alerts were incorporated into the system when a delivery was approaching the planned date to enhance coordination between departments. At the end of this phase, the system prototype was ready for initial testing because all the essential functionalities had been incorporated into the system.



Order Details	
Order ID	2310-0069
Order Date	20/9/2023
Customer	Teknion Furniture Systems (Malaysia)
Order Priority	High
Planned Delivery Date	5/10/2023
Actual Delivery Date	8/10/2024
Status	Delivered
Delay Date	3
Delay Reason	Missed Deadline
Customer Satisfaction	Dissatisfied

Figure 8. Example of an input of order details for customer

The input form for order details was characterized by all the fields needed in an order. Each order will create its own Order ID, such as "2310-0069". This ID is automatically generated by the system to ensure easy identification or traceability. It removes duplication and lets the user quickly find records. For example, the record "20/9/2023" indicates the Order Date, which shows the day the order was placed. This field is crucial in computing delivery timelines and evaluating the efficiency of order processing. Customer specifics remain another crucial aspect on this form. For instance, the customer's name, "Teknion Furniture Systems (Malaysia)," along with the address and other necessary contact information for the company, will capture the details for proper communication and delivery accuracy. The system also allows users to specify the Order Priority, as in this case, where it is marked as "High." This feature helps the logistics team prioritize urgent orders and allocate resources effectively to meet deadlines. The field called Planned Delivery Date is important as it indicates the target delivery date of the order (e.g., "5/10/2023"). It serves as a reference point for generating alerts and following the dispatch and delivery schedule; it also records the Actual Delivery Date. Comparison of these two fields helps users establish delays and take corrective measures to avoid the same in the future. When an order is delayed, the Delay Days are automatically computed by the system, which is done by subtracting the planned date from the actual one. For instance, when the delay is three days, the system marks it as severe information for performance analysis.

The reason for the delay states the reason it occurs, such as 'Missed Deadline', which is included at the bottom of the delay. This is to help the company study and fix the issues. Additionally, the field integration with the shipment tracing system would accurately maintain data along with real-time tracking and monitoring. Currently, the "Delivered" order status indicates that the shipment has been successfully delivered. Here, employees will have access to current information about the progress of every order, improving communication and transparency throughout the departments. This order data structured input plays a key role in the shipment tracking system functionality. It will enable the company to maintain a centralized order database that can be utilized for reporting, trend analysis, and informed decision-making. Automated calculations, such as those for delayed days, would save time and eliminate potential manual errors, while customer feedback would make the system operationally efficient and customer-friendly. The sample demonstrates the primary importance of ordering process input within a complete shipment tracking system. Under the standardizing input procedure, errors are minimized while ensuring that all important data points are recorded consistently. It provides very accurate reports and analytics. When comprehensive data and precise information are captured, an effective manner of analyzing, managing, and tracking shipments is available. The well-structured input forms increase efficiency while enhancing customer service and performance within the organization. This essentially becomes a foundation functionality for the system to address delivery challenges while meeting its set goals.

The results will provide context in terms of the operational challenges faced by the company, thereby offering a holistic view of how this system addresses inefficiencies and assists in achieving its organizational objectives. The implementation of the shipment tracking system has resulted in a considerable improvement in the company's delivery efficiency, addressing delays, poor shipment visibility, and ineffective scheduling. Through tracking planned and actual delivery dates, orders that would not be delivered on time were identified in real time. Analysis of past data revealed that it was possible to reduce the number of times delays were experienced due to missed deadlines after the introduction of the system.

The system had features that generated reports on delivery performance, including customer satisfaction. It was noted that high-priority orders were delayed less often from the reports, thus indicating that the strategies employed for allocating resources were worthwhile. Besides, the visualization functionalities of the system revealed trends and bottlenecks for strategic decision-making, which improved its effectiveness. Next, the resultant feedback from customers reflected a significant increase in customer satisfaction levels. The ability to keep customers informed about the status of their orders was another distinctive feature that enhanced the customer experience.

The discourse revolves around the results and their implications with respect to the delivery issue the manufacturing company faces. The findings further incorporate several key insights from the implementation of the shipment tracking system. A reduction in delays and increased visibility of shipments directly improved operational efficiency (Azimjonov, J., & Özmen, A., 2021). Automation of critical functions, such as alert generation and tracking delays, reduces dependence on manual processes, minimizes errors, and allows for resource allocation to other value-added activities. This efficiency serves the company's objectives of streamlining delivery operations. Current data and alerts from the slot, which come in real-time, enabled the logistics team to identify possible delay occurrences before they happened. For instance, orders flagged as high priority received same-day treatment for delivery. The anticipatory effect of this practice helped optimize resource utilization and significantly reduce costs incurred due to late deliveries. To illustrate a point, one can say that the information emerging from historical data integrated into the system enabled a better understanding of how patterns of delay develop and bring about delay causatives. By analyzing past records, the system revealed two main reasons: cross-communication between departments and poor scheduling practices, which contributed to the delays. In cross-communication, the priorities of different teams frequently end up conflicting, or a proper transfer does not take place between teams due to inopportune scheduling, resulting in bottlenecks and missed deadlines. All these pointed out that an integrated approach is required to facilitate coordination and improved planning accuracy. For example, the analysis shows that miscommunication between departments and inaccurate scheduling largely cause delays. In fact, at times, miscommunication would account for the delay. When there is no real-time update on inventory levels, false assumptions about availability would affect order preparation and dispatch. Similarly, incomplete or inadequate documentation could mislead shipment processing and cause other delays. Based on these findings, improvements to communication protocols or potentially more effective scheduling algorithms can be made. The real-time updates provided through the central database kept all stakeholders informed about the progress of orders and deliveries. This real-time access removed the need for periodic reportage or manual communication, enabling quick response times to any problems or changes regarding delivery plans. In other words, centralized data access has revolutionized the delivery process, providing a single platform for the sharing of real-time information. This advantage improved interdepartmental efficiency as well as the accountability of events. The company established a strong base for better outcomes and meeting operational goals by eliminating data silos and ensuring all stakeholders had access to the same real-time, accurate information.

Apart from that, effective delivery management also involves operational transparency. Before the system was installed in the company, it had issues with the visibility of the steps in the delivery processes. Such opacity made it hard to identify and address the source of the delay at the manager's level. Afterward, the new system allows employees to view the status of their orders at any time and track their progress in real-time, from order placement to shipment and final delivery. For example, it is possible to determine whether there is a delay in order processing, during transit, or at the final mile. Accordingly, the assigned teams can focus their energies on discovering targeted solutions for bottlenecks rather than using broad, inefficient solutions.

One of the important advantages derived from the system is improved communication with clients, which has been made possible through real-time tracking and automated alerts. Customers can now receive updates regarding the status of their shipments, including critical information on estimated delivery dates, delays, or schedule changes, thereby bringing a greater level of visibility that reduces uncertainty and allows for more efficient planning of the operational scope for customers. This more integrated communication process is proving to be particularly useful for high-priority or time-sensitive orders (Ahmed et al., 2024). Clients are cared for to meet costs within the new normal terms set forth by the company, considering more timely and appropriate communication characteristics on occasions such as when an important consignment may be delayed. The alert triggers proactive communication with the customer, as well as a resolution plan. Such measures build credibility and commitment that can further strengthen customer ties within the norm of a company in existence. It is now ensured that, through this system, all clients are dealing with the same resource through the channels through which their communications have been standardized. This means that they can expect to receive equal levels of service from the organization despite the complexity or volume of their orders. Such trust and expectation of excellence cultivate return business and word-of-mouth marketing. The order delivery promptness and proactive updates have transformed the company's reputation in the market. Timely delivery does not only mean faultless logistics capabilities but also operational competence and customer-centricity of the company. Clients appreciate suppliers who keep to their word concerning the delivery date, particularly in manufacturing industries, where profit opportunities can be lost due to unanticipated delays. Supply chain delivery performance enhancement is an essential component to building credibility among clients so that they can consider the company a trustworthy partner in their supply chains (Rolf et al., 2022). This is critical because differentiation is perceived in an intensely competitive and progressively increasing customer-expectation environment. Therefore, providing superior services, well backed by the latest technology, gives the company an edge in winning high-end customers in the market. Besides, the transparency of the system is now a unique selling proposition that stands out from contemporary competitors who still rely on

cumbersome manual ways of tracking. The act of deliberately keeping the customer informed about the shipment maintains accountability and professionalism, which goes a long way with clients whose primary priority is an uninterrupted supply chain process.

The initial major obstacle has been the hesitation of employees to adopt the electronic solution. Many staff members felt that the system was too complex and difficult for them to use. The resistance brought out the need for implementing extensive training programs, which should ensure that all users become familiar with the system and its available features. The various interventions used to address this issue included workshops, hands-on tutorials, and user manuals. Through suitable intervention, staff members gradually developed the competency to use the system effectively. However, the training phase required a significant amount of time and resources, which may temporarily slow down operational activities. The challenges emphasize the importance of ongoing training and a responsive support system. Previous studies have highlighted the importance of user-centered design and proactive change management for achieving successful adoption. Data entry quality heavily determines the shipment tracking system's accuracy and reliability. Missing or incorrect delivery dates, duplicate order IDs, and incorrect priority classification can compromise the entire system's functionality. During implementation, the problems with data quality proved to be a significant constraint.

For instance, on a few occasions, incomplete records or outdated information caused the reports on deliveries to be misleading, leading to delays in alerts. To mitigate these issues, stringent data validation processes must be implemented, including mandatory fields, automated error-checking algorithms, and prompts for users to correct inconsistencies in their information. Although the method can enhance data reliability, it may complicate data entry, as it demands extensive training and supervision. This dependence on input quality makes it imperative to create a data-driven culture within the organization where accuracy and consistency are held paramount at every level. Although the system now offers better visibility and smoother processes, it still relies on manual updates and batch processing, which prevents the generation of real-time insights. For instance, updates on shipment status were required to be made manually by the logistics team, which sometimes caused delays in reflecting the latest developments. This restriction prevented the system from responding dynamically to shifting circumstances, such as unexpected delays or urgent customer inquiries. The situation may escalate into a high-pressure situation without real-time intervention, leading to missed opportunities for proactive interventions and thus compromising the system's potential value.

The study aims to evaluate the changes in shipment delays and the improvement in on-time delivery that have resulted from implementing the shipment tracking system. The system is expected to address the causes of inefficiencies in deliveries by utilizing historical data, implementing improved scheduling algorithms, prioritizing resource allocation, and providing pre-scheduling alert indications. It was found that interventions did reduce the delays, mainly those stemming from inaccurate scheduling and miscommunication. On-time deliveries demonstrated quantifiable improvements, measurable within the first few months of the program, which proved the efficacy of the system in creating streamlined operations and enhancing resource utilization. It was assumed that the efficiencies realized would not only improve operations but also enhance customer relationships through timeliness in feedback and dependability in delivery performance. Delay reductions and improved delivery rates validate that these outcomes can be realized through a data-driven approach to solving logistical problems and achieving measurable results.

## 5. CONCLUSIONS

The research investigated the implementation of a shipment tracking system for its intended purpose of addressing delivery delays and inefficiencies in a manufacturing firm. Through an extensive examination of the primary sources of shipment delays, including miscommunication, unsuitable schedules, and insufficient visibility, major areas of concern were identified. Using Microsoft Access, a specific tracking system was developed to oversee orders and specify how they would be shipped, and to proactively alert when timely delivery was necessary, to address issues related to efficient or inefficient delivery. The findings indicate that the system implementation has indeed improved delivery performance by resolving the inefficiencies further down in the chain. A good approximation of the measures, including queuing, enhanced planning algorithms, priority-based resource allocation, and centralized data access, has significantly contributed to achieving a noticeable reduction in shipment delays and an improvement in on-time delivery rates. The additional uses of historical data further advanced targeted interventions with better resource management and more streamlined interdepartmental communications. This research has fully met its objectives regarding identifying critical inefficiencies and developing a reliable shipment tracking system, as well as demonstrating significant improvements in delivery performance. The insights gained provide the right basis for future developments in logistics management, thereby making the company more competitive in an increasingly demanding marketplace.

Apart from improving daily operations, this study shows that shipment tracking systems also support good governance, ethics, and sustainability. The system encourages transparency and accountability within the company, while better communication with customers helps build trust and reduce misunderstandings. At the same time, fewer delays and smarter use of resources mean less waste and a smaller environmental impact. In this way, the tracking system is not just about efficiency; it also promotes responsible, ethical, and sustainable practices in manufacturing. While a shipment tracking system was successfully created and implemented in this study to address delivery inefficiencies, several issues were identified that may have an impact on the study's findings and broader application. This tracking system relies heavily on the data quality of its input data; thus, efficiency and accuracy of the shipment tracking are vital information.

The challenges encountered in achieving optimal performance were primarily due to errors, omissions, or inconsistent data entries during the implementation phase. Validation rules, although incorporated to try and alleviate the issue, also left a lot open to contention because of the manual nature of some processes that snuck in such inaccuracies. This raises major concerns over the extent to which data quality dependency warrants the need for data governance practices to guarantee efficacy over system longevity. Secondly, the system developed using Microsoft Access provided significant improvements in visibility and tracking, but lacked superior real-time functionality, resulting in limited real-time access. Changes to system data were dependent on periodic manual entries, which stifled the capability to instantly reflect the changes in the shipment's status. This limitation may be problematic for time-sensitive operations and disqualifies the use of the system in environments that require real-time data to be updated as dynamically as possible.

A few recommendations are made, considering the research's limitations and conclusions, to ensure sustained improvements in delivery operations and enhance the efficacy of the shipment tracking system. These suggestions tackle the difficulties faced and provide avenues for further advancement and wider implementation. Firstly, good performance data governance requires dependence on data that is accurate and reliable. Automated and periodic reconnaissance checks are valuable towards minimizing errors and ensuring the integrity of data. Providing employees with adequate training on correct data entry and offering friendly input sheets to users can further improve the quality of data. Besides, the integration of advanced features such as real-time tracking will make it possible to overcome the disadvantages of manual updating and batch processing. Generating and incorporating advanced technologies, such as cloud-based platforms, GPS-enabled tracking devices, and IoT sensors, can transform the way we view information, providing instant updates and improving decision-making through dynamic operational changes.

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## AUTHORS CONTRIBUTION

K. Shanmugamani (Writing - original draft, Methodology, Data curation, Formal Analysis, Resources)

Nor Rokiah Md Haron (Conceptualization, Supervision, Writing - review & editing)

## AVAILABILITY OF DATA AND MATERIALS

The data supporting this study's findings are available on request from the corresponding author.

## ETHICAL STATEMENT

Not applicable.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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