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Just in Time Inventory Management and Operational Performance in Kenyan Sugar Firms: A Qualitative Study

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Abstract

Just-in-Time (JIT) inventory management practice is mostly associated with reduced inventory costs, waste minimization, and improved operational efficiency. This study investigated how JIT inventory management affects the operational performance of sugar manufacturing firms in Kenya. A qualitative research design was employed, with data collected through interviews with procurement personnel or their equivalents in Kenyan sugar milling firms. Interview data were analyzed thematically. Three major themes emerged: cost savings and space optimization, flexibility and responsiveness to demand, and challenges associated with emergency situations and stock availability. The findings indicate that JIT contributes to operational performance by reducing storage and inventory holding costs, optimizing warehouse space, and improving the timely availability of materials required for production. However, lean inventory levels may expose firms to shortages, work stoppages, and disruptions during unforeseen emergencies. The study concludes that JIT can enhance cost efficiency, flexibility, and operational responsiveness, but should be complemented by appropriate contingency measures and strategically determined buffer stocks. Strengthening inventory information systems, supply chain visibility, and employee capacity is recommended to improve JIT effectiveness and operational resilience.

Keywords: Just-in-Time inventory management; operational performance; sugar manufacturing firms; qualitative approach; supply chain management; Kenya.

Introduction

Just-in-Time (JIT) inventory management practice centers on optimizing resource allocation to ensure materials of the right quantity and quality are available precisely when and where needed. This approach enables organizations to respond instantly to demand fluctuations while minimizing excessive stockpiling (Hutchins, 1999). The primary goal of JIT is to achieve near-zero inventory across both individual enterprises and entire supply chains, significantly reducing manufacturing costs. Successful implementation requires several critical elements, including efficient setups, small lot sizes, steady production rates, pull control systems, a flexible workforce, preventive maintenance, supplier collaboration, and the use of quality circles (Ahmad et al., 2004; Golhar & Stamm, 1991; Schonberger, 2007; Zhu et al., 1994). The philosophy underpinning JIT emphasizes waste elimination, employee engagement, strong supplier relationships, and total quality control to drive sustainability (Golhar & Stamm, 1991). As a material management framework, JIT ensures seamless material availability while reducing resource requirements, lead times, and waste (Agha, 2010). Known for its capacity to enhance productivity, quality, operational efficiency, and cost-effectiveness, JIT equally supports communication within manufacturing operations (Godana & Ngugi, 2014).

Through the alignment of inventory levels with customer demand, JIT reduces storage costs, minimizes the risk of obsolete inventory, and supports cost savings (Chan & Zhang, 2011; Adeyemi, 2010). Its design promotes prompt responses to customer orders, prevents unnecessary stockpiling, and facilitates operational flexibility. These attributes place JIT as a valuable strategy for navigating the complexities of modern manufacturing, improving quality, and optimizing resources while enhancing timely and reliable service delivery. In addition to waste reduction and resource optimization, JIT increases operational performance by fostering efficiency in processes like production reliability and lead time management (Voss et al., 1997). Key performance indicators such as productivity, customer satisfaction, competitive priorities, and new product development highlight the impact of JIT on internal operations (Ahmad & Schroeder, 2003; Feng et al., 2006). This underscores JIT's important role in achieving sustainable improvements in modern manufacturing environments.

Statement problem

Sugar manufacturing companies in Kenya continue to fall short of achieving their anticipated operational performance levels, despite huge emphasis on inventory management practices like Just-in-Time (JIT), which is widely adopted across the sub sector. This persistent gap highlights a crucial matter in the effectiveness and the implementation of these practices.

Objective of the study

To investigate how implementing just-in-time inventory management practice affect the operational performance of sugar manufacturing firms in Kenya.

Literature review

Musara (2012) focused on small and medium-sized enterprises (SMEs) in the manufacturing sector and revealed a low adoption rate of JIT principles among SMEs. The study also identified challenges hindering JIT implementation. Nonetheless, it demonstrated statistically significant positive correlations between

JIT inventory management and cost efficiency, quality, and flexibility. Ganiyu et al. (2019) examined manufacturing firms in Nigeria and found a positive contribution of the JIT inventory approach to financial performance, suggesting potential benefits from its adoption. Ufua et al. (2021) investigated JIT implementation in a commercial livestock farm in southern Nigeria. The study emphasized the importance of commitment from internal organizational members and collaboration with supply chain partners for effective JIT utilization, especially in unique contextual situations. Harcourt and Ali (2021) studied paint manufacturing firms in Rivers State, Nigeria, and discovered a significant and positive relationship between JIT inventory management and sales performance. Adeyemi (2010) explored the adoption of JIT and its barriers in Nigeria, revealing a higher adoption rate among larger companies compared to smaller ones.

Ahmad et al. (2004) examined the impact of JIT implementation on operational performance measures and found minimal direct and indirect effects on financial and growth performance, highlighting spurious correlations between JIT practices and managerial perceptions of a firm's financial performance. Giunipero et al. (2005) conducted a longitudinal study that confirmed previous findings on JIT inventory practices, indicating increased knowledge and familiarity among supply chain professionals. Moreira et al. (2008) assessed JIT implementation in Portuguese manufacturing companies and highlighted the perceived benefits of JIT, including stock reduction, enhanced quality, and waste elimination. Bortolotti et al. (2013) examined the moderating effects of product customization and demand variability on the relationship between JIT implementation and efficiency and responsiveness performance in South African SMEs. They found that product customization did not significantly moderate the impact of JIT, while demand variability had a negative moderating effect on the JIT-responsiveness relationship. Zaid et al. (2016) investigated the impact of total JIT practices along the supply chain management in Jordan and found that JIT production directly influenced JIT purchasing and selling. JIT selling, in turn, directly affected operational performance, while JIT production indirectly influenced operational performance through JIT selling.

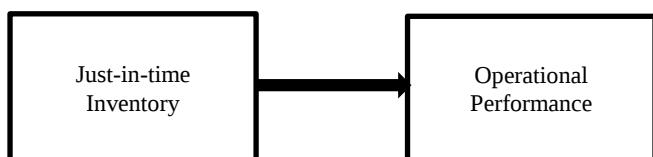
Inman et al. (2011) modeled JIT inventory practice as antecedents to agile manufacturing, operational performance, and firm performance. The results indicated positive relationships between JIT-purchasing and agile manufacturing, as well as between agile manufacturing and operational performance and marketing performance. The relationship between operational performance and financial performance was mediated by the marketing performance of the firm. Thakre (2021) studied the impact of JIT implementation on inventory management performance in the Indian automobile sector. The study emphasized the need for deeper integration and adequate execution of JIT through enterprise resource planning (ERP) or database management systems (DMS) to minimize costs and manage efficient workflow. Mankazana and Mukwakungu (2018) compared two South African companies, one with JIT inventory practice and the other without, and found that the non-implementation of JIT practices resulted in lower performance rates. The study suggested that adopting JIT methods and guidelines could improve stock management practices and overall company performance.

Agu et al. (2016) examined the effect of JIT on the growth of selected manufacturing firms and found a positive relationship

between JIT inventory practice and firm performance, highlighting the significance of inventory control for productivity. Khourshed and Abdelaziz (2023) measured the relationship between inventory level and organizational effectiveness through JIT in Egyptian ISO-certified businesses. The findings indicated that inventory level significantly affects organizational effectiveness, mediated by JIT inventory. The study recommended the application of advanced technologies and machines that support the JIT process for better outcomes. Abdulaal and Baymout (2021) investigated the impact of adopting JIT on inventory performance at Al Tayar Plastic Mfg. Co. The study utilized qualitative and quantitative methods and demonstrated a positive impact of JIT implementation on the performance of the inventory management system.

Conceptual Framework

The conceptual framework suggested that there existed relationship between just in time inventory management practice and the operational performance of sugar firms.



Methodology

The study involved procurement personnel or their equivalents in the sugar milling firms in Kenya. The qualitative data was collected from this group and the interview conversation was recorded for analysis. Procurement personnel or their equivalents were preferred since they deal with the inventory management issues that their organizations encounter.

Findings

The study aimed to investigate the extent to which just in time inventory management approach affect the operational performance of sugar manufacturing firms in Kenya. To respond to this objective, a thematic analysis was conducted. The interview transcripts focused on exploring the extent to which sugar manufacturing firms in Kenya implement just-in-time (JIT) inventory management practice and how it affects their operational performance. Just-in-time inventory management involves purchasing and producing goods only as they are needed, thereby minimizing inventory holding costs and reducing waste. The objective of the study gained insights into the practical implementation of JIT inventory management and its effects on cost efficiency, operational flexibility, and responsiveness to market demand within the context of the sugar manufacturing industry in Kenya. The following themes were developed with reference to the data from the transcripts. Codes were generated by identifying specific excerpts from the interview transcripts that provided insights into the practical implementation of JIT inventory management and its effects on operational performance. For each theme, codes were generated by extracting relevant excerpts from the interview transcripts that related to the objectives of the study. These excerpts were then grouped together based on shared characteristics or meanings to form the themes.

Cost savings and space optimization

This theme related to the financial benefits and spatial efficiencies gained through implementing just-in-time inventory management. It highlighted the reduction in storage costs and the optimization of

warehouse space. It reflected on the organization's efforts to minimize expenses associated with inventory storage, such as rental or maintenance costs, while maximizing the utilization of available space. Excerpts highlighting financial benefits and spatial efficiencies gained through implementing JIT inventory management were coded under this theme. The focus was on reducing storage costs and optimizing warehouse space. Examples from the transcripts such as mentions of saving on storage costs and minimizing inventory holding costs were indicative of this theme.

"In terms of positive effects towards it, first I would say it has saved on the organization in terms of storage cost."

PT1

"It has removed the amount of space. And to minimize the inventory holding costs." **PT4**

The theme emphasized the financial benefits and spatial efficiencies gained through JIT inventory management practices. It underscored the importance of reducing storage costs and maximizing warehouse space utilization to enhance cost efficiency within the sugar manufacturing industry in Kenya. By highlighting excerpts from the transcripts that emphasize savings on storage costs and minimization of inventory holding costs, the conclusion reaffirms the alignment of the study findings with existing literature on the financial advantages of JIT. This theme aligns with the literature on the financial benefits of implementing just-in-time (JIT) inventory management practices. JIT is known for reducing inventory holding costs and optimizing warehouse space, leading to improved cost efficiency (Ferdows & De Meyer, 1990).

Flexibility and responsiveness to demand

This theme emphasized the organization's ability to adapt to changing demand patterns and respond promptly to customer needs by maintaining an agile inventory system. It underscores the importance of having the right items available at the right time to meet production requirements and customer expectations. Excerpts emphasizing the organization's ability to adapt to changing demand patterns and respond promptly to customer needs were coded under this theme. The focus was on maintaining an agile inventory system to meet production requirements and customer expectations. Examples such as ensuring consistent availability of required items for production reflected this theme.

"It affects the performance by getting the product that you require you know, being able to get the right item at the right time." **PT3**

"Just in time inventory management has ensured less stock keeping but at the same time ensuring consistent availability of the required items for production." **PT9**

The theme demonstrated the organization's ability to adapt to changing demand patterns and respond promptly to customer needs through the implementation of JIT inventory management practices. It stressed the importance of maintaining an agile inventory system to meet production requirements and customer expectations within the sugar manufacturing industry in Kenya. By highlighting excerpts that emphasize consistent availability of required items for production, the theme aligned with literature on the role of JIT in enhancing operational flexibility and customer satisfaction. The literature supports the notion that JIT enables organizations to be more flexible and responsive to changes in customer demand by ensuring the timely availability of products or

materials (Blackburn, 1991). This enhances operational efficiency and customer satisfaction (Gunasekaran et al., 2001).

Challenges on emergency situations and stock availability

This theme acknowledges the limitations of just-in-time inventory management, particularly in addressing unforeseen emergencies or sudden spikes in demand, which may lead to temporary disruptions in operations. It highlights the trade-off between lean inventory practices and the need for buffer stock to handle unexpected situations effectively. Excerpts acknowledging the limitations of JIT inventory management, particularly in handling unforeseen emergencies or sudden spikes in demand, were coded under this theme. The focus was on the trade-off between lean inventory practices and the need for buffer stock to handle unexpected situations effectively. Examples such as mentions of work stoppages or challenges in obtaining items urgently highlighted this theme. The literature on the trade-off between lean inventory practices and the need for buffer stock supported the development of this theme.

"In terms of the negative effect there are always some small work stoppages and also cannot cater for any emergency only when the need for the item arises." PT1

"On the other hand, it poses a challenge in that sometimes you need an item urgently and you can easily miss it which can affect your operations negatively." PT10

The theme acknowledged the trade-offs associated with JIT inventory management, particularly in handling unforeseen emergencies or sudden spikes in demand. It underscored the need to balance lean inventory practices with the requirement for buffer stock to ensure operational resilience within the sugar manufacturing industry in Kenya. By highlighting excerpts that discuss work stoppages and challenges in obtaining items urgently, the conclusion aligns with literature on the potential drawbacks of JIT, such as vulnerability to disruptions during unexpected events. Literature acknowledges the trade-off between lean inventory practices and the need for buffer stock to handle emergency situations (Lee & Tang, 1997). While JIT can lead to cost savings and efficiency gains, it may leave organizations vulnerable to disruptions during unexpected events (Golhar & Stamm, 1991).

These themes provided a comprehensive understanding of the implications of implementing just-in-time inventory management practices on the operational performance of sugar manufacturing firms in Kenya, covering both the benefits and challenges associated with such an approach. Overall, these themes were developed by systematically analyzing the interview transcripts to identify patterns and commonalities related to the objectives of the study. The themes provide a comprehensive understanding of the implications of implementing JIT inventory management practices on the operational performance of sugar manufacturing firms in Kenya, covering both the benefits and challenges associated with such an approach.

Themes on just in time inventory management approach

Theme	Description	Cases	Counts	Evidence
Cost Savings and Space Optimization	Financial benefits and spatial efficiencies	4	2	"it has saved on the organization in terms of storage cost." PT1 "It has removed the amount of space." PT4
Flexibility and Responsiveness to Demand	Adaptation to changing demand patterns	5	2	"being able to get the right item at the right time." PT3 "ensuring consistent availability of the required items for production." PT9
Challenges with Emergency Situations	Limitations in handling unforeseen emergencies	2	2	"there are always some small work stoppages and also cannot cater for any emergency only when the need for the item arises." PT1 "sometimes you need an item urgently and you can easily miss it which can affect your operations negatively." PT10

Source: (Research Data, 2024)

The interviews with representatives from various sugar manufacturing firms shed light on their implementation of JIT inventory management practices and the associated effects on operational performance. Several key themes emerge from the discussions. Firstly, there is a consensus among participants regarding the cost-saving benefits of JIT, particularly in terms of reducing storage costs and optimizing warehouse space. Secondly, JIT enables firms to be more flexible and responsive to fluctuating demand, ensuring the timely availability of required items for production. However, challenges arise in handling emergency situations or unexpected spikes in demand, where JIT's lean inventory approach may result in temporary disruptions or shortages. Despite these challenges, the overall sentiment towards JIT is positive, with participants acknowledging its role in

enhancing operational efficiency and cost-effectiveness within their organizations.

Conclusion

The cost savings and space optimization resulting from just in time implementation could lead to the reduction in storage costs and improved warehouse space utilization which contribute to enhanced operational efficiency. This will positively affect operational performance by streamlining inventory management thus reducing unnecessary inventory costs.

Just-in-time equally enhances organizational flexibility and responsiveness with reference to inventory management through meeting production requirements and customer expectations promptly. However, the vulnerability to disruptions during

emergencies was mentioned as a significant concern. Therefore, firms need to carefully balance lean inventory practices with buffer stock to ensure operational stability. This means that while striving for efficiency through JIT, firms should also maintain a degree of resilience to mitigate potential risks associated with supply chain disruptions.

Recommendations

Sugar manufacturing firms should strategically implement JIT inventory management while establishing robust contingency plans to address potential disruptions, such as supply chain interruptions. Continuous monitoring of JIT practices, including key performance indicators, is critical for adapting to market demands and maximizing performance. Companies should equally invest in superior inventory systems and analytics tools to enhance supply chain visibility and control, alongside providing detailed employee training to ensure effective implementation. By balancing efficiency with resilience, these measures can optimize JIT benefits, mitigate associated risks and improve operational performance.

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