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The Influence of Warehousing Management Practices on Health Store Facilities Operational Performance: A Case of Medical Stores Department Mabibo Depot

Hamza Mohamed Minangi[1], Deus N. Shatta[2]

[1]*Student, Logistics and Transport Management, National Institute of Transport Dar es Salaam, Tanzania*

[2]*Senior Lecturer in Procurement, Transport, Logistics, Supply Chain Management, and Head of the Consultancy and Professional Development Unit, National Institute of Transport, Dar es Salaam, Tanzania*

[1]hminangi5@gmail.com
[2]deusshatta@gmail.com
[2] http://orcid.org/0000-0003-1852-6070

Abstract *— This study assessed the influence of warehousing management practices on health store facilities operational performance at the Medical Stores Department (MSD) Mabibo depot in Dar es Salaam, Tanzania. It examined the effects of material handling practices, warehouse layout management, and inventory control practices. Guided by the Theory of Constraints, the study adopted a positivist philosophy, a quantitative approach, and a cross-sectional design. A structured questionnaire with five-point Likert items was administered to all 50 employees directly involved in warehousing (inventory officers, drivers, procurement staff, and operators), stratified by job group, giving a 100% response rate. Cronbach's alpha ranged from .829 to .914. Data were analyzed in IBM SPSS Statistics version 27 using descriptive statistics, Pearson correlation, and multiple linear regression. Each practice had a positive and significant effect on operational performance. Warehouse layout management was the strongest predictor (β = .536, p < .001), followed by material handling practices (β = .395, p < .001) and inventory control practices (β = .295, p = .006). Together they explained 56.4% of the variance in operational performance, F (3, 46) = 19.803, p < .001. Demand forecasting was the weakest inventory control item (M = 3.64). The study recommends strengthening demand forecasting, preserving the effective layout, sustaining equipment maintenance and safe handling, and adopting an integrated warehousing approach. Policy makers should also develop warehousing management guiding principles for public health store facilities in Tanzania.*

Keywords — *warehousing management practices, material handling, warehouse layout, inventory control, operational performance*

I. INTRODUCTION

Warehousing is widely regarded as a critical driver of operational excellence, because well-run warehouse systems reduce operating costs, limit inventory inaccuracies, and keep goods moving smoothly (Harish & Jayanthi, 2024). As supply chains grow more complex, organizations are pressed to adopt modern warehousing practices that shorten cycle times and improve resource utilization (Ardiansyah, 2024). Core warehousing activities, namely inventory control, material movement, order management, and layout design, can all influence organizational performance (Kisinga et al., 2024).

In health systems the risks are higher, because warehousing determines whether medicines, vaccines, laboratory reagents, and consumables reach facilities on time (Mwizerwa & Akumuntu, 2024). In Tanzania, the Medical Stores Department (MSD) procures, stores, and distributes medicines and other health commodities to public health facilities, while warehousing in the country still faces poor storage accommodation, limited automation, and weak inventory management systems (Kisinga et al., 2024). Studies elsewhere link material handling, warehouse layout, and inventory control to performance, but most were carried out in private manufacturing, retail, and commercial firms. Little empirical evidence exists for public health warehouses such as the MSD Mabibo depot.

This study therefore assessed the influence of warehousing management practices on health store facilities operational performance at the MSD Mabibo depot. Its specific objectives were to determine the influence of material handling practices, warehouse layout management, and inventory control practices on operational performance.

A. Theoretical Framework

The study is guided by the Theory of Constraints (TOC), which holds that every organization has at least one constraint limiting its ability to reach its goal, and that substantial improvement requires identifying and relieving the weakest link (Goldratt & Cox, 2016). TOC proposes five focusing steps: identify the constraint, exploit it, subordinate everything else to it, elevate it, and repeat the cycle when a new constraint emerges. In a warehouse, the constraint may be weak inventory control (inaccurate records, stock-outs, overstocking), an inefficient layout (long travel, congestion), or poor material handling (inadequate equipment, error-prone manual work). Evidence supports the relevance of each: inventory control improves supply chain performance and operational accuracy (Karoli & Mwita, 2026; Mwizerwa & Akumuntu, 2024), layout planning improves space utilization and processing time (Nyakundi & Mutia, 2025), and modern handling systems with formal procedures raise productivity and reduce waste (Osman et al., 2025).

B. Empirical Review and Research Gap

Studies of material handling generally report positive effects on performance. Okeoma et al. (2022) found that material management, automated handling, and manual handling significantly affected productivity, performance, and efficiency at a Nigerian food manufacturer, while Odeleye (2021) reported lower handling costs, shorter operating cycles, and better use of space at a Nigerian brewery. Yonas (2025) found a significant positive effect of material management practices on organizational performance in the logistics department of the Ethiopian National Defense Force. Results are not uniform, however. Thoti et al. (2025) reported a negative relationship between material handling equipment and warehouse performance in Indian warehouses, and Ekwueme et al. (2024) found that handling quality indicators did not significantly predict perceived profit, with leadership the dominant factor.

Research on layout points in a consistent direction. Mohamud et al. (2023) reviewed ten empirical articles and concluded that warehouse layout and operations improve inventory accuracy, order processing, and productivity. Ernawati et al. (2023) found that warehouse layout affected work productivity among 25 warehouse employees, and Peter et al. (2024) found that layout significantly influenced the performance of distribution firms in Kenya.

For inventory control, Ilori and Majiyagbe (2024) reported cost savings and higher profit at a Nigerian paint manufacturer, but noted that inaccurate demand forecasts expose make-to-stock firms to damage risk. Mbugi and Lutego (2022) showed that first-in-first-out issuing, perpetual inventory systems, and economic order quantity supported cost reduction and efficiency at a Tanzanian food and beverage manufacturer, and Shajema (2018) found that vendor-managed inventory, stock-taking, and lean practices significantly improved the performance of retail chain stores in Nairobi County.

These studies were mostly conducted outside Tanzania or in private commercial organizations, and they seldom examined the three practices together. A geographical and knowledge gap therefore remains regarding their individual and combined influence on operational performance in public health storage facilities, particularly at the MSD Mabibo depot.

C. Conceptual Framework

Fig. 1 shows the conceptual framework. Inventory control practices, warehouse layout management, and material handling practices are the independent variables, and health store facilities operational performance, reflected in timeliness of order fulfilment, inventory accuracy, process reliability, and reduction in operational delays, is the dependent variable.

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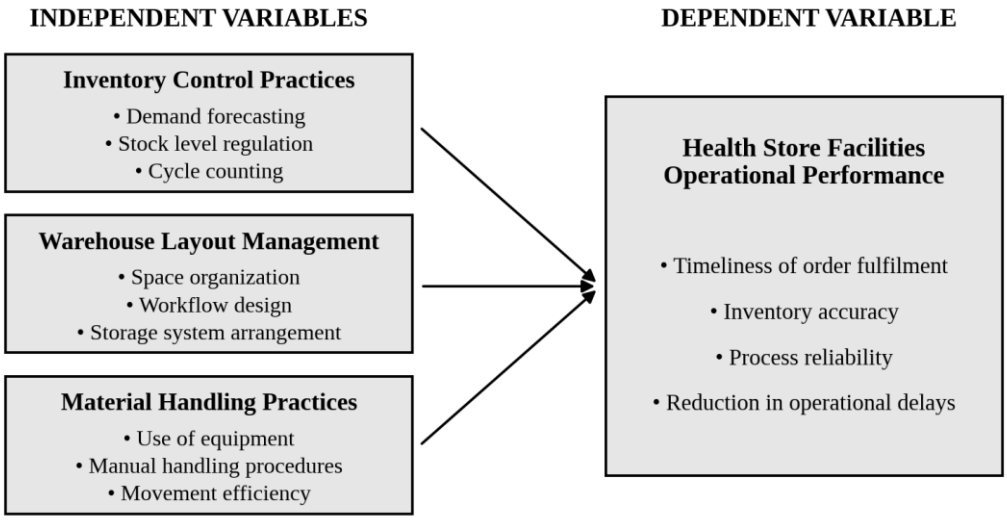


Fig. 1 Conceptual framework

Source: Author (2026)

II. METHOD

A. *Research Design and Approach*

The study adopted a positivist research philosophy, a quantitative approach, and a cross-sectional design in which data were collected at a single point in time (Saunders et al., 2019). Positivism treats reality as objective and measurable, which suited a study that measured warehousing practices and operational performance with structured questionnaire data and tested the relationships between them statistically.

B. *Study Area, Population, and Sampling*

The study was conducted at the MSD Mabibo depot in Dar es Salaam, Tanzania, a government warehousing facility that handles substantial volumes of medical supplies. The population was the 50 employees directly involved in warehousing activities: 24 inventory officers, 16 drivers, 7 procurement staff, and 3 operators. Because the population was small, all 50 employees were included. The population was stratified by job group so that each group was represented in proportion to its size and no single group dominated the responses (Saunders et al., 2019).

C. *Instrument and Data Collection*

Primary data were collected with a structured questionnaire administered to all 50 respondents. It covered demographic characteristics (job group, gender, age, and education level) and four constructs: material handling practices (5 items), warehouse layout management (9 items), inventory control practices (6 items), and operational performance (5 items). Items were rated on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). They were drawn from the existing literature and reviewed before data collection to ensure clear wording, relevance to the intended construct, and absence of ambiguity.

D. *Data Analysis*

Data were coded and analyzed in IBM SPSS Statistics version 27. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized respondent characteristics and construct scores. Mean scores were interpreted using the conventional ranges of 1.00–1.80 (strongly disagree), 1.81–2.60 (disagree), 2.61–3.40 (neutral), 3.41–4.20 (agree), and 4.21–5.00 (strongly agree) (Joshi et al., 2015). Pearson correlation examined the strength and direction of relationships, and multiple linear regression estimated the individual and combined influence of the three practices on operational performance. Internal consistency was assessed with Cronbach's alpha, with values of .70 or higher considered acceptable (Saunders et al., 2019).

E. *Ethical Considerations*

Permission to conduct the study was obtained from the authorities at MSD Mabibo depot before data collection. Participation was voluntary and based on informed consent, no personally identifying information was collected, and all data were used strictly for academic purposes.

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III. Result and Discussion

A. Response Rate and Respondent Profile

All 50 questionnaires were returned and fully completed, a response rate of 100%. As Table I shows, inventory officers (48%) and drivers (32%) formed most of the respondents. Most respondents were male (70%), 56% were aged 25–34 years, and half (50%) held a bachelor's degree.

Table I
Respondent Characteristics (N = 50)

Variable	Category	*f*	%
Job group	Inventory officer	24	48
	Driver	16	32
	Procurement staff	7	14
	Operator	3	6
Gender	Male	35	70
	Female	15	30
Age group (years)	25–34	28	56
	35–44	18	36
	45–54	4	8
Education level	Certificate	12	24
	Diploma	10	20
	Bachelor's degree	25	50
	Master's degree	3	6

Source: field data (2026).

B. Reliability of the Instrument

Table II shows that Cronbach's alpha ranged from .829 (material handling practices) to .914 (warehouse layout management). All four constructs exceeded the .70 threshold, so the instrument was sufficiently reliable for further analysis.

Table II
Reliability Analysis

Construct	Items	Cronbach's α	Remark
Inventory control practices	6	.889	Acceptable
Warehouse layout management	9	.914	Acceptable
Material handling practices	5	.829	Acceptable
Operational performance	5	.875	Acceptable

Source: field data (2026).

C. Descriptive Results

All four constructs fell in the "agree" range (Table III). Warehouse layout management was rated highest (M = 3.97, SD = 0.63), followed by material handling practices (M = 3.95, SD = 0.58) and operational performance (M = 3.92, SD = 0.56). Inventory control practices received the lowest rating (M = 3.77, SD = 0.71). Within inventory control, accuracy of demand forecasting had the lowest mean of any item in the study (M = 3.64, SD = 0.93), and control of stock levels was also relatively weak (M = 3.70).

Table III
Descriptive Statistics for Study Constructs

Construct	Items	*M*	*SD*	Highest-rated item (*M*)	Lowest-rated item (*M*)
Material handling practices	5	3.95	0.58	Equipment is regularly maintained (4.06)	Equipment available; safety guidelines followed (3.90)
Warehouse layout management	9	3.97	0.63	Easy access to stored goods (4.08)	Layout supports inventory control (3.84)
Inventory control practices	6	3.77	0.71	Demand forecasts updated regularly (3.86)	Accurate demand forecasting methods (3.64)
Operational performance	5	3.92	0.56	Processes reliable and consistent (3.96)	Activities performed accurately (3.88)

Note. Five-point scale (1 = strongly disagree, 5 = strongly agree). Source: field data (2026).

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D. Correlation Analysis

Operational performance correlated positively and significantly with warehouse layout management (r = .510, p < .01), material handling practices (r = .487, p < .01), and inventory control practices (r = .330, p < .05) (Table IV). Correlations among the three predictors were weak and non-significant ($|r| \leq .260$), so multicollinearity was unlikely to be a problem in the regression.

TABLE IV
PEARSON CORRELATIONS AMONG STUDY VARIABLES

Variable	1	2	3	4
1. Inventory control practices	—			
2. Warehouse layout management	−.125	—		
3. Material handling practices	.260	.029	—	
4. Operational performance	.330*	.510**	.487**	—

Note. N = 50. *p < .05. **p < .01 (two-tailed). Source: field data (2026).

E. Multiple Regression Analysis

Before estimation, the study checked linearity, the absence of multicollinearity, independence of observations, and sample adequacy relative to the number of predictors. The regression model was significant, F (3, 46) = 19.803, p < .001, with R = .751, R^2 = .564, and adjusted R^2 = .535 (standard error of the estimate = 0.3848). The three practices together therefore explained 56.4% of the variance in operational performance. Table V shows that all three were significant positive predictors. The regression equation was OP = −0.338 + 0.232(ICP) + 0.473(WLM) + 0.380(MHP), where OP is operational performance, ICP is inventory control practices, WLM is warehouse layout management, and MHP is material handling practices. The constant was not significant (p = .547).

TABLE V
REGRESSION COEFFICIENTS FOR OPERATIONAL PERFORMANCE

Predictor	*B*	*SE B*	β	*t*	*p*
(Constant)	−0.338	0.557		−0.607	.547
Inventory control practices	0.232	0.080	.295	2.894	.006
Warehouse layout management	0.473	0.087	.536	5.448	< .001
Material handling practices	0.380	0.097	.395	3.913	< .001

Note. Dependent variable: operational performance. R^2 = .564, adjusted R^2 = .535. Source: field data (2026).

F. Discussion of Findings

1) ***Material Handling Practices:*** Material handling had a significant positive effect on operational performance (B = 0.380, β = .395, p < .001) and was the second strongest predictor. This is consistent with TOC, which treats poorly maintained equipment, error-prone manual handling, and badly designed handling systems as bottlenecks that limit throughput (Goldratt & Cox, 2016), and it agrees with Okeoma et al. (2022), Odeleye (2021), and Yonas (2025). Equipment maintenance was the highest-rated handling item (M = 4.06), whereas equipment availability and adherence to safety guidelines were rated lowest (M = 3.90 each), which suggests that equipment adequacy and safety compliance deserve further attention. The negative relationship reported by Thoti et al. (2025) and the non-significant effect of handling quality on perceived profit in Ekwueme et al. (2024) differ from this result. However, those studies examined equipment alone or perceived profitability rather than the efficiency, timeliness, and reliability of handling processes, and Thoti et al. did not consider management practice or employee attitudes. How equipment and procedures are managed therefore appears to matter more than owning equipment, in line with the TOC principle of managing the constraint.

2) ***Warehouse Layout Management:*** Layout management was the strongest predictor (B = 0.473, β = .536, p < .001) and also the highest-rated practice (M = 3.97). Under TOC, a poor layout is a physical constraint that lengthens travel, causes congestion, and slows picking. The present results suggest that at the MSD Mabibo depot the layout is a well-managed constraint that supports flow rather than limiting it. The finding agrees with Ernawati et al. (2023), Peter et al. (2024), Mohamud et al. (2023), and Nyakundi and Mutia (2025), who linked layout to productivity, space use, and processing time. Easy access to stored goods (M = 4.08) and a simple workflow (M = 4.04) were the top-rated layout items, while the contribution of the layout to inventory control was rated lowest (M = 3.84). The link between layout and stock accuracy could therefore be strengthened.

3) ***Inventory Control Practices:*** Inventory control had a significant but comparatively weaker effect (B = 0.232, β = .295, p = .006) and the lowest mean score (M = 3.77), which makes it the most likely binding constraint at

the depot in TOC terms. Demand forecasting accuracy was the weakest item (M = 3.64), echoing Ilori and Majiyagbe (2024), who identified forecasting errors as a source of inventory risk. The comparatively higher ratings for cycle counting and error correction (M = 3.80 each) agree with Shajema (2018), who linked stock-taking to performance, and the defined minimum and maximum stock levels (M = 3.84) resemble the stock-control parameters described by Mbugi and Lutego (2022). Overall, evidence from manufacturing, retail, and public health settings consistently points to inventory control as important for performance, and demand forecasting is the strongest candidate for focused improvement at the depot.

IV. Conclusions

Warehousing management practices significantly influence the operational performance of health store facilities at the MSD Mabibo depot. Material handling practices, warehouse layout management, and inventory control practices each had a positive and statistically significant effect, and together they explained 56.4% of the variance in operational performance. Warehouse layout management was the strongest predictor, followed by material handling practices and inventory control practices, with demand forecasting the main area of weakness.

A. Recommendations

Management of the MSD Mabibo depot should strengthen demand forecasting using historical consumption data, stock movement records, and appropriate forecasting techniques, together with regular stock counts and accurate inventory records. It should maintain the current layout and review it whenever stock volumes, product categories, or operational requirements change. Equipment availability and maintenance should be sustained, and staff should be trained in safe and efficient handling. Management should also adopt an integrated approach in which material handling, layout, and inventory control are coordinated rather than treated separately, and monitor performance using measurable indicators such as order processing time, stock accuracy, stock-out frequency, equipment availability, and handling time. Policy makers should develop warehousing management guiding principles for public health store facilities in Tanzania.

B. Limitations and Future Research

The study covered one depot and a small sample of 50 employees, used a cross-sectional design, and relied on perceptual questionnaire data. The findings may therefore not generalize to other MSD depots and may reflect respondent bias. Future studies could compare several MSD depots or other public health institutions, use longitudinal designs to track changes after interventions such as improved forecasting, and add variables such as staff training, technology, and transport management.

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