INFLUENCE OF INVENTORY CONTROL ON THE PERFORMANCE OF MANUFACTURING FIRMS IN KENYA

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Abstract: **The purpose of the study was to assess the influence of inventory control on the performance of manufacturing firms in Kenya. The specific objective of the study was to establish the influence of inventory control on performance of manufacturing firms in Kenya. The study focused on the transaction cost analysis theory. The study used cross sectional survey research design. Cross sectional design was justified on grounds that data of different manufacturing firms will be collected at a defined period. The study's target population included supply chain managers in charge of procurement department in manufacturing firms in Nairobi County. The 499 supply chain managers in manufacturing firms were the population for this study. The sample of this study consisted of 222 supply chain managers in manufacturing firms in the Nairobi that were stratified and randomly selected from a list of 499 supply chain managers in manufacturing firms operating in Nairobi in Kenya. This study relied on both primary and secondary data sources. Secondary data was collected for performance of the selected manufacturing firms for the period of between 2012 and 2016. This study utilized a questionnaire to collect primary data. Inferential statistics such as correlation analysis and regression were used to test for the relationship of the variables. The findings revealed that inventory control practices used in this study were significant predictors of performance of manufacturing firms in Kenya. This revealed that there is a significant positive influence of inventory controls on the performance of manufacturing firms in Kenya. The study concluded that inventory control plays a significant role in the overall performance of the manufacturing firms in Kenya. The study recommended that manufacturing firms should invest in inventory control o enhance their performance.**

*Keywords***: Firms' Performance, Inventory Control, Inventory Management.**

I. INTRODUCTION

A fundamental element of operations strategy is the definition of the firm's competitive priorities. These may include the basic priorities cost, quality, delivery, and flexibility (Boyer and Lewis, 2002), as well as additional ones such as innovation (Kroes & Ghosh, 2010). A firm has to make trade-offs between these priorities while allocating its limited resources, at least with respect to the relative rates of improvement of the different priorities. In their study of 110 manufacturing plants, Boyer and Lewis (2002) found that trade-offs between cost and flexibility, delivery and flexibility, and delivery and quality exist. This trade-off is also reflected in the distinction between lean vs. agile manufacturing and supply chain strategies as well as the efficiency–responsiveness dichotomy in supply chain priorities, where efficient supply chains aim for the cost-efficient fulfillment of predictable demand, and responsive supply chains for the quick response to unpredictable demand (Wagner, Grosse-Ruyken & Erhun, 2012).

Various theories that guide on effective supply chain management and its benefits in clued the systems theory, resource based theory and the principle agent theory. Supply chain management is also the integration of key business processes from initial raw material extraction to the final or end customer, including intermediate processing, transportation and storage activities and final sale to the end customer. Organizations.

Firms with large system inventories, many suppliers, complex product assemblies, and highly valued customers with large purchasing budgets have the most to gain from the practice of supply chain management The manufacturing sector has high, yet untapped potential to contribute to employment and GDP growth. Industrial activity, concentrated around the three largest urban centres of Nairobi, Mombasa, and Kisumu is dominated by food-processing (Oyuke, 2012). After a long period of virtual stagnation, the Kenyan economy went through a strong phase over the period 2003-2007, as the rate of economic growth accelerated up to 7 per cent. During the same period Total Factor Productivity (TFP) in manufacturing increased by as much as 20% (WB, 2007). The growth in manufacturing industry declined from 3.3 per cent in 2011 as compared to 4.4 per cent in the year 2010 mainly due to a challenging operating environment (KNBS, 2012). As an important sector in the overall economic growth, manufacturing sector requires in depth analysis at industry as well as firm level Studies that have been done in this areas include Kimani (2013) who pointed out that manufacturing companies have faced challenges of dealing with scope global market place and its supply chain while retaining speed and flexibility, elimination of wasted time, effort and materials from all point in the supply chain and meet the needs of customer without holding more inventories.

A supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user (Carr & Pearson, 2002). Supply chain management is the streamlining of a business' supply-side activities to maximize customer value and to gain a competitive advantage in the marketplace. Supply chain management (SCM) represents an effort by suppliers to develop and implement supply chains that are as efficient and economical as possible. Supply chains cover everything from production, to product development, to the information systems needed to direct these undertakings (Wisner, Tan & Leong, 2014) The purpose of this study was to establish the influence of inventory control on performance of manufacturing firms in Kenya

2.   LITERATURE REVIEW

Theories provide a general explanation to an occurrence and that a researcher should be conversant with theories that are applicable to his area of study (Ngumi, 2013). It guides research to determine what things to measure, and what statistical relationships to look for (Defee, Randal, Thomas & Williams, 2010). The study was anchored on Transaction Cost Theory which was developed by Ronald Coase (1937). It refers to the cost of providing for some good or service through the market rather than having it provided from within the firm. According to Coase article on the "The Problem of Social Cost", transaction costs include search and information costs, bargaining and decision costs and policing and enforcement costs (Williamson, 1979). It observes that market prices govern the relationships between firms but within firm decisions are made on a basis different from maximizing profit subject market prices. Within the firm decisions are made on through entrepreneurial coordination (Allen, 1999).

In order to explain how Transaction cost applies to the critical decision points of purchasing, a further explanation of the activities of the purchasing function is given (Baily, 2005). The main activities of Transaction cost economics are centred within 5 processes, namely category strategy, supplier strategy, quotation supplier selection and negotiation, operative procurement and supplier evaluation. Within the first process the category strategy, the buyer puts equal products into one pool (Schiele 2006) and can then determine a strategy for this pooled group.

For a supplier strategy, one might identify the purchasing volume, and level of dependency on the supplier to create a supplier strategy (Johnston, *et al.* 2004). For supplier selection and negotiation, one can choose between competitive bidding and negotiation (Papazoglou & Heuvel, 2007). Coming to the operative procurement step, this step assists the supplier to act according to what has been negotiated beforehand. When the supplier is providing the buyer with the component, one can measure performance of the supplier, which can be indicated through quality, costs and service (Papazoglou & Heuvel, 2007).

The company should make a component if transaction costs cannot be kept low, use a hybrid governance approach if asset specificity is high but transaction costs can be kept low through the safeguards provided in the contract, and use the market if the component which has to be supplied has low asset specificity (Williamson, 2008). Coming to the sourcing strategy, whether to use multiple suppliers or a single supplier, one might use the same approach of the human agent as being opportunistic and limitedly rational, as in the make or buy decision (Ellram, Tate & Billington, 2008).

Single sourcing is used when the supplier offers special technology, which can lead to a competitive advantage of the company; however, the relationship has to be safeguarded to ensure a cooperative relationship (Walter, Müller, Helfert & Ritter, 2003). Multiple sourcing can be applied when the component is placed within an unassisted, highly competitive market, mostly not providing any special technology that leads to a competitive advantage (Schwabe, 2013). When creating a supplier portfolio the company pools suppliers with the same activities into one pool, however since there is a difference between special technology suppliers, and suppliers providing low asset specificity, one might differentiate between parts that provide a competitive advantage and parts that do not and therefore pool only suppliers with high asset specificity for components delivering a competitive advantage and pool only suppliers with low asset specificity for suppliers providing components that do not lead to a competitive advantage (Lalkaka, 2006)

3. RESEARCH METHODOLOGY

The study adopted a cross sectional survey research design. Cross sectional design was justified on grounds that data of different manufacturing firms was collected at a defined period (Connaway and Powell, 2010). Eriksson and Kovalainen, (2008), research design is a plan that guides the research in the process of collecting, analyzing and interpreting observations; the researcher's blueprint for the methods and instruments used in collecting data and evaluating it, in order to respond to the research questions of the study. The target population of the study was the supply chain managers in manufacturing firms in Kenya, Population is generally a large collection of individuals or objects that is the main focus of a scientific query and to whose benefit the study is done (Castillo, 2009). According to Castillo, a research population is a well-defined collection of individuals or objects known to have similar characteristics and usually have a common, binding characteristic or trait. Burns and Grove (2003) describe a target population as the entire aggregation of respondents that meet the designated set of criteria. Parahoo (1999) defines population as the total number of units from which data can be collected such as individuals, artefacts, events or organizations. The study's target population includes the supply chain managers in manufacturing firms in Nairobi County. According to KAM (2014), there are a total of 499 large scale manufacturing firms operating in Nairobi where 80 per cent of their members are based. The 499 supply chain managers in manufacturing firms were the population for this study.The study aimed to examine the effects of inventory control on performance of manufacturing firms in Kenya where the following simple regression model was used: $Y = \beta_o + \beta X + e$. Where; β_o is the intercept of the variable Y, β is the the slope or gradient of the regression line which explains the manner in which Y relates with X, X is Inventory Control and e is the error term.

4. RESEARCH FINDINGS AND DISCUSSIONS

The study sought to establish to what extent manufacturing firms in Kenya control their inventory. The study analyzed the materials costs, fixed operational costs, carrying costs, logistics costs and redistribution costs for sampled companies for a period of five years. The results are presented in Table 1.

Table 1: Descriptive Results for Inventory Costs

Inventory Control	Statistics	2012	2013	2014	2015	2016
Materials Cost	Mean	30466.13	30470.9	26441.61	34312	33815.17
	Std. Deviation	42366.47	44558.51	30261.63	40680.31	37990.43
	Minimum	1051	1097	1846	1863	1632
	Maximum	181370	212711	128204	148846	128266
Fixed Operational Costs	Mean	52908.34	53002.83	49910.1	45856.69	48561.28
	Std. Deviation	24832.1	24268.93	27738.74	24008.05	27783.36
	Minimum	10445	10715	7260	9546	8688
	Maximum	91913	96159	97094	86723	91828
Carrying Costs	Mean	43780.69	45826.17	55395.86	48772.28	48220.28
	Std. Deviation	28860.05	29213.01	26029.38	24458.72	29065.95
	Minimum	7400	7674	10112	8005	6680
	Maximum	98372	93486	92020	97190	98687
Logistics Costs	Mean	53189.86	57657.14	47301.59	47974.9	50290.48
	Std. Deviation	25471.33	25281.01	27420.79	28588.32	22847.01
	Minimum	6645	11891	8400	9981	13032
	Maximum	95153	91589	96104	99898	97883

Redistribution Costs	Mean	53637.21	50422.41	53239.55	45910.97	53390.48
	Std. Deviation	27715.73	24541.97	28491.45	26680.15	25295.5
	Minimum	8488	10307	10042	7417	8099
	Maximum	99010	97438	99350	99187	95331

The findings revealed that there was an increase in average material costs among manufacturing companies in Kenya. For instance, in 2012, the companies average spending was Kshs 30.5 million compared to over 33 million spent in 2016. The highest materials cost for the period was 128 million while the lowest was 18 million. The standard deviation was very high across the period indicating that material costs varied largely depending on the company.

The findings further revealed that fixed operational costs reduced from an average of 52.9 million in 2012 to 48.6 million in 2016. The finding implied that manufacturing companies in Kenya control their fixed operational costs n efficiently way. The results further showed that there was an increase in carrying costs and a reduction in logistics costs across the study period. The average company increased their carrying costs by about 5 million but reduced their logistics costs by about 3 million over the five years of the study. The findings revealed that there almost no significant change in redistribution costs since the average redistribution costs was 53.6 million in 2012 and 53.3 million in 2016 indicating a very slight change.

The finding implied that manufacturing firms in Kenya moderated their cost associated with their inventory management. The finding further implied that firms had adopted supply chain optimization to minimize their costs. These findings concur with Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya. Munyao, Omulo, Mwithiga and Chepkulei (2015) also highlighted that inventory problems firms experience includes unorganized inventory arrangement, large amount of inventory days / no cycle counting and no accurate records balance due to unskilled workers.
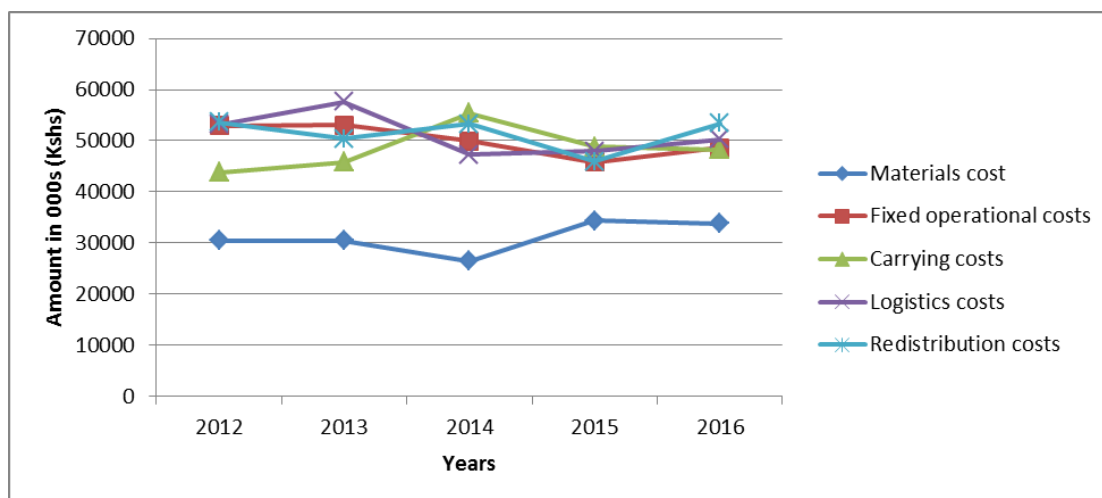

Figure 1: Trends for Inventory Costs

The findings presented in figure 4.2 indicated that inventory control cost including materials costs, fixed operational costs, carrying costs, logistics costs and redistribution costs for sampled firms increased slightly between 2012 and 2016. This increase does not necessarily imply lack of inventory control; it could be as results of firms' expansion plan and increase in production capacitor of the company hence the need for more inventories. Bartmann and Bach (2012) argued that excess inventories guarantee uninterrupted supply of materials and components, to meet production schedules and finished goods to meet customers demand. Too less of inventory on the other hand, releases working capital for alternative uses and reduces carrying costs and increases ordering costs. But there is the risk of stock out costs.

The first objective of this study was to establish the influence of inventory control on performance of manufacturing firms in Kenya. The findings presented in the Table 4.11 shows the respondents views on the statement used to measure inventory control mechanism used by manufacturing firms in Kenya. The study used percentages, mean and standard deviation in the analysis.

Table 2: Descriptive Results for Inventory Control in Percentage

	SD	D	N	A	SA	Mean	Std. Dev
Our company has a fixed annual inventory budget	2.6	9.5	22.1	35.8	30.0	3.81	1.05
The total amount of inventory stored by our company is manageable and cost effective	2.6	3.7	23.2	44.2	26.3	3.88	0.93
Our company invest a lot of financial resources in holding its stock	0.0	4.7	18.4	50.0	26.8	3.99	0.80
Cost of holding stock is sometimes unbearable to the company	1.1	3.2	15.8	47.9	32.1	4.07	0.84
Management of the our company sets optimized re-order and safety stock levels for inventory	3.7	4.7	21.1	35.3	35.3	3.94	1.04
Our company adhere to the fixed annual inventory budget	3.7	4.2	20.0	47.4	24.7	3.85	0.96

The study sought to establish whether manufacturing firms in Kenya had a fixed annual inventory budget. The finding presented in Table 4.11 showed that 35.8% and 30.0% of the respondents agreed and strongly agreed with the statement. The statement had a mean of 3.8 which confirmed that majority of the respondents agreed with the statement. The standard deviation of 1.05 indicates that the response varied slightly from the mean. The finding implied that majority of the manufacturing firms in Kenya had fixed annual inventory budget set to control their inventory.

The findings also revealed that majority of the respondents agreed as shown by the mean of 3.88 that the total amount of inventory stored by our company was manageable and cost effective. The total percentage for those who agreed and strongly agreed was 75.3% while a small combined percent of 5.8% disagreed and strongly disagreed. The finding implied that whereas majority of the manufacturing firms stored manageable inventory, there was small percent that store excess inventory.

On whether, manufacturing firms invested a lot of financial resources in holding its stock, the mean response obtained was 3.99 which confirmed that majority of the respondents agreed and strongly agreed with the statement. These finding implied that majority of the manufacturing firms incurred a lot of costs in holding of the inventory. The results similarly, revealed that 47.9% and 32.1% of the respondents agreed and strongly agreed that costs of holding stock were sometimes unbearable to their companies.

On whether management of the manufacturing firms' sets optimized re-order and safety stock levels for inventory, the results revealed that 35.3% and 35.3% of the respondents agreed and strongly agreed respectively, 21.1% were neutral while 4.7% and 3.7% of the respondents disagreed and strongly disagreed respectively. Finally, the study finding showed that 47.4% and 24.7% of the respondents agreed and strongly agreed that their firms adhered to the fixed annual inventory budget.

These findings implied that manufacturing firms in Kenya had inventory control practices in place to effectively manage their inventory. Effective inventory management enhances costs reductions hence improving performance. These findings concur with Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya.

The objective of the study was that there is no significant influence of inventory control on the performance of manufacturing firms in Kenya. The findings of univariate regression analysis are presented in Table 23 to 25.

Table 3: Regression Analysis for Inventory Control and Performance of manufacturing firms

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.622	0.386	0.383	0.57248

a.   Predictors: (Constant), Inventory Control
b.   Dependent Variable: Performance of manufacturing firms

The model summary results presented in Table 4.23 indicated that the model had R-square of 0.386 which implied that other factors held constant inventory control explained 38.6% of the variation in performance of manufacturing firms in Kenya. The remaining 61.4% variation in performance of manufacturing firms in Kenya was explained by other variables which are not in this model. The findings are in line with Kitheka (2012) who revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between

inventory management automation and the performance of the supermarkets. The results are in line with Kimaiyo and Ochiri (2014) who in their study concluded that inventory management plays a very important role on the Performance of manufacturing firms.

Table 4: ANOVA Test for Inventory Control and Performance of Manufacturing Firms

a)	*Model*	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
	Regression	38.780	1	38.780	118.331	0.000
1	Residual	61.613	189	.328		
	Total	100.393	190			

a. Predictors: (Constant), Inventory Control

b. Dependent Variable: Performance of manufacturing firms

Table 4.24 presented the results of analysis of variance (ANOVA). The F-statistic obtained was 118.331 with a p-value of 0.000. The findings implied that inventory control has a significant influence of Inventory Control on the performance of manufacturing firms in Kenya. The findings further confirmed that inventory control was a significant predictor of performance of manufacturing firms in Kenya. Thus the null hypothesis was rejected and concluded that there was a significant influence of Inventory Control on the performance of manufacturing firms in Kenya. The findings are supported by Awino (2011) who found that inventory control has a significant influence on the performance of manufacturing firms. The findings are also in line with Ondiek and Odera (2012) who concluded that materials management has a significantly affects the performance of manufacturing firms.

Table 5: Beta Coefficients for Inventory Control and Performance of manufacturing firms

	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	1.134	0.228		4.969	0.000
Inventory Control	0.698	0.064	0.622	10.878	0.000

a. Predictors: (Constant), Inventory Control

b. Dependent Variable: Performance of manufacturing firms

The results in Table 4.25 shows beta coefficients summary in which t-values were 4.969 and 10.878 with p-values of 0.000 which are less than 0.05 hence the model was statistically significant, thus the beta coefficient 1.134 and 0.698 were statistically significant. The model is defined as $Y = 1.134 + 0.698X_1$, where Y was the Performance of Manufacturing Firms and X_1 was Inventory Control this implies that a unit change in inventory control would result to 0.698 units change in performance of manufacturing firms in Kenya. This further confirmed that there was a significant strong positive linear relationship between inventory control and performance of manufacturing firms in Kenya. These findings concur with Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya. The findings are in line with Koumanakos (2008) who found that the higher the level of inventories preserved (departing from lean operations) by a firm, the lower its rate of returns. The findings are supported by Munyao *et al* (2015) who found that despite the fact that that material requirement planning was most effective in contributing to performance of the production department most organizations in the manufacturing industry used action level methods.

5. CONCLUSION

The objective of this study was to establish the influence of inventory control on performance of manufacturing firms in Kenya. The findings of descriptive statistics implied that manufacturing firms in Kenya had inventory control practices in place to effectively manage their inventory. Effective inventory management enhances costs reductions hence improving performance. The finding further implied that manufacturing firms in Kenya moderated their costs associated with their inventory management.

The results of correlation analysis indicated that inventory control had a strong, positive and significant influence on the performance of manufacturing firms in Kenya. The finding of univariate and multivariate regression analysis further confirmed that there was a significant positive linear relationship between inventory control and performance of manufacturing firms in Kenya. Secondary data analysis also confirmed that inventory control had a strong, positive and

significant influence on Return On Assets, Return On Equity, sales growth and profit margins which imply significant influence of inventory control and performance of manufacturing firms in Kenya. The study therefore rejected the null hypothesis that there is no significant influence of inventory control on the performance of manufacturing firms in Kenya, hence the study conclude that inventory control significantly influences the performance of manufacturing firms in Kenya.

Based on the findings, the study concluded that inventory control plays a significant role in supply chain optimization and consequently on overall performance of the firms. Firms that have managed to control their cost of holding stock and optimized re-order and safety stock levels for inventory have also managed to optimize their supply chain management leading to better performance.

This study established that some of the manufacturing firms had a fixed annual inventory budget while other had not. The study recommends that manufacturing firms through their supply chain managers should forecast their inventory demand for the year based on previous year's demand so that they can come up with an annual budget for inventory. This would assist in controlling and managing inventory to avoid unnecessary and unexpected spending because of holding excess inventory or incurring extra costs to procure again in case of shortage. The study further recommends that manufacturing firms should optimize the total amount of inventory stored by the company to a manageable and cost effective level.

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