EFFECT OF SYSTEM REVIEW PRACTICES ON OPERATIONAL PERFORMANCE OF CONSTRUCTION INDUSTRY IN UASIN GISHU COUNTY, KENYA

Elson K. Kirui

PhD Student, Jomo Kenyatta University of Agriculture and technology, Kenya

Kimani E. Maina

Lecturer, Jomo Kenyatta University of Agriculture and Technology, Kenya

International Academic Journal of Economics and Finance (IAJEF) | ISSN 2518-2366

Received: 6th May 2020

Published: 18th May 2020

Full Length Research

Available Online at: http://www.iajournals.org/articles/iajef_v3_i5_191_203.pdf

Citation: Kirui, E. K. & Kimani, E. K. (2020). Effect of system review practices on operational performance of construction industry in Uasin Gishu County, Kenya. *International Academic Journal of Economics and Finance*, *3*(5), 191-203

ABSTRACT

System review practices is key to any business in that, for any construction industry that carries inventory, or products stored for future sale, it is necessary to keep track of what is currently on hand. This is achieved through various practices for example keeping track of inventory using a periodic inventory system, continuous inventory system, vendor managed inventory and others. The objective of the study was to evaluate the effect of system review practices on operational performance of construction industry in Uasin Gishu County, Kenya. The study was guided by systems theory. The research adopted the descriptive research design. The target population was the construction contractors in Kenya and the accessible population was the construction contractors in Uasin Gishu County, Kenya and licensed by the National Construction Authority of which as at 1st February, 2018 stood at 340 for building works and 298 for road works. The sample size was 34 building contractors and 30 road contractors. The study adopted a two stage sampling technique. Stratified sampling technique was applied in grouping companies into building works contractors and road works contractors. Simple random sampling applied where 1 director, 1 technical staff and 1 secretary were targeted in each of the 64 sampled companies. A pilot study was done where 20 respondents were selected randomly from the building and road works contractors in Uasin Gishu County, Kenya and the piloted respondents were not part of the study. The study collected primary data using questionnaire and secondary data from journal articles. Data collected was analysed using both descriptive and inferential statistics. Descriptive statistics included mean, frequency, standard deviation, variance and percentages whereas inferential statistics included pearson product moment correlation coefficient and regression analysis. Data was presented using tables, charts and graphs. The study established that system review practices increases operational performance of construction industry in Uasin Gishu County, Kenya (β=0.278; $p<0.05$). The study concluded that system review practices has a significant influence relationship with operational performance of construction industry in Uasin Gishu County, Kenya. The study recommends that the national construction authority (NCA) as the regulating body of the construction industry should ensure that contractors embrace the application of information technology (IT) in their operations. This will enable the construction industry to apply the relevant system review practices pertaining operations of the construction industry. Also, the study recommends that the government should come up with sensitization programs pertaining benefits of excellent inventory management practices.

Key Words: *system review, operational performance, construction industry*

INTRODUCTION

For any business that carries inventory, or products stored for future sale, it is necessary to keep track of what is currently on hand. Some businesses keep track of inventory using a periodic inventory system. A periodic inventory system is an inventory system that updates

inventory at the end of a specified period of time. This may mean that they update their inventory records at the end of each month, quarter, or year. Other methods for carrying system reviews on inventory management are: continuous system review, vendor management inventory, jointly managed inventory and inventory management between counts. Brigham et al. (2013) posit that the firm should design and develop an inventory management system that balances the demand and supply. This is intended to reduce inventory costs, reduce the cycle time and improved sharing of information. This will help the businesses to manage and coordinate their supply chain more effectively of which this is a long term goal of improving company's performance. Proper system review will improve on the efficiency and effectiveness of the construction industry leading to the reduction of waste, reduction of costs and improved customer satisfaction.

In order to improve operational efficiency an organization has to measure both the input and the output side of the inventory management (Maksoud, 2011). Effective inventory management has become a critical issue for firms' productivity. Inventory management is essential in the operation of any business that wishes to achieve efficiency in production. Many large manufacturing firms have saved millions of dollars in costs and decreased inventories while improving efficiency and customer satisfaction though various inventory management practices (Chapman et al., 2000). Construction project is the product of the construction industry and therefore, project performance which falls in one of the non-financial categories (product performance) defined by Gunday, Ulusoy, Kilic and Lutfihak (2011) is suggested as one of the suitable dimensions for the performance indicator for construction industry in determining the overall organizational performance. Construction project is the product of the construction industry and therefore, project performance which falls in one of the non-financial categories (product performance) defined by Gunday, Ulusoy, Kilic and Lutfihak (2011) is suggested as one of the suitable dimensions for the performance indicator for construction industry in determining the overall organizational performance.

STATEMENT OF THE PROBLEM

Success of any construction industry is mirrored through proper system reviews applied in the organization management. However, management of construction companies is always indifferent on the perfect system review to be adopted in order to attain the maximum outcome in regard to company systems so as to achieve the required operational performance. Thus leaving the system review practices to remain an academic debate among the other aspects that contribute to the success of any business. System review practices is analysed in order to ensure that the company achieves accurate accounting and accurate inventory counts, since the inventory system can generate real-time costs of goods sold at any trading period. According to Yu (2010), proper systems adopted by any organization has great possibility to solve logistics and supply chain management problems because it has great abilities to reduce workload to project managers, improve the demand forecasting, and others. Proper system review practice in construction industry is one of the key factors for success. The challenge in system review practice is how to adopt to an effectively universal system that benefits both

the customer and the supplier. Problems are likely to rise when inventory is not tracked properly. Inefficiency and additional costs mount, supplies get lost, shrinkage can go unchecked, stock-outs occur, critical equipment locations are uncertain, billing is inefficient since supplies are used without being associated to client's record, and on-hand inventory can balloon unnecessarily. All of these leads to inefficiency and additional costs due to poor systems in place (Oballah, Waiganjo & Wachiuri, 2015). Omojola and Olugboyega (2015) conducted a study on the influence of construction materials supply chain network structures and strategies on project delivery in Nigeria and found out that phone and personal interaction were the network systems employed by small contractors to relate with material suppliers with suppliers and small contractors not employing information technology in their supply chain network, and that strategies employed by contractors to select suppliers had a positive influence on cost, quality and schedule of projects. A study done by Keitany, Wanyoike & Richu (2014) on the role of materials management on organizational performance in Kenya revealed that that there is a significant increase in operational performance as a result of the use of proper inventory control systems.

RESEARCH OBJECTIVE

The research objective of the study was to determine the effect of system review practices on operational performance of construction industry in Uasin Gishu County, Kenya.

RESEARCH HYPOTHESIS

System review practices does not significantly affect the operational performance of construction industry in Uasin Gishu County, Kenya.

THEORETICAL REVIEW

Systems theory was propagated by Bertalanffy in 1936. The argument of the theory is that if multiple disciplines focuses their research and theory development efforts, they would be able to identify laws and principles which would apply to many systems. Basically, the function of any system is to convert an input into an output through processes. For any system to survive, it must save some of the outcome or product to maintain the running of the system. Bertalanffy (1972) defines system theory as the trans-disciplinary study of systems in general, with the goal of elucidating principles that can be applied to all types of systems at all nesting levels in all fields of research. In practice, several methodologies (such as operations research, systems analysis, and systems dynamics) employ systems approach to understanding complex phenomenon and problems thus this theory applies to the second objective of this study.

Construction industry through its huge inventory management must in a daily basis employ a good sounding system of operations. According to Dent and Umpley (1998), systems theory is based on the six underlying assumptions which are: observation, cause/effect, reflexivity, self- organization, determinism, and interdependence. Our contention is that the six underlying assumptions are what distinguish systems theory from other theories of traditional sciences. The theory explains the value of integration of parts of a problem. Problems cannot

be solved as well if they are considered in isolation from interrelated components. An enormous advantage systems analysts have in knowing the definitions of systems theory is that they present us with ideal guidelines for our initial familiarization with a new problem, which of course is a new system. This theory has done a lot as far as systems development is concerned. The world today is setting trends in trying to outdo traditional approaches in organizations and inputting computerization and automation.

Systems theory is relevant to the study because in the construction industry, there is interaction with the outside world as they are often systems or as they seek to develop systems. Sections of organizations interact amongst themselves in exchange of key information and materials. Procurement, transport and the stores departments are part of the entire supply chain (Lysons & Farrington, 2006). This proves the dependence between departments in internal environment and even the external environment such that the automation of one department causes the automation of the other department also. Concrete criticisms have been made on this theory. According to Jayeoba et al., (2013), there are several levels and types of interaction such as; worker-worker, worker-union, union-management, management-leadership, worker (union)-owner's, worker-customer, management-customer, worker-societal (host community), management-societal, owners-societal, superior-subordinate. Equally, some interactions are gender specific, ethnic specific, and age specific. Also, important is the leadership/management, management/union negotiators. In the era of alternative dispute resolution, some neutral third-parties such as arbitrators, conciliators and board of enquiry are introduced into the system.

EMPIRICAL REVIEW

Sindhu, Nirmalkumar and Krishnamoorthy (2014) researched on inventory management system in construction industries in India. Initially, questionnaire survey was conducted in various construction companies. Next, those results were analyzed by using Statistical Package for Social Sciences (SPSS). Findings revealed the following inventory management risks: lack of storage space, problems with decentralized processing, inadequate training practices, improper financial support in ordering of materials, and difficulty in delivery of long lead materials. The study gave results based on one variable thus giving conflicting conclusions.

Kasim (2011) researched on implementation of information and communication technology (ICT) for materials management in construction projects in Malaysia. Construction organizations were visited and semi-structured interviews were used as a method of collecting data from those responsible for managing construction projects such as project manager, site manager and project coordinator. The findings revealed that spreadsheets and handheld devices were the common ICT tools adopted in the materials management processes. The main barrier was found to be the high cost involvement at the initial stage and in overall implementation of ICT in the materials management processes. However, the sample size of five construction industries from the whole country was not sufficient thus the results of this study cannot be fully relied upon.

Omojola and Olugboyega (2015) conducted a study on the influence of construction materials supply chain network structures and strategies on project delivery in Nigeria. The study carried out a questionnaire survey to address the problem. In total, 60 questionnaires were administered to small contractors and material suppliers in the study area with a response rate of 100%. The data was analysed using percentage tables, relative importance index, linear regression and Pearson's coefficient of correlation and determination. The findings revealed that the phone and personal interaction were the network systems employed by small contractors to relate with material suppliers. The findings also revealed that suppliers and small contractors were not employing information technology in their supply chain network, and that strategies employed by contractors to select suppliers had a positive influence on cost, quality and schedule of projects.

Yu (2010) carried a study on the vendor managed inventory on construction industry in Sweden. Interviews were applied in the study. The study points out that logistic companies showed great interests in the VMI method, since VMI could potentially help companies to obtain more business and secure long-term cooperation. Moreover, VMI to has great possibility to solve logistics and supply chain management problems in the construction sector, because it has great abilities to reduce workload to project managers, improve the demand forecasting, and others. The study used only one measure of the system review, that is vendor managed inventory.

Kitheka and Ondiek (2014) carried out a study on inventory management automation and the performance of supermarkets in Western Kenya. The study employed a descriptive survey design and targeted all the supermarkets in Kisumu, Kakamega and Bungoma. Data was collected from 11 out of the 12 targeted supermarkets and a response rate of 90.9% was achieved. Data was gathered using structured questionnaires and analysed using both descriptive and inferential statistics, with the help of statistical package for social sciences (SPSS). Findings 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 study utilized only on one variable, that is, inventory management automation in order to measure organizational performance.

RESEARCH METHODOLOGY

Research Design

A research design outlines how the research will be conducted. Generally, this is a guide to the research process. Research design is a plan and structure of investigation so conceived as to obtain answers to the research questions (Cooper, 2008). Descriptive research design was used in this study. This design granted the researcher with fairly a lot of information from a huge sample of individuals. The design accurately describes an association between variables minimizing bias and maximizing the reliability of the data (Kothari, 2008). This design was intended to provide solutions to the hypotheses. According to Mbuvi et al., (2016) descriptive research design utilizes both quantitative and qualitative data, which enables the researcher to

have an in-depth examination of the key indicators under investigation. Basically, descriptive research design is appropriate since it describes the elements of the study variables.

Population of the Study

A population refers to all individuals, units or elements that meet the selection criteria for a group to be studied, and from which a representative sample is taken for detailed examination. According to Borg and Gall (2009) target population is a universal set of research of all members of actual or imaginary set of people, events or objects to which an investigator wishes to generalize the result. The target population of the study was the construction contractors in Kenya and licensed by the National Construction Authority. Accessible population is the final group of participants from which data is collected by surveying either all its members or a sample drawn from it (Asiamah et al., 2017). Accessible population for the study was 340 building works and 298 road works contractors licensed by the National Construction Authority as at 1st February, 2018 and their operations centred at Uasin Gishu County, Kenya.

Sampling Technique and Sample Size

This is a way of gathering information whereby information will be collected from a study population representation. Cooper and Schindler (2011) state that stratified sampling is best suited in research because it minimizes biasness. The study adopted a two stage sampling technique method. Stratified sampling technique was applied in the first stage where companies were grouped as building works contractors and road works contractors. There are 340 building works contractors and 298 road works contractors. In a descriptive research, a sample size of 10-50% is accepted (Mugenda & Mugenda, 2003). Thus, the researcher took 10% of the accessible population to be used on the study hence 34 building works and 30 road works companies were targeted. The total population of 64 companies in Uasin Gishu County, Kenya was divided into two strata; that is 34 building works contractors and 30 road works contractors. The second stage applied the simple random technique to identify 1 director, 1 technical staff and 1 secretary in each of the 64 selected companies. Therefore, a total of 192 respondents were sought for the study.

Data Collection Technique

Primary data was collected through semi-structured questionnaire. Questionnaire contained both open and close-ended questions so as to be able to capture more information from the respondents. This method was adopted because questionnaires provide an efficient and convenient way of gathering the data within the resources and time constraints (Gitau, 2016). The structure of the questionnaire provided the flexibility for specific and unique responses to some of the questions (Wangari & Kagiri, 2015). Secondary data was obtained from the journal articles on the operational performance of construction industry.

Pre-testing of Research Instruments

A pilot study was done before commencing on the actual study. The aim of the pilot study was to test the reliability and validity of the research instrument (Wire, 2015). Mugenda and Mugenda (2003) suggest that the piloting sample ought to represent 10% of the population size based on the study sample size. The accuracy and validity of the data instrument of the study was thus tested by administering it to 20 respondents randomly selected from the building and road works contractors from Uasin Gishu County, Kenya. The instrument of the study was modified according to the pilot test responses. Piloting helps in revealing questions that could be vague which facilitates their examination until they communicate the same sense to all the subjects (Mugenda & Mugenda, 2003).

Data Processing and Analysis

After collecting all the relevant data, the questionnaires were edited, coded and classified for completeness and accuracy. The data collected was analysed using descriptive statistics and inferential statistics. Descriptive statistics included mean, frequency, standard deviation, variance and percentages. Inferential statistics included pearson product moment correlation coefficient and regression analysis. Regression analysis is a research method used when the study involves modeling and analyzing several variables, where the relationship includes a dependent variable and one or more independent variables to provide meaningful and accurate conclusions of the phenomenon under study (David, 2005). Information was displayed by use of bar charts, graphs, pie charts and tables to search for any correlation between the variables. The study adopted the linear regression model as shown in Equation 1

$$\hat{Y} = \beta_0 + \beta_1 X_1 + \varepsilon$$

Where: $\hat{Y}$ represents the operational performance, β_0 is a constant, that is the y-intercept for the regression model, β_1 is the beta coefficient of system review practices, X_1 represents system review practices and ε is an error term.

RESEARCH FINDINGS AND DISCUSSIONS

The study sought to find out the effect of system review practices on operational performance of construction industry in Uasin Gishu County, Kenya through the respondent's views. The research findings showing the resultant means and standard deviations of the variable statements are presented in Table 1.

From the findings, the respondents agreed that the company updates its inventory counts each time an item is removed from the store (mean=1.865; std dev=0.939) and that, the company performs stock-taking periodically at a specified time period (mean=2.401; std dev=1.008). The respondents were indifferent whether the company's inventory levels are managed by the supplier (mean=3.208; std dev=1.012) and that, whether the company's inventory levels are managed by both the supplier and the company itself (mean=2.865; std dev=1.283). Lastly, the respondents were unclear whether the company manages its inventory levels by use of the purchase account ledger (mean=2.771; std dev=1.228).

Table 1: Descriptive Statistics for System Review Practices

S/No	System review practices statements	N	Min	Max	Mean	Std Dev
i.	The company updates its inventory counts each time an item is removed from the store	192	1.00	5.00	1.865	0.939
ii.	The company performs stock-taking periodically at a specified time period	192	1.00	5.00	2.401	1.008
iii.	The company's inventory levels are managed by the supplier	192	1.00	5.00	3.208	1.012
iv.	The company's inventory levels are managed by both the supplier and the company itself	192	1.00	5.00	2.865	1.283
v.	The company manages its inventory levels by use of the purchase account ledger	192	1.00	5.00	2.771	1.228

The findings mirrored on the observation made by Sindhu, Nirmalkumar and Krishnamoorthy (2014) which noted that the system variable gave conflicting conclusions. Also, it was noted that the findings were in line with the observation of Omojola and Olugboyega (2015) which revealed that suppliers and small contractors were not employing information technology in their supply chain network. The finding results implies that the respondents have conflicting conclusions on whether the system review practices variable has a positive or no statistical significance in operational performance of construction industry in Uasin Gishu County, Kenya.

INFERENTIAL ANALYSIS

The study carried a correlation analysis between system review practices and operational performance of construction industry in Uasin Gishu County, Kenya. Result findings are shown in Table 2.

Table 2: System Review Practices Correlation Analysis

		Operational Performance
System Review Practices	Pearson Correlation	0.371**
	Sig. (2-tailed)	0.000
	N	192

**. Correlation is significant at the 0.01 level (2-tailed).

System review practices indicate a statistically positive significant relationship with operational performance of construction industry in Uasin Gishu County, Kenya ($r=0.371$; $p<0.01$). This implies that implementation of system review practices in the construction industry of Uasin Gishu County, Kenya would yield a positive growth on its operational performance.

From the analysis, it was noted that there exists a strong positive relationship between the study variable. This is shown by the correlation coefficient ($R=0.371$). Also, $R2=0.138$

meaning 13.8% variation in the operational performance of construction industry in Uasin Gishu County, Kenya is explained by the predictor variable in the model. However, 86.2% variation in the operational performance of construction industry in Uasin Gishu County, Kenya is due to other predictor variables not in the regression model. The summary for the linear regression model is shown in Table 3.

Table 3: Summary Model for the Linear Regression

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.371[a]	0.138	0.133	0.53485

a. Predictors: (Constant), System Review Practices

From the analysis, the linear regression model is statistically significant (F=30.390; p=0.000) thus making the model good fit for the data. The significance value (p-value) is 0.000 which is less than 0.005 thus making the model statistically significant in predicting how the independent variable affects the dependent variable of the study. The ANOVA results are shown in Table 4.

Table 4: ANOVAa Analysis Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	8.693	1	8.693	30.390	0.000[b]
Residual	54.351	190	0.286		
Total	63.045	191			

a. Dependent Variable: Operational Performance
b. Predictors: (Constant), System Review

From the findings, the test results show a positive significance of the predictor variable. System review practices is a significant predictor on operational performance of construction industry in Uasin Gishu County, Kenya (t=5.513; sig.=0.000). Hence, the research hypothesis that system review practices does not significantly affect the operational performance of construction industry in Uasin Gishu County, Kenya was rejected at significance level of 5%. The results of analysis are shown in Table 5.

Table 5: Linear Regression Model Significant Test Results a

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
Constant	1.284	0.138		9.323	0.000
System Review Practices	0.278	0.050	0.371	5.513	0.000

a. Dependent Variable: Operational Performance

Based on the findings of the t-test results, the independent variable was proved to be significant at significance level of 5%. Its p-value was less than 0.05 significance level. Therefore, the study variable result in the regression equation as shown in Equation 2.

$$\hat{Y} = 1.284 + 0.278X_1$$

Equation 2 depicts that if the construction industry in Uasin Gishu County, Kenya does not implement the system review practices, operational performance would be constant at 1.284 unit. A unit increase in system review practices will lead to 0.278 increase in operational performance of construction industry in Uasin Gishu County, Kenya.

RESEARCH RESULTS

Effect of System Review Practices on Operational Performance of Construction Industry in Uasin Gishu County, Kenya

The findings pointed out that the respondents were in agreement that the company updates its inventory counts each time an item is removed from the store and that, the it performs stock-taking periodically at a specified time period. The respondents were indifferent whether the company's inventory levels are managed by the supplier and also, whether the company's inventory levels are managed by both the supplier and the company itself. Lastly, the respondents were unclear whether the company manages its inventory levels by use of the purchase account ledger. System review practices indicated a statistically positive significant relationship with operational performance of construction industry in Uasin Gishu County, Kenya. It was noted that the findings on the effect of system review practices in Uasin Gishu County, Kenya tied with the assertion of the systems theory that, system review practices incorporate the interaction with the outside world as they are often systems or as they seek to develop systems for example with the suppliers of construction materials.

Operational Performance of Construction Industry in Uasin Gishu County, Kenya

It was noted that the respondents were in agreement that system review practices have contributed to the quality improvement on the company's products and also it has contributed to the efficiency and effectiveness of the company's operations. Further, the respondents were in agreement that system review practices have contributed to the cost reduction policies of the company and also it has contributed to client unwaveringness in the company. Lastly, the respondents were in agreement that system review practices have contributed to on-time delivery of the company's inventory.

CONCLUSIONS

The study concluded that there is a statistically positive significant relationship between system review practices and operational performance of construction industry in Uasin Gishu County, Kenya. Thus the construction industry is encouraged to have an efficient system review practice as this will improve on the operational performance of the company.

RECOMMENDATIONS

The study recommends that the national construction authority (NCA) as the regulating body of the construction industry should ensure that contractors embrace the application of information technology (IT) in their operations. This will enable the construction industry to apply the relevant system review practices pertaining operations of the construction industry.

Also, the study recommends that the government should come up with sensitization programs pertaining benefits of excellent inventory management practices. This will act as a motivational gear since all construction industry partners are after better returns on their investments. The company's interaction with the external environment brings in the essence of the systems theory which applies well on the continuous and periodic review measures. However, the applicability of this theory has some limitations on the measure of vendor managed inventory, jointly managed inventory and inventory management between counts due to the conflicting conclusions from the respondents.

REFERENCES

Ahmed B. Abdel-Maksoud (2011). Management Accounting Practices and Managerial Techniques and Practices in Manufacturing Firms: Egyptian Evidence. *Int. J. Managerial and Financial Accounting, 3*(3), 237-246.

Asiamah, N., Mensah, H. K. & Oteng, E. F. (2017). General, Target, and Accessible Population: Demystifying the Concepts for Effective Sampling, *The Qualitative Report, 22*(6), 1607-1622.

Bertalanffy, L. V. (1950). An Outline of General System Theory. *British Journal of the Philosophy of Science, 1*(1), 134-164.

Borg, W. & Gall, M. D. (2009). *Educational research: An introduction,* (5th ed.). New York: Longman.

Brigham, E. & Gapenski, L. (2013). *Intermediate Financial Management*, New York: Pearson Prentice Hall.

Chapman, S., Ettkin, L. P. & Helms, M. M. (2000). Businesses Need Supply Chain Management, *Institute of Industrial Engineers Solutions, 32*(8), 31 - 35.

Cooper, D. & Schindler, P. (2011). *Business Research Methods, 11th Edition*. Boston: McGraw Hill.

Cooper, D. (2008). *Business Research Methods.* London: McGraw Hill Publishers.

David, B. (2005). *Regression Analysis Application: Repression Sensitization as a Dimension of Personality*. New York: Free Press.

Dent, E. B. & Umpley, S. A. (1998). *Underlying Assumptions of Several Traditions in Systems Theory and Cybernetics*. The George Washington University: Robert Trappl Publishers.

Esther, O. M. (2015). The Effect of Inventory Management Practices on Service Delivery at St. Martin's Hospital, Agroyesum, Amansie-West. *Corporate Management, Governance, and Ethics Best Practices, 5*(6), 121-191.

Gitau, N. N. (2016). Inventory Management Practices and Organizational Productivity in Parastatals in Kenya. *IOSR Journal of Business and Management, 7*(1), 11-56.

Gunday, G., Ulusoy, G., Kilic, L. & Alpkan, L. (2011). Effects of Innovation Types on Firm Performance. *International Journal of Production Economics, 133*(2), 662-676.

Jayeoba, F. I., Ayantunj, O. I. & Sholesi, O. Y. (2013). A Critique of the Systems Theory of J. T. Dunlop. *International Journal of Academic Research in Economics and Management Sciences, 2*(2), 2226-3624.

Kasim, N. (2011). ICT Implementation for Materials Management in Construction Projects: Case Study on KICEM. *Journal of Construction Engineering and Project Management, 1*(1), 31-36.

Keitany, P. J., Wanyoike, D. M. & Richu, S. (2014). Assessment of the Role of Materials Management on Organizational Performance: A Case of New Kenya Cooperative Creameries Limited, Eldoret Kenya. *European Journal of Materials Sciences, 23*(5), 1-10.

Kitheka, S. S. & Ondiek, G. O. (2014*).* Inventory Management Automation and the Performance of Supermarkets in Western Kenya. *International Journal of Research in Management & Business Studies, 1*(4), 9-18.

Kothari, C. (2004). *Research Methodology: Methods and Techniques, 2nd edition,* New Delhi, India: New Age International Publishers.

Kothari, C. R. (2008). *An Introduction to Operational Research*, New Delhi: Vikas Publishers.

Lysons, K. & Farrington, B. (2006). *Purchasing and supply chain management*, (7th ed.). Harlow, United Kingdom: Pearson Education Publishers.

Mbuvi, L., Namusonge, G. & Arani, W. (2016). Factors Affecting Automation of Inventory Management in Micro, Small and Medium Enterprises: A Case Study of Kitui County. *International Journal of Academic Research in Business and Social Sciences, 6*(1), 2222-6990.

Mugenda, O. M. & Mugenda, A. G. (2003). *Research Methods*, Nairobi: Laba Graphic Services.

Oballah, D., Waiganjo E. & Wachiuri E. W. (2015). Effect of Inventory Management Practices on Organizational Performance in Public Health Institutions in Kenya: A Case Study of Kenyatta National Hospital. *International Journal of Education and Research. 3*(3), 703-711.

Omojola, S. O. & Olugboyega, O. (2015). Influence of Construction Material Supply Chain Network Structures and Strategies on Project Delivery in Obafemi Awolowo University, Ile Ife, Nigeria. *Journal of Civil and Environmental Research, 7*(9), 2224-5790.

Sindhu, S., Nirmalkumar, K. & Krishnamoorthy, V. (2014). Performance Analysis of Inventory Management System in Construction Industries in India. *International Journal of Innovative Research in Science, Engineering and Technology*, 3(4), 11488-11493.

Wangari, K. L. & Kagiri, A. W. (2015). Influence of Inventory Management Practices on Organizational Competitiveness: A Case of Safaricom Kenya Ltd. *International Academic Journal of Procurement and Supply Chain Management, 1*(5), 72-98.

Wire, W. C. (2015). Influence of Working Capital Management Practices on Financial Performance of Small and Medium Manufacturing Enterprises in Nairobi County, Kenya. *African Journal of Business Management, 45*(98), 125-151.

Yu, D. (2010). *Vendor Managed Inventory in the Swedish Construction Industry.* Sweden: Chalmers University of Technology Press.