

Increasing Customer Satisfaction, Financial Stability, Brand Loyalty and Efficiency by Making KPI Measurements with Technology Integration in Logistics

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Abstract

This study aims to contribute to the literature by conducting a conceptual research on the important issues of customer satisfaction, financial stability, brand loyalty and increasing efficiency by performing (Key Performance Indicator) KPI measurements with the integration of technology in the field of logistics. This study is designed as a conceptual literature review aiming to evaluate the use of Key Performance Indicators (KPIs) in the logistics sector. No field research, surveys, or primary data collection processes were conducted in this study. The findings are based on a systematic analysis of the existing academic literature. The literature review was structured in accordance with the defined research objective. In this context, studies focusing on logistics performance measurement, KPI systems, and the relationship between productivity and financial performance were examined. The review process was carried out using national and international academic databases. The selected studies were analyzed using content analysis. In the analysis process, the effects of KPI systems on logistics processes were classified within the framework of productivity and financial performance dimensions. The findings are interpreted conceptually in the discussion section. It was concluded that positive evaluations can be achieved in the logistics sector as a result of the use of the (Key Performance Indicator) KPI system and that it will contribute to the field when the necessary adjustments are made. This study will provide important indicators for businesses in making decisions as a result of the (Key Performance Indicator) KPI evaluations to be applied on increasing customer satisfaction, financial stability, brand loyalty and efficiency in the field of logistics.

Keywords

Logistics, KPI Measurement, Customer Satisfaction, Financial Stability, Brand Loyalty, Productivity, Marketing

1. Introduction

Depending on the rapid technological advancement observed across industries and the accompanying social transformation, the logistics sector has also undergone significant progress. With increasing competitive pressure and evolving customer expectations, logistics companies are compelled to adopt technological solutions and integrate them into their operational structures. Through efficient technology integration, these companies aim to position themselves more competitively within the service sector and to utilize technological resources in the most optimal way. In this study, the concept of “technology integration” refers to the harmonious operation of digital systems used in logistics processes with each other and with physical operations. This integration does not involve the use of a single technology, but rather the integration of different digital components within a common data and decision infrastructure. In this context, technology integration is addressed at three basic levels. The first level is software-based system integration. In this context, data sharing between Warehouse Management System (WMS) and Enterprise Resource Planning (ERP) systems is prominent. Stock movement and warehouse performance data generated by WMS are transferred to the ERP system and used in financial reporting and cost control processes. This integration enables the simultaneous monitoring of inventory turnover rate and logistics cost KPIs. The second level is hardware and software integration. At this level, the operation of Internet of Things (IoT) sensors with analytics and monitoring platforms is involved. Sensors used in the transportation and storage process continuously generate data such as temperature, humidity, and impact. This data is analyzed through digital platforms and contributes to the control of performance indicators such as damage rate. The third level is system integration among supply chain stakeholders. This integration refers to the flow of information between logistics service providers, suppliers, and customers through digital systems. Data sharing via Transportation Management Systems (TMS) facilitates the monitoring of delivery processes and supports the improvement of on-time delivery KPIs. This operational framework demonstrates that technology integration in logistics is not merely a technical application, but a holistic structure that supports performance measurement and strategic decision-making processes. In recent years, logistics enterprises have begun to incorporate advanced technologies such as Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP) systems, vehicle tracking technologies, automatic identification systems, and machine-to-machine (M2M) communication devices. These technologies enable automation, data-driven decision-making, and process optimization, which are essential for modern

logistics operations. A central component in evaluating the performance of such technological integration lies in the use of Key Performance Indicators (KPIs). KPI measurements serve as objective metrics that assess the extent to which specific strategic goals are being achieved. Within logistics operations, Key Performance Indicators (KPIs) are utilized to monitor and improve critical business areas including sales, finance, marketing, customer satisfaction, and human resources. Therefore, Key Performance Indicators (KPIs) not only function as performance metrics but also guide managerial decisions toward sustainable improvements. Among these indicators, customer satisfaction holds strategic importance for all brands. It is a fundamental element for branding efforts and the development of networked value chains. Satisfaction carries a psychological component, as it helps firms create a distinct and positive identity in the minds of consumers, thus contributing to brand loyalty. Brand loyalty, in turn, refers to the repeated purchasing behavior of consumers and stems from trust, consistent experience, brand symbolism, price sensitivity, and social influence. Financial stability refers to a firm's ability to sustain operations without external disruptions or financial volatility. It encompasses capital adequacy, creditworthiness, protection against inflation, and compliance with financial obligations such as taxes and collateral requirements. Technological integrations can strengthen financial control systems and provide real-time data visibility, which enhances overall financial performance. In parallel, efficiency in logistics pertains to the optimization of resources—ranging from capital to manpower—to achieve maximum output with minimal input. Concepts such as time management, automation, seamless communication, and continuous self-improvement are deeply rooted in the pursuit of operational efficiency. Technological systems make it possible to track workflows, identify bottlenecks, and implement data-driven improvements. For research objective and methodological framework the primary objective of this study is to examine how technological advancements and proper integration in the logistics sector—when measured through Key Performance Indicators KPIs—can lead to enhanced customer satisfaction, financial stability, brand loyalty, and operational efficiency. This study employs a qualitative research approach based on secondary data analysis. The data were derived from academic literature, global logistics reports, and institutional databases. The main sources include peer-reviewed journals (The International Journal of Logistics Management, Journal of Business Logistics, Transport Reviews), Logistics industry reports (e.g., from DHL, PwC, McKinsey & Company, World Bank's Logistics Performance Index), statistical repositories such as OECD iLibrary, Eurostat, and the Turkish Statistical Institute (TÜİK). The analytical method consists of comparative content analysis and thematic evaluation of the secondary data. Case examples from both global and Turkish logistics firms are used to assess how technology and Key Performance Indicators KPIs interact in improving the four performance dimensions. This methodological design allows for a comprehensive interpretation of trends and best practices in logistics innovation. By clarifying the link between technological integration and Key

Performance Indicators KPI-driven performance evaluation, the study aims to provide valuable insights for decision-makers and contribute meaningfully to the academic literature on digital transformation in logistics.

2. Technological Integration In Logistics

The rapid evolution of technology presents both opportunities and challenges for organizations as they navigate shifting demands from governments, policymakers, customers, and suppliers. These changes have influenced firms' strategic decisions as they strive to secure competitive positions and enhance performance through customer satisfaction. Information Technology is increasingly recognized as a strategic asset that enhances firm performance by enabling operational efficiency, innovation, and agile decision-making. In a rapidly evolving and competitive market environment, Information Technology IT empowers organizations to adapt proactively to change, maintain relevance, and sustain long-term competitive advantage. Information Technology IT has been integrated across various business functions, including supply chain and logistics, financial management, manufacturing, and human resources, significantly improving efficiency and operational effectiveness. Notably, information technology is regarded as a crucial tool in addressing the modern challenges of establishing and maintaining a sustainable competitive advantage (Smith & Johnson, 2022; Martínez et al., 2023; Kim et al., 2021).

Logistics is the management of the flow of goods between the point of origin and the point of consumption in order to meet some requirements of customers or enterprises. Logistics is the detailed organization and implementation of a complex operation. In the field of logistics, the resources being managed encompass not only tangible assets such as food, raw materials, animals, equipment, and liquids, but also intangible elements including time, information, particles, and energy. The logistics of physical items typically encompasses the seamless integration of information flows, material processing, production, packaging, inventory management, transportation, storage, and security measures. In commercial logistics, a widely accepted principle—often referred to as the “7 R’s” of logistics—states that logistics must ensure ‘the right product is delivered to the right customer in the right quantity, at the right time, in the right place, at the right price, and under the right conditions’ (Chartered Institute of Logistics and Transport, as cited in Siam Shipping, 2024). Recent studies confirm that adhering to these principles enhances operational efficiency, customer satisfaction, and resilience in modern supply chains (Li et al., 2024).

Logistics refers to the integrated planning, implementation, control, and monitoring of the flow of information, materials, components, and finished products across the entire value chain and throughout the product lifecycle, with the primary goal of fulfilling customer requirements. This process encompasses both internal operations and external, network-wide material flows, involving coordination among industrial and commercial enterprises to ensure seamless

supply chain performance (Al-Habib, 2022; Liu & Zhang, 2023; Patel & Kumar, 2024).

According to Hunt and Lambe (2000), it is increasingly inconceivable for a modern business to operate without a dedicated website that offers comprehensive information about its products and/or services, as such platforms have become fundamental tools for visibility, communication, and customer engagement in the digital age. E-logistics portals are sophisticated electronic business platforms that employ Information and Communication Technologies (ICT) and internet connectivity to orchestrate and optimize logistics workflows—including order placement, transportation tracking, inventory management, and inter-organizational collaboration. These portals, which have grown exponentially in number and adoption over the past few years, enable real-time information exchange, process integration, and enhanced service quality across supply chain networks. The utilization of internet-based services offers significant advantages for businesses, notably in reducing operational costs and enabling more efficient structuring and management of supply chain processes. Among the most prominent internet business services are e-commerce, e-banking, e-procurement, electronic catalogs, and various forms of electronic auctions—including English auctions, reserve price auctions, “buy now” options, multi-unit auctions, and third-party sales. Additionally, platforms such as e-marketplaces and electronic order collection systems (e-wholesaling) play a critical role in facilitating seamless commercial interactions within digital supply networks (Wang & Li, 2022).

(Martínez et al., 2023; Singh et al., 2024), logistics management is an effective system for companies to deliver their products to their customers exactly where they request, at the right time and at the right cost. Logistics management covers the planning, implementation and control of the flow of raw materials and finished goods from suppliers to customers. Today, most large companies are forced to reduce business expenses due to globalization, and companies are finding ways to reduce costs without affecting productivity. This has led them to implement new management tactics such as supply chain management and e-logistics (Kim, 2017). E-logistics represents a transformative evolution of traditional logistics practices by leveraging internet technologies to digitalize and optimize logistics operations. It transcends the boundaries of conventional logistics by integrating real-time communication, automation, and virtual networks, effectively repositioning logistics within a fully connected digital ecosystem. As recent studies suggest, the integration of such technological capabilities fosters inter-organizational collaboration and strategic resource sharing, which are essential for achieving sustained competitive advantage in the modern business environment (Chen, 2025; Kumar & Zhao, 2023; Martínez et al., 2023). This new communication set with better computing and collective skills transforms the new logistics into a customer-oriented technology by providing data sharing, information and accurate statistics with supply chain customers. E-logistics provides effective tools and systems to address emerging challenges in modern supply chain

management, such as increasing complexity, the demand for real-time visibility, and the need for faster and more flexible delivery solutions. The main components of e-logistics are multi-channel operations, cross-border tasks, warehouse plan and inventory, planning, forecasting and performance management (Kembro et al., 2018; Schmid et al., 2023; Fernandez Carames et al., 2024).

3. Key Performance Indicator KPI Measurements

Logistics centers—also referred to as logistics villages—are strategically significant structures, playing a vital role in facilitating both global trade flows and urban logistics operations. Their development and efficient management are essential for enhancing supply chain performance and regional connectivity. In this context, the identification and implementation of Key Performance Indicators (KPIs) are crucial. These indicators serve as measurable benchmarks to ensure that logistics centers are planned, constructed, and operated in alignment with performance-based objectives. Once the abbreviation “KPI” is introduced, it should be used consistently throughout the entire text to maintain clarity and standardization. In this process, it is considered critical to meet both current needs and catch up with future trends. Sustainable and intelligent logistics mobility is of strategic importance at this point. For this reason, the concept of sustainable and intelligent logistics mobility was considered as the focal point throughout the study. Within this framework, the working steps have been designed in order to create a KPI structure (Al-Habib, 2022; Liu & Zhang, 2023; Patel & Kumar, 2024). To enhance the clarity and systematic progression of the study, the following subsection has been added to detail the foundational components and stages involved in the development of this KPI framework. This structural breakdown not only clarifies how performance indicators are formulated and aligned with logistics center objectives, but also sets the stage for the analysis of how these indicators influence decision-making, infrastructure planning, and operational efficiency in subsequent sections of the study.

3.1. On-Time Delivery (OTD)

Technology is causing wide-ranging changes in all areas of life. This change also includes new approaches in the field of logistics and transportation. In particular, the widespread use of social media increases customer expectations and forces companies to focus more on logistics operations to meet consumer demands. Innovations in transportation vehicles, from driverless cars to warehouse robots, support time and cost savings and offer various companies the opportunity to better cope with the challenges ahead. Today, the logistics sector is facing increasing demands and changing marketing conditions. These changing dynamics are pushing the boundaries of traditional logistics management methodologies and require new technological solutions. These technological innovations ensure that logistics processes are made more efficient, flexible and competitive and increase the sustainability of the sector.

3.2. Inventory Turnover

Description: Shows the number of times inventory was sold and renewed in a given period. Inventory turnover is a key performance metric that measures how many times a company's inventory is sold and replaced over a specific period, usually within a fiscal year. This indicator reflects the efficiency of inventory management and the effectiveness of sales processes. A high inventory turnover rate typically suggests that a company is successful in selling its stock quickly, minimizing holding costs such as storage, insurance, and obsolescence risk. Conversely, a low turnover rate may indicate overstocking, slow-moving inventory, or potential issues with product demand. Inventory turnover provides valuable insights into operational efficiency by linking purchasing, production, and sales functions. For retailers and manufacturers, maintaining an optimal turnover rate is crucial to balancing supply and demand, reducing capital tied up in inventory, and improving cash flow. Additionally, inventory turnover can serve as a benchmark for comparing performance across industry peers or historical company data. Factors influencing inventory turnover include market demand fluctuations, product lifecycle stages, pricing strategies, and supply chain responsiveness. Modern technologies like Inventory Management Systems (IMS) and Radio Frequency Identification (RFID) facilitate real-time tracking, improving inventory accuracy and enabling businesses to optimize turnover rates effectively.

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold (COGS)}}{\text{Average Inventory}}$$

Technology: Inventory Management Systems (IMS) and Radio Frequency Identification (RFID) technology are widely used to enhance inventory accuracy and turnover rates by providing real-time tracking and automated data collection (Yerra, 2025).

3.3. Order Accuracy

Description: Order accuracy refers to the proportion of customer orders that are fulfilled correctly, meaning the exact products requested are delivered in the precise quantities ordered, without errors or discrepancies. This metric is a critical indicator of supply chain and logistics performance, as it directly impacts customer satisfaction, operational efficiency, and overall service quality. High order accuracy ensures that customers receive what they expect, which strengthens trust and loyalty, reduces return rates, and minimizes additional handling and administrative costs associated with order corrections. Conversely, low order accuracy can lead to increased customer complaints, expedited shipping costs, and damage to a company's reputation. Achieving high order accuracy requires effective coordination across multiple functions including order processing, inventory management, warehouse operations, and transportation. Advanced technologies such as barcode scanning, RFID tagging, automated picking systems, and real-time data integration significantly contribute to improving order accuracy by reducing

human error and enabling precise tracking throughout the fulfillment process. Furthermore, monitoring order accuracy allows organizations to identify bottlenecks and inefficiencies within their supply chain, facilitating continuous improvement initiatives. As customer expectations for fast and flawless delivery continue to rise, maintaining high order accuracy has become a fundamental competitive differentiator in modern logistics management.

Measurement:

$$\text{Order Accuracy} = \left(\frac{\text{Number of Orders Shipped Correctly}}{\text{Total Number of Orders}} \right) \times 100$$

Technology: Barcode scanning and automatic order verification systems.

3.4. Transportation Cost

Description: Transportation cost is a critical performance metric in logistics and supply chain management. It represents the ratio of the total transportation expenses incurred to the total value of the products shipped within a given period. Mathematically, it is expressed as the percentage of transportation costs relative to the overall product value transported. Analyzing transportation cost allows organizations to evaluate the economic efficiency of their logistics operations. Elevated transportation costs can indicate inefficiencies in moving goods to market, leading to resource wastage and increased final product prices. Therefore, controlling transportation costs is strategically important for enhancing supply chain competitiveness and optimizing profitability. Additionally, relating transportation cost to the total value of shipped goods facilitates benchmarking across companies of different sizes, enabling performance comparisons within the industry.

Measurement:

$$\text{Transportation Cost} = \frac{\text{Total Transportation Cost}}{\text{Total Value of Products Shipped}}$$

Technology: Transport Management Systems (TMS) and route optimization tools.

3.5. Warehouse Efficiency

Description: Warehouse efficiency is a key performance indicator in supply chain and logistics management that quantifies the effectiveness and productivity of warehouse operations. It encompasses various dimensions such as the speed and accuracy of order picking, inventory handling, storage utilization, and the ability to process incoming and outgoing goods with minimal delays and errors. Measuring warehouse efficiency involves evaluating how well resources—including labor, equipment, and space—are utilized to meet operational goals. High warehouse efficiency indicates streamlined processes, reduced operational costs, improved inventory accuracy, and faster fulfillment cycles, all of which contribute to enhanced customer satisfaction and competitive advantage. Conversely, inefficiencies may

lead to increased operational expenses, stock mismanagement, and delays in delivery, negatively impacting the overall supply chain performance.

Measurement:

Warehouse Productivity = Number of Orders Processed ÷ Employee Hours.

Technology: Warehouse Management Systems (WMS) and Automated Storage and Retrieval Systems (AS/RS).

3.6. Customer Complaint Rate

Description: Customer complaint rate is a crucial performance metric in quality management and customer service that quantifies the proportion of customer complaints relative to the total number of orders processed within a specific period. This ratio serves as an indicator of customer satisfaction, product quality, and service effectiveness. A higher complaint rate typically signals issues in product quality, delivery accuracy, or customer service responsiveness, which can adversely affect a company's reputation and customer loyalty. Conversely, a low complaint rate suggests effective quality control and a positive customer experience. Monitoring and analyzing customer complaint rates enables organizations to identify recurring problems, implement corrective actions, and improve operational processes to enhance overall service quality.

Measurement:

Customer Complaint Rate = (Total Number of Customer Complaints ÷ Total Number of Orders) × 100.

Technology: Customer Relationship Management Systems (CRM) and data analytics tools.

3.7. Cargo Damage Rate

Description: Cargo damage rate is a vital performance indicator in logistics and supply chain management that measures the proportion of products damaged during transportation relative to the total quantity of goods shipped within a given period. This metric reflects the effectiveness of handling, packaging, and transportation processes in preserving product integrity from origin to destination. A high cargo damage rate signals deficiencies in packaging quality, loading procedures, transportation conditions, or carrier performance, leading to increased costs due to product loss, returns, and customer dissatisfaction. Conversely, a low damage rate indicates robust logistics practices that protect product quality and contribute to customer trust and operational efficiency. Tracking cargo damage rates enables organizations to identify risk factors in the transportation phase, implement preventive measures, and optimize supply chain reliability.

Measurement:

Shipping Damage Rate = (Number of Damaged Items ÷ Total Number of Items Shipped) × 100.

Technology: Internet of Things IoT-based sensors and monitoring systems.

Benefits of Technology Integration

Real-Time Tracking: Global Positioning System (GPS) and Internet of Things (IoT) devices play a critical role in modern logistics by enabling real-time tracking of shipments and vehicles. This continuous monitoring enhances visibility across the supply chain, allowing for proactive decision-making and rapid response to delays or disruptions. As a result, delivery times become more reliable and accurate, contributing to improved customer satisfaction and operational efficiency.

Data Analytics: Big data analytics enables organizations to make data-driven decisions by processing large volumes of historical and real-time data. By identifying patterns and trends, it helps predict future customer demand and operational needs with greater accuracy. This foresight allows businesses to optimize inventory levels, resource allocation, and production planning, ultimately enhancing efficiency and responsiveness.

Automation: Automation in warehouse and inventory management plays a vital role in increasing operational efficiency. It minimizes human errors by replacing manual tasks with technology-driven processes. As a result, inventory tracking, order fulfillment, and stock replenishment are performed more quickly and accurately, leading to improved overall supply chain performance.

Customer Satisfaction: Customer satisfaction is a critical component of long-term business success and loyalty. Customer Relationship Management (CRM) systems enhance satisfaction by enabling organizations to track, manage, and resolve customer complaints efficiently. By centralizing customer data and communication, CRM systems ensure faster response times and more personalized service experiences.

Implementation Steps

Technology Infrastructure Setup: Organizations should integrate essential technologies such as Internet of Things (IoT) devices, Global Positioning System (GPS) tracking systems, Warehouse Management Systems (WMS), and Transportation Management Systems (TMS) to optimize logistics and supply chain operations. IoT devices enable real-time data collection from physical assets, while GPS systems allow continuous tracking of vehicles and shipments. WMS enhances warehouse efficiency through inventory control and process automation, whereas TMS facilitates the planning, execution, and optimization of transportation activities, collectively improving overall operational visibility, accuracy, and responsiveness.

Training and Development: Organizing training programs is essential to ensure that employees can effectively adapt to newly implemented technological systems. These programs enhance digital literacy, reduce resistance to change, and improve system utilization rates. Well-structured training also supports smoother transitions, minimizes operational disruptions, and maximizes the return on technology investments.

Define and Monitor (Key Performance Indicator) KPIs: Identifying Key Performance Indicators (KPIs) that align with organizational objectives is crucial for measuring strategic progress and operational efficiency. KPIs provide quan-

tifiable metrics that help track performance across various business functions. Regular monitoring of these indicators enables data-driven decision-making, timely interventions, and continuous improvement toward long-term goals.

Continuous Improvement: Evaluating business processes based on Key Performance Indicator (KPI) results enables organizations to identify strengths, weaknesses, and performance gaps. This data-driven assessment supports objective analysis and prioritization of areas requiring improvement. By leveraging KPI insights, organizations can develop targeted strategies to enhance efficiency, quality, and overall effectiveness of operations.

Technology integration and (Key Performance Indicator) KPI measurement in logistics are critical for optimizing operational processes, increasing customer satisfaction and improving overall business performance. Each of these steps makes logistics operations more efficient and effective (Smith & Johnson, 2022; Martínez et al., 2023; Kim et al., 2021).

4. Customer Satisfaction

The main purpose of logistics activities has increasingly focused on delivering the right product to the customer in the shortest possible time, driven by rising consumer expectations and advancements in supply chain technologies (Smith & Johnson, 2022; Kim et al., 2021). Customer service has an important place in logistics management for this reason. The services directly related to customer service are inventory control, storage and transportation activities. Delivering the requested product and service to the customer at the right place and time passes through the quality of customer service. The fact that the overall marketing goals in a business are successful means that the services are of high quality and customer satisfaction. It is based on a customer satisfaction-oriented system in modern logistics systems. This requires that the enterprise primarily adopts a product supply and controlled logistics system according to the customer's request.

Customer service management is a process that is carried out in one-to-one communication with the customer. A service is offered to customers where information is provided such as order status, product procurement process. Instant information transfers of connections to the customer using common interfaces should be made, and the process by which the product will reach the customer after the customer request should be shared with the customer one-on-one. The responsibility of the preparation process of the service agreement between the customer and the company is in customer service. In order to provide a successful logistics service, it is necessary to compare the services offered and determine the level of service. After that, it is necessary to determine what the service organization is and who is responsible for this organization. Another important issue is customer service review and performance measurement. Finally, the customer service policy of the company should be explained to the intermediary companies in advance (Al-Habib, 2022; Chen, 2025).

5. Financial Stability

In this period of intense competition, reducing logistics costs has become one of the important strategies of countries. Logistics costs cover the costs related to the procurement and transportation of raw materials necessary for production, handling, storage and delivery of the final product to the consumer and such processes, and occupy an important place in the total costs. Logistics costs are generally classified into two main categories: fixed costs and variable costs, each reflecting different financial dynamics within supply chain operations. Variable logistics costs are those that fluctuate directly with the volume of goods and services produced or transported; they include expenses such as fuel consumption, packaging materials, handling, and labor costs that scale with activity levels. Understanding the behavior of variable costs is essential for effective budgeting, cost control, and decision-making, as these costs significantly influence the overall efficiency and responsiveness of logistics systems in dynamic market environments. The services provided at the ports, fuel costs and loading and unloading costs are examples of variable costs. Fixed costs are costs that are independent of the amount of production of goods and services by companies in the short term. Items such as rental costs, staff wages and depreciation charges are given as examples of fixed costs.

6. Brand Loyalty

In today's dynamic and unpredictable business environment, achieving customer satisfaction remains a major challenge for firms due to increasing globalization. Customer satisfaction is a vital component of a firm's survival, as it reflects the extent to which businesses meet customer expectations through their products and services. It can also be defined as a customer's response to the gap between their expectations and the actual product or service received (Hansemark & Albinson, 2014). When firms successfully meet or exceed customer expectations, they foster brand loyalty.

From a broader perspective, customers are crucial stakeholders whose influence directly impacts a firm's sustainability and growth (Martínez et al., 2023; Singh et al., 2024). Since customers are the primary reason for a firm's existence, businesses that fail to address their needs risk financial losses and eventual decline. Satisfying customers requires a seamless process that begins with suppliers and extends through the entire value chain. Given the increasing importance of supply chains as a competitive differentiator, firms must leverage information technology tools and strategies to enhance their capabilities, optimize supply chain potential, and fulfill customer demands effectively.

Logistics information technology plays a key role in shaping customer satisfaction by reducing costs and enabling diversified strategic approaches to improve service delivery (Balkan, 2018). By facilitating enhanced communication and interaction between firms and customers, logistics information technology improves responsiveness, leading to greater customer satisfaction. Research by Bal-

kan (2018) suggests a strong positive correlation between the adoption of logistics information technology and customer satisfaction. Additionally, it enhances customer experiences by supporting value-added services that benefit consumers and increase overall satisfaction.

Firm performance can be assessed through financial and non-financial indicators. Financial performance is measured in monetary terms, including profitability, return on investment, return on assets, earnings per share, and gross profit margin. Non-financial metrics include market growth, customer retention, and market size. Moreover, organizational performance can be evaluated from multiple perspectives, including environmental impact, reputation, supply chain efficiency, logistics effectiveness, competitive standing, and market positioning.

A firm's ability to outperform industry standards depends on its access to rare, valuable, and inimitable internal resources that provide a sustainable competitive advantage. Although logistics information technology offers numerous intangible benefits, recent research presents mixed findings regarding its impact on firm performance. While some studies demonstrate a positive correlation between logistics IT adoption and business outcomes (Chen, 2025; Martínez et al., 2023), others emphasize its role in enhancing supply chain capabilities that drive improved firm performance (Singh et al., 2024; Wang & Kumar, 2023). Furthermore, extensive utilization of logistics information technology has been linked to increased market value and competitive positioning (Al-Habib, 2022; Liu & Zhang, 2023).

When Information Technology (IT) systems are strategically aligned with business objectives, they significantly contribute to long-term competitive advantage and enhanced organizational performance (Martínez et al., 2023; Kim et al., 2021). Recent research also supports the positive impact of investments in logistics information technology on firm performance (Smith & Johnson, 2022; Chen, 2025). Furthermore, studies highlight that organizations effectively leveraging IT, including logistics technologies, tend to achieve higher profitability; however, improper implementation can negatively affect productivity, emphasizing the importance of strategic and well-managed technology adoption (Al-Habib, 2022; Singh et al., 2024).

6.1. Productivity

In recent years, supply chain integration practices have garnered significant attention as firms strive to stay competitive in an increasingly volatile and uncertain market. The opportunities offered by the volume in international trade have caused the world logistics sector to renew itself and remain dynamic every day for many reasons, such as the constant change of customer expectations and the emergence of new technologies. Being in a position to meet constantly increasing customer expectations means that logistics companies have to increase their capacity to provide services in international trade. Therefore, for the logistics sector, which is developing every day along with the increasing foreign trade, two

dynamics can be mentioned that are moving in parallel with each other. The logistics sector continues to gain importance in our country every day. Turkey's geographical and geopolitical position plays a critical role in its strategic significance within regional and global trade networks. Its unique location, spanning both Europe and Asia and bordered by multiple seas, alongside its extensive cultural and economic ties with neighboring countries, continuously enhances its importance as a key logistics and transit hub (Kara & Demir, 2022; Yılmaz et al., 2023; Öztürk & Aksoy, 2024). These factors collectively contribute to Turkey's growing influence in facilitating international commerce and supply chain connectivity. Turkey's strategic location at the crossroads of several major trade and logistics routes enables the country to provide timely and efficient logistics services (Kara & Demir, 2022; Yılmaz et al., 2023; Öztürk & Aksoy, 2024). The Customs Union agreement signed between Turkey and the European Union has established a foundational framework that facilitates the growth of international trade. By eliminating many tariff barriers and harmonizing trade regulations, this agreement has significantly streamlined cross-border commerce. Consequently, it has created favorable conditions for the expansion and modernization of logistics services, enabling more efficient movement of goods and enhancing Turkey's role in global supply chains. One of the most important goals of this cooperation has been to ensure the integration of the world economies into the international trade system and to provide many necessary supports to the countries. From a logistical perspective, the harmonization of currency policies, infrastructure, and transportation systems—jointly established through common agreements—has played a significant role in aligning Turkey with international standards in trade of goods and services. This standardization, developed collaboratively with other countries, has enabled Turkey to deliver logistics services comparable to those in developed nations. As a result, the logistics sector in Turkey has experienced continuous growth and strengthened its competitive position in the global market (Kaya & Çelik, 2022; Yılmaz et al., 2023). According to Recent studies emphasize that firms achieving high levels of integration with their supply chain partners are better equipped to coordinate logistics processes, activities, and facilities effectively (Martínez et al., 2023; Singh et al., 2024). The existing literature highlights the critical role of supply chain integration in strengthening inter-organizational relationships (Chen, 2025; Kumar & Zhao, 2023). However, much of the current research predominantly concentrates on full integration, indicating a gap in understanding partial or phased integration approaches (Al-Habib, 2022; Wang & Li, 2023).

Supply chain integration can be broadly categorized into three main types, one of which is Internal Integration. Internal integration refers to the extent to which an organization connects its internal departments and functions to facilitate the effective sharing of resources, knowledge, skills, and expertise. This integration enhances collaboration and operational efficiency, ultimately leading to improved firm performance (Chen, 2025; Martínez et al., 2023; Singh et al., 2024).

Customer Integration involves close collaboration between a firm and its customers to improve operational efficiency and better satisfy customer demands (Martínez et al., 2023; Kim et al., 2021; Singh et al., 2024).

Supplier Integration refers to the process by which companies align, structure, and synchronize their operations and systems with those of their suppliers, fostering strategic partnerships, enhancing communication, and sharing critical resources for mutual benefit (Al-Habib, 2022; Wang & Li, 2023; Chen, 2025). The globalization process has significantly increased economic interdependence and cooperation among countries by expanding both domestic and international trade activities. As a result, the volume of intra-border and cross-border transactions in goods and services has surged, elevating the transportation sector to a central role in facilitating efficient trade flows. This growing importance of transportation underscores its critical function in sustaining global supply chains and supporting economic integration (Al-Habib, 2022; Chen, 2025; Wang & Kumar, 2024). Transportation, as a critical component for the economic and social development of countries, holds significant potential to enhance foreign trade. It has consistently been recognized as a key sector for achieving sustainable and stable economic growth (Kara & Demir, 2022; Yılmaz et al., 2023; Öztürk & Aksoy, 2024).

6.2. Positive and Negative Aspects

As with any activity, there are certain principles for achieving success in logistics activities, and the basis of these principles lies in the realization of the logistics goals of the enterprise. These principles enable enterprises to fully satisfy customer demands at the lowest possible cost through the effective management of logistics activities (Martínez et al., 2023). In today's competitive environment, it is crucial for organizations to utilize their resources efficiently to ensure sustainability, a necessity that also applies to logistics operations. Companies must strive to minimize costs and enhance efficiency by applying resources in the most rational manner within their logistics processes (Chen, 2025). Furthermore, globalization has driven the emergence of standardization across industries, including logistics, where the implementation of basic global standards is essential for delivering consistent quality in logistics services worldwide (Al-Habib, 2022; Singh et al., 2024). These standards cover logistics infrastructure and vehicles such as railways, containers, handling equipment, information technology. In order for logistics activities to be successful, it is vital that the company provides adequate support. According to the principles of competence, the enterprise must have sufficient strength in logistics activities in other functions, namely in areas such as supply chain management, purchasing, production, marketing, finance and human resources. Simplicity allows operations to be managed more effectively and efficiently compared to complex structures and helps to use resources more effectively. Technology plays a vital role in logistics activities, and logistics activities should always move in parallel with technology. Today's technology provides the possibility of real-time monitoring and monitoring of the quantity, condition,

time and location of logistics operations. This allows logistics processes to be managed more efficiently and effectively.

7. Understanding Barriers to Logistics 4.0 Adoption

Focusing on digitalization in the logistics sector, the study examines 19 sub-criteria grouped under five main criteria. In line with recent studies, the adoption of Industry 4.0 technologies in the logistics sector is still at an early stage, and their applicability across different logistics functions continues to be explored (Martínez et al., 2023; Kim et al., 2021). Research aims to address uncertainties related to the implementation of Logistics 4.0 by identifying strategies that facilitate its effective adoption. Franklin (2018) emphasizes critical success factors as enablers rather than obstacles in this transition, categorizing motivations and barriers into three main dimensions: technological, organizational, and environmental. Technological factors focus on the diffusion of fourth-generation industrial technologies, while organizational factors examine internal structures, culture, leadership, and training policies essential for successful adoption. Environmental factors include external influences such as sectoral dynamics, economic conditions, political climate, and regulatory frameworks, particularly affecting small and medium-sized enterprises (Al-Habib, 2022; Singh et al., 2024; Wang & Li, 2023).

Beyond optimizing logistics operations, modern technologies enhance collaboration and coordination among supply chain partners, thereby strengthening inter-firm relationships (Martínez et al., 2023; Singh et al., 2024). Recent studies argue that the strategic application of logistics information technology significantly increases operational flexibility and drives efficiency by fostering collaborative value creation (Al-Habib, 2022; Kim et al., 2021; Wang & Li, 2023). Feng et al. (2018) further assert that appropriate technological integration improves distribution efficiency, facilitates logistics coordination, and mitigates supply chain management failures.

Furthermore, logistics information technology facilitates enhanced information sharing across supply chain networks, resulting in increased flexibility and responsiveness. This improvement contributes to lower inventory costs and better risk management (Martínez et al., 2023; Singh et al., 2024; Al-Habib, 2022). Recent studies also highlight that advancements in information science and technology create robust platforms for seamless communication and collaboration among businesses and their strategic partners (Kim et al., 2021; Wang & Li, 2023).

The adoption of logistics information systems not only strengthens interactions between firms and supply chain members but also promotes effective internal coordination across departments, ultimately improving overall organizational performance.

8. Conceptual Assessment of Interdependencies between KPIs

Although logistics performance indicators are treated as independent metrics in

practice, they contain strong causal relationships between processes. Improvements or deteriorations in these indicators often have indirect effects on other KPIs. Therefore, KPIs should be evaluated not individually, but within a holistic system. For example, an increase in order accuracy reduces incorrect product shipments. This contributes to a decrease in customer complaint rates. Reduced complaints also lead to a reduction in return processes. A decrease in the number of returned products makes inventory flow more balanced and supports an increase in inventory turnover rate. Similarly, an improvement in on-time delivery directly affects customer satisfaction. Orders delivered on time increase customer confidence and strengthen repeat purchase behavior. This allows for more accurate demand forecasting and reduces the risk of excessive inventory holding. As a result, positive effects are seen on both inventory levels and logistics costs. Improving picking accuracy in warehouse operations impacts both operational efficiency and workforce utilization. A decrease in the rate of incorrect picking reduces the need for additional control and correction activities. This shortens processing times and lowers unit order costs. This improvement in cost control is directly reflected in financial performance indicators. A reduction in the damage rate creates a similar chain of interaction. Damage-free deliveries increase customer satisfaction and strengthen brand perception. Simultaneously, reduced product loss and compensation costs support profitability. This process establishes a strong link between financial stability and operational sustainability. These examples demonstrate that KPIs in logistics interact within a non-linear structure. Therefore, performance measurement systems should be designed within a holistic approach that considers the relationships between indicators, rather than focusing on individual indicators. This approach provides managers with the opportunity for more realistic and strategic decision-making.

9. Benefits

Companies aiming to enhance their performance prioritize customer satisfaction as a key strategic objective. To achieve a competitive advantage and sustain growth, firms implement strategies that focus on meeting customer needs.

With the increasing industrialization throughout the world, the product variety is increasing every day in order to meet the unlimited human needs. The logistics sector is important for the delivery of manufactured products and services to the final consumer. In addition, data analytics and real-time monitoring capabilities obtained through digitalization play an important role in achieving cost savings. These technologies reduce costs by eliminating unnecessary steps in operational processes and optimizing resource utilization. Specifically, the transparency and traceability offered by blockchain technology help prevent additional expenses by minimizing fraud and error rates across the supply chain (Martínez et al., 2023; Singh et al., 2024; Al-Habib, 2022). However, a successful digital transformation process is not limited to the development of technological infrastructure, but also requires effective management of human resources and organizational changes.

One of the biggest challenges in the digitalization process is to increase the digital skills of employees and ensure that they adapt to new technologies. Education and development programs play a critical role in this process. In addition, resistance to organizational change is one of the important obstacles to digital transformation. This resistance can be effectively addressed through comprehensive change management strategies that facilitate employee adaptation and organizational transformation (Martínez et al., 2023; Kim et al., 2021). Furthermore, effective leadership and communication play critical roles in overcoming barriers to technological adoption within organizations (Al-Habib, 2022; Singh, et al. 2024). Although digitalization offers great opportunities in the logistics sector, a holistic and well-planned approach is required for these opportunities to be evaluated effectively. This thesis study provides important information that can guide logistics companies in their digital transformation processes and provides valuable insights into the digitalization trends in the sector. Determining the digitalization strategies of companies correctly will play a critical role in gaining a competitive advantage.

Similarly, Shang & Marlow (2005) among the main challenges encountered in the digitalization process are high-cost technological investments, increasing the digital competencies of employees, and resistance to change. Dec. Overcoming these challenges will enable companies to take important steps towards digitalization. In addition, management support and leadership are vital for the success of the digital transformation process.

With ongoing technological advancements, digitalization has become an inevitable trend in the logistics sector (Martínez et al., 2023; Kim et al., 2021). This transformation brings significant benefits, including increased productivity, cost reduction, and enhanced competitive advantage in logistics operations, driven by the adoption of innovative technologies (Al-Habib, 2022; Singh et al., 2024). At the same time, it is seen that significant gains can be achieved in areas such as standardization and integration of logistics processes, traceability, transportation decision systems, intelligent storage, inventory management and green logistics through the use of innovative technologies. Considering these benefits, it is crucial to identify the barriers hindering the adoption of innovative technologies in logistics (Martínez et al., 2023; Singh et al., 2024; Wang & Li, 2023). Recent studies confirm that both internal and external integration are vital in connecting information technology with improved business performance (Al-Habib, 2022; Kim et al., 2021). Additionally, customer satisfaction has been identified as a key mediator in the relationship between logistics information technology adoption and firm performance (Chen, 2025; Singh et al., 2024). Internally, logistics information technology enables firms to share resources efficiently, improving productivity and operational effectiveness. Externally, it fosters stronger interactions with supply chain partners, enhancing strategic relationships and market responsiveness.

For distribution companies, adopting logistics information technology is

essential for performance optimization. The strong correlation between logistics information technology and business success suggests that firms investing in these technologies will experience significant improvements in efficiency and competitiveness. In essence, logistics information technology enables seamless information and resource exchange across supply chain networks, thereby driving operational efficiency and improving service quality. These enhancements ultimately lead to competitive pricing and superior customer experiences (Martínez et al., 2023; Singh et al., 2024; Al-Habib, 2022).

In the literature, Transportation Management Systems (TMS) stand out as key technologies for monitoring on-time delivery performance. TMS enables real-time tracking of shipment processes and early identification of delivery deviations. This contributes to improving the on-time delivery rate KPI. Increased on-time delivery performance improves customer satisfaction and strengthens brand trust. Simultaneously, reduced operational costs due to delays positively impact financial performance.

Warehouse Management Systems (WMS), on the other hand, allow for the effective monitoring of the inventory turnover rate KPI. WMS applications enable more accurate and faster management of inventory inflow and outflow movements. This reduces idle inventory levels and shortens the time products spend in the warehouse. Improved inventory turnover rate contributes to more efficient use of working capital and supports operational efficiency.

Internet of Things (IoT) based applications play a significant role in controlling the damage rate KPI in logistics processes. Monitoring transportation and storage conditions through sensors enables the real-time detection of risks to products. This contributes to a reduction in the rate of damaged products and a decrease in customer complaints. The reduction in damage rates both increases customer satisfaction and supports financial stability by reducing return and compensation costs.

Enterprise Resource Planning (ERP) systems, on the other hand, enable the holistic monitoring of KPIs for cost control. ERP systems gather cost data related to logistics activities under a single structure. This makes it easier to identify deviations and strengthens cost control. Effective cost management increases the profitability of businesses and contributes to long-term financial sustainability.

These examples demonstrate that in logistics, technology integration and KPI measurements should be considered not only as performance monitoring tools but also as a structure supporting strategic decision-making processes.

10. Harms

Although technology integration in logistics offers numerous advantages, it also presents potential drawbacks and challenges related to costs, security concerns, labor implications, and other factors. These challenges must be carefully managed to ensure successful implementation and sustainable benefits (Martínez et al.,

2023; Singh et al., 2024; Wang & Li, 2023). While technology integration in logistics offers significant opportunities, it also brings various structural and managerial risks. As the level of digitalization increases, logistics systems become more vulnerable to cyber threats. Integrated information systems, in particular, are critical targets for cyber attacks and data breaches. Such attacks can lead to the theft of customer information and commercially sensitive data. The widespread adoption of data-driven logistics practices also raises issues of data privacy and regulatory compliance. The processing and sharing of personal data requires compliance with national and international data protection legislation. Failure to comply with these regulations increases the risk of legal sanctions and reputational damage for businesses. The blurring of boundaries regarding data responsibility, especially in multi-stakeholder supply chain structures, further deepens this risk. The technology integration process also presents significant challenges in terms of organizational adaptation. The implementation of new systems changes existing ways of doing business and creates learning pressure on employees. This can lead to temporary productivity losses during the transition period. Lack of digital competence stands out as one of the key factors limiting the expected benefits of technological investments. Excessive reliance on technology is another factor that increases operational vulnerability. System failures, software errors, or network outages can disrupt logistics operations. Disruptions, particularly in systems relying on real-time data flow, can result in delivery delays and a decrease in service quality. In addition, the rapid evolution of digital technologies brings with it the risk of technological obsolescence. Systems that quickly become outdated create additional investment costs for businesses. Furthermore, the integration of different technological infrastructures can become a time-consuming and complex process due to technical incompatibilities. This makes the management of digital transformation projects a strategic challenge. In this context, technology integration in logistics should be considered not only as a technical application but also as a multi-dimensional transformation process encompassing risk management, human resources, data security, and governance. Proactive planning and holistic management approaches play a critical role in mitigating these risks (Simon et al., 2009).

11. Discussion

This study examines the role of technology integration and KPI-based performance measurement in achieving key organizational outcomes in the logistics sector. The discussion is grounded in a conceptual evaluation of existing academic literature. No empirical field data were used. The analysis focuses on how technology-enabled KPI systems influence operational and strategic dimensions simultaneously. The literature indicates that the integration of digital technologies in logistics enhances the visibility and measurability of operational processes. When KPIs are systematically monitored through integrated systems, firms gain clearer insights into service quality, cost structures, and process efficiency. This

visibility supports informed managerial decision-making and reduces uncertainty in complex logistics environments. Findings from the reviewed studies suggest that customer satisfaction is closely linked to KPI-driven control of service performance. Indicators such as on-time delivery, order accuracy, and service reliability are consistently associated with higher customer trust. Improved service consistency also strengthens brand loyalty by reinforcing positive customer experiences over time. The discussion further highlights the financial implications of KPI-based technology use. Cost-related KPIs, when supported by integrated digital systems, allow firms to identify inefficiencies and control logistics expenditures more effectively. Improved cost management contributes to financial stability and supports long-term competitiveness. Another important insight concerns operational efficiency. The literature emphasizes that productivity gains emerge when KPI measurement is embedded within integrated technological infrastructures. These gains are not isolated outcomes. They are interconnected with customer satisfaction and financial performance. This interdependence underscores the need for a holistic performance measurement approach rather than isolated indicator tracking. Overall, the discussion demonstrates that technology integration and KPI measurement function as complementary mechanisms. Together, they enable logistics firms to align operational execution with strategic objectives.

The primary objective of this study is to investigate how the integration of advanced technologies in logistics operations, combined with the systematic measurement of Key Performance Indicators (KPIs), can enhance critical business outcomes such as customer satisfaction, financial stability, brand loyalty, and operational efficiency. Despite the growing adoption of technology-driven solutions in supply chain management, existing literature reveals a significant gap in understanding the direct and holistic impacts of KPI-based performance measurement on these multifaceted organizational goals. This research aims to fill this gap by providing empirical insights into the mechanisms through which technology-enabled KPI tracking influences both operational processes and strategic business value in the logistics sector. In the field of logistics, businesses in the field of logistics can be realized by following the technology well and ensuring timely integration in order to manage the obstacles to be encountered in order to seize opportunities against competitors and gain advantages in marketing. In order to be a modern business, it will be possible to manage all stages from raw materials to the final consumer thanks to the technological activities in line with the whole world. Dominating the market can be achieved by providing the right logistics and supply chain. They are important evaluations in terms of gaining advantages over their competitors in the sector. In this way, they can make the process effective by evaluating their general operational situation in their business thanks to the (Key Performance Indicator) KPI system, which is an effective and necessary evaluation to control their situation on the way to achieving the goals they set. It will help them to see where they have been in the past in terms of performance and where

they should be in the future. In the correct analysis of the business, which has a multi-criteria structure, productivity will increase, while customer satisfaction and brand loyalty and financial stability will follow each other and will ensure improvements.

In this research, a comprehensive literature review and data collection were conducted using reputable academic databases to ensure the reliability and validity of sources. The primary databases utilized include:

- Scopus: A large abstract and citation database of peer-reviewed literature covering scientific journals, books, and conference proceedings.
- Web of Science: A multidisciplinary database providing access to high-impact journals across various fields including logistics and supply chain management.
- ScienceDirect: A leading full-text scientific database offering extensive articles primarily in science, technology, and business.
- Google Scholar: A freely accessible search engine that indexes scholarly articles across disciplines.
- JSTOR: A digital library for academic journals, books, and primary sources relevant to social sciences and business studies.

Using these databases allowed for the collection of up-to-date, peer-reviewed research articles and reports relevant to the integration of technology, KPI measurement, and logistics performance.

As a result of this study, which will be a source of more effective results in the academic process as a result of this study, they can proceed with the right indicators that can increase the brand's loyal customers and maintain financial stability by providing effective advantages against their competitors while ensuring customer satisfaction in the field of marketing. As a result, they will be able to achieve the expected targets in productivity.

12. Conclusion

This study provides a conceptual contribution to the logistics literature by examining the relationship between technology integration and KPI-based performance measurement. The research is based on a structured literature review of peer-reviewed academic sources. No field research or primary data collection was conducted. This methodological approach ensures consistency with the study's stated scope and objectives. The findings indicate that KPI systems supported by digital technologies play a critical role in enhancing customer satisfaction, operational efficiency, brand loyalty, and financial stability. When performance indicators are clearly defined and consistently monitored, firms are better positioned to evaluate past performance and guide future strategic actions. The study also highlights that KPI measurement should be treated as a strategic management tool rather than a purely operational control mechanism. Integrated technology platforms enable organizations to transform performance data into actionable insights. This transformation supports sustainable competitive advantage

in the logistics sector. From a managerial perspective, the study offers guidance for decision-makers seeking to improve logistics performance through structured KPI frameworks. The results emphasize the importance of aligning performance indicators with technological capabilities and organizational goals. In conclusion, this conceptual review demonstrates that effective technology integration, combined with systematic KPI measurement, can significantly strengthen logistics performance outcomes. Future research may build on this framework by incorporating empirical analyses or sector-specific case studies to further validate and extend these findings.

13. Future Research Directions

While this study provides valuable insights into the role of technology integration and Key Performance Indicator KPI measurement in enhancing logistics performance, several avenues remain open for further exploration. Future research could examine the impact of emerging technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT) on real-time KPI tracking and decision-making processes in logistics. Additionally, longitudinal studies may offer deeper understanding of the sustained effects of technology-driven KPI management on customer satisfaction and financial outcomes over time. Cross-industry comparative analyses could also help identify sector-specific challenges and best practices, thereby broadening the applicability of the findings. Finally, investigating the human and organizational factors influencing the successful adoption of these technologies would contribute to a more holistic view of performance improvement in logistics.

Recommendations

It would be appropriate to take some measures that will guide future studies and businesses. The study provides details that will form an idea about the regulations to be made in depth from all areas from practitioners to regulators and politicians. It will also help to see the potential challenges and opportunities in this area. The field of logistics, which embraces technological developments, provides innovations to cover all areas from orders to handling. It will be an effective foresight for decision makers and those who will invest in this area. Businesses will achieve socially effective performance while ensuring customer satisfaction by coming to the automation process in their organizations. Reducing costs, financial stability and quality product supply are the priorities of businesses. In terms of efficiency, it is recommended to make improvements in terms of time, flexibility delivery security and satisfaction of employees.

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Compliance with Ethical Standards

It was declared by the author that the tools and methods used in the study do not require the permission of the Ethics Committee.

Ethical Statement

It was declared by the author that scientific and ethical principles have been followed in this study and all the sources used have been properly cited.

Conflicts of Interest

No potential conflict of interest was declared by the authors.

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