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## WAREHOUSE MANAGEMENT SYSTEMS AND PERFORMANCE OF LARGE MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA.

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**ABSTRACT**

Large manufacturing firms in Kenya continue to face warehouse management challenges, including inaccurate inventory records, stock-outs, inefficient receiving processes, and poor warehouse space utilization, which negatively affect operational efficiency, customer satisfaction, and overall organizational performance. This study examined the influence of Warehouse Management Systems (WMS) on the performance of large manufacturing firms in Nairobi City County, Kenya, with specific focus on inventory management and receiving and put-away. The study was anchored on the Resource-Based View Theory and Transaction Cost Economics Theory. A descriptive research design was adopted. The target population comprised 172 respondents drawn from 92 large manufacturing firms registered with the Kenya Association of Manufacturers (KAM). Purposive sampling was used to select respondents directly involved in warehouse operations. Primary data were collected using semi-structured questionnaires, while descriptive statistics, Pearson correlation, and multiple linear regression were employed to analyze the data using SPSS Version 29. A total of 121 completed questionnaires were returned, representing a response rate of 78.1%. The findings revealed that both inventory management and receiving and put-away had positive and statistically significant effects on the performance of large manufacturing firms in Nairobi City County, Kenya. Inventory management exhibited a significant positive influence through improved inventory visibility, optimized stock levels, and enhanced inventory accuracy, while effective receiving and put-away practices enhanced receiving accuracy, warehouse space utilization, and operational efficiency. The regression model was statistically significant ($p < .001$), indicating that Warehouse Management Systems are important determinants of organizational performance. The study concludes that effective implementation of Warehouse Management Systems enhances warehouse operations and contributes significantly to improved organizational performance through better inventory control, efficient receiving and storage processes, improved customer satisfaction, and enhanced financial performance. The study recommends that large manufacturing firms strengthen investment in Warehouse Management Systems, prioritize real-time inventory management, automate receiving and put-away processes, and continuously improve warehouse operational practices to enhance competitiveness and organizational performance.

**Keywords:** Warehouse Management Systems, inventory management, receiving and put-away, organizational performance, large manufacturing firms, Nairobi City County, Kenya.

## INTRODUCTION

Supply chain comprises of the network of organizations, activities, resources, and processes involved in the movement of goods and services from suppliers to end consumers (Swaminathan & Tayur, 2021). Supply chain management (SCM) involves the planning, coordination, and control of material, information, and financial flows across the supply chain to ensure that customer requirements are met efficiently and effectively (Dzomonda, 2021). Effective SCM enables organizations to reduce operational costs, improve customer satisfaction, enhance productivity, and achieve competitive advantage (Tan & Sidhu, 2022).

As supply chains become increasingly complex and customer expectations continue to rise, organizations are increasingly adopting technology-driven solutions to improve operational performance. One such solution is the Warehouse Management System (WMS), which is designed to support and optimize warehouse operations through automation, real-time information processing, and improved inventory control. Warehouse Management Systems facilitate key warehouse activities such as inventory management and receiving and put-away operations, thereby improving operational efficiency and service delivery (Richards, 2018).

Warehouse Management is an integral component of the supply chain process, dealing with the efficient storage, organization and distribution of goods in various industries such as ecommerce, healthcare, manufacturing and more. Good warehouse management can improve warehouse logistics, lower warehouse costs and improve service levels (Chopra & Meindl, 2020). By strategically positioning warehouses, businesses can optimize their global and local distribution networks, ensuring they have the flexibility to adapt to changing consumer needs (Christopher, 2022). As companies strive to build resilience and adaptability in rapidly changing supply chain environments, they can effectively gather, store, process and send goods with the help of efficient warehouse facilities (Bowersox et al., 2021). Warehouse Management Systems (WMS) are key components of advanced technologies that are instrumental in optimizing warehouse operations (Gu et al., 2021). WMS plays a vital role in managing inventory, space utilization, order fulfillment and shipment accuracy, among others (Frazelle, 2016). WMS can automate these processes, which can help to minimize manual errors, shorten lead times, and improve overall supply chain responsiveness (Richards, 2021). Businesses that implement WMS experience significant operational efficiencies, cost reductions, and enhanced customer satisfaction (Ramaa et al., 2022). Furthermore, WMS gives instant information on what is taking place in the warehouse, which aids in data-driven decision making, and which allows for smooth collaboration between suppliers, distributors, and customers (Koster et al., 2020). The warehouse is a key component in the manufacturing industry where it is responsible for the smooth flow of raw materials and work in progress inventory and finished products. Good warehouse management helps to keep stock accurate, minimize stock outages and overstocking, improve order fulfilment, maximize labour usage and increase customer satisfaction. Thus, the use of Warehouse Management Systems has been recognized as a key factor in enhancing the organization's performance and competitiveness in manufacturing (Richards, 2022; Frazelle, 2016).

### Statement of the Problem

One of the key actors and contributors to the economic growth of Kenya is the manufacturing industry, which generates jobs, develops industries and value addition to the products. Approximately 7.3% of Kenya Gross Domestic Product (GDP) was in the manufacturing industry (KNBS 2024). Despite manufacturing playing a key role in Kenya, there are still several challenges in the manufacturing industry such as erroneous inventories, slowness of fulfilling of orders, sluggishness of order picking processes, warehouse management, expensive operations, and an increase in the demands of customers. The subsequent challenges have negatively impacted the efficiency, customer satisfaction, profitability and competitiveness in manufacturing industry (KAM, 2023). A number of these performance

problems may have such origins, yet the ones that have come to the fore are a warehouse inefficiently and unproductive Warehouse Management System (WMS). Proper management of its warehouse, system combination, efficient utilization of the warehouse technologies and well-managed inventories can make the businesses capable of achieving all its strategic objectives and mitigating the risks involved in operating its warehouse (Abbas & Hussien, 2021).

To address these problems in operation, a number of companies have adopted Warehouse Management Systems (WMS), as a means of enhancing the efficiencies of their warehouses and supply chains. Warehouse Management Systems offer organizations up to date data regarding their stock, provide more accuracy in inventory, streamline warehouse activities, enhance order fulfilment and decision making (Abbas & Hussien, 2021). Consequently, the WMS has been deemed one of the worthy wizards towards augmenting operational effectiveness and organizational results. However, although there are organizations that report performance problems regardless of using warehouse technologies, there are others reporting those problems even when they have installed Warehouse Management System.

Incorporating WMS systems can face challenges like insufficient employee training, system integration issues, implementation expenses, employee resistance to technology changes, and data quality problems (Al-Ansi, 2022; Al-Khawaldah, 2022; El Baz & Iddik, 2022). These challenges can lead to issues such as inventory inaccuracies, slow order processing, inefficient operations, improper use of warehouse technology, and higher operating expenses. The overall effect of the WMS on the organizational performance is therefore not clear, especially in the case of emerging economies, where the technological adoption and operating context are very different from that of developed economies.

Although a fair amount of research has examined Warehouse Management practices in relation to supply chain performance broadly, there remains a notable shortage of empirical work that isolates the contribution of specific WMS components to the performance of large manufacturing firms within the Kenyan context. In particular, very limited attention has been paid to how inventory management, and receiving and put-away individually influence the performance of large manufacturing firms operating in Nairobi City County, Kenya. It was against this backdrop that the present study sought to determine the correlation between Warehouse Management Systems (WMS) and the performance of large manufacturing companies in Nairobi City County, Kenya

### Objective of the Study

The general objective was to establish the relationship between warehouse management systems and performance of large manufacturing firms in Nairobi city county, Kenya.

The following were the specific objectives:

i. To assess the effect of Inventory management on performance of large manufacturing firms in Nairobi city county, Kenya.
ii. To examine the effect of Receiving and put-away on performance of large manufacturing firms in Nairobi city county, Kenya.

## LITERATURE REVIEW

### Theoretical Review

### Resource-based View Theory

The Resource Based View (RBV) Theory was first introduced by Wernerfelt (1984) and further developed by Barney (1991). The theory states that resources and capabilities are the key to competitive advantage and performance of an organization. The RBV explains that the firms that have resources that are valuable, rare, inimitable, and non-substitutable perform better than

firms that do not have these resources (Barney, 1991). The theory focuses on the fact that the resources used in an organization can be physical, technological, skill and knowledge, and competence of the management. From a warehouse perspective, Warehouse Management Systems (WMS) can be seen as strategic technological resources that will help companies to be more visible, accurate, productive and efficient in their operations.

If suitably applied, WMS provides a business with the ability to operate the warehouse efficiently and to meet customer needs promptly. Although the RBV Theory has been widely used in strategic management research, it has been criticized for its lack of explanation about how resources are acquired and developed, and the measurement of intangible resources and capabilities (Foss & Knudsen, 2003).

However, the theory is still relevant in the explanation of how a company can use its internal resources to enhance their performance and to gain a competitive advantage. The Resource Based View Theory is applicable to this research because Warehouse Management Systems are one of the valuable resources of an organization that can be used to improve inventory management, and receiving and put-away operations. By taking good use of these abilities, big manufacturing organizations can enhance their operational performance, consumer fulfillment, and general organizational efficiency.

**Transaction Cost Economics (TCE) Theory**

Coase (1937) expanded on this idea to develop the Transaction Cost Economics (TCE) Theory, as further developed by Williamson (1975, 1985). The theory provides a way to understand why organization undertake transactions to reduce their costs. TCE theory suggests that the transaction costs are in order of the information search costs, the costs of negotiating an agreement, costs of monitoring activity, costs of coordinating an activity, and costs of enforcing a decision. Companies react, therefore, by making sure that the structures, processes, and technologies are implemented to minimize these costs and efficiencies.

This theory has proposed that companies are constantly evaluating alternative approaches to the way the organisation should run and pick the one that would minimise the cost of transacting and maximise on the performance of the organisation (Williamson, 1985). In the contemporary business environment, information systems and changes in technology are being heavily applied to address the operation inefficiencies, provide greater coordination and lead to effective decision making. The technologies that the companies have introduced to make their warehouses run smoothly and minimize warehouse inventory control, order fulfillment, labour use, incoming and outgoing cost are known as Warehouse Management Systems (WMS).

WMS enables immediate tracking of products, and it automates documenting orders, makes more efficient use of the free employees and follows inventory (Richards, 2018). This enables businesses to save the transaction costs involved in running the warehouses, save on time and get better customer satisfaction. Although it is popular TCE has drawn criticism that it pays little attention to the cost minimization but a minimal emphasis on the other organizational factors which can affect performance like innovation, learning and strategic capabilities (Williamson, 1985). Still, the theory can be applied to demonstrate how our organizations have adjusted the technological systems and activities to help lower the cost of transactions and to enhance the performance of organizations.

This study can applied the theory of transaction cost economics since the Warehouse Management Systems are implemented to enhance the operational efficiency through minimizing the cost of the receiving and put away and inventory management costs in the warehouse. The theory therefore offers a reasonable foundation into how their implementation on them can help in improving the performance of large industries in the City County of Nairobi City in Kenya.

## Conceptual Framework

A conceptual framework can be regarded as a chart which illustrates how the variables being examined relate to each other and may be used by the researcher to describe, explain and communicate the associations among the variables. Kombo and Tromp (2016) refer to it as a framework which contains independent and dependent variables and thus helps in interpreting research results. This study will have the following independent variables that include Inventory Management and Receiving and Put-away and the dependent variable will be constituting the Performance of Large Manufacturing Firms in Nairobi City County Kenya. The conceptual model that shows the relationship among the research variables is described in Figure 2.1.

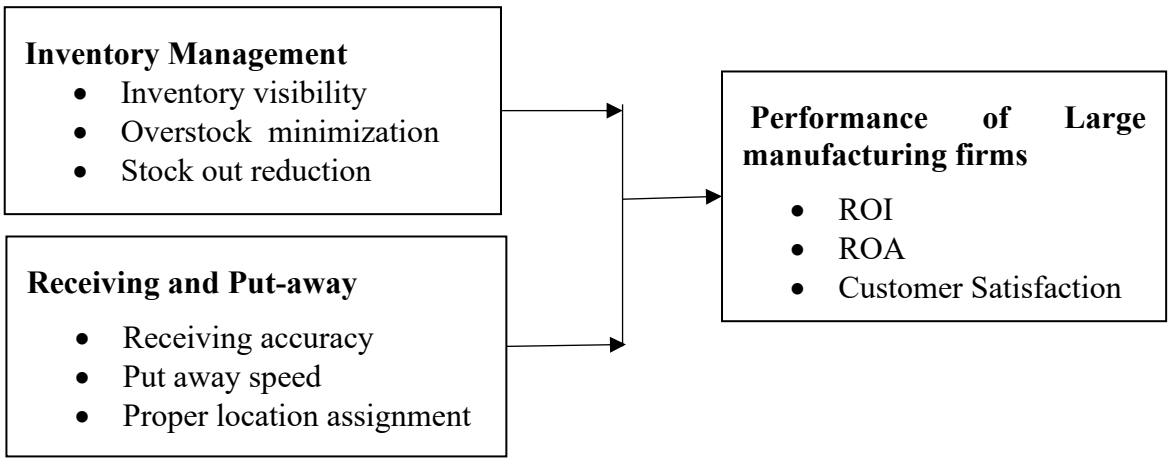


**Figure 2.1: Conceptual Framework**

## Inventory Management

Inventory Management is an essential part of Warehouse Management Systems (WMS) which deals with the effective management, tracking, and movement of inventory inside an organization. Good inventory management allows companies to keep their inventories at the proper level, reduce stock-outs and overstocks, and make their products available as needed. The author Richards (2018) pointed out that WMS streamlines inventory visibility by ensuring real-time data on stock levels, inventory locations, and inventory movements, which helps increase inventory accuracy and improve decision-making.

The new system of warehouse management facilitates the automation of a range of operations performed in the warehouse such as inventory tracking, inventory replenishment, cycle counting, inventory report, and reduces human errors, resulting in increased productivity of operations in warehouses (Behera, 2022). Inventory monitoring (in real time) helps companies to maintain the actual inventory level and make the decisions regarding stock level and inventory requirement. Another important factor discovered by Abbas and Hussien (2021) is that effective inventory management can be critical to the success of the warehouse, reduce costs of holding inventory and enhance customer service by raising the availability of products. Inventory visibility is one of the best-sellers of Warehouse Management Systems. Real-Time visibility enables managers to monitor the movements of inventory and in case of any disparities to make it more accurate and decrease losses caused by any discrepancies in inventory (Richards, 2018). Further, Warehouse Management systems contribute to reduction of overstock challenges as they enable businesses to have proper inventory records that can assist them maintain optimum stocks and reduce the huge weight of inventory carrying expenses. Another essential issue in inventory management that needs to be reduced is stock-outs. Good inventory control systems will maintain that the inventory is availed at the

appropriate time when it will be used and thus prevent a halt in the production and filling order process. According to Behera (2022), fulfilling the customer demand is an important variable that benefits any organization that adopts Warehouse Management Systems due to an improved availability of inventory, high customer satisfaction and operational efficiency are improved. Inventory Management was evaluated based on indicators including: visibility of the inventory, reduce overstock, reduce stock out, optimize stocks and accuracy of the inventory records.

**Receiving and Put away**

Receiving and put away are essential warehouse functions that provide the process for accurate receipt of materials, verification, acknowledgment and placement of incoming materials into the designated reordered areas in the warehouse. The activities are part of Warehouse Management Systems (WMS) as they play a vital role in ensuring inventory accuracy, warehouse efficiency, and organizational performance. Richards (2018) stated that the effective receiving and put-away procedures enable inventory to flow smoothly in the warehouse operations and help in inventory management. The receiving process consists of the inspection, verification and recording of incoming products to receive goods that comply with the quality standards and specifications set in the purchase order.

Warehouse Management Systems can be used to automatically capture the information of the inventory received in real time, thereby saving you from manual mistakes and enhancing inventory accuracy. Frazelle (2002) states that receiving procedures that are correct will help to keep inventory discrepancies to a minimum and will give visibility over the inventories during the warehouse operations. Put-away is the process of taking received inventory from the receiving areas and placing it in the proper storage locations in the warehouse.

Warehouse Management Systems boost the effectiveness of put-away by automatically assigning the right storage location depending on the characteristics of the product, storage capacity, and operational requirements. The correct location assignment increases the inventory's availability, optimises warehouse space usage and shortens the picking time during order fulfilment (Richards 2018). Another key warehouse performance measurement is the rate of put-away. Put-away processes are effective and lead to less congestion at the receiving area, better inventory availability and faster warehouse operations.

Organizations that adopt WMS systems benefit from better order receiving accuracy, quicker put-away operations, and better inventory management, which translates into improved operational efficiency and customer satisfaction, Behera (2022) noted. The Receiving and Put-away was quantified in this study by receiving accuracy, timely verification and recording of inventory, put-away speed, proper location assignment and utilization of warehouse space.

**Performance of Large Manufacturing Firms**

Performance of large manufacturing companies is the degree to which companies meet their goals in operational and financial performance with the efficient use of resources and effective execution of business activities. Performance includes either financial or non-financial indicators to the extent they measure the success of an organization in its strategy implementation (Taouab & Issor, 2019). In manufacturing organizations, the indicators used for assessing performance are usually related to customer satisfaction, profitability, return on investment (ROI), and return on assets (ROA). Customers' Satisfaction is an important criterion for evaluating organisation's performance as it is the result of a company's capability to satisfy their customers' expectation on product quality, availability and timely delivery. Kotler, Keller and Chernev (2022) state that customer satisfaction leads to customer loyalty, repeat buying and future organization success. If manufacturing companies can provide their customers consistently as per their requirements, then they will gain sustainable growth and competitive advantage.

Return on Investment (ROI) is a measure of financial performance that represents the profit or loss resulting from the investments an organization has made. Brigham and Ehrhardt (2022) define ROI as a measure of a company's ability to turn its resources into financial returns as compared to the costs of those resources. The higher the ROI number, the more efficiently resources are used and the better the financial performance will be.

Return on Assets (ROA) is the ratio that tells the efficiency of how a company uses its assets to make money. According to Ross, Westerfield, and Jordan (2022), ROA is an important measure of organizational efficiency since it shows the efficient management of available assets. Typically, firms that have a greater ROA are more prudent in utilizing their resources to achieve the goals of their firms. Recent researches indicate that the advantages of WMS include providing organizations with better customer satisfaction, operational reduction, enhanced order fulfilment and precise inventory (Kumar et al., 2023)

According to Behera (2022) organisations that use Warehouse Management Systems experience efficiency in their operations, financial performances through improved inventory control and optimisation of the warehouse. Similarly, Richards (2018) mentioned that effective warehouse management practices assist in providing a better customer service, increasing productivity and enhancing organizational performance. Customer satisfaction, Return on Investment (ROI) and Return on Assets (ROA) were the factors that determined the performance of the big manufacturing companies.

## Empirical Review

### Inventory Management

Abbas and Hussien (2021) experimented the effect of Warehouse management System on the performance in powder in manufacturing business ventures. The study shows that with real-time knowledge of the inventory, companies are not only able to improve the accuracy of their stock forecast but also have enough time to make any inventory decisions. These findings also demonstrated that inventory management can be correlated with less overstocking and stockout, resulting in a more efficient operation and satisfied customers. The research is however, not conducted in Kenya thereby leaving a gap in context that requires an extension of research to the manufacturing sector in Kenya.

Mwaniki, and Omwenga (2022) investigated the effect of inventory control practices on performance of manufacturing companies in Kenya. The study used descriptive survey as the research design and found two factors namely, inventory visibility and inventory record accuracy which were significantly contributing to organization's performance. The result of this research was that business firm which maintains accurate records of its stock and has a proper system of its inventory up-dates, has a smaller number of discrepancies and low cost in stock-related areas. However, the study was used only for an inventory management application, without looking at detail about Warehouse Management System (WMS) so there is lack of detail information about it.

Behera (2022) discussed the concept of how the Warehouse management systems may enhance the level of inventory management as well as the supply chain. This study revealed that they can leverage Warehouse Management System to help them to improve their inventory visibility, reduce the amount of stock-outs and improve their inventory management. The study also found out that real time inventory management has increased efficiency and has helped in fulfilling customer orders faster. The study was conducted in international perspective and not particularly focused in huge manufacturing industries in Kenya and thus providing a context but a gap.

Richards (2018) finds that the advantages of WMS is real time tracking of inventory, automatic inventory recording and improved tracking of inventory. The research results showed that organisations which employ a Warehouse Management System (WMS) can manage their

stocks whilst keeping them in the optimum position, minimising overstocking and reduce holding costs. This translates to more efficient running and improved organizational performance and consequently better inventory management. However, the research was implemented in general warehouse activities and not the functional role of the inventory management in the performances of the large manufacturing companies. The linkage of inventory management with the performance of large manufacturing companies was not clearly illuminated in the study and a kind of "context deficiency" was created.

From the studies reviewed it is seen that, having a good inventory system has a positive impact on the performance of the organization as it leads to proper visibility of the inventory, less stock out conditions, less overstocking as well as high inventory accuracy. There is very little empirical evidence however on Inventory Management component of Warehouse Management Systems and performance of Large manufacturing Firms in Nairobi City County of Kenya. For this reason, efforts were made in this study to fill this gap.

**Receiving and Put away**

Behera (2022) studied how Warehouse Management Systems help to enhance the receiving and put-away operations in the warehouse environments. The study revealed that automated receiving systems played a crucial role in enhancing inventory accuracy by enabling quick and real-time verification and documentation of received inventory. The results also showed that good put-a-way practices lowered discrepancy between the warehouse and inventory and enhanced space utilization. The study, however, did not focus specifically on the big manufacturing firms in Kenya and targeted a global context therefore creating a gap in the study context.

Richards (2018) studied the effect of Warehouse Management Systems on the performance of the Warehouse. The research discovered that companies applying a Warehouse Management System achieved higher rate of accuracy with receiving, inventory visibility and location assigning efficiency. This also revealed that automated put-away minimized the time that was needed to put away the inventory and how easily goods were accessible in the warehouse. However, the study looked at warehouse operations as they relate to the Nairobi City County manufacturing companies in Kenya rather than specifically focusing on manufacturing companies and hence the study had some contextual gaps.

The study by Mwangi and Muthoni (2021) sought to understand how the warehouse operations have affected manufacturing business in Kenya. The study adopted the descriptive survey design and conclude that efficient receiving process and right location of storage had significant impact on improving the accuracy of inventory and operational efficiency. The researchers found that workplaces that had streamlined receiving and put away operations had less delays in operations and better customer service. The study only addressed the generic aspects of warehouse practices and did not address its Receiving and Put-away part of Warehouse Management Systems, presenting a conceptual gap.

In the study carried out by Shanmugamani and Mohamad (2023), the authors' study aimed to determine the impact of automation on warehouse operations. The results showed that automating receiving and put away workflow improved inventory management, minimized handling mistakes, and boosted the efficiency of the warehouse. The investigation also revealed that companies that implemented automated location assignment systems retrieved their inventory faster and used warehouse space more effectively.

However, the study took place away from the context of Kenya, thus creating a contextual gap. After analyzing the selected research papers, it is found that receiving and put away process would be responsible for higher inventory accuracy, quicker turnaround times in factory, effective utilization of space and better organizational functioning. But little empirical evidence on the relationship between the Receiving and Put-away part of Warehouse Management

Systems on the performance of Nairobi City County large manufacturing firms. This study thus aimed to fill this gap.

## RESEARCH METHODOLOGY

The study adopted a descriptive research design to examine the relationship between warehouse management systems and the performance of large manufacturing firms in Nairobi City County, Kenya. The design was appropriate because it enabled the collection of quantitative data and the examination of the influence of inventory management, and receiving and put-away activities on firm performance without manipulating the study variables (Saunders et al., 2019). The target population comprised 172 respondents drawn from 92 large manufacturing firms registered with the Kenya Association of Manufacturers. The respondents included operations managers, supply chain managers, procurement managers, warehouse managers, logistics managers, and other personnel directly involved in warehouse operations due to their knowledge and experience in warehouse management practices.

Purposive sampling was used to select respondents with direct responsibility for warehouse operations and implementation of warehouse management systems. Primary data were collected using a semi-structured questionnaire consisting of Likert-scale, nominal, and open-ended questions. Prior to the main survey, a pilot study involving 17 respondents (10% of the sample) was conducted to refine the instrument. Face and content validity were established through expert review, while construct validity was assessed using Confirmatory Factor Analysis (CFA). Reliability was evaluated using Cronbach's alpha coefficient, with a threshold of 0.70 considered acceptable for internal consistency (Greene & Dreyer, 2021).

Following the acquisition of the necessary research authorization and ethical approvals, questionnaires were administered using the drop-and-pick-later approach. Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 29, while qualitative responses were analyzed through thematic analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data, whereas inferential analysis employed multiple linear regression to determine the influence of inventory management, and receiving and put-away activities on the performance of large manufacturing firms (Hall, 2020).

## RESEARCH FINDINGS AND DISCUSSION

Of the 155 questionnaires that were administered to respondents, 121 were fully completed and returned, translating to a response rate of 78.1%. This was deemed sufficient for generalizing the study's findings. Sharma (2018) holds that a response rate of 70% or higher can be regarded as reliable for research purposes. This figure excludes the 17 respondents (10%) who had earlier taken part in the pilot test.

### Descriptive Statistics

This section presents the descriptive findings on the effect of Inventory Management, and Receiving and Put-away on the performance of large manufacturing firms in Nairobi City County, Kenya. Respondents rated the statements using a five-point Likert scale where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. The responses were analyzed using means and standard deviations. Mean scores of 1.0–1.4 indicated Strongly Disagree, 1.5–2.4 Disagree, 2.5–3.4 Neutral, 3.5–4.4 Agree, and 4.5–5.0 Strongly Agree. The results are presented according to the study objectives.

### Inventory management

The participants were asked to answer the Inventory Management statements using a 5 point likert scale ranging from "Strongly Agree" (SA) to "Strongly Disagree" (SD). Table 4.9 shows the results. The results showed that respondents were satisfied with Warehouse Management

Systems regarding real time visibility and tracking of the inventory level (M = 3.74, SD = 1.060). The results also revealed that Warehouse Management Systems are useful in reducing the occurrence of too much goods in the warehouse (M = 3.83, SD = 0.920), preventing a shortage of goods (M = 3.90, SD = 0.900) and having the right amount of goods at the correct time (M = 4.06, SD = 1.025). Moreover, the Warehouse Management Systems (WMS) were found to improve inventory record accuracy and monitoring (M = 3.84, SD = 1.302), whereas overall inventory management was found to improve the performance of large manufacturing firms in Nairobi City County, Kenya (M = 3.56, SD = 0.801). Overall, the results indicate that good inventory management practices play a significant role in improving inventory control, minimizing discrepancies in inventory, and improving the operational efficiency of a large manufacturing organization. This finding aligns with Behera (2022), which found that organization using the Warehouse Management System have better management of their inventory, stocks out less, stocks less, and perform better.

**Table 1: Inventory Management**

| Statement | Mean | Std. Dev. |
|---|---|---|
| WMS provide real-time visibility and accurate tracking of inventory levels. | 3.37 | 1.060 |
| WMS help minimize overstocking within the warehouse. | 3.83 | 0.920 |
| WMS reduce stock-outs through timely inventory replenishment. | 3.90 | 0.900 |
| WMS ensure optimal inventory levels are maintained at all times. | 4.06 | 0.702 |
| WMS improve inventory record accuracy and monitoring. | 3.84 | 1.302 |
| Inventory management enhances the performance of large manufacturing firms in Nairobi City County, Kenya. | 3.56 | 0.801 |

**Receiving and Put-away**

Respondents were asked to indicate their level of agreement with statements relating to Receiving and Put-away using a five-point Likert scale where SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree, and SD = Strongly Disagree. The results are presented in Table 2.

The findings indicate that respondents agreed that WMS improve the accuracy of receiving incoming goods (M = 4.03, SD = 0.730) and enable timely verification and recording of received inventory (M = 4.03, SD = 0.830). Respondents further agreed that WMS enhance the speed of put-away operations (M = 4.61, SD = 0.787), ensure goods are assigned to the correct storage locations (M = 3.92, SD = 0.830), and improve warehouse space utilization through proper location assignment (M = 4.10, SD = 0.805). In addition, respondents agreed that Receiving and Put-away enhances the performance of large manufacturing firms in Nairobi City County, Kenya (M = 4.08, SD = 0.810).

These findings suggest that effective receiving and put-away processes supported by WMS improve inventory accuracy, storage efficiency, and warehouse space utilization, which in turn enhance the operational performance of large manufacturing firms. The findings are consistent with previous studies which established that efficient receiving and put-away operations contribute to improved inventory control, reduced handling errors, and enhanced organizational performance.

**Table 2: Receiving and Put-away**

| Statement | Mean | Std. Dev. |
|---|---|---|
| WMS improve the accuracy of receiving incoming goods. | 4.03 | 0.730 |
| WMS enable timely verification and recording of received inventory. | 4.03 | 0.830 |
| WMS enhance the speed of put-away operations. | 4.61 | 0.787 |
| WMS ensure goods are assigned to the correct storage locations. | 3.92 | 0.830 |

| | | |
|---|---|---|
| WMS improve warehouse space utilization through proper location assignment. | 4.10 | 0.805 |
| Receiving and Put-away enhances the performance of large manufacturing firms in Nairobi City County, Kenya. | 4.08 | 0.810 |

**Performance of Large Manufacturing Firms**

The respondents were requested to rate their agreement to the statements on the performance of large manufacturing companies in Nairobi City County, Kenya. The outcomes of the tests are provided in Table 3. The results show that 72.0% of the respondents were in favour of the role of Warehouse Management Systems implementation on improving the level of customer satisfaction in the firm and 28.0% did not agree. Moreover, 75.5% of the respondents agreed that Warehouse Management Systems have improved the firm's capacity in meeting customer requirements on time, while 24.5% disagreed. The results also showed that 79.7% of the respondents expressed an agreement to the statement that Warehouse Management Systems have helped to enhance the Return on Investment (ROI), while 20.3% disagreed.

Moreover, 73.0% of the respondents agreed that warehouses had helped them better ROA while 27.0% disagreed. Lastly, 74.1% of the respondents agreed that, as a whole, Warehouse Management Systems have improved the Company's performance and 25.9% disagreed.The findings suggest that the implementation of Warehouse Management Systems has positively influenced the performance of large manufacturing firms in Nairobi City County, Kenya. The high levels of agreement across customer satisfaction, ability to meet customer requirements, ROI, ROA, and overall firm performance indicate that Warehouse Management Systems contribute significantly to both operational and financial performance. These findings provide evidence that effective Warehouse Management Systems support improved organizational efficiency, customer service delivery, and profitability among large manufacturing firms.

**Table 3: Performance of Large Manufacturing Firms**

| **Statements** | **Yes (%)** | **No (%)** |
|---|---|---|
| The implementation of Warehouse Management Systems has improved customer satisfaction in the firm. | 72.0 | 28.0 |
| Warehouse Management Systems have enhanced the firm's ability to meet customer requirements on time. | 75.5 | 24.5 |
| Warehouse Management Systems have contributed to improved Return on Investment (ROI) in the firm. | 79.7 | 20.3 |
| Warehouse Management Systems have contributed to improved Return on Assets (ROA) in the firm. | 73.0 | 27.0 |
| Overall, Warehouse Management Systems have improved the performance of the firm. | 74.1 | 25.9 |

**Pearson Correlation Analysis**

The study further conducted inferential statistics entailing both Pearson and regression analysis with a view to determine both the nature and respective strengths of associations between the conceptualized predictors such as Inventory management, and Demand planning management and performance of Large manufacturing firms in Nairobi city County, Kenya.

**Table 4: Correlation Coefficients**

| Variables | Performance of Large Manufacturing Firms | Inventory Management | Receiving and Put-away |
|---|---|---|---|
| Performance of Large Manufacturing Firms | 1 | | |
| Inventory Management | .371** | 1 | |
| Sig. (2-tailed) | .000 | | |

| | | | |
|---|---|---|---|
| N | 102 | 102 | |
| Receiving and Put-away | .431* | .240* | 1 |
| Sig. (2-tailed) | .000 | .038 | |
| N | 102 | 102 | 102 |

The Pearson correlation analysis indicates that both independent variables are positively and significantly associated with the performance of large manufacturing firms in Nairobi City County, Kenya. Receiving and put-away exhibited the strongest positive relationship with firm performance ($r = .431$, $p < .001$), while inventory management also demonstrated a positive and statistically significant relationship ($r = .371$, $p < .001$). These findings imply that improvements in warehouse management system practices are associated with enhanced organizational performance. The results are consistent with the findings of Ongeri and Osoro (2021), who reported that warehouse management practices have statistically significant positive relationships with organizational performance.

**Regression Analysis**

To establish the degree of the effect of supply chain for a regression analysis was conducted, with the assumption that: variables are normally distributed to avoid distortion of associations and significance tests, which was achieved as outliers were not identified; a linear relationship between the independent variables and dependent variable for accuracy of estimation, which was achieved as the standardized coefficients were used in interpretation.

Regression analysis produced the efficient of determination and analysis of variance (ANOVA). Analysis of variance was done to show whether there is a significant mean difference between dependent and independent variables. The ANOVA was conducted at 95% confidence level.

**Model of goodness fit**

Regression analysis was used to establish the strengths of relationship between the performance of Large manufacturing firms in Nairobi city County, Kenya(dependent variable) and the predicting variables; Inventory management, and receiving and put away (Independent variables). The results showed a correlation value (R) of 0.861 which depicts that there is a good linear dependence between the independent and dependent variables. This discovery is in line with the findings of Ongeri and Osoro (2021). They observed that this also to depict the significance of the regression analysis done at 95% confidence level. This implies that the regression model is significant and can thus be used to evaluate the association between the dependent and independent variables. This finding is in line with the outcomes of Ittmann (2018), who observed that analysis of variance statistics examines the differences between group means and their associated procedures.

**Table 5: Model Goodness of Fit**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.861 | 0.741 | 0.692 | 0.067 |

With an R-squared of 0.741, the model shows that Inventory management, and receiving and put away an contribute up to 74.1% on performance of Large manufacturing firms in while 25.9% this variation is explained by other indicators which are not inclusive in this study or model. A measure of goodness of fit synopses the discrepancy between observed values and the values anticipated under the model in question. This finding is in line with the results of Mwakubo and Ikiara (2007).

**Analysis of Variance**

A study to determine the significance of the data collected was performed using Analysis of Variance (ANOVA) method. The results of the processed data (population parameters) showed a significance of 0.001 in the statistics of ANOVA. This implies that the significance value (p-

value = 0.001) is less than the 5% level of significance which is an appropriate value to draw conclusions about the parameters of the population from the data. Calculating the F statistic gave 18.873 which is more than the critical F-value; hence the overall regression model is statistically significant. This indicates that inventory management, and receiving and putaway when combined have a statistical effect on performance of large manufacturing companies in Nairobi City County, Kenya. This result aligns with Abbas and Hussien (2021) who identified that a good WMS positively impacts with their organization's performance as it brings the advantages to improve their inventory management, operations and order fulfilments.

**Table 6: ANOVA TEST**

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 4.151 | 1 | 4.151 | 76.870 | .001 |
| Residual | 6.460 | 120 | 0.054 | | |
| Total | 10.611 | 121 | | | |

**Regression coefficients of Determination**

To determine the relationship between the independent variables and the dependent variable and the respective strengths, the regression analysis produced coefficients of determination. Findings in table 7 reveal a positive relationship between the performances of Large manufacturing firms in Nairobi city County, Kenya. From the result shown below, it's clear that when all the independent variables are regressed against the dependent variable the constant gives a negative result meaning there is a strong relationship and how each predator has an effect on the dependent variable

**Table 7 Regression coefficient Results**

| **Model** | **Unstandardized Coefficients (B)** | **Std. Error** | **Standardized Coefficients (Beta)** | **t** | **Sig.** |
|---|---|---|---|---|---|
| (Constant) | -0.134 | 0.060 | — | -2.233 | .001 |
| Inventory Management | 0.470 | 0.132 | 0.858 | 5.472 | .001 |
| Receiving and Put-away | 0.261 | 0.115 | 0.321 | 2.270 | .002 |

A unit change in inventory management would thus lead to a .470 effect on performance of Large manufacturing firms in Nairobi city County, Kenya sector ceteris paribus; while a unit change in inaccurate Receiving and put-away would have an effect of .261 change in performance of Large manufacturing firms County. This outcome is in line with the results of Ongeri and Osoro (2021). This implies that among other factors, Inventory management, and Demand planning management are significant determinants of performance of large manufacturing firms in Nairobi city County, Kenya.

**Conclusion**

**Inventory Management**

The study finds that the performance of large manufacturing firms in Nairobi City County, Kenya is positively related to the Inventory Management as part of Warehouse Management Systems (WMS). The results have shown that the factors influencing the stock visibility, stock minimizing and stock out reduction factors are significant for the firm performance which are important in inventory management.

Finally, the study reveals that adoption of WMS-enabled inventory management can lead to better operational efficiency and effectiveness, thanks to fresh information on inventory, improved inventory control, and optimal inventory levels. As a result, better inventory management translates to better utilization of resources, lower inventory related cost, higher

customer satisfaction and better financial performance embodied in higher Return on Investment (ROI) and Return on Assets (ROA) for large manufacturing companies in Nairobi City County, Kenya.

### Receiving and Put-away

The study shows positive correlation between WM systems Receiving and Put away component and the performance of the large manufacturing companies in Nairobi City County, Kenya. The results show that an accurate receiver, faster put-away and correct locations assignment have a significant impact on smooth warehouse performance and inventory management. The study also reveals that it is possible for business organizations to get the right volume of inventory and make sure it is verified and stored properly under a WMS, therefore improving accuracy and minimizing errors, delays, and product handling expenses. Moreover, as receivers receive and put away items, effectively managing workstation access, warehouse space and activity flow can expedite order completion and enhance customer service. The benefits of these improvements include better customer satisfaction, greater efficiency, and better business performance, in terms of increase in Return on Investment (ROI), Return on Assets (ROA) among large manufacturing companies in Nairobi City County, Kenya.

## Recommendations

### Inventory Management

It is recommended that the implementation of Inventory management component of Warehouse Management system (WMS) should be increased among large manufacturing companies in Nairobi, City County, Kenya for better performance of other manufacturing companies who would like to change their performance. Real-time inventory tracking and effective inventory control should be a priority for firms to invest in, so that they are able to gain inventory visibility and reduce the risks of overstocking and stock-outs. It is also important to keep inventory records up to date and to ensure optimal levels of stock to enable smooth working regimes to be maintained. Good inventory management will optimize operational activities, minimize inventory holding costs, improve customer satisfaction, which in turn will lead to an improved ROI, ROA, and overall organizational performance.

### Receiving and Put-away

The study recommends the improvement of Receiving and Put-away component of Warehouse Management System (WMS) at big manufacturing firms in the Nairobi City County, Kenya and other manufacturing firms through enhancing receiving accuracy, improve put-away speed and location assignment of stock in the warehouse. To ensure goods are received and stored correctly, companies need to implement automated technologies to receive and keep track of inventory. Furthermore, the warehouse managers need to have procedures in place to receiving and put away products to ensure that there will be minimum mistakes, little delay and the best use of warehouse space. Improved inventory will be realized through receiving and a put-away activity, which will lead to improved organization performance, both from the receiving and put-away perspectives.

## REFERENCES

Abbas, T. M., & Hussien, F. M. (2021). The impact of warehouse management systems on operational performance in manufacturing enterprises. *International Journal of Innovative Research and Advanced Studies, 8*(1), 9–15.

Al-Ansi, A. M. (2022). Investigating characteristics of learning environments during the COVID-19 pandemic: A systematic review. *Canadian Journal of Learning and Technology, 48*(1), 1–25.

Al-Khawaldah, R. A., Al-Zoubi, W. K., Alshaer, S. A., Almarshad, M. N., AlShalabi, F. S., Altahrawi, M. H., & Al-Hawary, S. I. (2022). Green supply chain management and

competitive advantage: The mediating role of organizational ambidexterity. *Uncertain Supply Chain Management, 10*(3), 961–972.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120.

Behera, D. K. (2022). A green supply chain management survey: A case study. *Journal of Recent Activities in Production, 7*(3), 37–41.

Bowersox, D. J., Closs, D. J., Cooper, M. B., & Bowersox, J. C. (2021). *Supply chain logistics management* (5th ed.). McGraw-Hill Education.

Brigham, E. F., & Ehrhardt, M. C. (2022). *Financial management: Theory and practice* (16th ed.). Cengage Learning.

Chopra, S., & Meindl, P. (2020). *Supply chain management: Strategy, planning, and operation.* Pearson.

Christopher, M. (2022). *Logistics and supply chain management* (6th ed.). Pearson.

Coase, R. H. (1937). The nature of the firm. *Economica, 4*(16), 386–405.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Dzomonda, O. (2021). Supply chain management practices and organizational performance. *Journal of Contemporary Management, 18*(1), 1–18.

El Baz, J., & Iddik, S. (2022). Green supply chain management and organizational culture: A bibliometric analysis based on Scopus data (2001–2020). *International Journal of Organizational Analysis, 30*(1), 156–179.

Foss, N. J., & Knudsen, T. (2003). The resource-based tangle: Towards a sustainable explanation of competitive advantage. *Managerial and Decision Economics, 24*(4), 291–307.

Frazelle, E. H. (2016). *World-class warehousing and material handling* (2nd ed.). McGraw-Hill Education.

Greene, J. C., & Dreyer, L. (2021). *Research methods for business and management.* Sage.

Gu, J., Goetschalckx, M., & McGinnis, L. F. (2007). Research on warehouse operation: A comprehensive review. *European Journal of Operational Research, 177*(1), 1–21.

Hall, J. (2020). *Descriptive statistics and quantitative data analysis.* Academic Press.

Ittmann, H. W. (2018). Logistics and supply chain performance measurement. *Journal of Transport and Supply Chain Management, 12*(1), 1–9.

Kenya Association of Manufacturers. (2023). *Kenya manufacturing sector survey report.*

Kenya Association of Manufacturers. (2024). *Directory of Kenya manufacturers.*

Kenya National Bureau of Statistics. (2024). *Economic survey 2024.* Government Printer.

Kombo, D. K., & Tromp, D. L. A. (2006). *Proposal and thesis writing: An introduction.* Paulines Publications Africa.

Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International.

Kotler, P., Keller, K. L., & Chernev, A. (2022). *Marketing management* (16th ed.). Pearson.

Kumar, P., Aziz, S., & Khan, A. M. (2023). The influence of warehouse management systems on supply chain efficiency: A case study of the online garment supplier's experience. *International Journal of Economics, Commerce and Management, 11*(10), 1–18.

Latwal, A. (2020). Content validity in research instruments. *International Journal of Research Methodology, 9*(2), 21–28.

Mukherjee, S. (2020). Construct validity in quantitative research. *Journal of Research Methodology, 12*(1), 33–42.

Mwakubo, S. M., & Ikiara, M. M. (2007). *Public-private partnerships in the management of water services in Kenya.* Institute of Policy Analysis and Research.

Mwangi, P., & Muthoni, R. (2021). Warehouse operations and performance of manufacturing firms in Kenya. *International Journal of Logistics and Supply Chain Management, 6*(2), 34–49.

Mwaniki, A., & Omwenga, J. (2022). Inventory control practices and performance of manufacturing firms in Kenya. *International Journal of Supply Chain Management, 7*(2), 15–30.

Ongeri, N. V., & Osoro, A. (2021). Effect of warehouse consolidation on performance of registered distribution firms in Nairobi City County, Kenya. *The International Journal of Business & Management, 9*(10), 1–10.

Richards, G. (2018). *Warehouse management: A complete guide to improving efficiency and minimizing costs in the modern warehouse* (3rd ed.). Kogan Page.

Richards, G. (2021). *Warehouse management: The definitive guide to improving efficiency and minimizing costs in the modern warehouse* (4th ed.). Kogan Page.

Richards, G. (2022). *Warehouse management: The definitive guide to improving efficiency and minimizing costs in the modern warehouse* (5th ed.). Kogan Page.

Ross, S. A., Westerfield, R. W., & Jordan, B. D. (2022). *Fundamentals of corporate finance* (13th ed.). McGraw-Hill Education.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.

Sharma, G. (2018). Pros and cons of different sampling techniques. *International Journal of Applied Research, 3*(7), 749–752.

Tan, K. C., & Sidhu, J. (2022). Supply chain management and organizational competitiveness. *Journal of Business Logistics, 43*(2), 155–170.

Taouab, O., & Issor, Z. (2019). Firm performance: Definition and measurement models. *European Scientific Journal, 15*(1), 93–106.

Waddell, D. (2020). *Research methods for management.* Oxford University Press.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171–180.

Williamson, O. E. (1975). *Markets and hierarchies: Analysis and antitrust implications.* Free Press.

Williamson, O. E. (1985). *The economic institutions of capitalism.* Free Press.