International Journal of Accounting Finance and Social Science Research (IJAFSSR)

Vol. 2, Issue.3, May-June 2024, pp 8-20

www.ijafssr.com

EFFECTS OF INVENTORY MANAGEMENT ON CUSTOMER SATISFACTION: A CASE OF PUBLIC HEALTH SECTOR ENTITIES IN MBEYA CITY, TANZANIA

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ABSTRACT

The study investigates on the effects of inventory management on customer satisfaction. This investigation came following the cases reported customers o poor services provided from public health entities. To uncover this knowledge gap the study employed explanatory research design while the study being conducted in Mbeya City. The unit of analysis included Mbeya referral, Mbeya parental referral, Mbeya regional, Mbeya-City (Igawilo) hospitals as well as Mwenjelwa health center. Given the sample frame of patients/customers, management and clerical staff, 100 respondents was obtained from 4,100 total populations of all 5 public health entities. Using cluster sampling technique, the unit of analysis was segmented into four clusters from which at most 20 respondents was selected and data collected by using questionnaire. The collected data were proposed and subjected into analysis using descriptive statistics and regression inferential tool. The result of analysis revealed that strategic supplier partnership, lead time and use of information technology system positively and significantly affect customer satisfaction. Furthermore lean inventory management found to have positive but insignificant effect on customer satisfaction. The positive and significant association results provide a recommendation to the procurement and supply professionals in health centers effectively manage inventory by ensuring strong strategic supplier partnership, lead time management and lean inventory management. Also procurement and supply personnel in health sector entities should be adopted and used to information technology and digital systems in enhancing effective inventory management in satisfying customers who are now the patients.

KEYWORDS: Inventory management, customer satisfaction, strategic supplier partnership, lean inventory management, lead time, information technology.

1. INTRODUCTION

Customer satisfaction has been a priority to most of firms both those offering products and services (Muchaendepi, Mbohwa, Hamandishe & Kanyepe, 2019). It is through ensuring customer service satisfaction maximization where a firm survival and competitiveness is assured (Suchanek & Kralova, 2019). Customer satisfaction is the key issue in ensuring that the firm operates in foreseeable future. It is obvious that if a customer s satisfied, retention is there certain and this prove for perpetual sales and offering of services. Customer satisfaction creates a good image and

reputation to the firm offering a product or service. It is through utility maximization in which in which a firm offering product or service become dependable by customers. Though customers are satisfied differently but the following are the major factors influencing customer satisfaction includes right quantity (Palange & Dhatrak, 2021), right quality (Uvet, 2020), on time delivery (Fida, Ahmed, Al-Balushi & Singh,2020) and right placing of materials (Ghoumrassi & Tigu,2018).These customer satisfaction factors were revealed to be caused by effective inventory management (Mappesona, Ikhsani & Ali, 2020). Effective inventory materials propose on sustaining the adequate quantity, quality and on time delivery of materials (stocks) to customers (Tarigan, Siagian & Jie, 2021). This either has found to sustain through strategic supplier partnership (Kanike, 2023), lean inventory (Ramos, Pettit, Flanigan, Romero & Huayta, 2020), lead time (Taifa & Vhora, 2019) and information technology (Bordoloi, Fitzsimmons & Fitzsimmons, 2019).

Strategic supplier partnership, this function to be attained to adequate supplies, strategic supplier partnership sustains a sustainable source of materials for a firm able to meet a demand falls that due (Nenavani & Jain, 2022). Strategic supplier partnership insists on networking social capital in which instead of depending on only one supplier, a firm is recommended to form tiers of many right suppliers. It is through tie-ring relationship the firm will not only be sustained with optimal ordered quantity of materials but also lean inventory which would also ensure accessibility and availability of materials (Mofokeng & Chinomona, 2019). In here, Muchaendepi, Mbohwa, Ham and is he and Kanyepe (2019) suggested that to maintain adequate supplies in a store, economic order quantity model, lean inventory model and zero inventory management techniques are to be applied. The zero inventory management technique overloads by Just In Time (JIT) method has to ensure that production or supply is lean and agile to meet a demand fall due.

Lean inventory is an inventory management technique which ensures that the materials ordered are optimal to meet the current market demand (Goshime, Kitaw & Jilcha, 2019). Lean inventory postulates on making sure the stocks to be ordered or stocks in the store is enough or adequate to meet customer demand. Lean inventory management ensures that optimal order quantity is executed while avoiding under stocking and overstocking. It is through lean inventory management in which in which adequate materials is to be available and accessible in a store when need fall due (Kumar, Garg & Agarwal, 2019). Short of that a firm would be running out of stock and this may cause loss of customers. Firm running out of stock incur stock out cost, which is together with losing potential customers as customers as at that time customers' complains over stock shortage will be obvious for them withdrawal from the relationship. Again excess amount of materials ordered than what is required in the market is also harmful as this would be creating wastes, obsolete and obsolescence materials of which its quality is drawn. Obsolete materials are low quality materials to be offered at a declining value or disposed at zero value (Khujamqulov, 2022).

Lead time reported by Darko, Terkper, Novixoxo and Anning (2018) to be a vital factor for customer's service maximization, lead time implies the taken for materials to be delivered to customers. Normally on time delivery satisfy customers. Lead time implies on speed used in servicing customers. It is through quickly retrieval of the available materials in which handling of

the same materials would become timely. Lead time as it was reported by Song, Song and Shen (2021) implies the time taken (interval) for materials being available on the hands on the customers. Johnson, Leenders and Flynn (2021) defined lead time as the time for materials which is at maximum level to come to minimum level which is a buffer time for a new stock to be replenished. Lead time implies on time delivery materials available in a store. To ensure that the materials of demand on available in a store thus ordering should be on time; thus on-time replenishment for the ordered materials should be pampered for customers serviced on time. Thus, being not timely a store might be running out of stock which then delays service provision and this is what cause customers' dissatisfaction.

Information technology has revealed to play role in shortening the order cycle (Mehmood, 2021). Information technology fastens information sharing between the firms' product, service offering and customer. It is by adopting information technology in which request, order, contract size, quality and time when delivery is to be executed is shared electronically (Yang & Zhang, 2021). Moreover is through use of information in which the whipsaw effect has found to be minimized. Information has found also to function in enhancing e-payment. Therefore information is a tool which enhances deliverance of optimal ordered quantity to customers. Information technology also quicken and therefore due ditching on-time delivery of materials of the need.

The background reviews above revealed the impacts of efficient working capital management on performance of the firm. In the reviews, while other studies were examining on the effects of lead time, lean inventory, information technology or strategic supplier partnership on performance of the firm, the current study has aggregated all four predictors and it's on customer satisfaction. Moreover, while other studies has used different focus group and research areas the current study has employed public health care centers as a unit of analysis and the study has been unique in Tanzania.

2.0 LITERATURE REVIEW

2.1 Theoretical Literature Review

The study adopted two theories i.e. Relationship marketing theory and Assimilation theory. The relationship marketing theory is a theory applied in the various field including supply chain management. International marketing relationship network databases, information and transaction analysis (Traisat, 2010). The theory features commitment and cooperation that are imperative in the study of the various relationship existing between different prodigy that are related to the relationship between buyers and sellers especially in the aspect of information study (Wilcon, 1996); Toften and Oslan (2003) reported that the relationship marketing theory explains the relationship and information existing between various buyers and sellers as well as the other explanations of the various track of the stated relationship, the various facets in the relationships as well as the justification for the relationship.

The assimilation theory is based on the dissonance of Festinger (1957). Dissonance theory hold that cognitive comparisons between expectation product expectations and the perceived performance of the product by consumers (Peyton, Pitt & Kamery, 2003).Consumer attempts to make reduction

and avoid disagreement by adjusting their expectations and the real performance of the product by lifting the level of customer satisfaction through the reduction of the importance of the experience that suffered disconfirmation or the expectations in order to match product performance they received (Anderson, 1993).

2.2 Empirical Literature Review

The study by Kwadwo (2016) on the impacts of efficient inventory management on the profitability of manufacturing firms in Ghana found that there is a significantly strong correlation between inventory management and profitability of manufacturing firms in Ghana. The study adopted the cross-section design and data gathered covered the period 2004-2014 from the annual reports of 4 manufacturing companies listed in Ghana stock exchange. Moreover the study used judgmental sampling procedure. Data analysis used multiple regression models. It is from the significant results, the study therefore recommends that efficient management of raw materials inventory should be a major factor to be considered by Ghanaian manufacturing in enhancing their profitability.

In Kenya (Nwangangi, Guyo & Arasa, 2015) findings revealed that improvement in inventory management by one unit lead into increase in marketing performance , financial performance and customer satisfaction by 0.3, 0.423 and 0.143 unit respectively. From the study on how inventory management influenced the performance of manufacturing firms in Kenya, it was found that inventory management influences all the constructs of measuring firm performance. The research design adopted was both descriptive and explanatory. Data was collected from heads of logistic department of 320 firms through the use of questionnaire. A pilot study was conducted to test for validity, reliability and practicability of the research instruments. Descriptive statistics such as percentage and frequencies was used while the inferential statistics used was a linear regression.

Other studies reviewed above have shown on the effects of working capital management on performance, profitability and liquidity of the firm, different from the current study in which investigation has been on the effects of effective working management on customer satisfaction. Contextually, the current study used four variables which are strategic supplier partnership, lean inventory, lead time and information technology. In empirics front view, the current study have used public health sector as a unit of analysis. This has came following data archives on the great level of dissatisfaction and complains of customers (patients) on low quality medical care services they acquire from public health centers in Tanzania. Moreover while most of studies have been conducted in other parts of the world but in Tanzania it is a new study. Furthermore, difference in methodology hold another peculiarity between the current study and others reviewed above.

3.0 METHODOLOGY

3.1 Data Source

The study used survey research strategy and explanatory research design. The unit of analysis was public health sector entities found in Mbeya City, Tanzania. The area was selected to exemplifying other areas in Tanzania facing the problem of customers' (patients') complaints over service dissatisfaction. A number of cases as complaints has been reported from customers that medical

treatment is unsatisfactory to find medical/treatment equipments, medical products and other medical accessories are not accessible and available when demand fall due. Five (5) public health/hospital centers/hospitals were involved including Mbeya referral, Mbeya parental referral, Mbeya regional, Mbeya city and Mwanjelwa health center. Moreover, cluster sampling was used to attain to 100 respondents being customers/patients, management and other clerical staffs from which at most 20 respondents were chosen. The total population size from which the stated sample was derived was 4,100 from all five units of inquiry. The four clusters formed included referral, regional, city hospitals and health centers.

3.2 Model specification

The study used multivariate regression data analysis tools. The explanatory variables included the customer satisfaction (CS) and lead time (LT). The explained variables were strategic supplier partnership (SSP); lean inventory (LT); lead time (LT); and information technology (IT)

The model specification for this study is formulated as:-

$$CS = \beta_0+\beta_1SSP+\beta_2LI+ \beta_3LT + \beta_4IT + \mathcal{E}_L$$

Where CS = Customer satisfaction

SSP = Strategic supplier partnership

LI= Lean inventory

LT=Lead time

IT = Information technology

4.0 FINDINGS AND DISCUSSION

4.1 Descriptive statistics

The study motivated at determining the strength of relationship between effective inventory management on customer satisfaction Using descriptive statistic tools, specifically mean and standard deviation was employed to examine the strength of results of analysis. The recommended level for mean ≥1 while standard deviation is to be<1 (See Table 1)

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Age	100	1	3	215	2.15	0.880
Gender	100	1	2	145	1.45	0.500
Inventory ordering approach	100	1	2	142	1.42	0.496
Professionalism	100	1	2	177	1.77	0.423
Materials budgeting	99	1	3	201	2.03	0.562

Source: Author's computations (2023)

With mean = 2.15 at standard deviation= 0.880 for the variable age represent that age of respondents significantly affected the model relationship between effective inventory management and customer satisfaction. The young ones were revealed to be less affected as compared to adult and elder ones Customer satisfaction as refers to three groups of respondents found to differ between youths, adults and elders. Significant effects were was revealed against elders whose meeting health obligation expenses is questionnaire indeed when health insurance is not provided for free to her public.

Moreover, gender variances was also shown over the model relationship between inventory management and customer satisfaction given mean=1.45 and standard deviation=0.500. Effective inventory management indicated to have significant effect on customer satisfaction. Customers being sick or unhealthy males and females, the significant and positive relationship between the variables under discussion were found to be sustained especially female sick customers. From the field it was reported that it normally happen during the end of the month where buffer stock of medicines replenishes showing the problem to be with lead time management. Lead time is a time interval from when stock is at maximum, before coming to zero intermediated by a minimum stock level. Normally to combat the problem of running out of stocks, inventory manager /controller need to be aggressive on lead time management. In which when stocks reaches to minimum level a next replenishment is to be executed. Moreover, and as a suggestion of this is that new delivery is to be effected where stock reaches at buffer level. Thus, this study suggests that public health centers should be operating under buffer/ safety stock system.

Given mean =1.42 and standard deviation=0.496, it indicates that selection of inventory management approach significantly affect customer satisfaction. This is exactly true from the fact that lean inventory system is affected when for instance economic order quantity (EOQ) approach is used rather a pull-zero inventory management technique. It is through the use of Just In Time or Kan ban system called zero-inventory systems where double material handling is avoided while at the same time materials are made available when needed. This is what is called lean inventory system where the firm running out of stocks is combated. This caution is provided for zero/lean inventory system that there should be continuous and mass production of stocks. If is this is not enough effective employment of lean inventory system need effectiveness in ongoing supplier-buyer relationship (Frazelle, 2020). On-going relationship is none arm's length supplier-buyer relationship which exists even after payment for goods/service is done (Wang, Lin, Wang, Wang, Xiangli & Li, 2023). On-going relationship is more than just a business transaction. This has revealed to be fastened through strong tie-ring, strong supply chain networking or simply inter-functioning (Njuguna, 2022).

Execution of inventory manager/controller expertise showed to affect the model relationship between inventory management and customer satisfaction. Expertise entails on professionalism, skills, knowledge and competencies that the inventory manager should be equipped with given mean=1.77 and standard deviation=0.423 to be revealed. Expertise entails on the effective selection of the approach to use in managing inventory ordering systems. In-fact there are two major approaches in managing inventory i.e. non-zero and zero inventory ordering systems. None zero inventory management approaches include economic order quantity (EOQ), reorder level (max-max), min-max (blanket) approach, material requirement planning (MRPI), manufacturing resources planning (MRPII), Enterprise Distribution planning (EDP),Vendor managed inventory(VMI). The zero-inventory approaches include Just In Time (JIT), Kan Ban system (KS).While non zero-inventory management /ordering approaches are push inventory system, zero inventory management systems are lean pull inventory system. Zero inventory management approaches offer for stockless lean system and they are said to be trade-off kind of inventory management systems. Zero inventory systems are economical in a manner that they do not create

dead stocks in the store therefore allowing a store space to be used profitably. Though there are some precautions to be adhered by inventory manager (controller) or procurement and supply entity but steady and effective replenishment of stock is to be maintained (Ugwu,Orga &Okonkwo,2023) Short of that customers' complaints would be part of procuring organizations now public health centers.

Material budgeting analysis results given mean=2.03 and standard deviation=0.562 indicate that government budget has a great influence on the model relationship between effective inventory management and customer satisfaction. Customers being sick and serves of sick respondents revealed to be positively and significantly affected by the government budget. It is from the guidelines, public health sector is operating and due to the factor deficit budget optimal order quantity of health apparatus and medicines is not reached. None sustaining of the required quantity of health inventory, equipment, properties and other medical inputs is the reason what was revealed from the field to affect the model relationship significantly. Deficit budget is a cause for most of public health entities not used to lean-non zero inventory management systems. To avoid dead of redundant and obsolescent stocks then public health entities reported to order just the amount of medicinal materials and equipments as per budget but to find they replenish towards the end of the month.

4.2 Regression Results

Under this subtitle the study aimed at determining nature of relationship between explained and explanatory variables. Explained variables include strategic supplier relationship lean environment, lead time and information and explanatory variables are customer satisfaction and lead time. Using multiple regression results given R^2 = 67 percent and R^2 adjusted= 34 percent a significant effect, effective inventory management has on customer satisfaction by ensuring on- time delivery called right time of delivery of materials. Consistent significant results were shown against running Durbin Watson test with value=2.011>2.00 the acceptable level (Table 2).

Table2: Model Summary[a]

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
0.19[a]	.670	0.344	1.237	0.670	13.972	4	95	0.000	2.011

a. Predictors: (Constant), **IT**=information technology, **SSP**=strategic supplier partnership, **LI**= Lean inventory, **LT**=Lead time management.

Source: Author's calculations (2023)

Table3: **Coefficients**[a]

Model1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.154	0.877	-	0.176	0.861
SSP	0.039	0.040	0.081	0.972	0.033
LI	0.105	0.043	0.208	2.455	0.016
LT	0.360	0.049	0.630	7.423	0.000
IT	0.004	0.043	0.008	0.104	0.018

a. Dependent Variable: CS=customer satisfaction

b. Predictors: (Constant), **IT**=information technology, **SSP**=strategic supplier partnership, **LI**= Lean inventory, **LT**=Lead time management.

Source: Author's calculations (2023)

From Table 3, given β =0.081, t=0.972 at p=0.033 indicate that strategic supplier partnership is a factor out for customer satisfaction. Strategic supplier partnership entails on strong network that should exist between the supplier and buyer. Having more than one credible supplier called tie-ring create on-going relationship, alliances which help to attain a close relationship a result of discarded bullwhip effects (Tarurhor & Osazevbaru, 2021). Normally whipsaw effect break up communication between a supplier and buyer. This situation leads into wrong material delivery. The materials ordered may be evaluated not conforming to expectations. The deliveries might further found not to meet the quality or materials specification, to be rejected by the buyer. Non strategic supplier partnership may cause access to old, fashioned and conforming product (Tarigan, Siagian & Jie, 2021). It is through establishing strategic supplier partnership that create on-going relationship which then help to smear out arm's length discrepancies which is the cause of a procuring entity running out of stock (Binalla,2019). Strategic supplier partnership uncover for the search of potential/credible suppliers who is quality-oriented. A potential supplier is the one from which the 5R's in procurement and supply chain management is sustained (Guan, Gurnani, Geng & Luo, 2019).

Given β =0.208, t= 2.455 at p=0.016 (See Table 3) indicate that lean inventory system is an effective system of managing inventory. This system of managing inventory is agile and helps to be accessed to current and up to date materials. Lean inventory system is a stockless material management system which curb for the problem of double material handling. Lean inventory system is a stockless material management system which curb for the problem double material handling. Lean inventory management system sustain materials retain its quality ingredients in satisfying customer. Lean inventory management avoids creation of dead, inadequate, redundant and obsolescent stocks (Mor, Bhardwaj, Kharka & Kharub, 2021). Apart from quality retention of materials it is also an agile system which helps customers accessed to current and new varieties. Thus, lean inventory system is a timely inventory management system. Thus is through lean inventory management system in which replenishment lead time is adhered and the challenges

stock outs and other sought of non performing products are avoided (Kuupiel, Tlou, Bawontuo, Drain & Mashamba-Thompson, 2019).

Given the β =0.630, t=7.423 at p=0.000 (Table 3) show a positive and significant effect existing between time delivery (lead time) and customer satisfaction. Apart from product performance in terms of quality and quantity, customers are also satisfied by on timely delivery of materials. Timely delivery is the right lead time of replenishment. Right time of delivery s important for a buyer meet its demand. Short of that is that a procuring firm fails to conform to market demand. This is from the fact that a procuring firm may be facing two problems i.e. over-stocking or under stocking if not zero stocking. Lead time of maximum stock level to the minimum stock level of another replenishments. Non adhering to lead time or simply non- adhering to right time of replenishment cause a procuring and supply organization run out of stock or under stocking if it happen that a new replenishment is executed at zero level. The new replenishment is effected while other large quality of stock is in the store, then it cause overstocking. More-further overstocking is the cause of creation of dead stocks and material double handling which is not economical in the normal practice of using store (Pham, 2019). In avoiding this challenge that is why different authors studying on proper inventory management in satisfying customers dictates on employment of buffer stocking system (Njuguna, 2022). Under buffer or safety stocking it is insisted that a new or next replenishment is to be done when stock reaches at a safety stock level. This has revealed to combat the problem of stock out, under-stocking or overstocking.

Information technology in relation to customer satisfaction showed a positive and significant association given β=0.008 t =0.0.104 at p =0.018 (See Table 3). Application of information technology in managing inventory implies in application of sosphiscated platforms. It is a computerized inventory management system which offer ease storage and retrieval of materials. It is through the use of computer where location index of materials is executed by applying sosphiscated platforms (software) (Attarn, 2020). It is through computerization where manual system or labor force is avoided. Inventory management computerizations quicken identification and retrieval of materials (Madamidola, Daramola & Akintola, 2020). Computerization enhances on time access and delivery of materials. Thus, it is through computerization where lead time for new replenishment of materials is attained which therefore help to overcome the problem of stock out, thus access to materials on demand by customer is reached, the facts which are consistent with those by Udayakumar, Geetha and Sana(2021).

5.0 CONCLUSION

Inventory management is the planning and control over inventory in a store. Effective inventory management found to be a significant determinant of customer satisfaction and on time delivery. Strategic supplier partnership found to be a significant factor over customer satisfaction. Consistent results as those on strategic supplier partnership were shown with other explained variables i.e. lean inventory management, lead time (right time of delivery) and use of information system technology. It is through a significant results that shows that effective inventory management lead to customer satisfaction from which the current study recommend for the following:-

The government has to increase its budget on health sector in ensuring that availability of medical products and medicinal equipments/appliances. To have selection of effective inventory management approach, the inventory manager (controller) has to be equipped with procurement and supply expertise. Moreover, the call up is given to the authority i.e. employment ministry and department that every one working inn procurement and supply unit has to acquire the certified procurement and supply (CPSP) professionalism certificate. This either, is a wake up alert for pharmaceutical staff sit for professional examinations in procurement and supply management called Procurement and Supply Professionals and Technicians Board (PSPTB) examinations. The procurement and supply personnel should act effectively in their positions by enhancing strategic supplier partnership, sustaining lean inventory and lead time. More-further, the procurement officers are to be adopted and used to information technology and digital systems.

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