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LOGISTIC VISIBILITY AND PERFORMANCE OF E-COMMERCE FIRMS IN NAIROBI COUNTY, KENYA

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ABSTRACT

Logistics visibility is the ability to track and monitor the status and location of parts, components and products as they move along through the supply chain, from origin to destination. The objective of this study was to determine the effect of logistic visibility on performance of E-Commerce firms in Nairobi County, Kenya. The study's specific objectives were: warehouse management and information technology. The study's target population was 120 respondents from E Commerce firms in Nairobi county. The study employed questionnaires as a data collection tool. Questionnaires were designed using both opened and closed ended questions. Data collected was analyzed using SPSS software version 23 and presented in tables, graphs and pie chart. The study's findings were that the respondents on average tended to agree with each of the statements in study variables with most means above 3.50. on the same breath, the respondents also had consensus with many statements of study variables with SD of below 1.00. The study concluded that the warehouse management and information technology have a significant influence on performance E- commerce firms in Nairobi County. The study also concluded that in every unit increase in warehouse management, results in an increase in performance of E- commerce firms in Nairobi county. A unit increase in Information technology on its own, results in an increase in performance of E-commerce firms in Nairobi County. The study recommends that the E- commerce firms should Implement a Warehouse Management System (WMS) which helps track inventory in real-time. The study suggests an examination on the warehouse management system in E- commerce firms in Nairobi County.

Key Words: Logistic Visibility, Performance, E-Commerce Firms, Warehouse Management, Information Technology

Background of the Study

Logistics visibility is the ability to track and monitor the status and location of parts, components and products as they move along through the supply chain, from origin to destination. Visibility indeed has an objective when it comes to your supply chain, it has a specific role; to collect better information about your logistical operations and strengthen them, make them more efficient, more accurate in order to reduce risks, to increase profit, to make your customers happy and to reduce your costs. In other words, visibility is your supply chain's best friend. It is there to improve the supply chain by taking real-time data and putting it at the disposition of your stakeholders and your customers, making everybody aware of the shipment's status and availability in real time and with alerts. (Alpage, 2023).

Logistics is a concept which is related to the transportation of raw material from suppliers to a manufacturing enterprise site, the internal transportation and storage of raw material and finished goods within the manufacturing enterprise, and the transportation, distribution, and storage of the finished goods to distribution centers, retail centers, and the end customer. Logistics is related to the concept of Supply Chain Management (SCM) in the sense that Logistics Management is part of the SCM. While most of the tangible actions in Logistics happen in the raw material and finished product flow from the suppliers to the manufacturer to the end customer, Logistics also involves the reverse flow of information (demand flow) which is facilitated by IT- and IoT-related technologies (Vlasios Tsiatsis & Catherine, 2019).

Logistics management is "that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.

Statement of the Problem

Logistics centers on the movement of goods, but its effects extend much further. In business, success in logistics translates to increased efficiencies, lower costs, higher production rates, better inventory control, smarter use of warehouse space, increased customer and supplier satisfaction, and an improved customer experience (Abby, 2024). The very essence of a business is to exchange goods or services for money or trade. Logistics is the path those goods and services take to complete the transactions. Sometimes goods are moved in bulk, such as raw goods to a manufacturer. And sometimes goods are moved as individual disbursements, one customer at a time. No matter the particulars, logistics is the physical fulfillment of a transaction and as such is the life of the business. Where there is no movement of goods or services, there are no transactions—and no profits (Abby, 2024). While the logistic sector plays vital role in fulfilling the functions of a business to its customers, it does not operate in isolation of challenges and problems. The major problems that hinder smooth logistical operations include; fragmented communication, infrastructure deficiency, delivery delays, technological integration etc.

Given the growing list of challenges that the logistics industry faces, viable solutions are needed now. Luckily, there are solutions available. For example, digitization and collaborative logistics can tackle most existing issues and enable enterprises to plan, control, and monitor the movement of goods with greater ease. Many logistic players have embraced digitization and have adopted a host of SAP and non-SAP solutions to address existing and emerging challenges. For example, SAP's Digital SCM (supply chain management) has enabled logistics players to move away from transactional SCLM and toward a strategy-driven, digital, and sustainable approach. In addition, the solution enhances their resilience and mitigates potential future disruptions with agility and data-driven actions (Georgy Norkin, 2024).

Many local studies like (Mercy Mwende Muema & Dr. John Achuora, 2020), (Abebe, D. A. & Miroga, J., 2020) focused on logistic management practices and performance of supply chain management. Few or no known studies have specifically addressed the logistic management practices on performance of Ecommerce firms in Kenya. It is against this background that this research intends to harness the knowledge aperture and traverse the logistic management practices on performance of Ecommerce firms in Nairobi County, Kenya.

Research Objectives

The general objective of this study was to establish the effect of logistic visibility on performance of E-commerce firms in Nairobi County, Kenya.

This study was coined on the following specific objectives:

1. To assess the effect of warehousing management on performance Ecommerce firms in Nairobi County, Kenya
2. To determine the effect of inventory management on performance Ecommerce firms in Nairobi County, Kenya.

LITERATURE REVIEW

Theoretical Review

Resource based view Theory (RBV)

This theory was put forth by Jay Barney's in 1991 in his article, "Firm Resources and Sustained Competitive Advantage," is seen as pivotal in the emergence of the resource-based view. According to RBV, resources can be broadly defined to include assets, organizational processes, firm attributes, information, or knowledge controlled by the firm which can be used to conceive of and implement their strategies (Seriki, 2023).

The resource-based view (RBV), also known as resource-based theory is a strategy which emphasizes the significance of organizational resources and capabilities as the key to gaining competitive advantage and performance. A highly skilled talent pool helps an organization to explore opportunities and prevent risks in advance. It also enables them to implement strategies to improve operational efficiency and effectiveness. The comprehensive view of all the resource pools facilitates managers' gaining insight into resource skills, competencies, experience, capacity, availability, etc. This, in turn, enables managers to plan ahead and allocate resources per the project's scope, demand, and timeline. This real-time centralized information helps them make data-driven decisions, leverage talent to its optimum potential, and maximize profitability (Om Gupta, 2023).

The central argument in the resource-based view (RBV) is that despite a firm having well-defined goals to accomplish, how the mission will be fulfilled is often limited by resource availability. The RBV focuses on the utilization and deployment of resources, leading to the development of resource-driven competencies and eventual competitive advantage. Resources in a firm can be either internal or external to the firm and may be acquired or already owned by the firm. The process through which a firm coordinates and deploys these resources will eventually affect its competitive advantage (Seriki, 2023).

The resource-based view (RBV) of the firm suggests that possessing essential resources enables a firm to create competitive advantage and enhance performance (Barney, 1991; Slotegraaf et al., 2003; Vorhies and Morgan, 2005). The perspective of RBV helps firms develop an effective strategy and dynamic capability to meet their strategic objectives and attain sustainable competitive advantage (Hardeep Chahal, 2020).

The resource-based strategy helps foster a deep understanding of a firm's unique resources and capabilities. It encourages leveraging these distinct strengths to drive innovation, encouraging the development of new products, services, or processes that capitalize on these resources. Additionally, RBV promotes adaptability by continuously evaluating and evolving these resources to match changing market demands, enabling firms to pivot and adjust strategies effectively based on their core competencies, thus fostering a culture of innovation and resilience (Om Gupta, 2023). This theory is vital to this study because it recognizes warehousing management and information technology as a vital internal resource that makes the efficiency wheels of an organization move hence desired operational performance and effectiveness.

Conceptual framework

A conceptual framework is a representation of the relationship you expect to see between your variables, or the characteristics or properties that you want to study. A conceptual framework illustrates the expected relationship between your variables. It defines the relevant objectives for your research process and maps out how they come together to draw coherent conclusions (Tegan, 2024).

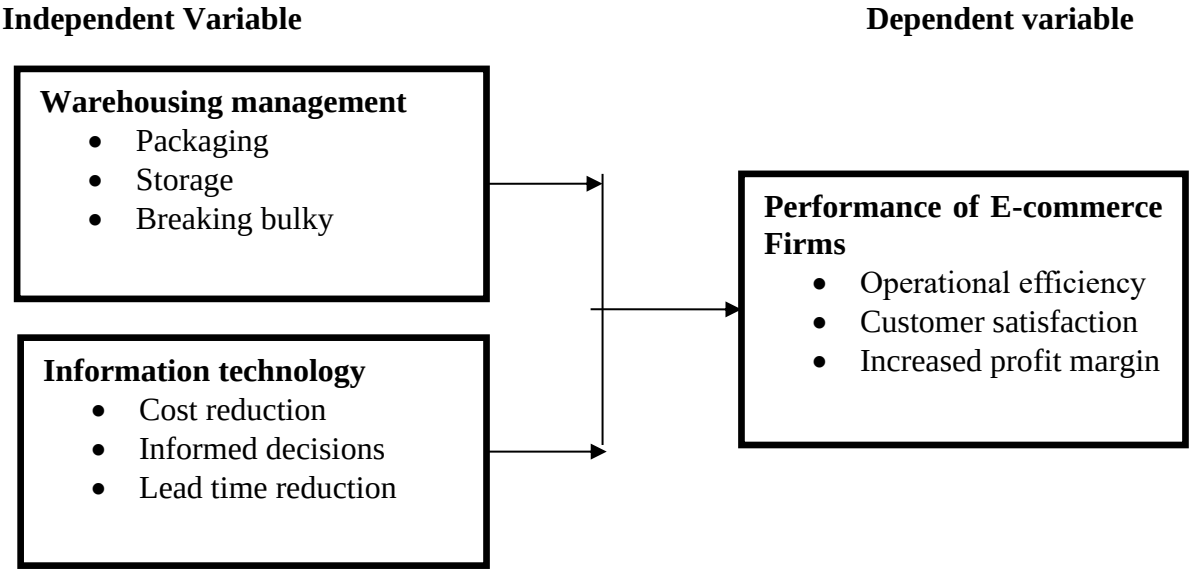

Figure 2. 1: Conceptual framework

Warehousing Management

Warehousing refers to the storing of goods and products before distribution or sale. Warehouses act as temporary storage facilities, and sometimes as fulfillment centers, distributors, or other service providers in the supply chain, helping create a smooth flow of products from businesses to consumers (Will, 2023).

Warehouses have several functions, such as storing goods and facilitating distribution, transportation, and logistics operations. Some of the processes involved in these warehousing functions are receiving, categorizing, storing, tracking inventory levels, fulfilling orders, and shipping products. Technology such as barcodes and RFID tags are often used to accurately track quantities and locations of each product to ensure speedy, precise delivery. Warehouses also sometimes provide value-added services like packaging, labeling, customization, and assembly. By consolidating goods from different suppliers into one location for efficient distribution to customers, warehouses play an important role in the supply chain management process (Will, 2023).

Warehousing plays a critical role in E- commerce operations as it involves the storage of goods from various suppliers that will eventually be sold to customers online. A warehouse serves as the hub for inventory management, order processing, and shipment coordination. E- commerce businesses must ensure that their warehouses operate efficiently to reduce costs, increase productivity, and deliver customer satisfaction consistently. This involves proper product categorization and a smart layout for optimal storage capacity utilization, (Will, 2023).

In the intricate supply chain dance, warehousing stands front and center, bridging production, distribution, and customer satisfaction. Its versatile functions span storage finesse, inventory coordination, risk mitigation, and value-added services. These functions collectively underscore its pivotal importance in streamlining supply chain efficiency. Its benefits, ranging from optimized order fulfillment and cost advantages to increased adaptability and risk management, synergize to empower businesses in meeting consumer demands while maintaining operational excellence. As industries flex to dynamic market conditions, the relevance of warehousing in supply chain management remains unparalleled.

Information Technology

Information technology (IT) is a set of related fields that encompass computer systems, software, programming languages, data and information processing, and storage IT forms part of information and communications technology (ICT). An information technology system (IT system) is generally an information system, a communications system, or, more specifically speaking, a computer system — including all hardware, software, and peripheral equipment — operated by a limited group of IT users, and an IT project usually refers to the commissioning and implementation of an IT system (Cosker Glynn , 2023).

According to (Yasar, 2024), Information technology (IT) is the use of computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data. Typically, IT is used in the context of business operations, as opposed to the technology used for personal or entertainment purposes. The commercial use of IT encompasses both computer technology and telecommunications.

IT enables seamless communication and collaboration across different locations and time zones and IT systems and tools streamline processes, automate repetitive tasks and provide access to real-time data, thereby improving the overall efficiency and productivity of businesses. For example, a retail company with an integrated IT system can use an automated inventory management tool to track stock levels in real time and replenish them through automatic reordering. Also, IT provides access to vast amounts of information and knowledge in databases and E COMMERCE libraries, empowering individuals and organizations to make informed decisions and stay updated with the latest developments (Yasar, 2024).

Empirical Review

Warehouse Management

Shikwesha, Singh, and Gaikwad (2025) conducted a mixed-methods study in India exploring the impact of IoT integration in warehouse and last-mile logistics. Their approach involved survey distribution to 180 logistics managers in major metropolitan areas, complemented by interviews with five warehouse operations directors. Their findings revealed that real-time tracking of inventory, automated fleet coordination, and smart shelving systems enhanced warehouse visibility and accuracy, resulting in a 28% improvement in order fulfillment rates. The study emphasized how IoT applications in inventory control and predictive maintenance contributed to reducing downtime and misallocation of stock, both critical to performance in e-commerce logistics.

Similarly, Maravić, Pajić, and Andrejić (2025) employed a data envelopment analysis (DEA) method to evaluate the performance of couriers in e-commerce fulfillment based on warehouse handling metrics. Using operational data from logistics providers in the Balkans, the study assessed metrics such as inventory turnover, average picking time, and order cycle time. It concluded that performance-based ranking models can assist firms in reallocating resources across underperforming warehouse units, thus achieving overall network optimization. The researchers recommended real-time dashboards and AI-based load forecasting as tools to further streamline warehouse operations.

In another empirical contribution, Nandikonda et al. (2025) implemented AI-driven optimization models in Indian e-commerce warehouses. Their multi-algorithm approach combined Hybrid Metaheuristic Optimization (HMO), Reinforcement Learning (RL), and Multi-Depot Vehicle Routing Problems (MDVRP). They conducted a longitudinal experiment across five warehouse hubs and observed that AI-enhanced warehouse strategies improved inventory turnover by 33% and reduced warehouse holding costs by 21%. Their study strongly supports the case for intelligent inventory segmentation and adaptive bin location algorithms in dynamic warehousing environments.

Garrido and Bezerra (2025), in a broader study across Latin American logistics chains, explored how Industry 4.0 technologies such as artificial intelligence and cyber-physical systems affect warehouse visibility and responsiveness. Utilizing a structured survey distributed to 300 supply chain professionals and analyzed through structural equation modeling (SEM), the authors found that digital visibility tools such as RFID, real-time analytics, and warehouse drones played a significant role in accelerating warehouse throughput and reducing human error in picking and packing activities.

In Europe, Ondov, Rosová, and Šofranko (2025) applied a simulation-based approach to examine the efficiency of warehouse layouts and material handling systems. Conducted in a Slovak e-commerce distribution center, the simulation tested multiple scenarios involving robotic assistance and lean workflow designs. Results demonstrated that integrating automated guided vehicles (AGVs) with warehouse layout redesigns led to a 15% increase in space utilization and a 25% reduction in worker fatigue, illustrating the value of ergonomics and automation in warehouse performance.

Moreover, Nguyen (2025) evaluated the role of IT capability in the context of omnichannel retail warehouse operations. Through a quantitative study of 120 small and medium retailers in South Africa using regression analysis, the research showed that IT-driven distribution competence (including synchronized inventory views and omnichannel picking systems) significantly predicted business performance, especially in dual-channel operations where traditional and online order flows converged. The study recommended cloud-based WMS platforms to support inventory pooling and real-time allocation.

Finally, Patil (2025) addressed the strategic grading of carriers and warehouse staff based on AI-driven performance analytics. His experimental study in logistics-intensive industries involved the deployment of a grading system that analyzed order cycle consistency, stockout frequency, and return processing time. The graded feedback system improved warehouse employee performance by increasing accountability and enhancing inter-departmental coordination between procurement, stocking, and outbound teams.

Collectively, these studies demonstrate the diverse methodological approaches used to investigate warehouse management practices and their measurable influence on logistics and business performance. From advanced algorithms and simulation models to real-time IoT

integration and staff grading systems, the role of warehousing has transformed from a passive storage function into a dynamic engine of supply chain competitiveness.

Information Technology

Zhang (2025) explored the influence of inter-organizational information and communication technology (Inter-OICT) on the resilience and performance of e-commerce logistics networks in China. Using structural equation modeling (SEM) on data collected from 245 supply chain and logistics managers, the study tested the mediating roles of organizational flexibility and trust. Results indicated that Inter-OICTs—particularly cloud-based logistics platforms, collaborative planning tools, and shared dashboards—significantly improved logistics agility and delivery consistency during supply chain disruptions. The study emphasized the role of IT not just as a tool but as a relational infrastructure fostering coordination and strategic alignment.

Korucuk and Aytekin (2024) used a Polytopic fuzzy methodology to assess technological challenges faced by logistics firms in adopting e-logistics systems. The study was conducted in Turkey's Giresun province, collecting both survey and interview data. Their fuzzy modeling approach enabled them to rank the severity of problems such as system downtime, user resistance, and integration failure. The study concluded that while IT boosts performance by enabling better order visibility and delivery optimization, firms must address systemic challenges like digital literacy gaps and outdated infrastructure.

In a practical simulation study, Liu (2024) evaluated the impact of smart logistics systems on enterprise performance in Chinese e-commerce sectors. Applying the Economic Value Added (EVA) model, the researcher analyzed logistics cost structures pre- and post-IT integration. The results showed substantial improvements in capital efficiency, customer service levels, and fulfillment reliability. Notably, systems equipped with AI for inventory optimization and blockchain for contract traceability showed the highest performance uplift.

Siriwatpatara and Rojniruttikul (2024) conducted an SEM-based study examining how IT capability influences business outcomes in Thai retail enterprises adopting e-commerce. Data were collected from 320 retail managers via stratified sampling. The model tested the interaction between IT adoption (such as ERP, CRM, and logistics tracking apps), e-business integration, and firm profitability. The findings demonstrated that firms with well-integrated IT architectures experienced higher customer satisfaction and fewer order failures, suggesting that backend systems are just as critical as consumer-facing technology in driving performance.

Additionally, Evangelista, Hallikas, and Jaber (2024) focused on the environmental implications of IT adoption in logistics. Their book chapter examined over 30 logistics service providers across Europe and assessed how green IT strategies, like digital documentation, carbon tracking, and low-energy data centers, influenced both sustainability and operational KPIs. Their findings suggest that digital transformation, when aligned with sustainability goals, not only enhances transparency but also serves as a differentiator in competitive logistics markets.

Wijaya et al. (2024) explored IT strategic planning in Indonesian logistics firms through a case-based action research methodology. By engaging with the executive leadership of PT XYZ, the researchers facilitated workshops on IT infrastructure development and monitored implementation of an enterprise resource planning (ERP) solution. The case revealed that strategic IT planning increased departmental coordination and dramatically reduced order fulfillment delays, reinforcing the notion that performance gains stem not only from technology acquisition but from deliberate digital strategy alignment.

Taken together, these studies confirm the indispensable role of IT in driving performance across various logistics and e-commerce operations. Whether through simulation modeling, fuzzy logic, SEM, or case studies, the literature affirms that robust IT frameworks enable responsiveness, enhance visibility, and support both operational and strategic decision-making in logistics ecosystems.

RESEARCH METHODOLOGY

The study was conducted in 5 selected E-commerce firms in Nairobi CBD these include; Glovo, Killmal, Uber, Bolt and Jumia. The IT departments, Management, Stores, Finance and sales department made up the study target audience. In this study, the Yamane's formulae was appropriate formulae for determining sample size. The distribution of sample size is shown on Table 1.

Table 1; Distribution of Sample Size

Department	Target population	Sample size
IT	30	23
Sales	30	23
Stores	20	15
Management	20	15
Finance	20	15
Total	**120**	**91**

Source: Hr department of E commerce firms

The sample size for this study was 91 respondents from selected E-commerce firms in Nairobi County. Random sampling technique was used in selection of individual respondents where the number of staff in each firm was determined in relation to the size of population. The study relied on primary data obtained from respondents of the selected firms. This was occasioned by questionnaires. The collected data was processed and analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics—including frequency counts, percentages, means, and standard deviations—were employed to summarize the respondents' demographic characteristics and perceptions of the study variables. The results were presented using tables and figures for ease of interpretation and clarity. In addition to descriptive analysis, inferential statistics were used to test hypotheses and determine the nature and strength of relationships between variables. Specifically, a multiple linear regression analysis was conducted

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

The sample size was 91 staff in IT, Sales,Stores, finance and general management. This sample size was determined using the Yamane's formula. Therefore, the researcher issued 91 questionnaires to the respondents. Out of these questionnaires, 75 questionnaires were returned, 16 questionnaires were not filled. This therefore meant that the complete questionnaires were 75 questionnaires which formed the basis of the data analysis in this study. In this context, the response rate for this study was 82.4% which was deemed sufficient for data analysis. According to Mugenda and Mugenda (2002), a minimum response rate of 80.0%

Descriptive Analysis of Study Variables

This section presents a descriptive analysis of the study's key variables—Warehouse Management, Information Technology, and Performance of E-commerce Firms. Data were obtained using a structured questionnaire based on a five-point Likert scale, where 1 = Strongly

Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. To interpret the mean scores meaningfully, the following scale was adopted: 1.00–1.79 (Strongly Disagree), 1.80–2.59 (Disagree), 2.60–3.39 (Neutral), 3.40–4.19 (Agree), and 4.20–5.00 (Strongly Agree). These ranges provide a standardized method for evaluating the level of agreement among respondents regarding the influence of each independent variable on firm performance. The descriptive statistics presented in the subsequent tables summarize the central tendencies and variability of responses for each variable.

Warehouse Management

This section presents a descriptive analysis of the respondents' perceptions regarding warehouse management practices in e-commerce firms within Nairobi County. The analysis was based on responses to a set of key indicators, each rated on a five-point Likert scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. Mean values were interpreted using the following range: 4.00–5.00 as strong agreement, 3.50–3.99 as general agreement, and 3.00–3.49 as neutral. The standard deviation was used to assess the level of consensus, with values below 1.00 indicating moderate to strong agreement, and values equal to or above 1.00 reflecting a lack of consensus. Table 4.5 presents the results for warehouse management indicators.

Table 2: Descriptive Statistics for Warehouse Management

Statement	Mean	Std. Dev
The organization's safety measures are implemented regularly and frequently in warehouses	4.48	0.508
The company provides ongoing training to warehouse employees on technologies and processes	4.45	0.506
Warehouse operating costs are regularly monitored and controlled to ensure profitability	4.06	0.788
The warehouse uses real-time monitoring tools to track order processing, inventory, and accuracy	3.91	0.879
The warehouse operations are well-organized to ensure timely order fulfillment and dispatch	3.70	1.045
The company uses effective space management techniques to maximize storage capacity	3.67	1.080
The inventory management system ensures accurate tracking and recording of stock levels	3.52	0.972
Aggregate Score (Overall Perception)	**3.97**	**0.826**

The results indicate that respondents strongly agreed that warehouse safety measures are consistently applied, with the highest mean score of 4.48 and a low standard deviation of 0.508. This suggests not only positive perceptions but also high consistency across respondents, implying that most e-commerce firms maintain structured and regularly implemented warehouse safety protocols. Close behind, the statement regarding ongoing training for warehouse staff scored a mean of 4.45 with a standard deviation of 0.506. This demonstrates a strong agreement that companies are investing in employee development, particularly in adapting to new warehouse technologies and processes. The high level of agreement and consensus here reflects a sector-wide appreciation for training as a driver of operational effectiveness.

Cost control practices in warehouse operations also received favorable responses, with a mean of 4.06 and a standard deviation of 0.788. This indicates that most respondents believe their

firms regularly monitor and manage operating costs, contributing to overall profitability and efficient resource utilization. Regarding the use of real-time monitoring tools to track order processing and inventory metrics, the mean was 3.91 with a standard deviation of 0.879. Respondents agreed that such technologies are in place, though there was slightly more variability in responses, which could reflect differences in the level of digital integration among firms. The organization of warehouse operations to support timely order fulfillment scored a mean of 3.70 and standard deviation of 1.045. While the average response leaned toward agreement, the high standard deviation suggests a lack of consensus, indicating that some firms may still be experiencing operational inefficiencies.

Similarly, the statement on the use of space management techniques recorded a mean of 3.67 and standard deviation of 1.080. Although respondents generally agreed, the variability in responses suggests disparities in warehouse layout optimization and storage utilization practices among firms. Lastly, the inventory management system's accuracy in tracking stock levels was rated at a mean of 3.52 with a standard deviation of 0.972, indicating moderate agreement with varied experiences across the respondent group.

The overall aggregate mean score was 3.97, placing the collective perception within the general agreement range. The corresponding standard deviation of 0.826 suggests moderate consistency in responses. These findings reflect that, while some aspects of warehouse management—particularly safety and staff training—are uniformly strong across firms, others such as space utilization and operational organization exhibit room for improvement. These observations are consistent with previous findings in the literature. For instance, the study by Muhalia Eric Jepherson and Dr. Makori Moronge (2021) confirmed that warehouse management systems significantly influence supply chain performance in Kenyan FMCG firms. Their study found that WMS reduces picking errors, optimizes storage space, improves inventory control, enhances productivity, and reinforces safety compliance. Similarly, Ondov et al. (2025) observed that integrating lean layouts and automation in warehouse settings leads to improved efficiency and reduced worker fatigue. The strong agreement in this study on safety and training supports this literature, while the variability in responses concerning space management and inventory accuracy aligns with findings that highlight uneven levels of digital maturity and operational discipline in the warehousing functions of many firms.

Information Technology

This section evaluates respondents' perceptions of Information Technology (IT) practices and infrastructure within e-commerce firms in Nairobi County. Data were collected using a five-point Likert scale, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. Mean scores were interpreted as follows: 4.00–5.00 indicating strong agreement, 3.50–3.99 indicating general agreement, and 3.00–3.49 suggesting neutrality. In terms of consensus, standard deviations below 1.00 reflect moderate to high agreement, while values equal to or above 1.00 suggest a lack of consensus. The descriptive results are presented in Table 3.

Table 3: Descriptive Statistics for Information Technology

Statement	Mean	Std. Dev
The IT department provides timely and effective support to resolve technical issues	4.67	0.540
The organization's IT systems are integrated, allowing seamless data sharing across departments	4.42	0.867
The organization's IT strategy is aligned with overall business objectives and supports growth	4.38	0.975
The organization regularly audits its IT security systems to identify and address vulnerabilities	4.15	0.745
The organization has strong cybersecurity measures in place to protect sensitive data and systems	4.12	0.680
The organization's investment in IT infrastructure and services is sufficient to meet business goals	3.91	1.071
Aggregate Score (Overall Perception)	**4.28**	**0.813**

The results reveal that the highest-rated item was the effectiveness and responsiveness of the IT support department, with a mean score of 4.67 and a standard deviation of 0.540. This indicates strong agreement and a high level of consensus, showing that respondents consider their IT departments reliable in resolving technical issues promptly—an essential factor in maintaining operational continuity in e-commerce platforms. The integration of IT systems across departments received the second-highest mean score of 4.42, with a standard deviation of 0.867. Respondents agreed that their organizations had well-integrated systems enabling seamless data flow, enhancing coordination and real-time decision-making.

Strategic alignment between IT and business objectives also scored highly (mean = 4.38, SD = 0.975). This suggests that most respondents believed their IT strategies were not standalone initiatives but were harmonized with broader organizational goals. While the agreement was strong, the slightly higher standard deviation implies minor variations in perception across firms, possibly due to differences in IT governance maturity. The regular auditing of IT security systems had a mean of 4.15 and a standard deviation of 0.745, indicating strong agreement and consistent responses. This points to proactive security practices that help firms detect and mitigate vulnerabilities in advance.

Similarly, the presence of strong cybersecurity measures to protect sensitive data scored a mean of 4.12 with a standard deviation of 0.680, indicating that firms recognize the importance of data security and have established controls in place to ensure it. The lowest mean was recorded on the statement concerning the sufficiency of investment in IT infrastructure and services (mean = 3.91), though this still falls within the general agreement range. However, the standard deviation was 1.071, indicating a notable variation in how respondents perceived investment adequacy—suggesting that while some firms feel adequately resourced, others may be operating under constrained IT budgets or outdated infrastructure.

The overall aggregate mean score was 4.28, placing the general perception in the range of strong agreement. The standard deviation of 0.813 indicates a good level of consensus across the firms surveyed. Collectively, the findings confirm that IT infrastructure, support systems, and cybersecurity are well-established in most e-commerce firms in Nairobi County. These results are consistent with the findings of Wardatulaina Mohd Yusof, Nurulizwa Rashid, and Norshahira (2024), who examined the influence of IT deployment in Malaysia's logistics sector. Their study concluded that the integration of IT in tracking, customer service, and

cybersecurity significantly improves organizational performance. The Nairobi-based data reinforce this view, highlighting the central role of IT not only as a support function but also as a strategic enabler of growth, efficiency, and service quality in the e-commerce logistics ecosystem.

Performance of E- commerce Firms

This section presents the findings on respondents' perceptions regarding the performance of e-commerce firms operating in Nairobi County. The analysis was based on responses to six performance indicators rated on a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). Mean scores were interpreted using the following guide: 4.00–5.00 signifying strong agreement, 3.50–3.99 indicating general agreement, and 3.00–3.49 reflecting neutrality. Standard deviations below 1.00 were interpreted as indicators of moderate to strong consensus, while values of 1.00 and above reflected less agreement among respondents. Table 4 summarizes the descriptive statistics for performance indicators.

Table 4.: Descriptive Statistics for Performance of E-commerce Firms

Statement	Mean	Std. Dev
The firm's e-commerce marketing campaigns effectively attract new customers	4.45	0.794
The firm ensures timely delivery of products or services purchased online	4.42	0.502
Operational issues (e.g., stockouts, delays) are resolved efficiently and effectively	4.39	0.659
Cloud-based solutions are used to enhance the scalability and reliability of operations	4.23	0.765
The firm consistently delivers high-quality products or services as advertised online	4.21	0.781
E-commerce operations contribute significantly to the firm's overall profitability	4.11	0.873
Aggregate Score (Overall Perception)	**4.30**	**0.729**

The results demonstrate that respondents strongly agreed with all the statements in the matrix, reflecting a generally positive evaluation of e-commerce firm performance. The highest-rated aspect was the effectiveness of e-commerce marketing campaigns in attracting new customers, with a mean of 4.45 and a standard deviation of 0.794. This suggests that firms are effectively leveraging digital marketing strategies, such as targeted ads, SEO, and influencer engagement, to expand their customer base. Closely following was the firm's ability to ensure timely delivery of purchased products and services, which recorded a mean score of 4.42 and the lowest standard deviation (0.502). This reflects both strong agreement and high consensus, indicating that timely fulfillment is a consistent and reliable strength across the firms studied—an essential factor in maintaining customer trust and competitive advantage.

Operational efficiency, particularly in resolving issues such as stockouts and delays, scored a mean of 4.39 with a standard deviation of 0.659. This suggests that most firms have competent support structures and contingency mechanisms in place, which allows them to address disruptions quickly and minimize customer dissatisfaction. The use of cloud-based solutions to support scalability and reliability in e-commerce operations scored a mean of 4.23, with a standard deviation of 0.765. This shows a growing trend of adopting modern, flexible IT infrastructure capable of supporting demand surges and maintaining operational integrity across digital platforms. The consistent delivery of high-quality products or services, as advertised online, had a mean of 4.21 and a standard deviation of 0.781. Respondents agreed

that e-commerce firms meet customer expectations in terms of product quality, which is a cornerstone for trust in online transactions.

The lowest mean score—though still within the strong agreement range—was observed in the perception that e-commerce operations contribute significantly to overall profitability, with a mean of 4.11 and a standard deviation of 0.873. This suggests that while firms recognize the value of e-commerce, some may still be optimizing cost structures, logistics, or digital sales channels to fully realize profitability potential.

The aggregate mean score was 4.30, indicating strong agreement overall, while the standard deviation of 0.729 shows a consistent pattern in responses across firms. The results portray e-commerce operations in Nairobi County as generally effective, customer-focused, and increasingly reliant on digital infrastructure. These findings align with broader empirical evidence. For instance, Zhang (2025) found that firms with integrated IT systems and agile customer service strategies achieve better performance outcomes in logistics and e-commerce environments. Likewise, Evangelista et al. (2024) highlighted that strong alignment between digital infrastructure and business objectives improves both responsiveness and profitability in supply chains. The consistency of responses in this study—especially in relation to delivery reliability and issue resolution—reflects these global patterns and affirms the growing maturity of the e-commerce sector in Nairobi.

Correlation Analysis

This section presents the results of a Pearson correlation analysis conducted to examine the strength and direction of the relationship between the independent variables—warehouse management, and information technology—and the dependent variable, performance of e-commerce firms. Pearson's correlation coefficient (r) measures the degree of linear association between variables, ranging from -1 to +1, with the following interpretation scale: 0.00–0.30 = Weak correlation, 0.31–0.60 = Moderate correlation, 0.61–0.80 = Strong correlation, and 0.81–1.00 = Very strong correlation. According to Kothari (2016), correlation analysis is instrumental in determining whether changes in predictor variables are systematically associated with variations in the outcome variable. A p-value below 0.05 indicates statistical significance. The correlation results are presented in Table 5

Table 4. 1: Correlation Analysis

Variable		Firm Performance	Warehouse Mgmt	Information Technology
Firm Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	75		
Warehouse Management	Pearson Correlation	0.702*	1	
	Sig. (2-tailed)	0.001		
	N	75	75	
Information Technology	Pearson Correlation	0.794*	0.624	1
	Sig. (2-tailed)	0.000	0.125	
	N	75	75	75

* Correlation is significant at the 0.05 level (2-tailed)

The correlation between information technology and firm performance was the strongest among all the variables, with a coefficient of $r = 0.794$ ($p < 0.05$), indicating a very strong and statistically significant relationship. This implies that firms that effectively deploy IT infrastructure—such as integrated platforms, cloud-based systems, and cybersecurity

measures—tend to experience greater efficiency, profitability, and scalability. This finding is consistent with Wardatulaina et al. (2024) and Zhang (2025), who highlighted how information technology enables real-time coordination, predictive analytics, and automation, all of which substantially enhance firm performance in the e-commerce sector.

Warehouse management also showed a strong and significant positive correlation with performance, with a coefficient of $r = 0.702$ ($p < 0.05$). This suggests that improvements in inventory control, space utilization, and warehouse safety have a meaningful impact on operational success. These results support the conclusions by Muhalia and Moronge (2021), who found that warehouse systems reduce inefficiencies and improve fulfillment speed, especially in high-volume operations such as fast-moving consumer goods and online retail.

Multiple Linear Regression Analysis

The study sought to know the relationship between the warehouse management, and information technology (independent variable) and performance of E- commerce firms (dependent variable). In this context, performance was regressed against warehouse management, and information technology and the correlation results presented in the table 6

Table 6: Regression Coefficients

Variable	Unstandardized Coeff. (B)	Std. Error	Standardized Coeff. (Beta)	t-value	Sig. (p-value)
Constant	2.811	0.438		6.42	0.000
Warehouse Management	0.365	0.102	0.412	3.57	0.001
Information Technology	0.411	0.095	0.493	4.33	0.000

Information technology demonstrated the strongest standardized effect on performance, with a beta coefficient of 0.493 ($B = 0.411$, $p < 0.001$). This indicates that, controlling for other factors, a one-unit increase in IT effectiveness is associated with a 0.411 unit improvement in firm performance. This result is consistent with findings by Wardatulaina et al. (2024) and Zhang (2025), who emphasized that integrated IT systems, cybersecurity protocols, and real-time data analytics enhance firm agility, customer service responsiveness, and operational security. In the Nairobi context, this suggests that firms investing in cloud-based infrastructure, automated tracking systems, and strategic IT alignment are more likely to experience strong growth and customer satisfaction.

Warehouse management also had a statistically significant influence, with a beta of 0.412 ($B = 0.365$, $p = 0.001$). This aligns with the conclusions drawn by Muhalia and Moronge (2021), whose study among FMCG manufacturers in Kenya demonstrated that warehouse management systems improve inventory tracking, reduce errors in picking and dispatching, and optimize storage utilization. In the current study, the strong coefficient suggests that e-commerce firms that implement modern warehouse practices—such as space optimization, staff training, and digital inventory controls—are better positioned to meet demand efficiently and reliably.

Based on the regression coefficients, the final fitted multiple linear regression model that predicts the performance of e-commerce firms is expressed as:

Performance of E-commerce Firms = 2.811 + 0.365(Warehouse Management) + 0.411(Information Technology)

Conclusions

In the establishment of the influence of warehouse management, the study concluded that the warehouse management have a significant influence on performance E- commerce firms in Nairobi County. The study also concluded that in every unit increase in warehouse management, results in an increase in performance of E- commerce firms in Nairobi County

Finally, in the determination of the influence of information technology, the study concluded that information technology has a significant influence on performance of E- commerce firms in Nairobi County A unit increase in Information technology on its own, results in an increase in performance of E- commerce firms in Nairobi County

Recommendations

Warehouse Management

The study established that while warehouse safety and employee training practices were well-implemented across most firms, there were inconsistencies in areas such as space utilization and inventory tracking accuracy. In light of these observations, it is recommended that e-commerce firms adopt Warehouse Management Systems (WMS) to streamline operations and enable real-time visibility of inventory levels. These systems will allow for accurate demand forecasting, reduce picking and dispatch errors, and improve warehouse layout utilization. Moreover, firms should institutionalize routine and comprehensive staff training focused not only on safety compliance but also on modern warehousing technologies, including automation and lean storage techniques. By investing in digital inventory tools and reinforcing workforce competencies, firms will enhance their warehousing efficiency and overall order fulfillment capabilities.

Information Technology

Information technology was identified as the most influential factor on firm performance, with strong systems integration and IT support noted across most firms. However, there was some variability in perceptions of whether IT investment levels were adequate. To maintain and strengthen IT-driven performance, firms should ensure continued investment in robust IT infrastructure, including scalable cloud solutions and cybersecurity frameworks. The integration of Order Management Systems (OMS) with warehouse and transportation platforms should also be prioritized to facilitate automated order processing and seamless coordination across supply chain functions. Furthermore, firms are encouraged to deploy route optimization tools such as Onfleet or Routific to enhance last-mile delivery efficiency and reduce operational costs. These systems use advanced algorithms and real-time data to plan the most efficient delivery routes, thereby improving delivery speed and customer satisfaction. Additionally, periodic IT audits and system upgrades should be institutionalized to ensure the technological ecosystem remains agile, secure, and aligned with evolving business needs.

Suggestions for Further Studies

Future studies could expand this scope by examining other relevant variables such as reverse logistics, demand forecasting, or customer service efficiency, which also impact firm performance. Additionally, the research was confined to Nairobi County. Future scholars may consider expanding the geographical scope to include other counties or conduct a comparative regional study to uncover broader trends and challenges across different markets. Finally, since the study targeted only e-commerce firms, further research could investigate logistics visibility across other sectors such as manufacturing, healthcare, or retail to explore how visibility practices vary across industries.

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