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Effect of Just-in-Time Inventory Management on Sugar Companies' Operational Performance in Kenya

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Abstract

This study examined the effect of Just-in-Time (JIT) inventory management on the operational performance of sugar manufacturing firms in Kenya. Data were collected from staff in procurement, planning, stores, and warehousing departments, with 148 valid responses analyzed using ordinal logistic regression. The findings revealed a significant positive effect of JIT inventory management on operational performance ($\beta = 3.555$, $p < 0.001$). The results indicate that effective JIT implementation enhances operational performance through improved inventory control, reduced waste, and efficient resource utilization. The study recommends strengthening JIT practices through integrated inventory management systems, employee training, supplier coordination, and continuous performance monitoring.

Keywords: *Just-in-Time inventory management; operational performance; sugar manufacturing; inventory management; Kenya.*

Introduction

Just-in-Time (JIT) inventory management focuses on optimizing resource allocation to ensure materials of the right quality and quantity are available precisely when and where needed. This approach enables businesses to respond quickly to demand fluctuations while minimizing excess stock (Hutchins, 1999). JIT also aims at achieving near-zero inventory across individual

enterprises and entire supply chains, ultimately reducing manufacturing costs. Its implementation relies on various factors, including efficient setups, small lot sizes, steady production rates, pull control systems, a flexible workforce, preventive maintenance, supplier collaboration, and quality circles (Ahmad et al., 2004; Golhar & Stamm, 1991; Schonberger, 2007; Zhu et al., 1994). Central to JIT is the emphasis on waste elimination, employee

involvement, strong supplier relationships, and total quality control to ensure sustainability (Golhar & Stamm, 1991). It ensures timely availability of resources, reduced lead times, and resource requirements while optimizing production factors (Agha, 2010). Acknowledged for its ability to enhance productivity, quality, operational efficiency, and cost-effectiveness, JIT has become a critical tool for enhancing communication and coordination in manufacturing processes (Godana & Ngugi, 2014).

JIT allows organizations to align inventory levels, be it raw materials or finished products with changing customer demands, reducing storage costs and the risk of obsolete inventory (Chan & Zhang, 2011; Adeyemi, 2010). It supports swift responses to customer orders, minimizes unnecessary stockpiling, and fosters flexibility in production. As a result, JIT helps businesses navigate complex manufacturing challenges, enhance quality, optimize resources, and ensure timely and reliable delivery. Operational performance, a key outcome of JIT, includes measurable aspects of an organization's processes such as production reliability and efficiency (Voss et al., 1997). Performance indicators such as productivity, customer satisfaction, competitive priorities, and new product development reflect internal operational success (Ahmad & Schroeder, 2003; Feng et al., 2006). These elements underscore JIT's pivotal role in driving sustainable performance improvements in modern manufacturing.

Statement problem

Sugar manufacturing companies in Kenya continue to struggle to achieve their optimal operational performance levels, despite the adoption of inventory management practices like Just-in-Time (JIT). While various firms employ various strategies to optimize stock levels, they still face persistent challenges in effectively managing inventory. These prevailing issues highlight a critical gap in the effectiveness of current inventory management approaches within the industry.

Objective of the study

To assess the extent to which implementing just-in-time inventory management practice affect the operational performance of sugar manufacturing firms in Kenya.

Literature review

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. 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. Adeyemi (2010) explored the adoption of JIT and its barriers in Nigeria, revealing a higher adoption rate among larger companies compared to smaller ones. 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.

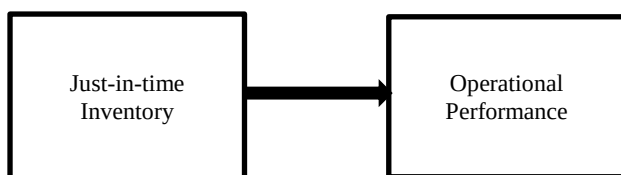
Giunipero et al. (2005) conducted a longitudinal study that confirmed previous findings on JIT inventory practices, indicating increased knowledge and familiarity among supply chain professionals. Moreira et al. (2008) assessed JIT implementation in Portuguese manufacturing companies and highlighted 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. 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. 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.

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 population consisted of staff from procurement department, planning department, stores department and, warehousing department in the sugar manufacturing firms. data was collected from the specimen of 164 employees across the four departments (procurement, stores, planning, and warehousing) from the overall strength of 288 staff members of different sugar cane milling companies. The study adopted ordinal regression model for analyzing data and to answer the study objectives. The model estimated the log odds and demonstrated the relationship between just-in-time inventory management approach and the operational performance of sugar manufacturing mills in Kenya. The study further conducted a hypothesis test so as to reject or accept the hypothesis.

Findings

Ordinal regression analysis for Just in time inventory management practice

Case Processing Summary

		N	Marginal Percentage
op	1.67	1	0.7
	1.83	4	2.7
	2.00	5	3.4
	2.17	12	8.1
	2.33	4	2.7
	3.33	2	1.4
	3.50	18	12.2
	3.67	42	28.4
	3.83	13	8.8
	4.00	9	6.1

	4.17	32	21.6
	4.33	5	3.4
	4.50	1	0.7
Valid		148	100
Missing		0	
Total		148	

Model Fitting Information³

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	362.447			
Final	213.953	148.495	1	0.000

Goodness-of-Fit

	Chi-square	df	Sig.
Pearson	683.726	143	0.000
Deviance	142.486	143	0.496

The presented model is considered to have an adequate fit because the p-value associated with the goodness-of-fit test is greater than 0.05. This suggests that the observed data do not significantly deviate from the assumed model, and the model provides a reasonable representation of the underlying patterns in the data.

Pseudo R-Square

Cox and Snell	0.633
Nagelkerke	0.643
McFadden	0.241

Pseudo R-Square does not technically explain the variations; however, it can be used as an approximate variation in the independent variable. In the context of ordinal regression, the McFadden value of R-Square is employed to assess the improvement in prediction compared to a null model. The model highlights a 24.1% improvement in the prediction of the outcome based on the predictors when compared to the null model. This suggests that the model, despite its simplicity or lack of detailed explanation, is providing meaningful information and contributing significantly to predicting the outcome variable.

Parameter Estimates

		Estimate	Std. Error	Wald		Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	op = 1.67	4.032	1.312	9.450	1	.002	1.461	6.603
	op = 1.83	5.819	1.001	33.805	1	.000	3.858	7.781
	op = 2.00	6.758	.972	48.312	1	.000	4.852	8.664
	op = 2.17	8.370	1.030	65.984	1	.000	6.350	10.389
	op = 2.33	9.016	1.093	68.026	1	.000	6.873	11.158

	op = 3.33	9.334	1.133	67.823	1	.000	7.113	11.555
	op = 3.50	11.324	1.442	61.672	1	.000	8.498	14.150
	op = 3.67	13.580	1.544	77.326	1	.000	10.553	16.607
	op = 3.83	14.219	1.565	82.598	1	.000	11.152	17.285
	op = 4.00	14.685	1.579	86.526	1	.000	11.591	17.780
	op = 4.17	17.204	1.671	105.989	1	.000	13.929	20.479
	op = 4.33	19.113	1.948	96.289	1	.000	15.295	22.931
Location	jit	3.555	.400	78.958	1	.000	2.771	4.339

Source: (Research Data, 2024)

The model showed that just-in-time inventory approach was a significant positive predictor of operational performance of sugar manufacturing firms in Kenya. For every one unit increase in just-in-time inventory management approach, there is a predicted increase of 3.555 in log odds of being at a higher level of operational performance. This finding suggests that the just-in-time (JIT) inventory approach is a crucial factor in predicting and positively influencing the operational performance of sugar manufacturing firms in Kenya. The findings are based on a statistical model that indicates a significant correlation between the adoption of JIT inventory management and higher levels of operational performance. The significant positive predictor implies a strong relationship between the just-in-time inventory approach and operational performance. The results suggest that sugar manufacturing firms in Kenya could enhance their operational performance by adopting or optimizing their just-in-time inventory management. The positive correlation between JIT inventory management and operational performance is consistent with the principles of lean manufacturing and operations management. JIT inventory management is known for its emphasis on reducing inventory levels, minimizing waste, and improving overall efficiency. The inclusion of the log odds ratio provides a specific measure of the effect size. The logarithmic transformation in ordinal regression models assist in the understanding of the magnitude of the impact of the independent variable (JIT inventory approach) on the dependent variable (operational performance).

The evidence from the model suggests a strong and positive correlation between implementing JIT inventory management and achieving higher operational performance in the sugar manufacturing industry. The empirical evidence supports the rejection of the null hypothesis, indicating a significant and positive relationship between the just-in-time inventory management approach and operational performance in sugar manufacturing firms in Kenya. This finding contributes to the understanding of supply chain management practices in the sugar industry and may have practical implications for businesses aiming to enhance their operational performance.

The finding was supported by Womack, et al, (1990) study which explored the principles of lean manufacturing and JIT inventory management. The authors discussed how JIT practices, including reducing inventory levels and minimizing waste, contribute to improved operational efficiency and performance in manufacturing environments. To further support the findings, the work of Shah & Ward (2007), which investigated the relationship between JIT inventory management and operational performance in various

industries revealed that JIT principles lead to enhanced operational performance by streamlining processes and reducing lead times.

Test of Parallel Lines

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	213.953			
General	231.227	14.472	11	0.435

In ordinal regression, the assumption of parallel lines is tested to ensure that the odds of moving into a higher category versus a lower one on the dependent variable remain consistent across all categories. To validate this assumption, the p-value associated with the test of parallel lines should be insignificant. In the context of the model under consideration, the obtained p-value of 0.435 indicates that the impact of the predictor remains consistent across different levels of the dependent variable.

The analysis indicated that the JIT inventory management practice is a significant positive predictor of operational performance in sugar manufacturing firms. Therefore, for every unit increase in JIT inventory management, there is a predicted increase in operational performance. The finding also aligns with the principles of lean manufacturing and operations management. JIT inventory management practice, with its emphasis on reducing inventory levels, minimizing waste, and improving overall efficiency, is shown to have a strong and positive correlation with operational performance in the sugar industry.

Conclusion

The objective focused on investigating the relationship between the just-in-time (JIT) inventory management practice and operational performance. This finding aligns with the principles of lean manufacturing and operations management. The central conclusion of this study was that the just in time inventory management practice is a critical and positive predictor of operational performance in sugar manufacturing firms in Kenya. Thus, the implementation of just-in-time inventory management practice has a significant positive effect on operational performance. Therefore, just-in-time inventory management approach positively affect operational performance by streamlining inventory management thus reducing unnecessary inventory costs.

Recommendations

Sugar manufacturing firms should continuously monitor key performance indicators related to inventory management,

operational efficiency, and market responsiveness to adapt and optimize JIT practices. Investing in advanced inventory management systems and analytics tools can enhance supply chain visibility and control, facilitating smoother operations. Additionally, providing comprehensive training for employees on JIT principles will equip them to implement and adapt these practices effectively, maximizing efficiency and mitigating risks. By adopting these strategies, sugar manufacturing firms can optimize their operational performance and overcome the challenges associated with JIT implementation.

References

1. Abdulaal, A., & Baymout, M. (2021). The Impact of Just in Time on The Inventory Management: The Case of Al Tayar Plastic Mfg. Co. *Pal Arch's Journal of Archaeology of Egypt/Egyptology*, 18(12), 162-170.
2. Adeyemi, S. L. (2010). Just-in-time production systems in developing countries: The Nigerian experience. *Journal of Social Science*, 22(2), 145-152.
3. Agha, N. C. (2010). Inventory management and cost control in manufacturing industries in Nigeria. *The Nigeria Journal of Management Research*, 5(2), 173-188.
4. Agu, O. A., Obi-Anike, H. O., & Eke, C. N. (2016). Effect of inventory management on the organizational performance of the selected manufacturing firms. *Singaporean Journal of Business economics, and management Studies*, 5(4), 56-69.
5. Ahmad, A., Mehra, S., & Pletcher, M. (2004). "The perceived impact of JIT implementation on firms financial/growth performance", *Journal of Manufacturing Technology Management*, Vol. 15, No. 2, pp. 118-130.
6. Ahmad, S., & Schroeder, R. G. (2003). The impact of human resource management practices on operational performance: recognizing country and industry differences. *Journal of operations Management*, 21(1), 19-43.
7. Bortolotti, T., Danese, P., & Romano, P. (2013). Assessing the impact of just-in-time on operational performance at varying degrees of repetitiveness. *International Journal of production research*, 51(4), 1117-1130.
8. Chan, F. T. S., & Zhang, T. (2011). The impact of collaborative transportation management on supply chain performance: A simulation approach. *Expert Systems with Applications*, 38(8), 2319– 2329.
9. Feng, J., Prajogo, D. I., Chuan Tan, K., & Sohal, A.S. (2006). The impact of TQM practices on performance: a comparative study between Australian and Singaporean organizations. *European Journal of Innovation Management*, 9(3), 269-278.
10. Ganiyu, A. B., Henry, A. W., & Adekunle, A. M. (2019). An assessment of just in time system on the financial performance of manufacturing firms in Nigeria. *Journal of Accounting and Taxation*, 11(7), 111-119.
11. Giunipero, L. C., Gopalakrishna Pillai, K., Chapman, S. N., & Clark, R. A. (2005). A longitudinal examination of JIT purchasing practices. *The International Journal of Logistics Management*, 16(1), 51-70.
12. Godana, B. E. & Ngugi K. (2014). Determinants of effective inventory management at Kenolkobil limited. *European Journal of Business Management*, 1(11), 2307-6305.
13. Golhar, D. & Stamm, C. (1991). "The just-in-time philosophy: A literature review", *International Journal of Production Research*, Vol. 29, No. 4, pp. 657-676.
14. Harcourt, H., & Ali, F. O. (2021). Just-In-Time Inventory Management Imports on Sales Performance of Paint Manufacturing Firms in Rivers State, Nigeria. *Nigerian Journal of Management Sciences* Vol, 22(2).
15. Hutchins, D. (1999). *Just in time*. Gower Publishing, Ltd.
16. Inman, R. A., Sale, R. S., Green Jr, K. W., & Whitten, D. (2011). Agile manufacturing: relation to JIT, operational performance and firm performance. *Journal of operations management*, 29(4), 343-355.
17. Khoureshed, N., & Abdelaziz, A. (2023). Testing the Just-In-Time Inventory Model Effect on Organizational Effectiveness for Egyptian Manufacturing Industries. 1-18.
18. Mankazana, S., & Mukwakungu, S. C. (2018). The impact of just-in-time (JIT) in inventory management system and the supplier overall performance of South African's bed mattress manufacturing companies. In *Proceedings of the International Conference on Industrial Engineering and Operations Management* (pp. 2-13).
19. Moreira, M. R. M. O. A., & Alvez, R. (2008). A study on just-in-time implementation in Portugal: some empirical evidence. *Brazilian Journal of Operations & Production Management*, 5(1), 5-22.
20. Musara, M. (2012). Impact of just-in-time (JIT) inventory system on efficiency, quality and flexibility among manufacturing sector, small and medium enterprise (SMEs) in South Africa. *African Journal of Business Management*, 6(17), 5786-5791.
21. Schonberger, R. (2007). "Japanese production management: An evolution-With mixed success", *Journal of Operations Management*, Vol. 25, No. 2, pp. 403-419.
22. Shah, R., & Ward, P. T. (2007). Defining and developing measures of lean production. *Journal of operations management* 25 (4), 785-805.
23. Thakre, S. (2021). Study of the Impact of Jit (Just-In-Time) In Inventory Management In The Automobile Sector India In. *IJM*, 12(2), 720-730.
24. Ufua, D. E., Ibidunni, A. S., Papadopoulos, T., Matthew, O. A., Khatoon, R., & Agboola, M. G. (2022). Implementing just-in-time inventory management to address contextual operational issues: a case study of a commercial livestock farm in southern Nigeria. *The TQM Journal*, 34(6), 1752-1771.
25. Voss, C.A., Åhlström, P., & Blackmon, K. (1997). Benchmarking and operational performance: some empirical results. *International Journal of Operations and Production Management*, 17(10), 1046-1058
26. Womack, J. P., Jones, D. T., & Roos, D. (1990). *The machine that changed the world: the story of lean production* Simon and Schuster.
27. Zaid, M. K. S. A., Migdadi, M. M., Alhammad, F. A., & Al-Hyari, K. A. (2016). An empirical examination of

total just-in-time impact on operational performance: insights from a developing country. *International Journal of Supply Chain and Inventory Management*, 1(4), 286-305.

28. Zhu, Z. & Meredith, P., & Makboonprasith, S. (1994). "Defining critical elements in JIT implementation: a survey", *Industrial Management and Data Systems*, Vol. 94, No. 5, pp. 3-10.