



Effects of Information Technology on Logistics Firms' Performance in Shah Alam, Selangor, Malaysia

Nuraihan Awang Kechil, Mohd Hafiz Zulfakar, Azlina Muhammad, Mohamed Syazwan Ab Talib, Shahrin Nasir

To Link this Article: <http://dx.doi.org/10.6007/IJARAFMS/v12-i3/14783> DOI:10.6007/IJARAFMS /v12-i3/14783

Received: 11 July 2022, **Revised:** 14 August 2022, **Accepted:** 31 August 2022

Published Online: 15 September 2022

In-Text Citation: (Kechil et al., 2022)

To Cite this Article: Kechil, N. A., Zulfakar, M. H., Muhammad, A., Talib, M. S. A., & Nasir, S. (2022). Effects of Information Technology on Logistics Firms' Performance in Shah Alam, Selangor, Malaysia. *International Journal of Academic Research in Accounting Finance and Management Sciences*, 12(3), 430–447.

Copyright: © 2022 The Author(s)

Published by Human Resource Management Academic Research Society (www.hrmars.com)

This article is published under the Creative Commons Attribution (CC BY 4.0) license. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this license may be seen at: <http://creativecommons.org/licences/by/4.0/legalcode>

Vol. 12, No. 3, 2022, Pg. 430 - 447

<http://hrmars.com/index.php/pages/detail/IJARAFMS>

JOURNAL HOMEPAGE

Full Terms & Conditions of access and use can be found at
<http://hrmars.com/index.php/pages/detail/publication-ethics>



Effects of Information Technology on Logistics Firms' Performance in Shah Alam, Selangor, Malaysia

Nurairhan Awang Kechil¹, Mohd Hafiz Zulfakar², Azlina Muhammad³, Mohamed Syazwan Ab Talib⁴, Shahrin Nasir⁵

¹Master Graduate, Faculty of Business and Management Universiti Teknologi Mara UiTM Selangor, Puncak Alam Campus, 42300 Bandar Puncak Alam, ²Senior Lecturer, Faculty of Business and Management Universiti Teknologi Mara UiTM Selangor, Puncak Alam Campus, 42300 Bandar Puncak Alam, ³Senior Lecturer, Faculty of Business and Management, Universiti Teknologi Mara UiTM Selangor, Puncak Alam Campus, 42300 Bandar Puncak Alam, ⁴Assistant Professor, School of Business and Economics Universiti Brunei Darussalam, BE1410 Brunei Darussalam, ⁵Senior Lecturer, Faculty of Business and Management Universiti Teknologi Mara UiTM Selangor, Puncak Alam Campus, 42300 Bandar Puncak Alam
Email: researchhz78@gmail.com, mohdhafiz@uitm.edu.my, azlina59@uitm.edu.my, syazwan.talib@ubd.edu.bn, shahrin348@uitm.edu.my

Abstract

Logistics is the backbone of global economic growth. When the economy grows rapidly, more efficient logistics are required to accommodate the growth. Information technology (IT) has aided in the transformation of logistics firms' supply chain roles. As a result, IT is regarded as a critical factor influencing the process of modern logistics companies in terms of efficiency and effectiveness in service delivery. Although implementations have become more widely used in recent years, there is still little research focusing on the actual adoption effects on the logistics industry's company performance in Malaysia. The study's goals are to look at how IT implementation in tracking, safety and security, customer service, and information integration affects the performance of logistics firms in Shah Alam, Selangor. The hypotheses and prediction model in this study are tested using correlation and multiple regression analysis based on data collected from 44 logistics firms in Shah Alam, Selangor. The findings show that IT implemented in tracking, safety and security, customer service, and IT integration have a significant positive impact on firm performance. The largest contributor among the three variables is IT integration, followed by customer service, and the smallest contributor is tracking, security, and safety. This research will assist logistics players in achieving superior performance in terms of efficiency and effectiveness. As such, it is useful for strategic IT investment planning and decision making, as well as developing systematic approaches to IT implementation in the logistics industry.

Keyword: Logistics, Information Technology, Performance, Selangor

Introduction

Logistics is a backbone to economic growth throughout the globe. When the economy expands dramatically, more efficient logistics is needed to accommodate its expansion (Zainal & Rasi, 2022). However, according to Muango et al (2021); Cerasis (2018), in the age of globalisation, the logistics industry is up against a formidable foe. This is because demand is growing faster than anyone could have predicted. As a result, new technologies are causing market disruption (Rey et al., 2021; Macaulay et al., 2015). The industry's infrastructure of transportation, customs, and services is complex. Aside from the local authorities' regulation of these sub-sectors, each country's logistics industries will face a variety of challenges. (Wang et al., 2022; Arase, 2015).

More recently, studies by Ainomugisha (2022); Mlimbila and Mbamba (2018) discovered a link between information system usage and perceived decreases in shipping and trucking costs, timely delivery of goods and services, perceived increase in trade volume, and enhanced organisational logistics capability. Zainal and Rasi (2021) claimed that investment in logistics information technologies are crucial in a company in order to keep relevant in the market and better managing customer relations.

Furthermore, increased proficiency and collaboration of the operating model are transforming the commercial and marketplace as a result of the technological advancement in ways that are only now becoming apparent (Premkumar et al., 2021; PWC, 2016). The importance of logistics has increased as e-commerce has grown. Logistics professionals can no longer conduct routine operations, and the days of peaks and troughs are over (Muango et al., 2021; Cerasis, 2018).

The transformation of client demands, innovations revolutions and new players in the industry are the primary source of interference in the logistics industry. (Arase, 2015, Bakar & Jaafar, 2016). This is due to modern logistics' sophistication. (Ainomugisha, 2022; Rey et al., 2021; Lukinskiy et al., 2017). The demands for responsiveness, speed, and global integration of complex dispersed traders, subcontractors, and manufacturers are increasing (Macaulay et al., 2015). Thus, the logistical challenge is to shift supply management from one-way business-oriented to open and cooperative methods (Michaelides et al., 2010).

According to Malaysia Economic Planning Unit (2015) reports, factors such as a good location, strong financial and strategic bonds, and solid transportation infrastructure are critical and important for the logistics industry. This is done to stimulate trade, improve business efficiency, and spur economic growth in order to position itself as the regional logistics hub. Furthermore, according to the Malaysian Rating Corporation Bhd (MARC) Economic Outlook 2016 Report, headline inflation will rise to around 3.2 percent, with Malaysia's GDP growth expected to average around 4.4 percent in 2016.

It was designed to provide guidelines and strategies to improve the efficiency and effectiveness of transport and trade facilitation mechanisms, improve the productivity of the freight logistics sector, and provide a better environment for the logistics industry in domestic and international markets in conjunction with the Logistics and Trade Facilitation Master Plan, which was launched in March 2015. By 2020, the goal is to be the "Preferred Logistics Gateway to Asia".

Furthermore, the National Logistics Task Force (NLT) has been established to ensure the smooth execution of the Logistics and Trade Facilitation Master Plan in order to boost Malaysia's economy and exports while also unlocking the potential of the logistics sector in Malaysia. The task force, which will be led by the Ministry of Transport, will also include members from the International Trade and Industry Ministry and the Prime Minister's

Economic Planning Unit.

Furthermore, the Malaysia Logistics Directory (2016/2017) reports emphasised that the successful implementation of the plan will make a significant contribution to the transportation industry. The national GDP will rise from 3.6 percent in 2013 to 4.3 percent in 2020 (RM50.8 billion), with the transportation and storage sub-sector rising from 3.6 percent in 2013 to 4.3 percent in 2020 (RM50.8 billion), an RM22.2 billion increase. Aside from that, cargo volume is expected to increase by 8% per year, reaching 880 million tonnes by 2020. Furthermore, it will create 146,000 new jobs by 2020, the majority of which will be in the high-skilled category.

Statement of Problem

Information Technology (IT) has altered how we communicate with one another as well as how we consume information (Rey et al., 2021; Domingo, 2016). Similarly, Muango et al (2021) and Evangelista and Kilpala (2007) found that the importance and success of ICT tools in achieving network efficiencies is confirmed by evidence from a number of case studies from world-leading companies, and Fawcett et al (2011) discovered that IT investments result in two capabilities: more efficient processes and collaborative Supply Chain relationships.

As a result, understanding the benefits of investing in modern ICT is critical (Muerza & Larrode, 2017). The investment costs will justify the addition of new value-added services (Evangelista & Kilpala, 2007). Furthermore, in order to increase the company's financial performance, micro and small players in the logistics industry must upgrade their ICT implementation (Evangelista & Kilpala, 2007).

According to Ainomugisha (2022); Muango et al (2021); Cerasis (2018), logistics will benefit from technology in the coming year. Understanding logistics technology trends and implications will be critical for success or failure. However, according to Evangelista and Kilpala (2007), micro companies in the logistics industry require a certain level of integration and coordination communication and information that covers both internal and external functions.

Regardless of the phenomena described in logistics companies, the operation is changing in every way due to the effects of technology. The lack of definition throughout the countries will cause them to suffer (Premkumar et al., 2021; Arase, 2015). Shipping carriers, dock management, hauliers, and manufacturers are all involved as challenges in collaborating to complete transactions and provide services (Michaelides et al., 2010). Furthermore, Ndonye (2014) stated that embracing technology in their operations will have a negative impact on many businesses due to the high cost of the technology.

IT capability enables data integration between companies and their channel partners, as well as between departments within a company. Inventory and shareholder wealth will improve both directly and indirectly (Alavi, 2019; Mishra et al., 2013). Furthermore, Gunasekaran, Subramanian, and Papadopoulos (2017) proposed that managers would understand and further investigate the various attributes of supply chain and logistics competitive elements when deciding on the use of IT to gain a competitive advantage.

Although information technology implementations have become more widely used in recent years, there is still little research focusing on the actual adoption effects on the logistics industry's company performance in Malaysia.

The objectives of this investigation are

- to determine the effects of IT implementation, specifically in tracking and security

- performance; customer service system; and IT integration, on the performance of logistics firms in Shah Alam, Selangor, Malaysia; and
- to determine whether the above determinants have any significant impact on the firms' productivity and development in operations.

As a result, according to one study conducted by Fadhiah, Zawawi, Wahab, and Al-Mamun (2014), despite the growth of the logistics industry and demand for ICT in Malaysia, there is still a lack of research focusing on the logistics industry itself in Malaysia, which is required in order to provide a more comprehensive picture of logistic performance in Malaysia. Thus, the study's findings, which discovered a positive relationship between the effects of IT implementation and the performance of logistics firms, have suggested further research to validate this conceptual model.

Literature Reviews

Review of past studies related to impact of IT on performance of logistics firms

Ainomugisha (2022); Dubey & Singhal (2021) suggested that a sound logistics information technology and information system provide benefits that extend across the entire logistics information system, including inventory, transportation, and delivery system with better efficiency, security, and safety. Most researchers agree that IT has a direct impact on the operations of most logistics companies in some way, and that they have a positive impact on the infrastructure and assets of a company management system. Table 1 lists some previous studies conducted to investigate the effects of information technology implementation on the performance of logistics firms.

Table 1

Previous studies related to the impact of IT on logistics firms' performance

Author	Country	Area of study	Findings
Kawasaki et al (2011)	Vietnam	Logistics	The ICT use on logistics has improved the effectiveness in control and planning and quality of customer service.
Fadhiah et al (2014)	Malaysia	Logistics	There is a positive significant effect on the firm performance of IT implementation from the Malaysian perspective.
Ndonye (2014)	Kenya	Logistics	There are positive influences of information technology implementation on the logistics performance in Kenya.
Wilson et al (2015)	Kenya	Logistics	Performance of logistics firm has been improved which is benefited from the Integration of IT system, service delivery and security system.

IT on Logistics Performance

The use of information technology in supply chain and logistics management has piqued the interest of the business and academic communities. Rey et al (2021); Lee and Wang (2011) investigated the potential for Internet-based collaboration to reduce the bullwhip effect in supply chains. Similarly, Capgemini (2008) discovered that collaboration among supply chain

members via Internet tools would significantly improve supply chain performance. Technology application in the supply chain context may provide benefits in the following areas: improved supply chain agility, reduced cycle time, increased efficiency, and timely delivery of products to customers (Lee & Wang, 2011).

In Europe, logistics accounts for nearly 60% of the annual turnover of transport companies (Ndonye, 2014). This clearly demonstrates that the logistics function is a source of competitive advantage, and thus its management should be given special attention to avoid unnecessary costs. Perhaps this is why logistics companies in developed countries such as the United States take on-time delivery, total order cycle time, inventory accuracy, backorders, and fill rates so seriously (McMullan, 1996).

Country adjacent, Singapore is another Tier 1 logistics country that places a high value on its logistics services. Most Singapore logistics firms place a premium on consistency and dependability in terms of delivery time, good service design and performance, special requests for low-cost operation, flexibility in accommodating unexpected changes, and maximum value addition to services provided to customers in order to meet their needs (Sum and Teo, 1999).

Every success, however, has a drawback. Another significant constraint has been the slow adoption of new technologies. According to Fawcett et al., (2005), if information technology in logistics is not shared with decision-makers, it could improve Supply Chain decision making. As a result, awareness of the economic benefits of using digital technology is low, and collaboration among stakeholders is inadequate (Tongzon & Nguyen, 2021; Domingo, 2016).

As a result, the logistics ecosystem is riddled with operational inefficiencies and underutilised assets (Wang et al., 2022; Aziz et al., 2016). The pain is exacerbated by a lack of technological systems and insufficient technical knowledge (Gunasekaran, Subramanian, & Papadopoulos, 2017). Technological infrastructure has remained inadequate, with slow network speeds, poor performance, and unreliable hardware and software, all of which contribute to high costs and underperformance ("India - On the Verge of a Logistics Revolution," 2018).

Furthermore, Mlimbila and Mbamba (2018) recommend in their study that logistics firms consider developing their employees' capacity to use and manage information systems and related information technology capability much more effectively and efficiently in order to improve the firm's logistics performance.

Surprisingly, the studies highlighted in Table 2 below by Lee-Partridge et al (2000); Helo and Szekely (2005); Yoshimoto and Nemoto (2005); Karacapilidis (2006); Lai et al (2006) found no significant benefits from ICT adoption on logistics performance. This is due to the fact that the findings have become known as the productivity paradox because the studies did not confirm the expectations of a positive correlation between IT investment and logistical firm performance and contradicted previous studies described earlier.

Table 2

Impact of IT adoption on logistics firms' performance

Author	Country	Title	Benefit from ICT Adoption
Lee-Partridge et al., (2000)	Singapore	Information Technology Management: The Case of the Port of Singapore Authority	Absent
Helo and Szekely (2005)	Finland	Logistics information systems: an analysis of software solutions for supply chain coordination	Absent
Yoshimoto and Nemoto (2005)	Japan	The impact of information and communication technology on road freight transportation	Absent
Karacapilidis et al., (2006)	Thailand	On the development of a web based system for transportation services	Absent
Lai et al., (2006)	China	The impact of information technology on the competitive advantage of the logistics firms in China	Absent

Tracking, Security & Safety and Company Performance

According to Mlimbila & Mbamba (2018); Wilson et al (2015), the benefits of tracing management include improved customer service and security, as well as cost savings on investment. Furthermore, it was revealed that information technology allows for quick monitoring, tracking, and tracing of shipments, which has greatly improved cargo security while lowering costs associated with theft, such as insurance costs (Rey et al., 2021; Ndonye, 2014).

Recent studies by Tongzon & Nguyen (2021) and Mlimbila & Mbamba (2018) specifically examined the role of information systems usage in contributing to reducing shipping and trucking costs, improving on-time delivery of goods and services, increasing trade volume, and enhancing organisational logistics capability.

Table 3 below summarises previous research by (Mehrerjerdi, 2010; Meyer et al., 2013; Ta et al., 2013; Johansson and Pa, 2008). The findings show that ICT improves operational tracking, security, and safety. For example, in the tracking system, new technology such as RFID and IOS data exchange have been implemented.

Table 3

Benefits of IT on logistics firms' tracking, security and safety

Author	Country	Benefits of ICT in Tracking, Security & Safety	Findings
Mehrjerdi (2010)	Iran	Yes	Companies will be the initial beneficiaries of positive enhancements provided by RFID technology
Meyer, Buijs, Szirbik, & Wortmann (2013)	Netherland	Yes	Intelligent products can enhance the utilization of readily available tracking technology
Ta, Hinkka, & Fra (2013)	Finland	Yes	Improvements in IOS help to apply common industry data exchange standards and will lead to better supply chain collaboration, which also increases the operational performance in the long run
Johansson & Pa, (2008)	Sweden	Yes	Better logistics performance for companies using radio frequency identification (RFID) technology

Customer Service and Company Performance

Table 4 summarises the findings of previous related studies from Ali (2018); Rollins (2011); Fernandes et al (2018); Fawcett et al (2011), all of which agree that ICT adoption in customer service improves logistics company performance. As a result, innovation should be viewed as a component of business management, allowing for the rapid implementation of new processes, products, and services to meet the needs of customers.

Table 4

Benefits of IT on logistics firms' customer service

Author	Country	Benefits of ICT in Customer Service	Findings
Ali (2018)	India	Yes	Accurate information sharing with their customers can help the logistics service providers in enhancing customers' shareholder value
Rollins (2011)	Finland	Yes	Open and fluent communication mediates the relationship between customer knowledge sharing and satisfaction with a logistics service provider.
Fernandes et al., (2018)	Brazil	Yes	The quality of logistics services totally mediates the relation between the LC and the satisfaction of clients.
Fawcett, Wallin, Allred, Fawcett, & Magnan (2011)	Vietnam	Yes	The customer satisfaction with the logistic service affected by three factors such as racking system, company reputation and service quality

Zainal and Rasi (2021); Wilson et al (2015) discovered positive significant effects on client satisfaction and logistics company performance. Furthermore, he claims that client

satisfaction at a company with IT implementation is higher than at a company without IT implementation, and that this improves firm performance in terms of increased profitability and security, and thus the client's confidence.

Tan et al (2018) supported these findings by stating that there is a complex multi-modal transportation network connecting various alternative target overseas markets, which has a significant effect on customer choice behaviour. Similarly, James & Inyang (2022); Jha (2019) suggest that logistics service providers prioritise delivery and service reliability. Furthermore, the most significant impacts of ICT use on logistics are an increase in control and planning effectiveness, as well as an improvement in overall customer service quality (Dubey & Singhal, 2021; Tongzon & Nguyen, 2021; Kawasaki et al., 2011).

IT Integration and Company Performance

According to the studies by Ainomugisha (2022); Fadiyah et al (2014), integration in the firm's management system has played a significant role in assisting them to run efficiently. Furthermore, Tan et al (2018) stated that this applied to transportation, stating that the distribution of domestic freight is affected by the cost of the transportation chain. Meanwhile, according to the same study described by Fadiyah et al (2014), technology implementation has a positive impact on firm performance in both developed and developing countries. However, for data collaboration and communication, a comprehensive measure must be applied to system innovation with other suppliers and partners (Ndonye, 2014).

Furthermore, Wilson et al (2015b) stated that the success of customer and supplier satisfaction was gained through the company's integration in the technology system of data and interaction. Furthermore, logistics service providers can easily access information from anywhere thanks to cloud technology, which enables the easy storage of vast amounts of data without the need for physical servers or hard drives. This gives service providers the ability to exert control over critical processes that require round-the-clock monitoring from anywhere ("India - On the Verge of a Logistics Revolution," 2018).

However, there are differences between middle and small businesses, with small businesses being less aware of market updates (James & Inyang 2022; Kawasaki et al., 2011). There are numerous advantages to IT integration, including increased market share and economies of scale and scope, sharing creativity throughout the logistical process, improving the flexibility of routing among various modes of transportation, and providing door-to-door transportation services (Premkumar et al., 2021; Rey et al., 2021; Tan et al., 2018).

Furthermore, larger businesses may anticipate greater benefits from using technology than smaller businesses (James & Inyang, 2022; Michaelides et al., 2010). Every ICT tool can be used at various stages of investment (Dubey & Singhal, 2021; Marchet et al., 2009). According to Rollins (2011), it is also critical that the buyer and seller of logistics services collaborate on management issues and build trust. This not only suggests a favourable strategy for ICT investment decisions, but also provides their corresponding option value to justify the decision (Kawasaki et al., 2011).

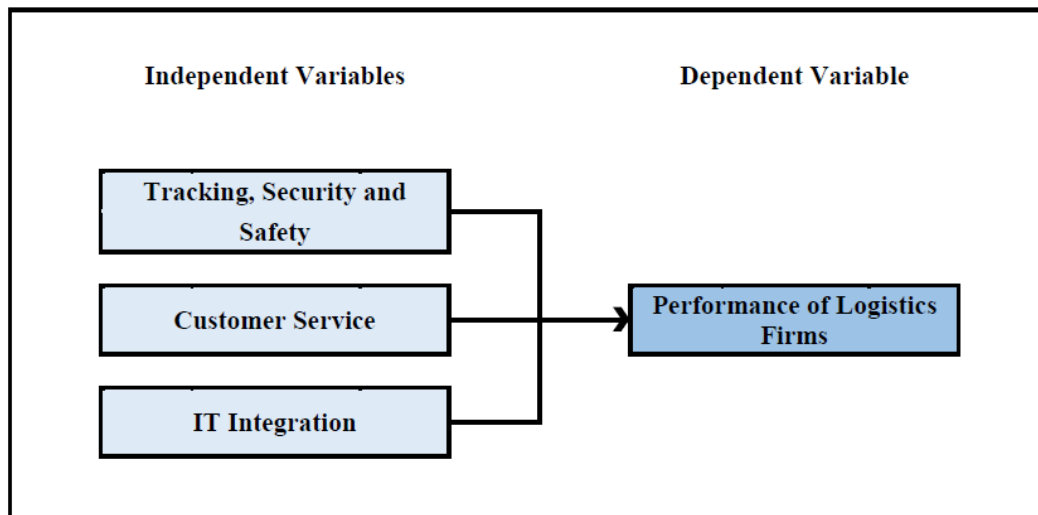


Figure 1
Study Conceptual Framework

Research Design

This study used a descriptive research design to investigate and quantify the relationship between the effects of IT implementation on the performance of logistics firms in Shah Alam, Selangor. The Malaysia Logistics Directory 2016/2017 lists 600 logistics firms registered with the Federal of Malaysia Freight Forwarder (FMFF). Nonetheless, there are an estimated 61 companies registered with the Freight Forwarders & Logistics Association in Shah Alam, Selangor (SFFLA). Logistics firms in Shah Alam are being targeted because it is Selangor's city centre. Furthermore, Shah Alam is a major hub for both domestic and international cargo in Malaysia. As a result, it is relevant and valid to provide the required information for this study.

For this study, the questionnaire was adopted from the previous studies by Wilson et al (2015a, 2015b) and was distributed to the selected logistics firms in Shah Alam, Selangor. This questionnaire is divided into five sections in Table 5 as follows:

Table 5
Five Sections of Research Questionnaire

Section	Variables	Number of item
A	Respondent’s demographic information	5 objective questions
		-
B	Tracking, security and safety	2 objective questions
		7-point Likert Scale
C	Customer service	-
		5-point Likert Scale
D	IT integration	2 objective questions 6-point Likert Scale
E	Performance	-
		7-point Likert Scale

Only 44 of the 61 questionnaire sets were successfully collected from the identified

logistics firms. The calculated response rate for this study is 72.13 percent. According to Mohamed (1998), a response rate of 15 to 25% in the Malaysia context could be considered acceptable and appropriate. As a result, it is possible to conclude that the response rate of this study is high and acceptable. Furthermore, according to Borg and Gall (2003), a study should include at least 30% of the total population. As a result, the samples collected exceed the minimum required percentage and are sufficient for this study.

Results and Discussion

Respondents Demographic

According to the findings, 23 of the 44 samples are classified as freight forwarders (52.3 percent), 19 as shipping lines (43.2 percent), and 2 as terminal operators (4.5 percent), as shown in table 12. In terms of firm size, large firms account for 28 (63.6 percent), medium firms account for 12 (27.3 percent), and small firms account for 4 percent (9.1 percent). Meanwhile, in terms of company ownership, 20 (45.5 percent) firms are owned by both local and foreign entities, while 12 (27.3 percent) firms are owned by both local and foreign entities.

Table 6

IT Service Provided by the Company

Service	Frequency	Percentage (%)	Ranking
<i>Routing, mapping and scheduling</i>	41	93.2	1
<i>Cargo tracking</i>	40	90.9	2
<i>Driver management</i>	16	36.4	3
<i>Fuel management</i>	12	27.3	4
<i>Vehicle tracking</i>	11	25.0	5

The highest service using information technology adoption in their respective firm is shown in Table 6. The highest ranking is 41 (93.2 percent) of respondents using IT in routing, mapping, and scheduling. Transportation management (TM) applications such as routing, mapping, and scheduling are frequently implemented to support day-to-day activities in the logistics industry, according to (Marchet et al., 2009).

Following that, 40 (90.9 percent) of respondents agreed that they use cargo tracking services. This is supported by a 2014 Shipper Council of Eastern Report, which stated that most logistics companies have begun to embrace cargo tracking in order to replace the security bond in their organisation. Furthermore, tracking is typically based on verification during the supply chain process, and proof of delivery is critical in transportation management (Marchet et al., 2009).

The third ranking was 16 (36.4 percent) for driver management, 12 (27.3 percent) for fuel management, and 11 (25.0 percent) for vehicle tracking. Marchet et al (2009) agree that practical parameter checking and monitoring for vehicles, such as tyre pressure monitoring, are still uncommon.

Correlation Analysis

According to the Pearson correlation analysis results in Table 7, the relationship between ICT

adoption in tracking, security, and safety and firm performance is $r = 0.396$ and $P = 0.008$. As a result of the $P < 0.05$, it is possible to conclude that IT implementation in tracking, security, and safety has a significant positive relationship with firm performance in logistics firms in Shah Alam, Selangor.

Table 7

Pearson Correlation for Tracking, Security & Safety and Firm Performance

		Company performance	Tracking, Safety & Security
Company performance	Pearson Correlation	1	.396**
	Sig. (2-tailed)		.008
	N	44	44
Tracking, Safety & Security	Pearson Correlation	.396**	1
	Sig. (2-tailed)	.008	
	N	44	44

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

Following that, the Pearson correlation analysis, as shown in Table 8, revealed that $r = 0.415$ and $P = 0.005$ for IT implementation in customer service. Since $P < 0.05$, it is possible to conclude that IT implementation in customer service and firm performance have a positive relationship, with an increase in IT implementation in customer service associated with an increase in firm performance.

Table 8

Pearson Correlation for IT implementation in Customer Service and Firm Performance

		Company performance	Customer Service
Company performance	Pearson Correlation	1	.415**
	Sig. (2-tailed)		.005
	N	44	44
Customer Service	Pearson Correlation	.415**	1
	Sig. (2-tailed)	.005	
	N	44	44

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

Furthermore, referring to the Pearson correlation analysis results in Table 9, the correlation of IT integration and company performance obtained is $r = 0.456$ and $P = 0.002$. Based on the results, it could be concluded that IT integration and company performance have a significant positive relationship as the value of $P < 0.05$. Thus, the increase in IT integration could be improving firm performance.

Table 9
Pearson Correlation for IT Integration and Firm Performance

		Company performance	IT Integration
Company performance	Pearson Correlation	1	.456**
	Sig. (2-tailed)		.002
	N	44	44
IT Integration	Pearson Correlation	.456**	1
	Sig. (2-tailed)	.002	
	N	44	44

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

Discussion of Hypotheses

Table 10
Hypotheses Testing

	Hypotheses	Direction	Results
H1	There is a significant relationship between information technology implementation in tracking, security & safety towards company performance	Positive	Supported
H2	There is a significant relationship between information technology implementation in customer service towards company performance	Positive	Supported
H3	There is a significant relationship between information technology integration towards company performance	Positive	Supported

Table 10 summarises the study's hypotheses and findings. Overall, the findings show that information technology implementation of tracking, security & safety, customer service, and IT integration have a significant positive impact on company performance. This is supported by previous related studies by Wang et al (2022); Fadiyah et al (2016), which found that IT implementation affects company performance, resulting in a competitive advantage in industry growth. Aside from that, technology will be a major influencer in the future logistics industry (Brah & Lim, 2006).

Furthermore, Ainomugisha (2022); Evangelista and Kilpala (2007) discovered a positive relationship between information technology adoption and financial performance among logistics providers. This study findings also corroborates with Muango et al (2021), that suggested IT had a positive influence on operational performance.

Tracking, Security & Safety and Company Performance

The H1 hypothesis states that there is a significant positive relationship between information technology implementation in tracking, security, and safety and company performance. This study's findings are consistent with previous related studies by Mlimbila & Mbamba (2018); Wilson et al (2015); Ndonye (2014); Kawasaki et al (2011); Johansson and Pa (2008), which found that a tracking system improves a company's performance. Furthermore, Premkumar, Gopinath, & Mateen (2021); Meyer et al (2013) emphasise the use of intelligent products to improve the utilisation of tracking technology for operational control queries and information assessments.

Thus, the adoption of information technology improves and enhances supply chain operations and productivity (Mehrjerdi, 2010), and cargo security boosts customer confidence (Mlimbila & Mbamba, 2018; Wilson et al., 2015). According to the H1 hypotheses, there is a significant positive relationship between information and furthermore, this will force companies to invest in system integration with tracking system operators or rely on manual methods (Karkkainen et al., 2004).

Customer Service and Company Performance

Following that, the study's findings support the second hypothesis of a significant relationship between information technology implementation in customer service and company performance. These findings corroborate the findings of (Wilson et al., 2015; Muerza & Larrode, 2017; James & Inyang, 2022).

According to Jha (2019), one of the most important factors of core competencies and developing long-term growth strategies for third-party logistics providers is delivery and service reliability. Furthermore, customer service is more practical because it interacts with the customer via the internet (Zainal & Rasi, 2021). Furthermore, it could constantly elicit a response from them (Bhandari, 2004). As a result, when customers are satisfied with the logistics services provided, they are more likely to do business again (James & Inyang, 2022; Fernandes et al., 2018).

IT Integration and Company Performance

The findings of this study support the third hypothesis that there is a significant relationship between information technology integration and company performance. It is supported by previous research by Wang et al (2022); Fadiyah et al (2014); Wilson et al (2015); Ndonye (2014), which confirmed that system integration with other supply chain partners for easier data sharing and communication.

Thus, connectivity and willingness to share and integrate information are found to have an impact on operational performance (Zainal & Rasi, 2021; Fawcett et al., 2005). Furthermore, Cuthbertson and Piotrowicz (2011) contend that how such information integration is used and shared between the supply partner and both within an organisation has an impact on logistics performance.

As a result, the findings of the study contradict those of Lee-Partridge et al (2000); Helo and Szekely (2005); Yoshimoto and Nemoto (2005); Karacapilidis (2006); Ainomugisha (2022) who found no significant benefits from ICT adoption on logistics performance. Overall, among the three variables that influence firm performance, IT Integration is the largest contributor, followed by customer service, and tracking, security, and safety are the smallest contributors. According to studies by Alavi (2019); Marchet et al (2009), a lack of awareness about the potential benefits of IT adoption results in a lower impact in tracking, security, and safety.

Furthermore, logistics industry fragmentation and multilevel sub-contracting (Marchet et al., 2009), lack of compatibility with the current system, inadequate employee training and system not being flexible enough (Evangelista & Kilpala, 2007), running cost and capital (Aziz et al., 2016) are undeniably a strong hinder and barrier to invest in new technologies such as tracking, safety, and security.

Conclusion

Some implications can be drawn from the study's findings for the logistics and supply chain industries. A significant positive relationship between IT implementation and company performance indicates that technology adoption will benefit logistics operations. As a result, logistics firms may be able to achieve superior performance in terms of efficiency and effectiveness.

Second, it is critical for a logistics company to correctly prioritise its technology investments in the company's operations. In the case of many companies struggling and lacking proper strategic planning for information technology adoption, the findings of this study may be used for IT investment decision making as well as developing systematic approaches to IT implementation.

Third, the study's findings help information technology solution providers and IT vendors better understand the current state of information technology implementation, particularly in the logistics and supply chain industry. As a result, improvements in specific technologies that suit the industry in terms of design, application, and cost that are more closely aligned with the business characteristics of logistics companies will be possible.

References

- Ainomugisha, E. (2022). *Information Technology Adoption, Supply Chain Integration and Logistics Performance: A case of Logistics firms in Uganda* (Doctoral dissertation, Makerere University Business School).
- Alavi, A. (2019). *Logistics integration in the port sector: the case of Iran* (Doctoral dissertation, University of Tasmania).
- Amin, H. M., & Shahwan, T. M. (2020). Logistics management requirements and logistics performance efficiency: the role of logistics management practices-evidence from Egypt. *International Journal of Logistics Systems and Management*, 35(1), 1-27.
- Arase, D. (2015). *Trends in Southeast Asia*.
- Aziz, Z. A., Che, R., Mohd, R., Yaacob, R., Syuhailah, N., Hussin, N., Razmin, M. (2016). Do Technological and Organizational Innovation Have Significant Influences on the Logistics Performance. *International Journal of Business and Management Invention*, 5(11), 55–62.
- Bakar, M. A. A., & Jaafar, H. S. (2016). Malaysian Logistics Performance: A Manufacturer's Perspective. *Procedia - Social and Behavioral Sciences*, 224(August 2015), 571–578. <https://doi.org/10.1016/j.sbspro.2016.05.442>
- Bhandari, R. (2004). Impact of Technology on Logistics and Supply Chain Management. *Journal of Business and Management*, (7th International Business Research Conference), 19–24.
- Borg, R., & Gall, M. D. (2003). *Educational Research: An Introduction* (Fifth Ed.) New York: Longman.
- Brah, S. A., & Lim, H. Y. (2006). The effects of technology and TQM on the performance of logistics companies. <https://doi.org/10.1108/09600030610661796>

- Capgemini (2008). Third-Party Logistics - The state of logistics outsourcing, available a change on business outcomes: Transformation of the Value Chain of Japan Airlines: Japan Cerasis. (2018). The Top Logistics Trends that Will Impact Logistics Management in 2018, 19. Retrieved from <http://cerasis.com/wp-content/uploads/2018/02/The-Top-Logistics-Trends-that-Will-Impact-Logistics-Management-in-2018.pdf>
- Cuthbertson, R., & Piotrowicz, W. (2011). Performance measurement systems in supply chains A framework for contextual analysis, 60(6), 583–602. <https://doi.org/10.1108/17410401111150760>
- Domingo, L. (2016). The Challenges of Logistics 4.0 for the Supply Chain Management and the Information Technology. *Norwegian University of Science and Technology*, (May), 1–84. Retrieved from https://brage.bibsys.no/xmlui/bitstream/handle/11250/2396477/15993_FULLTEXT.pdf?sequence=1
- Dubey, S., & Singhal, V. (2021). Impact of Internet of Things on Logistics Management: A Framework for Logistics Information System. In *Artificial Intelligence for a Sustainable Industry 4.0* (pp. 19-30). Springer, Cham.
- Evangelista, P., & Kilpala, H. (2007). The perception on ICT use among small logistics service providers : a comparison between Northern and Southern Europe. *European Transport*, 35, 81–98.
- Fadiah, N., Zawawi, M., Wahab, S. A., Yaacob, A. S., Samy, N. K. A. L., & Ali, S. (2016). Measuring the Effectiveness of Road Transportation Logistics Performance in East Malaysia : A Conceptual Model, 11(4), 110–120. <https://doi.org/10.5539/ijbm.v11n4p110>
- Fawcett, S. E., Osterhaus, P., End, L., Magnan, G. M., & Brau, J. C. (2005). Information sharing and supply chain performance: the role of connectivity and willingness. <https://doi.org/10.1108/13598540710776935>
- Fawcett, S. E., Wallin, C., Allred, C., Fawcett, A. M., & Magnan, G. M. (2011). Information technology as an enabler of Supply Chain Collaboration: A dynamic-capabilities perspectives. *Journal of Supply Chain Management*, 47(1), 22. <https://doi.org/10.1111/j.1745-493X.2010.03213.x>
- Fernandes, D. W., Moori, R. G., Pós-graduação, P. De, Empresas, A. De, Mackenzie, U. P., & Paulo, S. (2018). Logistic service quality as a mediator between logistics capabilities and customer satisfaction, 25(4), 358–372. <https://doi.org/10.1108/REG-01-2018-0015>
- Gunasekaran, A., Subramanian, N., & Papadopoulos, T. (2017). Information technology for competitive advantage within logistics and supply chains: A review. *Transportation Research Part E: Logistics and Transportation Review*, 99, 14–33. <https://doi.org/10.1016/j.tre.2016.12.008>
- Helo, P., and Szekely, B. (2005), “Logistics information systems – an analysis of software solutions for supply chain co-ordination”, *Industrial Management & Data Systems*, Vol. 105 No. 1, pp. 5-18.
- India - On the Cusp of a Logistics Revolution. (2018), (January).
- James, E. E., & Inyang, I. B. (2022). Logistics Management and Marketing Performance of Small and Medium-Sized Manufacturing Firms. *Logistics Management*, 5(1), 1-15.
- Jha, P. C. (2019). Studying the interrelationship between third party logistics service provider enablers using ISM methodology. <https://doi.org/10.1108/JM2-09-2018-0132>
- Johansson, O., & Pa, H. (2008). The impact of Auto-ID on logistics performance A benchmarking survey of Swedish. <https://doi.org/10.1108/14635770910972432>

- Karacapilidis, N., Lazanas, A., Megalokonomos, G., and Moraitis, P. (2006), "On the development of a web-based system for transportation services", *Information Sciences*, Vol. 176, pp. 1801-28.
- Karkkainen, M., Ala-Risku, T., & Framling, K. (2004). Efficient tracking for short-term multi-company networks. *International Journal of Physical Distribution and Logistics Management*, 34(7), 545–564. <https://doi.org/10.1108/09600030410552249>
- Kawasaki, T., Hanaoka, S., & Le, H. T. (2011). The Impact of Information and Communication Technology on Performance of Logistics Service Providers in Vietnam.
- Lee-Partridge, J. E., Teo, T. S. H., and Lim, V. K. G. (2000), "Information technology management: the case of the port of singapore authority", *Journal of Strategic Information Systems*, Vol. 9, pp. 85-99.
- Lee, E., & Wang, Y. (2011). An integrated resource management view of facilities management", *Facilities*. Pearson Education: Washington DC.
- Lukinskiy, V., Lukinskiy, V., & Shulzhenko, T. (2017). Logistics Systems Efficiency Increase Based on the Supply Chains Integration. *Procedia Engineering*, 178, 117–122. <https://doi.org/10.1016/j.proeng.2017.01.073>
- Macaulay, J., Buckalew, L., & Chung, G. (2015). Internet of Things in Logistics. *DHL Trend Research*, 1(1), 1–27.
- Marchet, G., Perego, A., & Perotti, S. (2009). An exploratory study of ICT adoption in the Italian freight transportation industry, 39(9), 785–812. <https://doi.org/10.1108/09600030911008201>
- McMullan, A. (1996), Supply chain management practices in Asia Pacific today. *International Journal of Physical Distribution and Logistics Management*, 26(10), 79-95.
- Mehrjerdi, Y. Z. (2010). Coupling RFID with supply chain to enhance productivity, 11(2), 107–123. <https://doi.org/10.1108/17515631011026434>
- Meyer, G. G., Buijs, P., Szirbik, N. B., & Wortmann, J. C. H. (2013). Intelligent products for enhancing the utilization of tracking technology in transportation, (257398). <https://doi.org/10.1108/IJOPM-11-2012-0530>
- Michaelides, R., Michaelides, Z., & Nicolaou, D. (2010). Optimisation of logistics operations using GPS technology solutions: a case study. *Proceedings of the Twenty First Annual POMS Conference*. Retrieved from <http://www.pomsmeetings.org/confpapers/015/015-0822.pdf>
- Mlimbila, J., & Mbamba, U. O. (2018). The role of information systems usage in enhancing port logistics performance: evidence from the Dar Es Salaam port, Tanzania. *Journal of Shipping and Trade*, 3(1), 1-20.
- Mohamed, M. Z. (1998), Assessing the competitiveness of the Malaysian electronic and electrical industry: Part 1-technology adoption. *Malaysian Management Review*, 33(10), 19-27.
- Muerza, V., & Larrodé, E. (2017). Identification and selection of ICTs for freight transport in product service supply chain diversification, 117(7), 1469–1484. <https://doi.org/10.1108/IMDS-09-2016-0375>
- Muango, C. O., Abrokwah, E., & Shaojian, Q. (2021). Revisiting the link between information technology and supply chain management practices among manufacturing firms. *European Journal of International Management*, 16(4), 647-667.
- Ndonye, S. K. (2014). Influence Of Information Technology On Logistics Performance In Kenya With Reference To Cargo Transportation. *Journal of Supply Chain Management*, 1(2), 1–18.

- Premkumar, P., Gopinath, S., & Mateen, A. (2021). Trends in third party logistics—the past, the present & the future. *International Journal of Logistics Research and Applications*, 24(6), 551-580.
- PWC. (2016). Shifting patterns: The future of logistics industry. Retrieved from www.pwc.com/transport
- Rey, A., Panetti, E., Maglio, R., & Ferretti, M. (2021). Determinants in adopting the Internet of Things in the transport and logistics industry. *Journal of Business Research*, 131, 584-590.
- Rollins, M. (2011). Inter-firm customer knowledge sharing in logistics services : an empirical study. <https://doi.org/10.1108/09600031111185239>
- Sum, C. C., Teo, C. B. (1999), Strategic posture of logistics service providers in Singapore. *International Journal of Physical Distribution and Logistics Management*, 29(9), 588-605.
- Tongzon, J. L., & Nguyen, H. O. (2021). Effects of port-shipping logistics integration on technical and allocative efficiency. *The Asian Journal of Shipping and Logistics*, 37(2), 109-116.
- Wang, X., Kumar, V., Kumari, A., & Kuzmin, E. (2022). Impact of Digital Technology on Supply Chain Efficiency in Manufacturing Industry. In *Digital Transformation in Industry* (pp. 347-371). Springer, Cham.
- Wilson, M. N., Iravo, M. A., Tirimba, O. I., & Ombui, K. (2015a). Effects of Information Technology on Performance of Logistics Firms in Nairobi County. *International Journal of Scientific and Research Publications*, 5(1), 2250–3153. Retrieved from www.ijsrp.org
- Wilson, M. N., Iravo, M. A., Tirimba, O. I., & Ombui, K. (2015b). Effects of Information Technology on Performance of Logistics Firms in Nairobi County, 5(4).
- Yoshimoto, R., and Nemoto, T. (2005), “The impact of information and communication technology on road freight transportation”, *IATSS Research*, Vol. 29 No. 1, pp. 16-21.
- Zainal, N., & Rasi, R. Z. R. M. (2021). The Relationship of Logistic Technology in Supply Chain Management on the Customer Relations. *Research in Management of Technology and Business*, 2(1), 552-560.