The Contribution of Inventory Management Software to Cost Efficiency in Inventory Holding of Tanzanian Private Companies: A Case of Tanzania Breweries Limited

Shabani Ally Salum [1], Deus N. Shatta[1], Anselimi Kashangaki[1]
Email: shebbyally7@gmail.com
[1]Senior Lecturer, Faculty of Logistics and Business Studies, National Institute of Transport, P. O Box 705, Dar es Salaam-Tanzania

Abstract

This study assesses the contribution of inventory management software to cost efficiency in inventory holding at Tanzania Breweries Limited (TBL), inventory tracking, and automated replenishment. Conducted at TBL's Dar es Salaam Tanzania, the research uses a deductive approach with a quantitative design. Data were collected through structured questionnaires from 277 respondents selected via stratified random sampling from a population of 1,279 employees. Analysis was performed using descriptive and multiple regression analysis through IBM SPSS version 27. The findings indicate that all two inventory management software variables were significantly contribute to cost efficiency in inventory holding. Inventory tracking improves visibility and stock optimization; and automated replenishment reduces overstocking by ensuring timely inventory refills. The study concludes that the integration of these technological tools enhances operational efficiency and cost-effectiveness. It provides practical insights for inventory and supply chain specialists in private manufacturing industries, highlighting the strategic role of technology in inventory management. The results empirically support the adoption of modern inventory systems as a means to enhance cost efficiency and improve overall logistics performance.

Keywords: Inventory Management Software, Inventory Tracking, Automated Replenishment, Inventory Holding

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Introduction

Effective management of inventory is essential to running a profitable company. It keeps surplus inventory to a minimal while guaranteeing that materials and items are available when needed. Businesses have been using inventory management software in recent years to increase productivity and maintain their competitiveness in a market that is changing quickly (Vamsi et al., 2019). Inventory tracking, and replenishment automation are all made easier using inventory management software. Businesses can forecast demand, keep updated on inventory movements, and manage optimal stock levels with these tools (Avlijas et al., 2021).

Studies have shown that inventory management software significantly reduces holding costs and enhances performance (Garba et al., 2020; Ugbebor et al., 2024). Researchers Valente & Neto (2017) have highlighted the role of modern inventory systems in reducing costs and improving efficiency. Also, study of Gołaś (2020) have investigated inventory management practices but have not thoroughly analyzed the specific contributions of inventory management software to reducing holding costs.

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Inventory management software, incorporating features such as accurate stock tracking, optimized and automated replenishment, has significant potential in streamlining inventory operations and minimizing holding costs (Avlijas et al., 2021). Despite the adoption of such systems by private companies in Tanzania, including Tanzania Breweries Limited (TBL), still their challenges such as insufficient inventory tracking and limited automated replenishment. of the inventories that increase costs and negatively affect profitability and customer satisfaction (Myers et al., 2000). This study addresses a research gap by assessing the contribution of these software functionalities on cost efficiency of inventory holding at TBL, with the objective of providing insights that can enhance inventory management efficiency, cost reduction, and competitive advantage within Tanzanian private enterprises.

Literature Review

Technology Acceptance Model (TAM) was employed to this study because it provides a solid framework for understanding the fundamental drivers of technology adoption. TAM is based on the following central hypotheses. First, Perceived Ease of Use (PEOU) positively influences Perceived Usefulness (PU). Second, PEOU positively influences Attitude Towards Use (ATU). Third, PU positively influences ATU. Fourth, ATU positively influences Behavioral Intention to Use (BIU). Finally, BIU positively influences Actual System Use (ASU) (Isiaku & Adalier, 2024; Venkatesh & Davis, 2000).

The implementation of inventory tracking systems, such as RFID and GPS-based monitoring, aligns with the TAM framework as their adoption depends on PU and PEOU. Previous studies confirm that organizations that perceive tracking technologies as useful and easy to use exhibit higher adoption rates (Lin, 2014). Study by Melewar et al. (2018) demonstrated that firms adopting automated inventory replenishment systems rely on real-time data analytics and stock management (Irere, 2023). The perception of improved efficiency (PU) and system simplicity (PEOU) influences firms' adoption decisions. Similar findings were reported by Ramanathan in study on automated restocking in retail chains.

Krishna et al. (2024) argue that inventory tracking systems significantly reduce holding costs by improving stock visibility and minimizing overstocking. By accurately tracking inventory levels, companies can optimize ordering processes and reduce the need for excess inventory. Similarly, Vamsi et al. (2020) they found that inventory tracking through barcodes and RFID technology contributed to better stock management, reducing holding costs by improving inventory visibility and accuracy. However, this research did not delve into the integration of inventory tracking systems with supply chain management tools. Ugbebor et al. (2024) found that inventory tracking systems contributed to reduced holding costs by optimizing inventory management.

They emphasized that improved tracking allowed companies to fine-tune their inventory levels and avoid excessive stock accumulation. Berling & Sonntag (2022) the study found that accurate tracking of inventory led to reduced excess stock and minimized storage costs. Goyal et al. (2016) they argue that real-time tracking, through technologies played a significant role in minimizing holding costs by providing greater visibility into inventory movement and preventing stock accumulation. Valente & Neto (2017) they highlighted that tracking systems improved the precision of inventory levels and reduced the likelihood of stockouts or overstocking, which are significant contributors to high holding costs.

Hypothesis 1: Inventory tracking has a positive contribution to cost efficiency in inventory holding

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Avlijas et al. (2021) they argue that the company experienced significant reductions in holding costs due to more accurate stock levels and fewer emergency orders. The automated system helped the company avoid overstocking, which directly led to reduced warehouse space requirements. In a study conducted by Angerer (2006), regression analysis was used to analyze the relationship between automated replenishment and inventory management in the beverage industry. Their findings indicated that automated replenishment systems were highly effective in reducing holding costs by ensuring that inventory levels remained optimal and minimizing the risk of stockouts and overstocking. Angerer (2006) found that automated replenishment significantly improved inventory stockouts, which in turn reduced holding costs. According to, Jebbor et al. (2023) they found that automated replenishment systems significantly reduced holding costs by maintaining a steady flow of inventory and preventing both overstocking and stockouts. The automated system helped the company to increase inventory turnover, which reduced storage costs and improved warehouse utilization.

Hypothesis 2: Automated replenishment has a positive contribution to cost efficiency in inventory holding.

Conceptual Framework

The conceptual framework of this study proposes inventory management software functions (inventory tracking and automated replenishment) as independent variables, with cost efficiency in inventory holding as dependent variable.

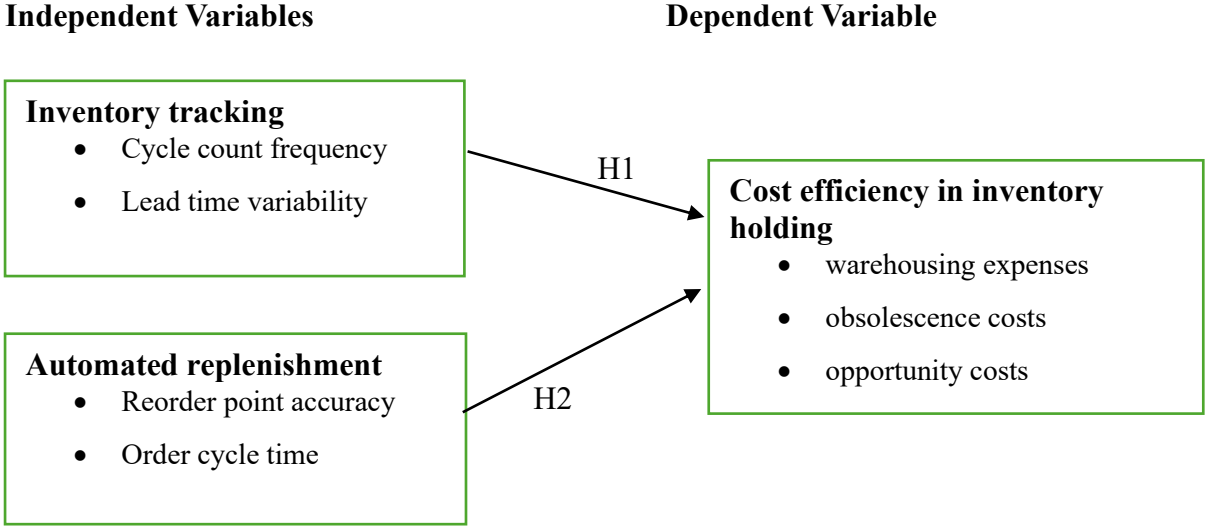

Figure 1. Conceptual Framework

Source: Researcher construction from literature review (2025)

The Mathematical Model of the Study

The regression model used for this analysis is represented by the following equation $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$. Thus, Y is the dependent variable, representing cost efficiency in inventory holding. X_1 and X_2 represents independent variables that are inventory tracking and automated replenishment respectively. And $\beta_0, \beta_1, \beta_2,$ are the coefficients for each independent variable. ε represents error term.

Methods

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A positivist research philosophy and deductive approach guided the study, aiming to validate theoretical constructs through empirical observation. The research used stratified random sampling to select a representative sample from the population of TBL employees, specifically those involved in inventory and logistics roles. This stratification ensured that various departments engaged in inventory management including inventory officers, warehouse managers, distribution officers, and packaging operators were proportionally represented. The study's target population consisted of 1,279 employees at TBL, with a final sample size of 277 respondents determined using Slovin's formula at a 90% confidence level and a 10% margin of error. This sample size is considered representative, allowing for accurate statistical inferences about the relationship between inventory management software and cost efficiency in inventory holding. Primary data were collected using structured questionnaires, designed to capture respondent views on inventory management software and their perceived impact on reduction of the holding costs. The questionnaires employed a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) to quantify the degree of agreement with each statement, facilitating quantitative analysis. The questionnaires were distributed and collected via Google Forms to streamline data collection and ensure data integrity. Data collected from the questionnaires were coded and input into IBM SPSS Statistics (version 27) for analysis. Data were cleaned to ensure completeness and consistency before processing. Descriptive statistics were employed to summarize the data. For inferential analysis, multiple regression models were developed to examine the relationship between the independent variables and the dependent variable.

Results and Discussion

The following sections explain and discuss the results of the study.

Inventory Tracking

The results from Table 1 shows positive perception of inventory tracking practices supported by inventory management software at Tanzania Breweries Limited (TBL). The perceived usefulness (PU) of the software were showed in the responses of 47% of participants agreed that cycle counts are conducted regularly to maintain inventory accuracy, while 49.4% of respondents confirmed timely resolution of inventory differences. Furthermore, 53.5% supported the statement that the system ensures accurate inventory tracking, and a62.1% agreed that the software helps minimize lead time variability. The 65.7% of respondents shows the strongest agreement that the role of inventory data in supporting effective decision-making. These results indicate that high percentage of respondents recognize the inventory management software value in improving data accuracy, enhancing responsiveness, and supporting operational decisions aspects of perceived usefulness in technology acceptance model. However, the presence of neutral responses across all items ranging from 13.7% to 27.8% suggests potential issues related to perceived ease of use, such as incomplete user engagement, limited training, or system complexity. Therefore, while the results confirm the software's contributing on improving inventory accuracy and decision-making, addressing user interaction challenges could further strengthen acceptance and performance outcomes. Overall, the study supports that systematic inventory tracking, when enabled by appropriate technology, contributes significantly to operational accuracy and strategic efficiency. That led to effiencies in costs assosiated to the holding of inventory.

Table 1: Inventory tracking

Statement	1(%)	2(%)	3(%)	4(%)	5(%)

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Cycle counts are conducted regularly to maintain inventory accuracy.	7.9	17.3	27.8	35.4	11.6
Inventory discrepancies are promptly identified resolved.	9.4	15.5	25.6	40.4	9
The system ensures accurate inventory tracking.	9.4	13.7	23.5	43	10.5
Lead time variability is minimized using the software.	10.5	13.7	13.7	51.3	10.8
Inventory tracking data supports effective decision-making processes.	4.7	13.4	16.2	46.9	18.8

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Automated Replenishment

The results of the study show that most employees at Tanzania Breweries Limited (TBL) see inventory management software as useful in improving operations and lowering inventory holding costs. About 48% of respondents agreed that the software helps in calculating reorder points, 50.2% respond that it reduces order cycle time, and 53.4% respond that it helps reduce human errors. A higher percentage, 58.5%, agreed that automated replenishment prevents stockouts, while 67.8% strongly supported that the software reduces holding costs. These findings support the perceived usefulness (PU) from technology acceptance model (TAM), showing that users believe the system helps improve accuracy, efficiency, and cost control. However, some of respondents were neutral in their answers about 28.9%, which may mean that some users find the system difficult to use or lack proper training. This reflects the perceived ease of use part of TAM. Therefore, while the software is widely seen as helpful, improving user experience through training and better system support could increase its full acceptance and effectiveness in the organization.

Table 2. Automated replenishment

Statement	1(%)	2(%)	3(%)	4(%)	5(%)
The software accurately determines reorder points.	7.6	15.5	28.9	39.7	8.3
Order cycle times have been improved through automation.	5.4	17.7	26.7	41.9	8.3
Replenishment processes are automated reduce manual errors.	6.1	19.1	21.3	42.2	11.2
Inventory levels are replenished before stockouts occur.	7.2	16.2	18.1	47.7	10.8
Automated replenishment has contributed to holding cost reduction.	7.9	11.2	13	51.6	16.2

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Multiple Regression Analysis

The modal summary results from Table 3 shows that The R value of 0.721 suggests a correlation between the independent and dependent variables, while the R Square value of 0.520 implies that approximately 52.0% of the variance in the dependent variable is explained by the model. The Adjusted R Square, slightly lower at 0.517, accounts for the number of predictors and confirms the model's explanatory strength. The standard error of the estimate (0.64828) reflects the average deviation of observed values from the predicted values.

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Therefore, management should prioritize optimizing these two practices while also exploring additional variables to improve the efficiencies of inventory holding costs.

Table 3. Modal Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.721[a]	.520	.517	.64828

a. Predictors: (Constant), Automated Replenishment, Inventory Tracking

The ANOVA results show that the regression model is statistically significant (F = 148.517, $p < .05$), indicating that automated replenishment and inventory tracking have a strong and meaningful contribution to cost efficiency in inventory holding at Tanzania Breweries Limited.

Table 4. Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	124.833	2	62.416	148.517	.000[b]
	Residual	115.152	274	.420		
	Total	239.985	276			

a. Dependent Variable: Cost efficiency in inventory holding
b. Predictors: (Constant), Automated Replenishment, Inventory Tracking

The regression coefficients indicate that both inventory tracking and automated replenishment have a statistically significant positive effect on cost efficiency in inventory holding since $p < .05$. The unstandardized coefficient for inventory tracking (β = 0.512, $p = .000$) shows that a one-unit increase in inventory tracking leads to a 0.512 unit increase in cost efficiency, holding other factors constant. Similarly, automated replenishment (β = 0.327, $p = .000$) contributes positively, though to a lesser extent. The high t-values (9.628 and 5.931) further confirm the strength of these relationships. The constant (β = 0.510, p = .003) is also significant, indicating the intercept of cost efficiency when both predictors are zero. This suggests that both Hypothesis 1 and Hypothesis 2 were accepted.

$$Y = 0.510 + o.512X_1 + 0.327X_2 + \varepsilon$$

Y is the dependent variable, representing cost efficiency in inventory holding. X_1 and X_2 represents independent variables that are inventory tracking and automated replenishment respectively.

Table 5. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		β	Std. Error	Beta		
1	(Constant)	.510	.171		2.985	.003
	Inventory Tracking	.512	.053	.497	9.628	.000
	Automated Replenishment	.327	.055	.306	5.931	.000

a. Dependent Variable: Cost efficiency in inventory holding

Discussions

Contribution of Inventory Tracking to Cost Efficiency in Inventory Holding

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The findings revealed that inventory tracking had substantial and statistically significant positive contributing to cost efficiency in inventory holding, with the highest standardized coefficient ($\beta = 0.512$, $p < 0.05$). Krishna et al. (2024) their findings supported the study, indicating that inventory tracking systems reduced holding costs by improving stock visibility and minimizing unnecessary overstocking. The improved visibility enabled firms to align ordering practices with actual demand, thus reducing storage costs and capital tied up in excess inventory. Similarly to Vamsi et al. (2020) their findings align with the study by highlighting how improved tracking reduces holding costs through better stock management. However, the observed improvements in inventory accuracy and reduction in stock accumulation support the findings.

The study by Ugbebor et al. (2024) confirmed that inventory tracking systems help reduce holding costs by optimizing stock levels and reducing excess inventory. They confirmed that accurate tracking facilitates informed decision-making on replenishment and stock rotation, thereby minimizing unnecessary holding of inventory. Berling & Sonntag (2022) found that accurate inventory tracking contributed to the reduction of excess stock and minimized storage-related costs. Valente & Neto (2017) emphasized that tracking systems enhance inventory precision, reducing both stockouts and overstocking factors strongly associated with high holding costs. Their conclusions support the idea that effective inventory tracking leads to better inventory control and fewer holding cost problems. These insights reinforce the findings of the study, where inventory tracking was the most influential factor in cost efficiency in inventory holding.

Contribution of Automated Replenishment to Cost Efficiency in Inventory Holding

The findings of the study revealed that automated replenishment had a statistically significant positive effect on reducing inventory holding costs, with a standardized coefficient of ($\beta = 0.327$, $p < 0.05$). The study by Ugbebor et al. (2024) supports the findings by demonstrating that automated replenishment significantly reduced holding costs through accurate stock level management and reduced reliance on emergency orders. Angerer (2006) conducted a regression analysis investigation within the beverage industry and found that automated replenishment played a key role in minimizing inventory holding costs. In previous study, Angerer (2006) found that automated replenishment systems effectively addressed stockout problems. The resulting reduction in inventory volatility contributed to lower holding costs. By ensuring availability of stock without surplus accumulation, the system optimized inventory flow and reduced the financial burden of excess inventory. Jebbor et al. (2023) confirmed that automated replenishment systems played a significant role in reducing inventory holding costs by enabling consistent inventory turnover and efficient warehouse utilization. The avoidance of overstocking and stockouts resulted in decreased storage time and space, thus reducing associated costs.

Novelty of the Article

This study offers a novel contribution by empirically examining the dual impact of inventory tracking and automated replenishment on cost efficiency in inventory holding, specifically within the context of Tanzania private companies, a setting that has received limited attention in existing literature. While previous studies have examining this technologies in isolation and predominantly within developed economy contexts, this research integrates both variables in a single model and identifies inventory tracking as the most influential factor ($\beta = 0.512$, $p < 0.05$), surpassing even automated replenishment ($\beta = 0.327$, $p < 0.05$). This highlights a unique insight that improving visibility and control through tracking systems contributes more

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significantly to holding cost reduction than automation alone. By contextualizing these findings in a developing economy, the study enriches existing knowledge and offers practical implications for firms seeking to adopt cost-saving inventory technologies in resource-constrained environments.

Conclusion

Inventory management software significantly contributes to improving cost efficiency in inventory holding at Tanzania Breweries Limited. The regression analysis demonstrated that both variables have a strong positive influence, with inventory tracking showing the greatest contribution. These results confirm the importance of adopting advanced inventory management technologies to enhance operational performance and reduce unnecessary storage costs. Also, the study supports the theoretical framework of the Technology Acceptance Model (TAM), as users perceived the software as both useful and partially easy to use. However, neutral responses suggest the need for improved user training and system support to enhance ease of use.

Suggestions

Based on these results, it is suggested that Tanzania Breweries Limited and similar companies should strengthen the integration of inventory management systems through targeted staff training, regular system updates, and continuous evaluation of software performance. Fulther research may explore additional factors influencing inventory cost efficiency, such as supplier performance or demand forecasting accuracy, to provide a more comprehensive understanding of inventory optimization strategies in the Tanzanian private companies.

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