INFLUENCE OF INVENTORY MANAGEMENT PRACTICES ON PROCUREMENT PERFORMANCE AMONG MANUFACTURING FIRMS IN NAIROBICOUNTY, KENYA

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ABSTRACT

The purpose of the study is to assess the influence of inventory management practices on procurement performance of manufacturing firms in Nairobi County, Kenya. It is aided by the following objectives, to explore the influence of material specification on procurement performance, to determine the influence of material management techniques on procurement performance, to examine the influence of material receipt controls on procurement performance and find out the influence of material delivery deviation controls on procurement performance of manufacturing firms. The study uses descriptive study design. The study aims at collecting information from respondents on the influence of material management practices on procurement performance of manufacturing firms in Kenya. The study analyzed different theories to expound on the relationship between the inventory management practices and procurement performance of manufacturing firms. The study employed stratified random sampling technique in coming up with a sample size of 213 respondents from a total of 455 target population in manufacturing firms in Nairobi, Kenya.. Pilot study was carried out to establish the reliability and validity of research instruments. Statistical Package Social Science analysis and Descriptive statistics were presented through pie charts, table and descriptive notes. Multiple regression model was used to show the relationship between the dependent and independent variables. A good response rate of 80% was realized. It was established that most of the firm's inventory management practices had positive impact on procurement performance. The study further adopted a regression analysis to determine the relationship between the variables at 5% level of significance. The study findings showed that the four variables had a significant influence on procurement performance. The study indicated that there has been limited amount of research on influence of inventory management practices on procurement performance of manufacturing firms in Nairobi Kenya. Thus, the findings of this study serve as a basis for future studies on inventory management practices. The inventory management practices and procurement performance of manufacturing firms in Nairobi Kenya, has not been widely studied which presents gaps in African and Kenyan

contexts. The study contributed to knowledge by establishing that material specification, material management techniques, material receipt controls and material delivery deviation controls influence procurement performances.

Introduction

In earlier years inventory was being treated as a cost center because purchasing department was spending much on acquisition of materials and stores were holding much stocks that blocked money and entire cash flows of firms (Sandeep, 2007). However, with globalization there has been a drastic change in the business environment that has made many firms to face stiff competition. Silver, (2007) noted that total costs can be relatively reduced through progressive recognition of materials management practices in the firms. Therefore, effective materials management practices can be treated as a profit center within the firms.

Inventory management is of great importance in the performance and growth of the procurement function in a firm (Jacobs *et al* 2009). Organizations realize entire profits from volume of goods sold and services offered to the customers, which are directly related to the materials quality used in operation process. The procurement function plays a vital role in ensuring quality conformance and quality production of goods. Mungu, (2013) stated that good managements of materials into, through and out of any firm guard the entire entity from poor quality, customer disappointment and loss of profits.

Statement of the Problem

Manufacturing sector in Kenya contributions to the economy has been stagnating at 10% for over 10 years (KAM, 2015). The vision 2030 suggests that manufacturing sector should account to 20% contribution to the economy (KAM, 2015), however, with this trend the projections may not be reached. Diminishing rate of productivity in diverse firms across different subsectors has been witnessed; this has been attributed to poor inventory management, long lead-times, and delays in delivery, poor receipt and rampant delivery deviation. Manufacturing sector in Kenya contributions to the economy has been stagnating at 10% for over 10 years (KAM, 2015). The vision 2030 suggests that manufacturing sector should account to 20% contribution to the economy (KAM, 2015), however, with this trend the projections may not be reached. Diminishing rate of productivity in diverse firms across different subsectors has been witnessed; this has been attributed to poor inventory management, long lead-times, and delays in delivery, poor receipt and rampant delivery deviation.

According to Monday (2008), firms that do not embrace materials management concept face great challenges in the management of operations and production activities associated with material procurement, material storage, material inventory and interdepartmental collaboration that ultimately render the organization uncompetitive. Through effective materials management concept, the procurement function of the firm's structure is able to perform as required. Quality, delivery and cost saving will indicate the performance of the procurement function (Krajewski & Ritzman, 1999).

According to the study by Linton *et al* , (2007) he noted that inventory management Problems rise if the user departments poorly specify materials. The buyers of the organization procure materials that do not conform to the user requirements. Supplier at times will be held liable of

wrong delivery but if well traced the problem will be found to be from specification drafted by the user department (Koh*et al*., 2013). Uncontrolled Inspection of quantities and qualities of materials will lead to defective materials being used in the production process. Delays in production will be delayed if materials taketoo long in the receiving bay. This study intends to bridge knowledge gap and examine the influence of the inventory management practices to procurement performance of manufacturing firms in Kenya.

General objective

The purpose of this study is to assess the influence of inventory management practices on procurement performance of manufacturing firms in Nairobi County, Kenya

Specific Objectives

i.   To explore the influence of material specifications on procurement performance of manufacturing firms in Nairobi County, Kenya.

ii. To determine the influence of material management techniques on procurement performance of manufacturing firms in Nairobi County, Kenya.

iii. To examine the influence of material receipt controls on procurement performance of manufacturing firms in Nairobi County, Kenya.

iv. To find out the influence of material delivery deviation controls on procurement performance of manufacturing firms in Nairobi County, Kenya.

LITERATURE REVIEW

Theoretical Review

Theory of Constraints (TOC)
Theory of Constraints was developed by Dr. Eliyahu M. Goldratt. It is a methodology used in identifying the most important limiting factor, which is termed as the constraint. The major concept of TOC is that every process has a single constraint and the total throughput of the process can only be improved through the improvement of the constraint. Brigham and Gapenski (2013) supported this theory by describing that for every profit making firms there must be at least a constraint that limits the entire system from achieving more of what it strives for and ultimately determines the output of the system.
A constraint is any factor that deprives any organization from meeting its objectives as it affects the operational processes. If a firm fails to manage this constraint, it adversely affects its production process and ultimately leads to decline in profits margin (Blanchard, 2010). The TOC is applicable to the supply chain network whereby the weak link limits the efficiency and effectiveness of the entire supply chain process. For the case of poor specification of materials affects the operations of the supply chain. Specification of materials is the constraint in the supply chain system.

Economic Order Quantity Theory (EOQ)
This is a mathematical model developed within the scope of Operations management to determine the optimum level of inventory. F. W. Harris developed the model in 1913, but R. H. Wilson a consultant who applied it extensively is given credit due to his in-depth analysis (Zer&

Wei, 2006). Bowersox and Closs (2002) described the Economic Order Quantity (EOQ) model as an approach of determining optimal inventory level that takes into account the inventory carrying costs, stock-outs and total costs are needed for determination of the appropriate levels of inventory to hold. Actually, EOQ is the level of inventory that minimizes total inventory ordering costs and holding costs.

EOQ is used to determine the number of units that a company should add to the inventory available in order to minimize costs associated with purchase, delivery and storage of materials. As described by Lysons (2012), EOQ is used as a component of continuous review system whereby the level of inventory is monitored at all times and a fixed quantity of materials is ordered each and every time the inventory reaches a specific reorder point. EOQ applies when the demand of a product is constant over a year and that each order is delivered in full when the inventory reaches zero. For each order placed, the cost charged is fixed regardless of the units ordered. Also, the cost of holding each unit per year is fixed (Zer & Wei, 2006).
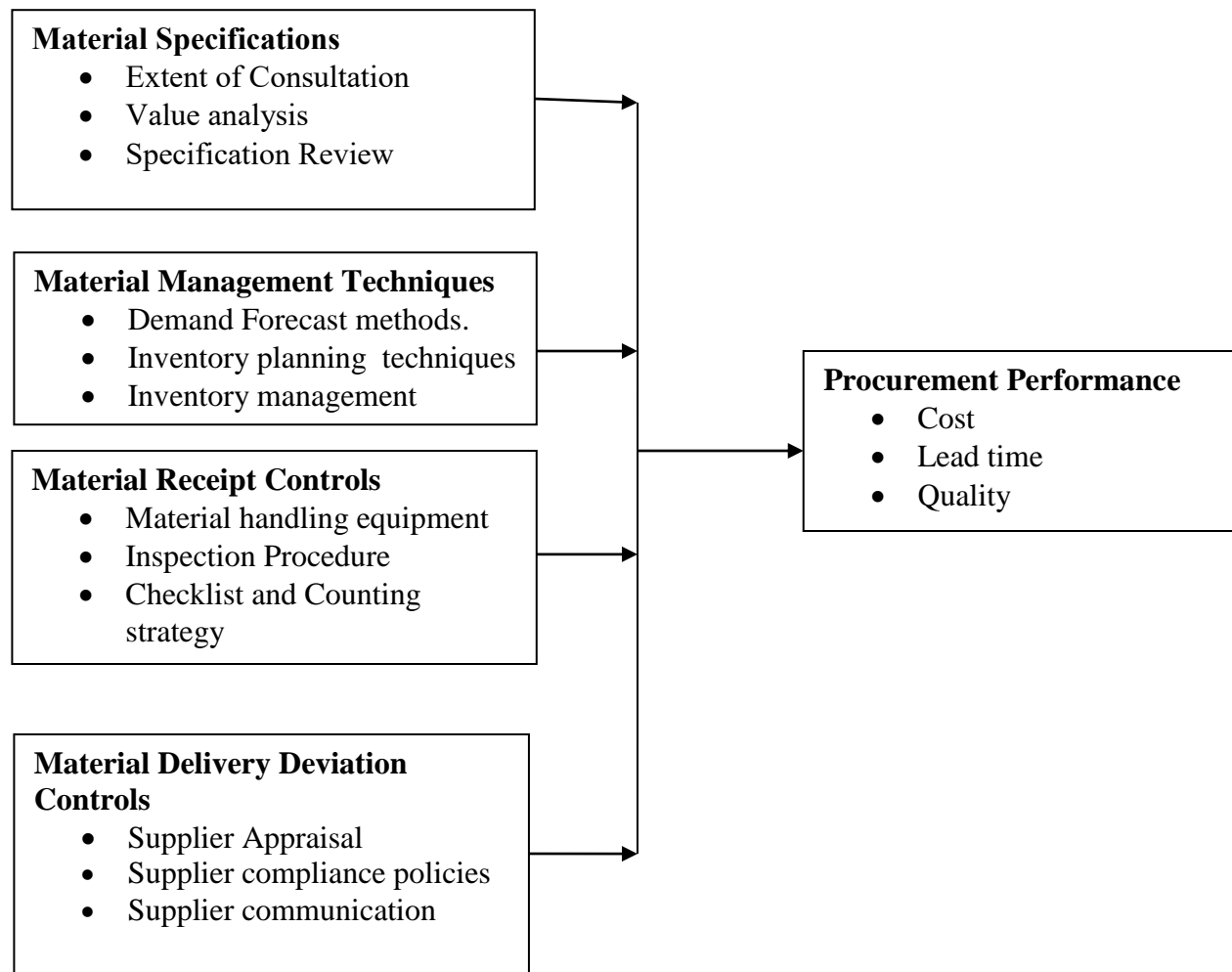
Queuing Theory

Queuing theory is a mathematical study of waiting line or queues (Schonberger, 2008). This theory enables analysis of several related processes, including arriving at the back of the queue, waiting in the queue (a storage process) and being served in front of the queue. The theory allows the measurement of performance like the average waiting time in the queue, the expected receiving service and the probability of finding the system full and thus waiting a certain time to be served (Shapiro, 2009).

Queuing theory optimize the facility receiving design and material handling systems geared towards minimizing acquisition costs and material handling costs. Moreover, it also considers inherent variability that is likely to affect the entire receiving process, which impacts the entire production process (Shapiro, 2009).

Theories of the Firm

According to Mehra and Inman, (2000) the theories of the firm were originally developed to identify why firms exist and how firms can perform their operations to meet the daily objectives. Earlier theories of the firm were rooted in deductive economies and have the transaction cost theory as their foundation. Fawlett *et al*., (2008) described transaction costs as those costs associated wrong deliveries from the existing suppliers while production costs as those associated with the coordination of various production activities in-house. A firm's existence is based on the difference between the transaction costs of the market and those of the firm. If in the market contracts are characterized by low transaction costs, therefore division of labor will not be organized within the firm (Stigler, 1968).Therefore; behavioral theories were introduced so as to overcome limitations associated with those of economic. Fawlett *et al*., (2008) suggested that both the economic and behavioral views as complimentary because neither of them fully explains the existence of firms. In this case, the existence of a firm is solemnly dependent on the behaviors of their potential suppliers

Conceptual Framework

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┌──────────────────────────────────┐
│ Material Specifications          │
│   • Extent of Consultation       │
│   • Value analysis               │
│   • Specification Review         │
│                                  │
└──────────────────────────────────┘

┌──────────────────────────────────┐
│ Material Management Techniques   │
│   • Demand Forecast methods.     │
│   • Inventory planning techniques│
│   • Inventory management         │
└──────────────────────────────────┘

┌──────────────────────────────────┐
│ Material Receipt Controls        │
│   • Material handling equipment  │
│   • Inspection Procedure         │
│   • Checklist and Counting       │
│     strategy                     │
└──────────────────────────────────┘

┌──────────────────────────────────┐
│ Material Delivery Deviation      │
│ Controls                         │
│   • Supplier Appraisal           │
│   • Supplier compliance policies │
│   • Supplier communication       │
└──────────────────────────────────┘

          ┌──────────────────────────────────┐
          │ Procurement Performance          │
          │   • Cost                         │
          │   • Lead time                    │
          │   • Quality                      │
          └──────────────────────────────────┘
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Independent Variables   **Dependent Variable**

Figure 2.1 Conceptual Framework

RESEARCH METHODOLOGY

Research Design

The study adopted descriptive survey design. According to Zikmund (2003), study design is a master plan that comprise of strategies selected to integrate diverse components of the study in a

logical and organized manner to facilitate the research objectives. The study design clearly outlines techniques and steps to be followed when obtaining valid and accurate information needed for the study Woods (2002). It is used to obtain precise and pertinent information concerning the phenomenon and coming up with valid conclusion from the facts realized (Khan, 1993).

Target Population

Target population is a universal set of study of all members of hypothetical or real set of people, objects or events to which a researcher desires to generalize the result (Borg & Gall, 2009). The target population of this study will be 455 sectors within the manufacturing field in Nairobi who directly relate to area of study.

Sample Size and Sampling Procedure

Sampling is the process by which a relatively small number of individuals, objects or events are selected and analyzed to find out a feature of the entire population (Woods, 2006). A sample is smaller subset of a population that adequately represents the entire group (Cai *et al*., 2008). A total sample size of 213 respondents will be taken with the aid of Slovin's formula: $n = N / (1 + e^2)$

Where;
n= Sample size
N =total population
e=Error of tolerance
As such, the sample size will be;

$n = 455 / (1 + 455 * 0.05^2)$
$n = 455 / 2.1375$
n=**213**

The confidence level was 95% thus giving a margin error of 0.05. The study used stratified random sampling technique in choosing the sample size from the three levels of management staffs. Stratified random sampling was the most suitable method in the selection of the respondents in each sub group while simple random sampling will be used to select respondents in the strata with the help of stratified sampling formula ($n_1 = n / N * N_1$)

Strata	Frequency	Sample size
Energy	50	23
Food & Beverages	65	30
Chemical	45	21
Building & Construction	75	35
Textile	55	26
Leather	70	33
Rolling Mills	95	45
Total	**455**	**213**

Data Collection Instrument

The researcher used questionnaire as the main data-collecting instrument. It is the most suitable data collection instrument because the study is mainly concerned with views, opinion and perception that can be fully and best collected (Mugenda & Mugenda, 2003). Questionnaire allows collection of large amount of information in a short period of and relatively in cost effective way Lai & Cheng, (2010). Semi-Structured questionnaires were employed because they are easy to administer and eases the data analysis process (Watson, 2010).

Pilot Study
Prior the main survey, a pilot study was conducted by issuing questionnaires to 10% of the sample size in different subsectors in the manufacturing field. The results obtained in the pilot study were not be included in the actual study.

Data Analysis and Presentation

Data analysis is the process of coming up with solutions through interpretation of data (Kothari, 2004). Types of data analysis include; qualitative and quantitative data analysis. Qualitative data analysis will be used because it will help the researcher to gain in-depth understanding of the research findings. In quantitative data analysis, features are counted and classified into statistical models in attempt to explain what is observed. In this study, data was presented inform of tables and charts where applicable and necessary. Microsoft excel and other supporting spreadsheets will be used in presentation of the data.

Inferential Analysis

The study used correlation analysis to measure the degree of relationship between dependent variable and independent variable, in determining the amount of variation on dependent variable explained by independent variable, regression analysis would be adopted. A multiple regression model was used to test the relationship between the dependent variable and independent variables. The model is represented as follows;

$$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:
Y =Procurement Performance (Dependent Variable)
B_0 =Constant Coefficient
X_1=Material Specification
X_2= Inventory management techniques
X_3= Material Receipt controls
X_4= Material Delivery Controls
ε = Error of Regression
$\beta_1 \ldots \beta_4$ = Regression Coefficient of the four variables

RESEARCH FINDINGS, ANALYSIS AND DISCUSSION
Response Rate
Out of 213 questionnaires administered, 170 were dully filled and returned making the overall response rate to be 80%. Only 43 (20%) questionnaires were not responded to. According to Kothari, (2004) a response rate of 50% is adequate for the descriptive study; as such, a response

rate of 80% for the study is adequate as per the recommendations. As such, this response rate was within the recommended threshold.

Pilot Test Analysis
Validity of the Instrument

The content validity of the study instrument after piloting was discussed with the research expert and it was found to be valid. The experts reviewed the questionnaire for structure, readability, ambiguity, and Completeness. The final survey instrument incorporated changes to remove ambiguities discovered during this validation process.

Reliability of the Instrument

Study findings indicated that material specification, material management techniques, material receipt controls, material delivery deviation controls and procurement performance had Cronbach's alpha's values greater than 0.7. Therefore, the instrument was reliable for data collection

Inferential Analysis

Inferential analysis was conducted using correlation and multiple regressions to determine the extent and direction of relationship between material specification, material management techniques, material receipt controls and material delivery deviation controls.

Correlation Analysis

The study reveals that there is a positive correlation between material specification and procurement performance. The correlation was significant as indicated by a correlation 0.523 and sig value of 0.000. This implies that an increase in material specification indicators such as extent of consultation, specification of review and value analysis increases the procurement performance. The study are consistent with the findings by Gathendu (2010) who conducted a study to determine the influence of inventory management on manufacturers firms in Kenya. The study noted that specifications of materials is required for production purpose and as per customers order should be clear and precise as required.

Additionally, the study findings also revealed that there is positive correlation between material management techniques and procurement performance. The correlation was significant as indicated by a correlation value of 0.687 and significant of 0.000. This implies that an increase in material management techniques such as demand forecasting techniques, material planning techniques and material management systems increases procurement performance. The study is consistent with the findings of Stukhart (2007) who described inventory management technique as the of operation continuously arranging material flows so as to ensure that inventory held is just enough to support current consumption rates with regard to the economy.

The study findings also revealed that there was a positives correlation between material receipt controls such as material handling equipment, inspection procedure and checklist and counting strategy and procurement performance with a correlation value of 0.505and a significant value of 0.000. The findings are consistent with the study of Watson (2010) who noted that quality inspection is only necessary if the supplier is of low reliability, because quality inspections are

expensive and time consuming. Song and Zipkin, (2011) also noted that quantity should be verified against order documents, while quality inspection can be performed by the supplier.

The study also reveals that there was the correlation between material delivery deviation controls indicators such as supplier appraisal, supplier compliance policies, supplier communication and procurement performance as shown by the correlation of 0.512 which was significant as indicated by a significant value of 0.000. The findings of the study is tandem with Drurry (2011) who noted that delivery of material of incorrect quality affects the time plan in the operating firm. It is costly and time consuming to complete work activities later after time elapsed.

Regression Analysis

Multiple regression analysis was used to determine the influence of inventory management practices on procurement performance of firms in the manufacturing sector in Kenya. The model $Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$ explained 60.6% of the variations in procurement performance of manufacturing firms in Nairobi County, Kenya. This showed that material specification, material management technique, material receipt controls and material delivery deviation controls explained 60.6% of the variation in procurement performance of manufacturing firms in Nairobi County, Kenya.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.779	.606	.588	0.50065

a. Predictors: Material specification, material management technique, material receipt controls and material delivery deviation controls

ANOVA Test (Model fitness)

Significance tests were conducted at 0.05 level of confidence. The significance value is 0.000 thus the model indicates statistical significance in predicting how manufacturing firms, material specification, material management techniques, material receipt controls and material delivery deviation controls influence procurement performance in Nairobi, Kenya. The F critical (Computed) at 5% level of significance was 43.602 while F critical (tabulated) was 2.583.

Since F calculated is greater than the Critical (tabulated) this shows that the overall model was significant. This is consistent with the finding that a major aim of inventory management is to improve the introduction rates and timing of new products and services as well as achieve improvements in quality, specifications and functionality without significant increase in cost (Koh*et al*, 2007).

Analysis of Variance (ANOVA) (Overall Model significance)

ANOVA					
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	2.583	4	413.146	43.602	.000
Residual	75.674	209	165		

Total	128.257	213	1693.594

Coefficient of Determination

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (procurement performance of manufacturing firms in Nairobi County, Kenya) that is explained by the 4 independent variables (Material specification, material management technique, material receipt controls and material delivery deviation controls).

	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Material specification	.351	.062	.145	5.641	.000
Material management technique	.217	.052	.086	4.173	.000
Material receipt controls	.215	.065	.489	3.307	.000
Material delivery deviation controls	.176	.073	.263	2.410	.000

    a. *Dependent Variable: Procurement performance of manufacturing firms*
    b. *Linear Regression through the Origin*

Thus, the established multiple linear regression equation becomes:

$$Y = 0.733 + 0.351X_1 + 0.176X_2 + 0.217X_3 + 0.215X_4$$

Summary of the Findings

This section summarizes research findings based on the influence of material specification, material management techniques, material receipt controls and material delivery deviation controls on firm procurement performance in manufacturing firms.

Material Specification

This study reveals that the formal introduction of material specification elements into purchasing process, the use of adequate and effective value analysis process, and the designing of products in relation to the necessary specification review, minimize material costs. According to the regression equation established, material specification is positively related to the procurement performance.

Material Management Techniques

Firms have formally introduced usage of material forecasting techniques to avoid maverick buying as, firms had formally introduced use of inventory planning techniques and inventory management system to enhance accuracy and effectiveness. Majority of the firms have also started recognizing the role of material management techniques on enhancing procurement performance with other firms in the manufacturing sector. According to the regression equation established, material management techniques is statistically related to the procurement performance.

Material Receipt Controls

The firms have formally introduced effective material handling equipment for consolidation and handling of materials; the firm had formally implemented route planning and effective inspection procedures to avoid defective items being accepted in the organization, the firms had also formally implemented checklist and adequate counting strategy that ensures that the right quality of products are received in the firms. According to the regression equation established, material receipt control is statistically related to procurement performance.

Material Delivery Deviation Controls

The firms have supplier appraisal as an important element in its procurement performance; the firms incorporated firm supplier compliance policies as a key factor in its impact assessment on the quality of products ordered and those supplied to ascertain whether there is diversion; the firms took into account the influence of its supplier activities and the general communication with the supplier; firms have material delivery deviation controls as an important element in their procurement performance.

The study also revealed that the firms accept the use of rules and policies to shape the conduct of the suppliers. Similarly, the firms invest in the supplier through effective and efficient communications as an advocacy for efficient procurement performances. According to the regression equation established, material delivery deviation control is statistically is correlated to procurement performance.

Conclusions

Specification of materials have positively impact procurement performance. This is due to the extent of user involvement and consultation in development of specification, value analysis, review and management of specification amendment improves the performance of procurement function. Therefore, enhancing suitability and competitiveness of the procurement function. Effectiveness of inventory management system contributes to ability to maintain optimum stocks. Dependability of demand forecasting, planning for production requirement and reduced lead times also contributes to optimal stock levels which ultimately improves the performance of procurement function.

Control of materials coming into a firm affects the performance of procurement function. The proximity of the receiving facility contributed to the effectiveness of the receiving process. Frequency of inspections would results to quality assurance. Through application of materials handling equipment, handling time would be minimized and also the extent of traffic would be minimal thus improving the performance of procurement function.

Cost of deviations in delivery were as a result of poor communication with suppliers which resulted to quantity and time cost and also lack of supplier delivery appraisals which lead to quality costs. Much time was incurred during inspection and testing of materials. Therefore, the performance of procurement function was being undermined because of extra costs incurred and thus inability to save on purchases.

Recommendations

In the light of above findings, some pertinent recommendations can be made. Manufacturing firms should embrace expertise in formulation of specification at early stages of materials design. User departments should always be involved and consulted in development of specification. The specifications should always be reviewed to meet requirements for use and purpose as this will improve the performance of procurement function as it will be able to meet the requirements of users and also reduce disputes among suppliers.

Manufacturing firms should adopt the technique of keeping the minimal amounts of inventories. These should be done by having a definite automated inventory control system, improving the production scheduling, having flexible manufacturing processes and adoption of best supplier sourcing technique to ensure inventories are held and controlled at suppliers' premises. This will aid in improving procurement function performance as much capital will not be tied up in acquired inventories which ultimately affect cash flows.

The receiving process of materials coming into the firms should be effectively and efficiently controlled through first ensuring that the receiving bay or section is at most proximal location. Materials handling equipment should be used for handling outlined materials correctly while putting the consideration that extra handling does not add value. Quantity and quality inspection should always be done and ensuring that there is no traffic of materials in the receiving section. These activities enhance the performance of the procurement function as they ensure the right quality is received, extra costs are not incurred and production is not delayed.

Manufacturing firms should practice long-term relationship with suppliers and develop strategies to develop them so that they can be able to deliver the quality required without errors and defects. Reliable communication practices should be adopted among the suppliers and the buying organization so as to curb costs from quantity and product deviations. Firms should outsource logistical services from expertise firms so as to minimize damages and delays in materials in transport. These activities improve the performance of the procurement function as they reduce or prevent costs from deviations in delivery.

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