Effect of Warehousing Management on Supply Chain Performance: A Case of Inyange Industries Ltd

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ABSTRACT

In local and globalized markets, warehouses are crucial supply chain nodes. This study aimed to investigate the effect of warehousing on supply chain performance: A case of Inyange Industries Ltd. The goals were to evaluate how inventory management, warehouse capacity building, and material handling affects supply chain performance in Inyange Industries Ltd. This research experimented with three different theories: Just-in-time, Lean, and Triple-A supply chain. The population of this study were 105 staff members of Inyange Industries Ltd. Therefore, census was conducted because the population size is affordable and the researcher can be able to contact all the respondents. Quantitative data were analyzed using inferential research methodology in this study. Questionnaires were used to gather primary data, which was then analyzed. Data analysis was carried out using the Statistical Package for the Social Sciences (SPSS), and descriptive and inferential statistics were used to show the study's results. According to the research, supply chain performance is positively and significantly affected by both automated and manual material handling. Mechanical material handling, on the other hand, improves supply chain performance, but not much. Inyange Industries' supply chain performance is influenced by the material handling systems to the tune of 19.3%, as shown by the modified R^2 value of 0.193. According to the research, supply chain performance is positively and significantly affected by inventory counts, warehouse management systems, and inventory organization. A 0.967 adjusted R^2 value suggests that 96.7% of the variation in Inyange Industries' supply chain performance is explained by the inventory management techniques. According to the research, supply chain effectiveness is positively and significantly impacted by warehouse demand planning, design, and management. Warehouse capacity planning techniques at Inyange Industries account for 95.4% of the variation in supply chain performance, as shown by the modified R^2 value of 0.954. The research concluded that material handling, inventory management, and warehouse capacity planning are all important warehouse management measures that significantly impact supply chain performance for the better. The methods used by Inyange Industries Ltd. for managing their warehouses have resulted in an improvement in supply chain performance of 87.2%. The regression coefficients, supported by their t-test values and Beta coefficients, highlight both the significance and strength of relationships between independent and dependent variables. Material Handling demonstrated the greatest impact (β1=0.532, t=8.556, p=0.000), followed by Inventory Management (β2=0.379, t=6.147, p=0.000), and Warehouse Capacity Planning (β3=0.172, t=3.268, p=0.002), emphasizing their respective contributions to Supply Chain Performance of Inyange Industries Ltd.'s supply chain. This proved that material handling in warehouse management has a major influence on supply chain performance. Because the p-value was lower than 5%, we may say that the association is statistically significant. The research concluded that both automated and human material handling should get additional funding. To maximize efficiency in stock-taking as well. Previous studies have looked at a variety of organizational factors that affect performance of supply chains. To further understand how warehouse management strategies affect overall performance, more research is needed.

Key words: Inventory Management, Material Handling, Performance, Supply Chain, Warehouse Capacity Planning, Warehousing

I. INTRODUCTION

Successful companies in today's globally competitive market understand the critical importance of well-managed supply chains. An essential part of this system, warehousing allows for the storing, processing, and shipping of products (Muller & Mentzer, 2018). Adomako et al. (2018) state that warehouses are vital to this system because they facilitate the movement of commodities from producers to consumers. In this study, it looks at the Rwandan setting to see how storage practices affect supply chain performance. The end goal is to enhance supply chain performance by identifying the elements that lead to more efficient warehouses in Rwanda.

Storage capacity constraints contribute to Rwanda's high gasoline prices. In the same way that other emerging economies have problems with inadequate storage facilities, this one might cause delays and higher storage costs due to logistical bottlenecks (Mjema & Ndungu, 2018). It would be helpful to learn more about how storage restrictions have affected gasoline costs in Rwanda.

Presently used warehouse space is inadequate to fulfill customer demand. The bulk of the present-day infrastructure was built for purposes other than supporting this commerce many decades ago. Therefore, they are unprepared to handle the surge in volume. The current warehouses needed to be updated due to their overcrowding. There has been an 85 percent rise in volume over the last three years, but there has been no corresponding growth in the number of warehouses, meaning that the two primary bonded warehouses, one public and one private, are overwhelmed. A public warehouse with a storage/handling capacity of around 1200 square meters is located at the Petite Barrier and the Rubavu Grand Barrier/La Cornice borders; a private warehouse with a capacity of about 600 square meters is close. Private businesses in Rubavu, notably those dealing in international commerce, face challenges (Ministry of Trade and Industry [MINICOM], 2021).

Because of a lack of proper storage facilities, Rwandan maize producers have a big problem: a high level of aflatoxin contamination in their harvest. Research by Niyibituronsa et al. (2020) on aflatoxin levels in stored maize from different facilities verifies the negative effects of improper storage methods. The failure of traditional methods to preserve maize from changes in moisture and temperature might lead to conditions that are conducive to aflatoxin development. Because their goods are now unfit for commercial sale due to contamination, farmers are unable to sell their goods and put their families' food security at risk. To lessen the spread of aflatoxin, boost food security, and expand their reach to commercial markets, Rwandan farmers need to upgrade their storage methods. Research conducted in Rwanda by Benimana (2021) found that hermetic storage bags significantly reduce levels of aflatoxin when compared to more traditional methods. Given these findings, it is of the utmost importance to support and provide hermetic bags and other improved storage solutions to Rwandan farmers. Farmers may enhance their lives by using these solutions, which reduce aflatoxin contamination, promote food security, and improve access to commercial markets. These high aflatoxin levels restrict small-scale farmers' access to commercial markets, similar to how small-scale farmers in other developing countries cope with post-harvest losses caused by inadequate storage (Gong et al., 2017). Rwandan farmers are in dire need of better storage solutions to lower aflatoxin levels and access commercial markets. Accordingly, the study aimed to investigate the effect of warehousing on supply chain performance.

1.1 Statement of the Problem

The warehouses that are already in use are insufficient to meet the demand. The majority of currently used infrastructure was constructed decades ago for uses other than aiding this trade. As a result, they are ill-prepared to deal with the increase in volume. There was a need to modernize the existing warehouses since they were very crowded. The two main bonded warehouses—one public and one private—cannot keep up with the demand since the volume has increased by over 85% in the last three years yet the number of warehouses is not increasing on the other side. The public warehouse is situated at the Petite Barrier and the Rubavu Grand Barrier/La Cornice borders and has a storage/handling capacity of roughly 1200 square meters, while the private warehouse is situated nearby and has a capacity of roughly 600 square meters. Rubavu's private companies, including cross-border traders, confront difficulties. (MINICOM, 2021).

According to World Food Program (WFP, 2022), maize small farmers are facing the challenge where Aflatoxin levels in their crops are overly high due to fungal diseases. 87% of farmers confirm that it was caused by inadequate storage in humid circumstances, which restricts access to commercial markets. Aflatoxin, which causes both acute and chronic illness, cannot be removed from crops that have been harmed. These farmers have been facing this challenge because they don't have enough effective warehousing to help them better do their post-harvest management.

1.2 Specific Objectives

i. To assess the effect of material handling on supply chain performance at Inyange Industries Ltd.
ii. To examine the effect of inventory management on supply chain performance at Inyange Industries Ltd.
iii. To establish the effect of warehouse capacity planning on supply chain performance at Inyange Industries Ltd.

1.2 Research Hypotheses

Ho_1: There is no significant effect of material handling on supply chain performance at Inyange Industries Ltd.
Ho_2: Inventory management significantly has no effect on supply chain performance at Inyange Industries.
Ho_3: There is no significant effect of warehouse capacity planning on Inyange Industries' Supply chain performance.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Just-In-Time theory

The Japanese management philosophy known as Just-In-Time (JIT) has been used by several Japanese industrial enterprises since the early 1970s. It was first developed and refined by Taiichi Ohno at Toyota's factories with the goal of reducing response times to customer expectations. Most people know Taiichi Ohno as the founder of JIT. In order to minimize and maximize the use of leftovers, this theory stresses the need of managing inventory levels and production schedule. According to Wagner and Silveira (2019), the JIT method is often used by organizations that have achieved the greatest level of JIT implementation. Because of the camaraderie and trust between the two parties, the vendor is able to reliably fulfill the shop's requests for products on time. The goal of JIT is to decrease production-related waiting time. The Just-in-Time (JIT) principle emphasizes zero inventory rather than standardization or management style. An unexpectedly urgent purchase order can postpone the delivery of completed goods to clients. The world-famous JIT inventory technique allows Toyota Motor Corporation to wait for fresh orders for automobile components before placing them. The approach took 20 years to perfect, even though the firm used it in the 1970s (Shah & Wadhwa, 2019). The study's author claims that a JIT system's main benefit is that it helps businesses save money and increase productivity by reducing the amount of inventory they need to maintain on hand. When it comes to requests for raw materials and manufactured goods, the Just-In-Time (JIT) delivery method of inventory management is ideal for speedy fulfillment.

The Just-in-Time (JIT) theory, emphasizing minimal inventory and close supplier relationships, aligns well with this study on warehousing and supply chain performance at Inyange Industries Ltd. JIT principles aim for efficient material flow, which can be evaluated through warehouse management practices. This study can explore how Inyange Industries manages inventory levels and supplier collaboration to achieve efficient production, mirroring JIT's core objectives.

2.1.2 Lean Theory

Lean Theory is a systematic approach to boost inventory value by the elimination of wasteful practices and the systematic detection and elimination of time, effort, and resource wastage. The "continuous flow" concept, first introduced by Henry Ford in the 1920s, is widely considered to have been the impetus for the lean management movement. Maximizing value via the elimination of non-value-added activities and the continual improvement of processes is the goal of lean concepts. Its primary goals are operational excellence, shorter lead times, and process simplification. A company may achieve a continuous flow of goods with the help of lean inventory management. Inventory distribution times may be affected by several variables such as transportation, batch operations, and work in line. According to the study's author, this method is still useful for cutting down on the material and monetary loss that might arise from inefficient supply chain management. The common obstacles that exist between the various links in the supply chain may be eliminated, allowing for this overall decrease. Better coordination of the supply chain's many links is assured in the long run(Goh & Goh, 2019). Lean theory, focused on eliminating waste and streamlining processes, aligns well with the study on warehousing and supply chain performance at Inyange Industries Ltd. Both aim for efficiency. Lean principles target non-value-added activities, which can exist in warehousing (e.g., excessive product movement, unclear layouts). This study can explore how Inyange Industries manages its warehouse to reduce waste and optimize processes, mirroring Lean's core objective of maximizing value.

2.1.3 Triple-A Supply Chain Theory (Agile-Adaptable-Alignment Supply Chain Theory)

According to Lee (2004), Triple-A Supply Chain Theory (Agile-Adaptable-Alignment Supply Chain Theory) stated that effective supply networks should be agile, adaptable, and aligned. Successful supply chain management, according to this notion, requires a high degree of agility, adaptation, and alignment. According to Stock and Lambert (2018), firms must be nimble enough to respond to unexpected changes in the market, adaptable enough to deal with shocks, and customer-centric enough to tailor their strategies to meet their needs. These ideas of supply chain management are only a small selection of the many interesting ones. Insightful information and practical tools are provided by every theory to improve decision-making and increase supply chain efficiency. Gaining a competitive edge is a continuous process that begins with developing your organization's agility, flexibility, and alignment. A+ performance from the supply chain 29 and refreshed in reaction to changes in consumer demand and market and economic structure. As these skills are integrated and coordinated within supply chain networks, the collaborating organizations create complex adaptive systems. These systems learn to adapt to changing markets and economies, and in the end, they gain a competitive edge by satisfying the supply chain's end users. According to Christopher and Ryall

(2020), an organization's ability to succeed is directly related to how well it implements the supply chains in which it participates. Researchers place an emphasis on strong supply chain performance when it allows for the safe delivery of products and services in exact quantities and at exact times, without damage.

The Triple-A Supply Chain Theory, emphasizing agility, adaptability, and alignment, aligns well with our study on warehousing and supply chain performance at Inyange Industries Ltd. This theory suggests successful supply chains are flexible and responsive, mirroring the need for efficient warehouse operations. Our study can examine how Inyange Industries adapts warehousing practices to changing demands and aligns them with overall supply chain goals, reflecting the core principles of Triple-A.

2.2 Empirical Review

2.2.1 Material Handling

The impact of a warehouse management system on the efficiency of the supply chain was the subject of a recent research. There is a higher focus on the capacity of firms to build smooth and effective logistics operations, according to the study, as a result of big product variations and decreased consumer response times. The way a company's warehouse operations are structured may have a direct influence on customer service levels, lead times, and cost. The efficiency of the whole series is therefore affected by storage. Reduced non-value-added time causes a 236-minute drop in process cycle time to a 95-minute drop. As a result, 40% less labor is required (Raama, 2018).

Dolgin et al. (2021), in their study titled "The Impact of Warehouse Layout Design on Order Fulfillment Performance," highlights how important material handling layout is for supply chain efficiency as a whole. To determine the effects of different layout configurations on variables including order fulfillment speed, picking accuracy, and trip durations, their research used simulation modeling. The fundamental activity of every supply chain is material handling, which includes the transportation of huge numbers of things from one point to another. Loading and unloading products from transport trucks, rearranging unloaded things inside the warehouse, transferring commodities for inspection and packing, and lifting storage units during order picking are all examples of what is involved. Organizations in a wide range of sectors may enhance their supply chain management by enhancing material handling methods and layout.

The importance of material handling in improving the efficiency of incoming and outbound material transport, warehouse management, and inventory control was highlighted in the study the Logistics Management Practices and Operational Performance of Multinational Corporations in Rwanda a Case Study of Nelsap-Cu, Rusumo Project (Nisabwe, 2022).

In order to determine the relationship between material stock control, material handling automation, material packaging, and material logistics planning and the performance of large-scale manufacturing firms in Nairobi, a research project was carried out (Moronge, 2019). Examining these characteristics and the relationships between them and the performance of these organizations were the particular goals of the research.

A respectable 71.3% of individuals bothered to reply. Most indications of material handling methods seem to have a beneficial influence on company results, according to the evidence. Along with determining a 5% significance threshold for the link between the variables, the study also used regression analysis.

2.2.2 Management of Inventory

Sohail et al. (2020) found that storage methods significantly affect supply chain customer satisfaction. According to their findings, a positive customer experience is the product of a number of interconnected factors, such as precise order fulfillment, prompt delivery, and easy return processing. Warehousing is crucial for these things to be feasible. When a warehouse is well-oiled, orders are completed swiftly and accurately, and returns are handled efficiently. Warehouse operations that are well-executed may help businesses increase customer satisfaction by decreasing delivery delays, error rates, and the difficulty of returns. Obala et al. (2015) found that pharmaceuticals lead to increased inventory shrinkage owing to expiration, damage, obsolescence, acquired drug not functioning as intended, and theft.

The impact of inventory control management on the performance of Rwandan manufacturing sector companies was the subject of research (Remy, 2022). The study's case study was Sulfo Rwanda Industry Ltd. The target population included 255 respondents. In order to ensure the industry's overall performance, Sulfo Rwanda Industry Ltd., a manufacturing sector, strives to emphasize inventory control management, according to the principal finding. Moreover, studies show that inventory control management impacts a company's performance. Innovative technology investments are necessary for the SULFO industry to reduce operating costs while increasing productivity, availability, reliability, and performance. Staff workers should undergo regular training in inventory control management to save costs and cover the costs of hiring forecasting experts.

2.2.3 Warehouse Capacity Planning

Solutions for packaging that make different promises might have vastly different costs and levels of performance. Customers may make better selections when they understand these distinctions. Efficient operations in warehousing have a direct influence on a company's profitability, customer service quality, and overall effectiveness. Consequently, it is essential to have a well-planned warehouse infrastructure. By streamlining processes and reducing bottlenecks, this system should help get products from the factory to the customer quickly and easily (Song *et al*., 2021).

This study accomplished what Rebelo set out to do: illustrate that warehouses can be a source of profit and that a serious approach to the existing empty space may result in increases in volume with little asset. The company's redesigned racks allowed either horizontal or vertical pallet storage. To determine the actual usable volume, we split the product dimensions by the corresponding value and compared them to the bin dimensions (height, width, and depth). The company clearly spent a lot of money sending things to an outside warehouse every day since there wasn't enough room inside. Furthermore, due to a lack of suitable containers, a number of cargoes were left unsorted and resting on the floor. Here you may find the most valuable possessions, and they were often broken or lost (Rebelo, 2021).

Akyol and Guner (2018) looked at how the design of warehouse layout affected the efficiency of e-commerce order fulfillment. Their findings stress the need of well-oiled storage and put-away processes for optimum product movement. But there are problems in the actual world. Problems with storage space allocation and possible delays could occur when staff do not have a thorough grasp of incoming merchandise. In addition, retrieval operations may be further complicated by poorly built storage rooms with restricted mobility, which impacts efficiency and safety. Another way that improper storage methods may reduce productivity and heighten the danger of accidents is by blocking paths with misplaced objects. These results show how important it is to optimize warehouse techniques for better organizational performance by facilitating efficient operations and making the most of available space.

The research on warehouse management concerns and challenges in Pakistan's fast-moving consumer goods (FMCG) industry found several problems and suggested solutions. Keeping track of a vast inventory is the most challenging aspect of operations. Proper record-keeping, including batch-wise inventory and First-In, First-Out implementation, becomes challenging due to the rapidity of product movement. However, ownership of activities is equally crucial in this whole situation. Given the significant negative impact on service and performance caused by under- or overutilization of third-party warehouses. When the warehouse is underutilized, overall efficacy drops, and when it is overutilized, service level drops (Qazi, 2020).

The research confirms what many have suspected: unpredictable demand is the root of many storage woes. Variations in demand could be caused by a number of factors, including the standing of a rival in the market, unforeseen events like vacations, or just a lack of alternatives. Warehouse capacity is limited, and customers need their items quickly during this non-seasonal demand. Relying on precise predictions and coordinated preparations is the only strategy for handling this demand variability. Workforce collaboration allows warehouses to maximize their limited capacity. The warehouse's layout and layout should be considered in relation to the sales forecast for the next five (5) years (Qazi, 2020).

Based on Janet (2018) study, Performed a study of holdings in Kisumu city to determine the impact of storage methods on organizational performance. Based on the data collected from both companies, it is clear that storage systems are their top priority. Achieving organizational efficiency was made possible by well-built storage systems, which resulted in reduced storage expenditures, little degradation, and the avoidance of space waste. Firms should treat storage systems with the seriousness they deserve and play by the laws if they want to boost efficiency.

Research on the effects of supply chain integration on operational performance, drawn from data collected from Chinese e-commerce sites, found that better supply chain management generally leads to less complexity and better coordination across various links in the supply chains of both consumers and businesses. They are in a stronger position to maintain and grow their market share as a result of the increased pleasure of their customers brought about by this development. Better coordination between the various parts of supply chains is made possible by the use of IT, which facilitates the free flow of information between suppliers and consumers (Jimenez-Jimenez et al., 2019).

Supplier and supply chain performance are also affected by the buyer's dedication and investment. In addition to illuminating the societal problems afflicting developing-world supply networks, the findings also provide valuable insight for businesses seeking to differentiate themselves via the establishment of socially responsible supply chains (Delgado et al., 2018).

Manteghi et al. (2020) states that SCI is a crucial intermediary in this relationship. So far as their research can tell, SCI's impact is size dependent. Small and medium-sized enterprises (SMEs) cannot achieve their performance objectives without effective SCI. A robust relationship between SCM practices and competitive competence, on the other hand, is more beneficial for big enterprises. According to Al-Madi (2017), it may be more appropriate to place a

focus on SCM practice and rivalry skill once SC integration has developed a little, although systematic SC integration may be more necessary in the early phases of SC integration.

III. METHODOLOGY

In this chapter, the methodology used to collect the study data has been presented. The section indicates the research design to be used by the researcher to achieve the research objectives as well as to answer the research questions, the population studied, the sample size and sampling procedure, the collection methods data, the data analysis as well as ethical considerations that were taken into account during this research.

3.1 Research Design

This research adopted a Correlational Research Design to understand the relationship between inventory management, material handling, warehousing capacities planning, and supply chain performance. The researcher simply collected primary data; there is no researcher intervention. This study was facilitated by the use of primary data from the questionnaires. The data was collected, analyzed using SPSS, and the findings were tabulated, presented, interpreted and discussed.

3.2 Study Population and Sample Size

The population is defined as the total collection of elements about which wish to make a sum. The study targeted a total of 105 members of the staff from the logistics department; warehouse department, finance, operations, and Quality Department at Inyange Industries LTD.

Therefore, since the population was not high, the researcher has decided to use the whole population. Hence, no sampling method was applied, census method was conducted because the population size is affordable and the researcher can be able to contact all the respondents . Statistically, Inyange Industries LTD was well-represented in the survey.

3.3 Data Collection Instruments

Data Collection Instruments are tools or techniques used to gather information and data for research purposes. In this study, questionnaires were used to gather primary data. members of the staff from Inyange Industries LTD served as the primary sources. Textbooks, journals, publications, and websites that discuss the subject served as secondary data sources. Questionnaires contained some study-related questions that were the same for everyone in order to collect data.

3.4 Data Analysis Method

Data analysis involves reducing the accumulated data to a manageable size, developing summaries, researching patterns and applying statistical techniques, while data preparation includes editing, coding and data entry. Data coding involves assigning numbers or other symbols to responses. Data entry converts information gathered by secondary or primary methods into a medium for visualization and manipulation. Version 22.0 of the Statistical Package for Social Science (SPSS) was used as a tool to analyze the data. The Statistical Package for Social Sciences (SPSS) for quantitative analysis was used in the study.

IV. FINDINGS AND DISCUSSION

4.1 Response Rates

This chapter focuses on the analysis of the data gathered from 105 members of the staff from the logistics department; warehouse department, finance, operations, and Quality Department at Inyange Industries LTD.

Table 1

Response Rate of the Study

Questionnaires	Frequency	Percentage
Filled and returned	100	95.23
Unreturned	5	4.77
Total	**105**	**100.0**

Table 1 shows response rate data in the engagement of participants in the study's questionnaire distribution. Out of the total 105 questionnaires distributed, a significant 95.23% response rate was achieved, as 100 questionnaires were completed and returned by the respondents. This high return rate indicates a strong willingness of participants to engage with the study's objectives. However, a minor portion of questionnaires, constituting 4.77%, remained unreturned, implying a slight disengagement from these participants. The lack of returned questionnaires was mainly due to the temporary absence of selected individuals during the data collection phase. Sataloff and Vontela (2021) indicated that response rates above 50% are desirable in social science research. A high response rate strengthens the validity of your findings, as it suggests that your data is more likely to be representative of the target population you aimed to survey.

4.2 Perception of the Respondents on the Material Handling

Findings showed the effect of Material Handling on supply chain performance at Inyange Industries Ltd. All perceptions from respondents are showed in Table 2. This study followed the following crietia, SD: strongly disagree, D: disagree, N: neutral, A: agree, SA: strongly agree, M; Mean, Std: standard deviation, and F: frequency.

Table 2

Perception of the Respondents on the Material Handling

	SD	D	N	A	SA		
Statement	**F**	**F**	**F**	**F**	**F**	**M**	**Std**
The warehouse employs Manual handling systems.	24	37	7	24	5	2.47	1.25
The warehouse employs Mechanical handling	0	0	9	37	51	4.43	0.66
The warehouse employs Automated handling	22	34	8	31	2	2.56	1.21
Material handling assists in delivery on time	0	1	2	14	80	4.78	0.525
Material handling assists in delivering damage-free goods	1	2	3	12	79	4.71	0.721
Material handling minimizes the company's supply chain cost	2	2	3	12	79	4.66	0.815

The above table shows the respondents' perception on material handling systems at Inyange Industries. Regarding the employment of manual material handling at Inyange, 24 respondents strongly disagree, 37 disagree, 7 are neutral, 24 agree and 5 strongly agree. The mean is 2.47 with a standard deviation of 1.25. With this, it is seen that manual material handling is not used at Inyange. For the employment of mechanical material handling at Inyange, 9 respondents are neutral, 37 agree and 51 strongly agree. The mean is 4.43 and standard deviation is 0.66. With this, it can be concluded that mechanical material handling is much used at Inyange Industries. Moreover, on the employment of automated material handling at Inyange, 22 respondents strongly disagree, 34 disagree, 8 are neutral, 31 agree, and 2 strongly agree. The mean is 2.56 and standard deviation is 1.21. With this, It can be concluded that automated material handling is moderately used at Inyange Industries.

On the part of material handling assists in delivering on time, 1 respondent disagree, 2 are neutral, 14 agree, and 80 strongly agree. The mean is 4.78 and the standard deviation is 0.525. It can be concluded that material handling contributes a lot in on-time delivery. On the section of material handling assists in delivering damage-free goods, 1 respondent strongly disagree, 2 disagree, 3 are neutral, 12 agree, and 79 strongly disagree. The mean is 4.71 and the standard deviation is 0.721. With this, is seen that material handling plays a big role in delivering damage free products. Lastly, on the section of material handling minimizes the company's supply chain costs, 2 respondents strongly disagree, 2 disagree, 3 are neutral, 12 agree, and 79 strongly agree. The mean is 4.66 and the standard deviation is 0.815. It can be concluded that material handling affects much the supply chain costs.

The analysis also showed that a high standard deviation spread from 0.52 to 1.25 which implies that respondents were more varied in their opinion to the responses given under the section of the material handling systems used at Inyange Industries. In conclusion, material handling is used at Inyange Industries especially mechanical material handling. Material handling also contributes a lot in on-time delivery, damage-free delivery and supply chain costs. This implies that material handling has proven a good level of efficiency at Inyange industries. This aligns with the study by Nisabwe (2022) where he found out that material handling is still essential for improving the operational performance of businesses since it increases the efficiency of both incoming and outbound material transport as well as warehouse management and inventory control.

4.3 Perception of the Respondents on the Inventory Management

Findings showed the effect of Inventory Management on supply chain performance at Inyange Industries Ltd. All perceptions from respondents are showed in Table 3.

Table 3

Perception of the Respondents on Inventory Management

Statement	SD F	D F	N F	A F	SA F	M	Std
There is Physical inventory counting	2	15	10	40	30	3.84	1.096
There exists a Warehouse management system	0	1	13	48	35	4.21	0.706
There is a regular inventory arrangement	0	3	16	43	35	4.13	0.799
Inventory management helps in delivering on time	0	0	2	18	77	4.77	0.468
Inventory management assists in delivering damage-free goods	0	0	3	16	78	4.75	0.490
Inventory management helps to reduce supply chain costs	0	1	3	16	77	4.74	0.564

The above table shows the respondents' perception on the inventory management practices used at Inyange Industries. Regarding the existence of physical inventory counting at Inyange, 2 respondents strongly disagree, 15 disagree, 10 are neutral, 40 agree and 30 strongly agree. The mean is 3.84 with a standard deviation of 1.096. With this, the majority of respondents say that physical inventory counting is done at Inyange. For the existence of warehouse management system at Inyange, 1 respondent disagrees, 13 respondents are neutral, 48 agree and 35 strongly agree. The mean is 4.21 and standard deviation is 0.706. With this, the majority of respondents say that warehouse management system is much used at Inyange Industries. Moreover, on the existence of inventory arrangement at Inyange, 3 respondents disagree, 16 are neutral, 43 agree, and 35 strongly agree. The mean is 4.13 and standard deviation is 0.79. This shows that the majority of respondents say that there is inventory arrangement at Inyange Industries.

The section of inventory management helps in delivering on time, 2 respondents are neutral, 18 agree, and 77 strongly agree. The mean is 4.77 and the standard deviation is 0.468. With this, it is seen that inventory management helps in on-time delivery. On the part of inventory management assists in delivering damage-free products, 3 respondents are neutral, 16 agree, and 78 strongly agree. The mean is 4.75 and the standard deviation is 0.490. This shows that inventory management helps in damage-free delivery. On the section inventory management helps to reduce supply chain costs, 1 respondent disagree, 3 are neutral, 16 agree, and 77 strongly agree. The mean is 4.74 and the standard deviation is 0.564. This shows that inventory management contributes in minimizing supply chain costs.

The analysis also showed a high and moderate standard deviation spread from 0.468 to 1.09 which implies that respondents were more and less varied in their opinion to the responses given under the section of the inventory management practices used at Inyange Industries. Overall, the study shows that inventory management is highly used at Inyange. It also shows that inventory management contributes much in on-time delivery, damage-free delivery, and supply chain costs. This implies that inventory management has proven a good level of efficiency at Inyange industries. This aligns with the study conducted by Remy (2022) where the major finding was that Sulfo Rwanda Industry Ltd as a manufacturing industry tries to pay attention to inventory control management to protect the performance of the whole industry. And as finds show that there is an effect of inventory control management on business performance.

4.4 Perception of the Respondents on the Warehouse Capacity Planning

Findings showed the effect of Warehouse Capacity Planning on supply chain performance at Inyange Industries Ltd. All perceptions from respondents are showed in Table 4.

Table 4

Perception of Respondents on Warehouse Capacity Planning

Statement	SD F	D F	N F	A F	SA F	M	Std
The firm undertakes informed Warehouse demand planning	1	2	12	35	47	4.29	0.841
The firm regularly appraises the Warehouse design	0	1	15	50	31	4.14	0.707
The firm regularly undertakes warehouse demand management	0	1	16	48	32	4.14	0.722
Warehouse capacity planning contributes in delivering on time	0	0	7	5	85	4.80	0.552
Warehouse capacity planning contributes in damage-free delivery	0	0	6	8	83	4.79	0.539
Warehouse capacity planning contributes in reducing supply chain costs	0	0	8	7	82	4.76	0.591

The above table shows the respondents' perception on the warehouse capacity planning practices used at Inyange Industries. On the part of the firm undertaking warehouse demand planning, 1 respondent disagrees, 2 disagree,

12 are neutral, 35 agree, and 47 strongly disagree. The mean is 4.29 and standard deviation is 0.841. The majority of respondents agree that the firm undertakes warehouse demand planning. In addition, on the part of appraising the warehouse design, 1 respondent disagrees, 15 are neutral, 50 agree and 31 strongly agree. The mean is 4.14 and the standard deviation is 0.707. The majority of respondents say that warehouse design is much considered at Inyange Industries Ltd. Moreover, on the firm regularly undertakes warehouse demand management, 1 respondent disagree, 16 are neutral, 48 agree, and 32 strongly agree. The mean is 4.14 and the standard deviation is 0.722. This shows that demand management is much done at Inyange.

On the section warehouse capacity planning contributes in delivering on time, 7 respondents are neutral, 5 agree, and 85 strongly agree. The mean is 4.80 and the standard deviation is 0.552. This shows that warehouse capacity planning contributes a lot in delivering on time. On the section warehouse capacity planning contributes in damage-free delivery, 6 respondents are neutral, 8 agree, and 83 strongly agree. The mean is 4.79 and the standard deviation is 0.539. With this, it is seen that warehouse capacity planning contributes a lot in delivering damage-free products. Lastly, on the section warehouse capacity planning contributes in reducing supply chain costs, 8 respondents are neutral, 7 agree, and 82 strongly agree. The mean is 4.76 and the standard deviation is 0.591. The results demonstrate the significant role that warehouse capacity planning plays in reducing supply chain expenses.

The analysis also showed a high standard deviation spread from 0.539 to 0.841 which implies that respondents were more varied in their opinion to the responses given under the section of the warehouse capacity planning practices used at Inyange Industries. Overall, warehouse capacity planning is used at Inyange and it contributes a lot in on-time delivery, damage-free delivery, and supply chain costs. This shows the efficiency of warehouse capacity planning due to the fact that it is used much. This aligns with the study by Qazi (2020) that showed that fluctuating demand causes a myriad of issues for warehouse operations and that the only way to deal with this demand variation is through accurate forecasting and collaborative planning. With cooperation, warehouses can make the best use of their limited capacity. Planning for the next five (five) years of sales should be done with regard to both warehouse design and planning.

4.5 Perception of the Respondents on the Supply Chain Performance

Findings showed the perceptions of respondents on supply chain performance at Inyange Industries Ltd. All perceptions from respondents are showed in Table 5.

Table 5

Perception of Respondents on Supply Chain Performance

Statement	SD F	D F	N F	A F	SA F	M	Std
The warehouse observes on time delivery	0	9	11	39	38	4.09	0.936
The company delivers damage-free products	0	7	12	38	40	4.14	0.901
The firm has minimized supply chain cost	0	7	12	39	39	4.13	0.897
Warehouse management practices have improved supply chain performance	0	8	13	38	39	4.11	0.923
There is efficiency in supply chain performance	4	9	12	37	35	4.12	0.904

The table above shows the perception of respondents on the overall supply chain performance at Inyange Industries. On the part of warehouse observes on-time delivery, 9 respondents disagree, 11 are neutral, 39 agree, and 38 strongly agree. The mean is 4.09 and the standard deviation is 0.936. The majority of respondents agree that they experience on-time delivery at Inyange Industries. On the part of the delivery of damage-free products, 7 respondents disagree, 12 are neutral, 38 agree, and 40 strongly agree. The mean is 4.14 and the standard deviation is 0.901. The majority of respondents agree that the company experiences damage-free delivery in their supply chain. On the section has minimized supply chain costs, 9 disagree, 11 are neutral, 39 agree, and 38 strongly agree. The mean is 4.13 and the standard deviation is 0.897. This shows Inyange has much minimized its costs.

On the section warehouse management practices have improved supply chain performance, 8 respondents disagree, 13 are neutral, 38 agree, and 39 strongly agree. The mean is 4.11 and the standard deviation is 0.923. This shows that the warehouse management practices have improved supply chain performance. Lastly, on the part there is efficiency 4 strongly disagree, 9 disagree, 12 are neutral, 37 agree, and 35 strongly agree. The mean is 4.12 and the standard deviation is 0.904. This shows the efficiency of supply chain performance at Inyange Industries.

The analysis also showed a high standard deviation spread from 0.901 to 0.936 which implies that respondents were more varied in their opinion to the responses given under the section of the supply chain performance at Inyange Industries.

The findings supported by Benimana (2021) emphasized that containers with a gasket seal much lower aflatoxin levels in comparison to conventional approaches. This is in line with what the researcher found, which is that Inyange Industries' supply chain performance has improved. The research shows that warehouse management strategies have improved supply chain performance, leading to less waste, less money spent on logistics, items that arrive undamaged, and faster turnaround times.

4.6 Regression Analysis

4.6.1 Model Summary of Supply Chain Performance and Warehouse Management

The amount of variance explained by the predictor factors is displayed in Table 6. The multiple correlation coefficient (R) between each predictor variable and the dependent variable is the first statistic. The value in this model is 0.934, indicating that the independent and dependent variables share a significant amount of variation. The value that follows, R Square=0.872, is just R squared. Its result is 87.2% of the variance in supply chain performance is explained by warehouse management methods in the model. This is commonly used to characterize the goodness of fit or the proportion of variance explained by a given set of predictor variables.

The findings supported by Adomako et al. (2018) emphasized that efficient warehouse management significantly enhances supply chain performance. This aligns well with our study, as indicated by the high multiple correlation coefficient and R squared values, indicating a significant relationship between warehouse management methods and supply chain performance in the Rwandan context.

Table 6

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.934[a]	.872	.868	.181

a. Predictors: (Constant), Warehouse capacity Planning , Inventory Management , Material Handling

4.6.2 ANOVA of Supply Chain Performance and Warehouse Management

Standard regression, which shows the importance of each predictor variable's prediction on the dependent variable, is displayed in Table 7. Material handling, inventory control, and warehouse capacity planning are these variables. The output analysis and whether or not there is a statistically significant difference in the group mean are displayed in the table. It is evident that the model (F=211.589, p=0.000) was deemed significant at 5% because the p-value (P=0.000) was below the 5% cutoff. Thus, the effectiveness of the supply chain of Inyange Industries Ltd. is greatly impacted by warehouse management methods.

The findings supported by Niyibituronsa et al. (2020) emphasized that The contamination of maize with aflatoxin is further exacerbated by insufficient storage techniques. Research found that warehouse management strategies significantly affect supply chain performance, therefore this makes sense in light of our findings.

Table 7

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.717	3	6.906	211.589	.000[b]
	Residual	3.035	93	.033		
	Total	23.753	96			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Warehouse capacity Planning , Inventory Management , Material Handling

4.6.3 Coefficient Correlation between Independent and Dependent Variables

All of the indicator variables utilized in this study on warehouse management techniques were statistically significant, as shown by the data in Table 8. This suggested that each of them makes a substantial contribution to the efficiency of Inyange Industries Ltd.'s supply chain. This led to the formulation of the regression model as Y=0.4+ 0.532X1 + 0.379 X2 + 0.172X3 +0.253 Material handling, inventory control, and warehouse capacity planning are the three variables that represent X1, X2, and X3 in the equation y= supply chain performance. Finding out which of the many independent variables has a greater impact on the supply chain performance of manufacturing organizations may be done with the help of regression coefficients.

Material handling had the greatest regression coefficient (β1=0.532), followed by inventory management (β2=0.379), and Warehouse capacity Planning (β3=0.172), as the regression coefficients table shows. This showed that the performance of the supply chain will be significantly impacted by material handling inside warehouse management.

The findings supported by Gong et al. (2017) emphasized that Just as small-scale farmers in other developing nations deal with post-harvest losses due to insufficient storage, small-scale farmers in this country face the same problem: high aflatoxin levels limit their access to commercial markets. Reduced aflatoxin contamination, increased food security, and better access to commercial markets are three ways in which farmers' livelihoods could be improved. This agrees with our findings from the Inyange Industries Ltd. warehouse management practices research, where all indicator factors contributed significantly to supply chain efficiency and were statistically significant.

Table 8
Coefficient Correlation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.400	.253		1.581	.117
	Material Handling	.532	.062	.540	8.556	.000
	Inventory Management	.379	.062	.372	6.147	.000
	Warehouse capacity Planning	.172	.053	.136	3.268	.002

a. Dependent Variable: Supply Chain Performance

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The major objective of this research was to analyze how Perceptions on Warehousing Management affected the Supply Chain Performance, using the Inyange Industries Ltd as an example. In fact, The correlation coefficient showed a moderate and positive relationship between material handling systems and supply chain performance at Inyange Industries. As a result, the Ho1 was rejected since it was confirmed that there is a significant effect of material handling on supply chain performance. From the findings, material handling has an influence on supply chain performance. It has been found that manual and automation material handling are not much used at Inyange and this might be a challenge since manual material handling has the highest and positive effect than other material handling systems. Automation also has a moderate and positive effect on supply chain performance. The correlation coefficient showed a high and positive relationship between inventory management and supply chain performance at Inyange Industries. As a result, the Ho2 was rejected since it was confirmed that there is a significant effect of inventory management on supply chain performance. Inventory management especially warehouse management system here has a high significant effect on supply chain performance and there are still some gaps regarding the use because it is not fully used according to the research findings. The correlation analysis showed a high and positive relationship between warehouse capacity planning and supply chain performance at Inyange Industries. As a result, the Ho3 was rejected.

5.2 Recommendations

The operations manager can improve the use of manual material handling and automation material handling effectively since they positively affect supply chain performance and they are not much used at Inyange Industries. Inyange Industries can optimize the use warehouse management system since it has found out to have a high, positive and significant effect on supply chain performance. More efforts can be attributed to it in order to increase its positive effect on supply chain performance. Furthermore, the department in charge at Inyange can conduct an internal research to see other factors that influence the supply chain performance. If warehouse management is improved and other factors that affects supply chain performance are not improved, the results might not be much effective.

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