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The Impact of Information Technology towards Logistics Performance

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Abstract

In the current global landscape, logistics is a cornerstone of economic growth, underpinning the expansion of economies worldwide. The rapid pace of economic development demands increasingly efficient logistics systems to support this growth. The integration of information technology (IT) has revolutionized logistics by enhancing the accuracy, speed, and coordination of supply chain activities. IT plays a vital role in improving logistics performance, from optimizing inventory management to streamlining transportation and warehousing processes. IT solutions such as real-time tracking, automation, and data analytics have become indispensable tools for logistics firms aiming to boost operational efficiency and customer satisfaction. Despite its growing adoption, further research is required to explore the specific impact of IT on corporate performance within Malaysia's logistics sector. This study investigates the influence of IT deployment on the performance of Malaysia's logistics industry, focusing on key areas such as tracking, security and safety, customer service, and IT integration. A quantitative approach will be employed, gathering data through a survey administered to 384 active participants in Malaysia's logistics industry. The findings indicate that IT integration in tracking, security, customer service, and overall IT systems significantly enhances organizational performance. This research offers valuable insights for logistics firms aiming to boost performance through more effective and efficient IT strategies, providing a strategic foundation for IT investment and systematic implementation within the logistics sector.

Keywords: Impact, Information Technology, Logistics Industry, Performance

Introduction

Logistics encompasses the strategic coordination and management of procurement, storage, and transportation processes to ensure that goods are delivered on time and in optimal condition. Effective operations management is crucial in the logistics sector, especially in today's highly competitive global environment, where the execution of efficient and cost-effective operations is paramount. Logistics involves the systematic management of acquiring, storing, and transporting resources to their intended destinations (The Economic Times, 2024).

As outlined by Rouse (2023), logistics is composed of five key elements: storage, materials handling and warehousing, packaging, inventory, transportation, and information control. Efficient storage, materials handling, and warehousing are vital for manufacturers, yet consumer demand often fluctuates, necessitating the temporary storage of surplus goods. Warehouses, equipped with shelving, racks, and material handling equipment, are essential for this purpose. Proper packaging also plays a critical role in maintaining product quality, and standardized packaging is commonly used to facilitate easier handling. Inventory management is closely linked to warehousing, as it involves controlling the flow of goods into and out of storage. Transportation is a hallmark of logistics, encompassing roadways, railways, shipping, and air travel, which enable the movement of goods, whether perishable items with short supply chains or complex products with global components. Information and control systems are integral to triggering operational procedures, such as warehouse orders and transport plans, ensuring smooth logistics operations (Rouse, 2023). In the era of globalization, the logistics industry faces significant challenges as demand outpaces predictions, driven by emerging technologies that disrupt the market (Muango, Abrokwah, & Qu, 2021). Transportation, service infrastructure, and customs processes within the logistics sector are highly complex, and each country encounters unique challenges shaped by local regulations and market conditions (Wang, Kumar, Kumari, & Kuzmin, 2022).

Recent studies highlight the positive impact of information technology (IT) adoption on the logistics sector. For example, Ainomugisha (2022) found that IT implementation leads to reduced shipping and trucking costs, faster delivery, and enhanced logistical capacities. Zainal and Rasi (2021), emphasize the importance of investing in logistics IT to maintain competitiveness and enhance customer engagement. The advent of IT has revolutionized logistics by integrating systems, enhancing communication, and improving organizational efficiency (Winkelhaus & Grosse, 2019). In Malaysia, the logistics services market is diverse, encompassing freight movement, compliance, shipping, warehousing, and distribution (Malaysia, 2020). Global trade heavily depends on the logistics industry to facilitate the movement of goods, and as globalization increases trade volumes, the demand for warehousing and storage facilities in Malaysia has risen correspondingly. The value of the local warehousing and storage market was estimated at RM 1.82 billion in 2021, with projections reaching RM 3.06 billion by 2027 (IMR Report, 2020).

Logistics is integral to global trade, as highlighted by Wiederer (2023), who stress that the effectiveness of a nation's logistics services influences its ability to participate in the global economy. The Malaysian logistics industry, particularly its shipping sector, faces challenges such as government bureaucracy, infrastructure constraints, and the need for technological and operational improvements (Lezhnina & Balykina, 2021; UNCTAD, 2021). Efficiency is central to logistics operations, providing a competitive edge through advanced technologies like on-time shipping, zero cargo damage, and cost minimization (Gavalas, Syriopoulos, & Roumpis, 2022; Gunasekaran et al., 2017). Malaysia's logistics industry is undergoing a transformation driven by IT, with companies adopting advanced technologies to improve performance and efficiency (Othman, 2020). IT advancements, including QR codes, barcode systems, mobile applications, and RFID, offer significant potential for enhancing logistics operations (Ng, 2022). However, despite the increased adoption of IT in logistics, there remains a need for further research on its impact on Malaysian logistics companies (Ainomugisha, 2022).

Literature Review and Hypothesis Development

Logistic Industry in Malaysia

Malaysia's logistics industry is a cornerstone of its economy, contributing significantly to economic growth. The sector has experienced substantial advancements in recent years, driven by improvements in logistical infrastructure, increased freight volumes, and the expansion of e-commerce (Kaur, 2023). Logistics encompasses the strategic coordination and management of the transportation, storage, and distribution of goods, raw materials, and information to meet customers' needs cost-effectively (Advanced Solutions International, Inc., 2018).

The Malaysian logistics sector is diversified into eight main segments: third-party logistics (3PL), 3PL marketplace, 3PL export, fulfilment, grocery delivery and food, on-demand services, alternate pickup, and parcel lockers. The 3PL market in Malaysia includes companies like Poslaju, GDex, Skynet, and DHL eCommerce, primarily focusing on last-mile delivery, while 3PL export services are dominated by DHL Express, LWE Logistics, FedEx, and SF Express, which specialize in export services. The 3PL marketplace includes aggregators like EasyParcel and SHIPPOP, while fulfilment service providers such as iStore iSend, Hubwire, TresGo, and SP Commerce manage the entire picking and shipping process. In the grocery and food delivery segment, major players include DeliverEat, Honestbee, Foodpanda, and HappyFresh. On-demand services in Malaysia, such as ZeptoExpress, GoGet, MatDespatch, and Zoom Delivery, function similarly to personal assistants, offering same-day package deliveries. Alternate pickup services like PostCo, CollectCo, and Pgeon collaborate with merchants to provide multiple physical locations where customers can pick up or return packages. Lastly, parcel lockers, including PopBox, BOXiT, and Poslaju EziBox, offer convenient additional pickup options for customers who are frequently on the move (Milo, 2018).

The Bursa Malaysia 2022 report highlights the future developments and opportunities within Malaysia's logistics industry. In 2021, the local logistics industry contributed 3.0% to the overall Gross Domestic Product (GDP), equivalent to RM46.72 billion, reflecting a 2.6% increase from the previous year. As the global economy remains strong, the logistics industry is expected to see increased demand for transport and warehousing services in 2022, driven by the rise in global e-commerce, increasing trade volumes, and the expansion of the manufacturing sector. The Malaysian government is anticipated to play a supportive role in guiding the logistics industry's infrastructure and export trade activities. Malaysia's position as a strategic logistics hub has further supported the development of its logistics infrastructure. According to the Bursa Malaysia report, the Malaysian logistics market is projected to grow at a compound annual growth rate (CAGR) of 7.7%, reaching RM73.05 billion by 2027, up from RM51.46 billion in 2022. The warehousing and storage market in Malaysia is expected to grow from RM2.01 billion in 2022 to RM3 billion by 2027, with a CAGR of 8.6% (IMR Report, 2020).

Information Technology

Information technology (IT) is a critical component influencing human life, economic relations, and societal well-being. IT in the workplace and daily life involves collecting, processing, storing, and transmitting data or providing access to information through various tools, including electronics and optics. Technological advancements have led to significant

transformations across many industries, making processes faster and more efficient (Ganguly, 2023). Various technologies are available for application, such as below:

Category	Description
Computing	Managing data centers and self-service tools for scalability, monitoring, and deployment of computing solutions.
Software	Automating routine operations, streamlining processes, and improving communication.
Networks	Network services like firewalls, bridges, and consoles to gather network data and set benchmarks.
Application Programming Interface (API)	Enhancing the functionality of code.
Data	Services such as market data, data warehousing, and in-memory databases.
Data Storage	Facilities like cloud database services.
Analytics	Tools for visualizing data and information for human consumption.
Monitoring	Tracking and observing business procedures.
Mobile	Mobile applications such as online wallets or navigation services.
Mobile Platforms	Operating and development platforms for mobile services.
Information Security	Functions that block suspicious websites or service requests.
Search	Technologies that enable online searches.
Business Automation	Tools for automating business functions.
Artificial Intelligence (AI)	Machine learning services or platforms.
Internet of Things (IoT)	Management of physical objects through software services.
Robotics	Machines capable of automating manual labor.

According to the Department of Statistics Malaysia (DOSM, 2022), IT contributed 12.1% to Malaysia's economy in 2021, up from 10.5% in 2020, amounting to RM359.3 billion. IT generated 23.2% of the GDP, with 14.0% from the Gross Value-Added Information Technology Industry (GVAICT) and 9.2% from e-commerce in other industries. The GVAICT rose to RM217.1 billion in 2021, reflecting a 7.8% increase over the previous year. Additionally, e-commerce's Gross Value Added reached RM201.1 billion in 2021, marking a RM37.2 billion or 22.7% increase. The information technology manufacturing industry and services industry grew by 11.1% and 7.0%, respectively. IT product exports increased by 14.6% year on year to RM360.8 billion, with IT product exports accounting for 33.9% of total national exports, while imports totalled RM261.2 billion, representing a 21.0% increase. The IT sector employed 1.21

million people in 2021, representing 8.0% of total employment, with the IT manufacturing industry contributing the most (34.9%), followed by IT services (29.2%) and IT trade (21.9%).

Information Technology in Logistic Industry

Information technology plays a crucial role in the logistics industry by enabling companies to manage the flow of goods efficiently. The industry involves the use of machines, vehicles, and computer applications to ensure that manufacturing and production are completed as quickly and efficiently as possible. The logistics industry's highly complex nature requires continuous optimization of technology to meet the rising demand for global commodity transport (Archetti et al., 2022). IT impacts logistics by enhancing efficiency, improving competitiveness, and promoting sustainability (Tigga et al., 2021).

IT in logistics includes management systems, virtualization, automation tools, operating systems, system software, and critical applications. User peripherals, devices, and software are also integral to IT in logistics. Data storage and utilization methods, architectures, and laws are considered part of IT. Chung (2021) identifies several logistics technologies, including blockchain, big data analytics, artificial intelligence (AI), automating warehouses, autonomous vehicles, and sustainability through technology. Examples of IT application in the logistics industry include:

- **FedEx** : In 2019, FedEx introduced its autonomous delivery robot, Roxo, in New York, although the project was halted by the city's mayor (Vincent, 2022).
- **Amazon**: Amazon tested its autonomous delivery robot, Scout, in Washington and California in 2019, with the aim of providing one-day delivery for Amazon Prime customers (Salinas, 2019).
- **Alibaba:** In 2020, Alibaba launched Xiaomanlv, an autonomous logistics robot that can deliver 500 parcels daily and travel 100km on a single charge (Hu & Hu, 2020).

Malaysia's logistics industry also embraces automation and digital technology to enhance service efficiency and output. Intelligent logistics integrates business and information flows, creating a modern logistics and information processing center. Technologies like Electronic Data Interchange (EDI), barcode, Radio Frequency Identification (RFID), Management Information Systems (MIS), Global Positioning System (GPS), Geographic Information System (GIS), and others provide accurate and timely logistical services. Westport Malaysia, for instance, has invested in digital solutions, including its Remote Physical Check System (RPS), which improves accuracy and reduces waste by allowing remote verification processes (Shahril, 2023). NinjaVan, another logistics company in Malaysia, is adopting green energy electric vehicles and innovative packaging solutions like "Ninja Packs," which use QR codes and barcodes for secure and efficient delivery (Oriental Daily, 2022)

Tracking, Security and Safety

Mlimbila and Mbamba (2018), argue that trace management offers enhanced security and reduced investment costs. The integration of information technology (IT) within logistics systems facilitates rapid surveillance, monitoring, and tracking of shipments, thereby significantly improving cargo security and reducing theft-related costs, including insurance

premiums (Rey et al., 2021). Furthermore, Tongzon and Nguyen (2021), investigated the impact of information systems on reducing shipping and trucking costs. Their study highlighted that IT enhances the timely delivery of goods and services, strengthens organizational and logistics capacities, and contributes to increased trade volume.

The utilization of advanced IT, such as Radio Frequency Identification (RFID), has been shown to significantly enhance logistics operations. As Condon (2023), notes, RFID technology enables firms to automatically monitor the movement of commodities, whether in transit or stored in warehouses. The automation of data collection through RFID allows organizations to provide real-time updates to asset monitoring systems, facilitating comprehensive tracking of stock levels, supply chain flows, and the identification of costly operational delays. This technological integration eliminates the need for manual tracking methods like spreadsheets, significantly reducing both the time employees spend on such tasks and the extent of human interaction required. Consequently, the adoption of RFID technology in logistics enhances safety and mitigates the risks of misplaced or stolen assets.

Additionally, QR code technology has emerged as a robust tool for securing customer details and protecting product authentication. Claeys (2023) highlights the example of FedEx, a global leader in logistics, which has leveraged QR code technology to streamline its return processes. In 2018, FedEx introduced FedEx Returns Technology, enabling store and business owners to send QR codes to customers who wish to return items. Customers present the QR code to a FedEx employee to receive a free shipping label, thereby simplifying the return process. This innovation underscores the increasing importance of QR code technology in logistics, offering both enhanced security and improved efficiency in handling returns.

H1: There is a significant positive relationship between Tracking, Security as well as Safety and Performance.

Customer Service

Mlimbila and Mbamba (2018), highlight that one of the key advantages of trace management is the enhancement in the quality of service provided to customers. This assertion aligns with previous research conducted in Brazil, where Fernandes et al (2018), found that the quality of logistics services mediates the relationship between logistics capacities and customer satisfaction. Similarly, Zainal and Rasi (2021), observed a significant positive impact on customer satisfaction and overall performance within the logistics industry. They further argued that customer satisfaction tends to be higher in companies that have implemented information technology (IT) compared to those that have not. This IT integration contributes to improved industry performance in terms of profitability, security, and customer confidence.

James and Inyang (2022), emphasize that logistics service companies should prioritize delivery reliability and service dependability. Moreover, Dubey and Singhal (2021) contend that the most substantial impacts of IT on logistics include improvements in the overall quality of customer service and enhanced control and planning effectiveness. Various information technologies are instrumental in enhancing the performance of the logistics industry, particularly from the customer service perspective. For instance, mobile applications that facilitate logistics tracking are beneficial for organizations needing to monitor the location and status of their shipments. These applications improve the visibility and efficiency of supply

chains, potentially leading to cost reductions and elevated customer service levels. By providing real-time updates on shipment statuses, mobile logistics tracking systems can help the industry enhance customer service, thereby reducing customer dissatisfaction and increasing overall satisfaction (Optisolnew, 2023).

In Malaysia, several logistics mobile tracking applications have been launched, offering convenience to courier service users. These applications allow users to track the delivery status of their shipments with real-time visibility, access live customer support, and manage orders on the go with a single application. The integration of QR code technology also offers performance improvements in the logistics industry from a customer service standpoint. QR codes enable logistics users to track and trace the exact location of their parcels, make cashless payments, access customer support, and provide feedback. Claeys (2023) suggests that QR codes hold significant untapped potential in enhancing logistics services. By offering immediate access to crucial information, QR codes contribute to increased transparency and help build consumer trust.

H2: There is a significant positive relationship between Customer Service and Performance.

Information Technology Integration

The integration of information technology into a firm's management system has been crucial for enhancing operational efficiency (Ainomugisha, 2022). Yang et al (2021), emphasize that the core of production transformation and the digitalization of processes has been a focal point in numerous studies, highlighting technology's positive impact on company performance. However, other research underscores the significance of organizational characteristics within the administrative and managerial sectors, suggesting that the effective application of organizational principles may be a prerequisite for the successful implementation of technological innovations.

The relationship between organizational and technical elements, and their combined contribution to company performance, has been explored from various angles. The complex interplay between technical and organizational factors carries significant implications for maintaining a competitive advantage. The execution of organizational strategies is particularly crucial in sustaining this edge (James & Inyang, 2022). However, there are notable distinctions between small and large enterprises, with smaller businesses often being less informed of market changes (James & Inyang, 2022). The incorporation of information technology offers several benefits, including expanding market share, achieving economies of scale and scope, and facilitating the dissemination of innovative ideas across the logistics process. Additionally, IT enhances the flexibility of routing across different transportation modes and enables door-to-door transportation services (Rey et al., 2021).

Moreover, larger corporations are generally better positioned to reap more substantial benefits from technology implementation compared to smaller enterprises (James & Inyang, 2022). Every information technology tool can be strategically employed at various stages of the investment process, maximizing its impact on organizational outcomes (Dubey & Singhal, 2021).

H3: There is a significant positive relationship between Information Technology Integration and Performance

Performance

Miles (2022), defines performance as an organization's capacity to achieve its goals and maximize results. In the contemporary workforce, organizational performance reflects a company's ability to dynamically reach its objectives. In this study, performance is considered the dependent variable, influenced by the manipulation of independent variables, such as Tracking, Security and Safety, Customer Service, and Information Technology Integration. The study specifically aims to evaluate the role of information technology in enhancing performance within the logistics industry.

One method for comparing logistics industry performance against industry benchmarks is through the use of key performance indicators (KPIs). KPIs allow industries to improve operations by leveraging valuable data. Specifically, logistics KPIs serve as performance indicators that logistics managers use to measure, visualize, and optimize all relevant logistics processes.

The World Bank's Logistics Performance Index (LPI) report, spanning from 2008 to 2022, highlights significant improvements in Malaysia's logistics performance. The LPI evaluates the overall competency and quality of logistics services provided by customs brokers and logistics operators. The LPI scores for Malaysia were 3.7, 3.3, 3.34, 3.47, 3.45, 3.34, and 3.4 for the years 2022, 2018, 2016, 2014, 2012, 2010, and 2007, respectively (World Bank, 2022). According to the LPI report, Malaysia's primary challenge lies in the timeliness and efficiency of its customs clearance process, which received a score of 2.9. Despite this, Malaysia's logistics system ranked second among ASEAN nations with a score of 3.2. Malaysia's performance in international shipping closely matched that of the top performers in its income category. However, in 2018, Germany and China, the global and income group leaders, respectively, outperformed Malaysia in LPI and its sub-indicators (Loheswar, 2021).

Furthermore, Malaysia advanced 15 places to the 26th rank in the World Bank's LPI for 2023 (Birruntha, 2023). According to Datuk Seri Michael Tio of Logistics Productivity Nexus (LPN), while Malaysia has made significant strides, there is still room for improvement to become the preferred logistics destination in Asia. He noted that Malaysia is well-connected by land, sea, and air, and possesses a comprehensive infrastructure conducive to the growth of the logistics industry. However, various challenges remain, including border bottlenecks, institutional and regulatory mismatches, insufficient value-chain activities, and a lack of skilled workforce.

Research Framework

This theoretical framework examines the factors of Tracking, Security and Safety, Customer Service, and Information Technology Integration concerning their influence on logistic performance. Additionally, it explores how these factors interrelate and contribute to enhancing overall performance in the logistics industry. In summary, the proposed framework

provides a comprehensive understanding of how these critical factors impact the performance of organizations, offering valuable insights into the dynamics of logistics operations (Figure 1).

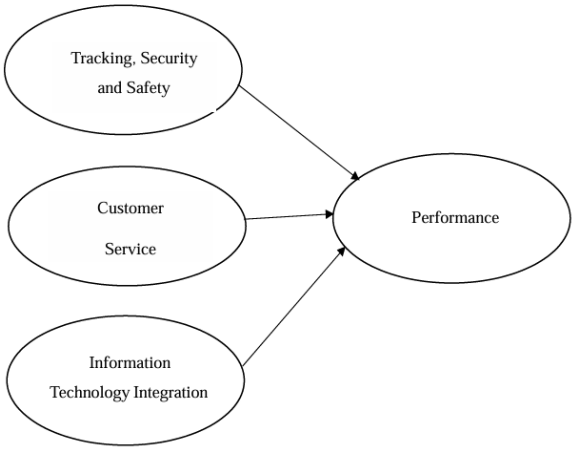

Figure 1 Theoretical Framework of the Research.

Methodology

This study employed a quantitative research approach, utilizing an online questionnaire survey distributed to 384 participants in Malaysia's logistics industry. A pilot test was conducted with 30 industry players to assess the reliability and validity of the survey instrument and to gather feedback on its structure. Based on the pilot test results, adjustments were made to ensure the questionnaire's relevance and effectiveness. The questionnaire was divided into Sections A, B, and C. Section A gathered demographic information, Section B focused on respondents' perspectives on the independent variables (Tracking, Security and Safety, Customer Service, and Information Technology Integration), and Section C addressed the dependent variable, which is performance in the logistics industry. The development of this questionnaire was guided by previous studies to effectively address all research questions and objectives.

The study utilized measurement scales that had been validated in previous literature. Responses were recorded using a 5-point Likert scale, with options ranging from 1 (strongly disagree) to 5 (strongly agree). The collected data were analyzed using SPSS version 29, including descriptive statistics, reliability and validity tests, Pearson correlation, and multiple regression analysis to fulfill the study's objectives.

Table 1 presents the demographic information of the 384 survey respondents. The majority of respondents were female, constituting 54.2% (n=208), while males accounted for 45.8% (n=176). The largest age group among respondents was 26-35 years, comprising 46.1% (n=177). This was followed by the 36-45 years group, which made up 33.3% (n=128), and the 18-25 years group at 16.9% (n=65). Smaller age groups included those aged 46-55 years at 3.1% (n=12) and those aged 55 years and above at 0.5% (n=2). In terms of academic level, 49.2% (n=189) of respondents were graduates, making it the most common educational attainment. Those with university-level education accounted for 26.8% (n=103), while 24.0% (n=92) had completed secondary education. Income levels varied, with the largest group (38.0%, n=146) earning between RM 3,001 and RM 4,500, followed by 22.4% (n=86) earning

RM 4,501 to RM 6,000, and 21.6% (n=83) earning RM 1,501 to RM 3,000. A smaller proportion of respondents earned below RM 1,500 (7.6%, n=29) and above RM 6,001 (10.4%, n=40). Regarding the area of residence, the majority of respondents were from the Southern region (Negeri Sembilan, Melaka, and Johor), representing 30.99% (n=119), followed by the Northern region (Perlis, Kedah, Penang, and Perak) at 29.69% (n=114). Respondents from the Central region (Selangor and Kuala Lumpur) made up 21.88% (n=84), while those from the East (Kelantan, Pahang, and Terengganu) accounted for 17.45% (n=67). All respondents (100%, n=384) indicated involvement in the logistics industry.

Table 1
Respondents' Background

Background	Categories	Frequency	Percentage (%)
Gender	Female	208	54.20%
	Male	176	45.80%
Age	18-25	65	16.90%
	26-35	177	46.10%
	36-45	128	33.30%
	46-55	12	3.10%
	55 and above	2	0.50%
Academic Level	Graduate	189	49.20%
	Secondary	92	24.00%
	University	103	26.80%
Income Level	Below RM 1,500	29	7.60%
	RM 1,501 - RM 3,000	83	21.60%
	RM 3,001 - RM 4,500	146	38.00%
	RM 4,501 - RM 6,000	86	22.40%
	RM 6,001 and above	40	10.40%
Area of Residence	Central (Selangor, Kuala Lumpur)	84	21.88%
	East (Kelantan, Pahang, Terengganu)	67	17.45%
	Northern (Perlis, Kedah, Penang, Perak)	114	29.69%
	Southern (Negeri Sembilan, Melaka, Johor)	119	30.99%
Logistics Industry	Yes	384	100.00%
	No	0	0%

Reliability Analysis and Validity Test

Reliability analysis was assessed using Cronbach's Alpha. Table 3 displays Cronbach's Alpha values for all variables, ranging from 0.750 to 0.856, with an overall alpha coefficient of 0.930, which are significantly higher than the threshold of 0.70. This indicates excellent reliability for the scales used. Specifically, the alpha values for TSS ($\alpha = 0.750$), CS ($\alpha = 0.774$), ITI ($\alpha = 0.783$), and Performance ($\alpha = 0.856$) demonstrate strong internal consistency. According to Malhotra (2012), a Cronbach Alpha value ≤ 0.60 is considered unreliable, while a value ≥ 0.70 is highly acceptable. Therefore, the results of this survey confirm the high reliability of the scales used in this study. Overall, the reliability analysis is highly satisfactory.

Table 2
Reliability analysis of each variable

Variable	Number of Items	Cronbach's Alpha
TSS	5	0.750
CS	5	0.774
ITI	5	0.783
PER	5	0.856

Result

In general, the data presented in Table 3 indicates noteworthy and favorable reliability across the variables. The Cronbach's Alpha values demonstrate strong internal consistency for TSS (α = 0.685), CS (α = 0.665), and ITI (α = 0.667), with an overall alpha of 0.930. These values confirm that the scales used in this study are highly reliable.

Table 3
Pearson correlation for variable of study.

	TSS	CS	ITI	PER
TSS	1	.709**	.688**	.685**
CS	.709**	1	.679**	.665**
ITI	.688**	.679**	1	.667**
PER	.685**	.665**	.667**	1

**. Correlation is significant at the 0.01 level (2-tailed).

The model summary for factors influencing customer usage intention is presented in Table 4. The coefficient of determination, R Square, indicates that the three independent variables collectively account for 56.9% (R2 = 0.569) of the total variance in logistic performance affected by Tracking, Security and Safety, Customer Service and Information Technology Integration. The regression model detailed in the table examines how Tracking Security and Safety, Customer Service and Information Technology influence logistic performance. The standardized coefficients reveal that Tracking Security and Safety ($p < 0.05$, β = 0.369), Customer Service ($p < 0.05$, β = 0.285), and Information Technology Integration ($p < 0.05$, β = 0.337) are all significantly related to logistics performance.

Table 4
Regression for Logistic Performance determine

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
(Constant)	-.776	.598		-1.297	.195
TSS	.369	.061	.314	6.034	<.001
CS	.285	.058	.252	4.869	<.001
ITI	.337	.060	.279	5.587	<.001

Dependent Variable: performance
R= 0.754. R square= 0.569. Adjusted R= 0.566. F = 167.396

Discussion

The study investigates the impact of information technology (IT) on logistics performance, with a focus on the Malaysian logistics industry. The research framework explores the relationship between various IT components, including Tracking, Security and Safety, Customer Service, and IT Integration, and their influence on logistics performance.Key IT innovations such as artificial intelligence (AI), the Internet of Things (IoT), and blockchain are identified as critical drivers, enhancing efficiency and sustainability in logistics operations. Notable companies like FedEx and NinjaVan have successfully integrated technologies such as autonomous robots and green energy vehicles, demonstrating the practical applications of these advancements in improving logistics performance (Tongzon et al., 2021). The study also tested several hypotheses to assess the impact of specific IT factors on logistics performance. Hypothesis 1, which posits that Tracking, Security, and Safety significantly impact performance, was supported by the findings. The t-value of .685** at a significance level of <.001 indicates a strong positive relationship between these factors and performance, confirming that IT implementation in this area enhances productivity and supply chain operations (Premkumar et al., 2021; Zare, 2010). The research conducted by Kechil et al. (2022) further supports this, emphasizing the role of cargo security in boosting customer confidence (Mlimbila et al., 2018). Hypothesis 2, which examines the impact of Customer Service on logistics performance, was also supported. The t-value of .665** at a significance level of <.001 demonstrates a significant positive effect. The integration of IT in customer service, such as using the Internet for communication, has been shown to enhance customer satisfaction and increase the likelihood of future business transactions (Zainal et al., 2021; James, 2022). This finding aligns with the study by Kechil et al. (2022), which highlights the importance of IT in improving customer service quality and overall logistics performance. Finally, Hypothesis 3 explores the role of Information Technology Integration in logistics performance. With a t-value of .665** at a significance level of <.001, the research confirms a significant positive impact. Effective IT integration within management systems improves operational performance, with connectivity and the readiness to exchange and integrate information playing crucial roles (Cuthbertson & Piotrowicz, 2011; Zainal et al., 2021). The study by Kechil et al. (2022) corroborates these findings, showing that IT integration is essential for maintaining competitiveness in the logistics industry. Overall, the study concludes that Tracking, Security, and Safety are the most critical IT factors impacting logistics performance, followed by IT Integration and Customer Service. Further research, particularly in specific industries with larger datasets, is recommended to validate and expand upon these findings (Dubey et al., 2021; Rey et al., 2021). Therefore, H1, H2, and H3 hypotheses are accepted.

Conclusions

This study presents the findings on the impact of information technology on logistics performance, drawing from comprehensive data collected from 384 respondents within the logistics industry. The research was conducted using a well-structured approach, encompassing five chapters: introduction, literature review, research methodology, data analysis, and conclusion. The findings reveal that information technology significantly enhances logistics performance, addressing the research questions and achieving the study's objectives through various analyses, including descriptive analysis, Pearson correlation, reliability testing, and hypothesis testing.The discussion highlighted that key constructs—Tracking, Security and Safety, Customer Service, and Information Technology Integration—

demonstrated a significant impact on logistics performance. Most respondents acknowledged the positive influence of IT on their operational efficiency, indicating that its implementation has led to improved service delivery and competitiveness within the industry. Despite achieving the study's goals, the research suggests the need for ongoing advancements in IT to sustain and further enhance logistics performance, ensuring long-term benefits for both the industry and the broader economy.

Significant Implications of the Research

The findings of this research on the impact of information technology on logistics performance carry significant implications for academia, industry managers, policymakers, and government agencies. From a knowledge perspective, this study contributes valuable insights to the existing literature on the role of information technology in the logistics sector. By elucidating how IT influences performance, the research offers a foundation for developing new theories, paradigms, and best practices in logistics management. Scholars and researchers can leverage these findings to deepen their understanding of the dynamic relationship between technology and industry success, fostering further academic inquiry and innovation. For industry managers, the research provides actionable insights into the strategic integration and optimization of information technology within logistics operations. Understanding which IT tools and systems most effectively enhance performance enables managers to make informed decisions, leading to increased efficiency, cost-effectiveness, and overall operational excellence. Additionally, the study equips managers with knowledge about potential challenges associated with IT implementation, preparing them to navigate these obstacles more effectively.

In the realm of policymaking, the research findings offer a robust foundation for crafting regulations that support and encourage the adoption of information technology in the logistics industry. Policymakers can use these insights to design regulatory frameworks, incentives, and support mechanisms that foster technological innovation within the sector. Emphasizing areas such as workforce development, cybersecurity, and innovation promotion, these policies can ensure a smooth transition to technology-driven logistics practices, ultimately enhancing the industry's competitiveness and sustainability.

Ethical Considerations

This study is voluntarily participation and the respondents agreed to take part in the study. Information gathered during this study is confidential.

Conflict of Interest

The authors declare that they have no conflict of interest.

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