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**EFFECT OF JUST-IN-TIME IMPLEMENTATION ON SUPPLY CHAIN
PERFORMANCE IN MANUFACTURING SECTOR IN KENYA: A CASE OF EAST
AFRICAN BREWERIES LIMITED**

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ABSTRACT

This study sought to ascertain the effects of Just-In-Time implementation on supply chain performance in manufacturing sector in Kenya, a case of East African Breweries Limited. The specific objectives that guided that study included to determine if organizational policy affect supply chain performance in manufacturing sector in Kenya; to assess if Information Technology Integration affect supply chain performance in manufacturing sector in Kenya; to find out if demand management affect supply chain performance in manufacturing sector in Kenya; and to establish if Quality Management affect supply chain performance in manufacturing sector in Kenya. This study employed descriptive research design to achieve these objectives. The study population comprised of 400 managers working at East Africa Breweries Limited in the following management positions: senior management, middle level management and lower level management. This study sampled 10% of the target population using stratified random sampling technique. The sample size was 40 respondents. A semi-structured questionnaire was used to collect primary data for this study. Data collected was analyzed using descriptive, inferential and content analysis methods. IBM SPSS Statistics version 21 was used to aid in data analysis. Quantitative data analysis results were presented using charts and tables. The results revealed that organizational policy on JIT implementation affected supply chain performance at EABL to a great extent. The findings have also shown that Information Technology Integration, Demand management and Quality management affect supply chain performance at EABL. This study concluded that having a clear organizational policy on JIT implementation is important in an organization as it has been found to positively affect supply chain performance. Information Technology Integration is crucial to JIT implementation. In JIT implementation, it is important to consider the demand management ability as it has been revealed to positively affect supply chain performance. The same applies to quality management in JIT implementation. This study recommends that EABL should review its organizational policy on JIT implementation to improve its supply chain performance especially in regards to better human resource management practices. EABL should also enhance its Information Technology Integration to promote information sharing and support its ERP systems.

INTRODUCTION

In today's competitive global business environment, the goal of all manufacturing systems is long-term survival. A company's survival in an increasingly competitive market closely depends upon its ability to produce highest quality product at lowest possible cost and in a timely manner with shortest possible lead time. In addition, these goals should be achieved by paying utmost respect to the humanity of the employees who make the system work. Sometime, the difficulty of achieving the goals lies in the

complexity of operations. It is not difficult to build the high quality product, but is extremely difficult to do so while maintaining excellent quality, and at some time respecting the humanity of people who do the actual work of building that product (Qureshi et al., 2013).

Just-in-time (JIT) as the name suggests is to produce goods just-in-time for use or sale. It is a Japanese manufacturing philosophy developed in the 1970s. JIT had its motivation in the Japanese urge to develop better and efficient technique capable of rebuilding their economy after World War II. JIT was invented by Taiichi Ohno of Toyota shortly after World War II. Ohno's system was designed to handle large or small volumes of a variety of parts. Prior to JIT, enormous defects existed in the manufacturing system that relates to inventory problem, product defects, rising cost of production through wastes and production delays (Adeyemi, 2010).

JIT advocates the elimination of waste by simplifying production processes, reductions in set up times, controlling material flows, and emphasizing preventive maintenance. These are seen as ways by which excess inventories can be reduced or eliminated, and resources utilized more efficiently. There are four cardinal objectives of JIT. First is the elimination of all activities that do not add value to product or service. The second objective is a commitment to a high level of quality and third objective is a commitment to continuous improvement in the efficiency of an activity. The fourth objective is an emphasis on simplification and increased visibility to identify activities that do not add value (Kannan and Tan, 2005).

Manufacturing firms today face different challenges from management of waste to improving performance. As the industrial environment becomes more competitive many have over the time considered implementing lean systems such as JIT in order to remain competitive. The focus of many manufacturing firms as pointed out by Muhamad, Suresh, Tian and Puvanasvaran (2012), has been on increasing operational efficiency, reducing costs, enhancing quality levels, ensuring steady profits, and meeting customer needs. The implementation of lean philosophies such as JIT may lead to operational and strategic gains for manufacturing firms (Openda, 2013).

Conceptually, JIT approach combines apparently conflicting objectives of low cost, high quality, manufacturing flexibility, and delivery dependability. Its effects are significant in improving the overall performance of the whole organization. However, there is no standard to implement JIT other than continuous progress towards the ultimate objective of delivery as wanted, with a smoothly synchronized continuous flow keyed to final demand, with perfect quality of incoming goods. Even with this problem, it provides a wide range of benefits. The adoption of JIT based approach may be helpful for manufacturing companies, which are still struggling with problems of unreliable and long lead-time, inferior quality, low productivity, high rate of scrap and defects, shortage of raw-material, and under utilization of workers and equipments (Moori, Pescarmona and Kimura, 2013).

East African Breweries Limited

EABL is East Africa's leading branded alcohol beverage business and has an outstanding collection of beer and spirits brands. It supports industries and a distribution network across the region. The group's diversity is an important factor in delivering the highest quality brands to East African consumers and long-term value to East African investors. EABL is the holding company of nine subsidiaries; Kenya Breweries Ltd (KBL) which is a bottling plant and barley processing company, East Africa Malting Ltd (EAML), a barley and malt production company, Uganda Breweries Ltd (UBL), which distills and produces a range of the finest quality spirit brands for the local and export markets. Others include United Distillers Vintners (Kenya) Limited (UDV) whose core business is the manufacture, marketing and sales of spirit based alcoholic beverages and International Distillers Uganda Limited which manufactures, markets and sales of spirits in Uganda. East African Maltings (Uganda) Limited plays a vital role of supplying quality brewing raw materials in the form of Malt, Barley and Sorghum to the brewing units of the EABL group in Uganda. EABL International Limited focuses on building the Spirits business in Eastern Africa and driving the geographic expansion through greater focus to drive a total beverage business and through expansion into new markets such as The Great Lakes Region. Serengeti Breweries Limited (SBL) has the largest beer market share in Tanzania while East African Beverages South Sudan Limited (EABSS) commenced operations in 2013 with the set-up of a depot in Juba from which it would supply beer and spirits to its distributors.

EABL has an annual turnover of Kshs 30 Billion, being one of the most profitable firms in Kenya and it has the largest share of the beer industry in the region. The group employs more than 1000 people across East Africa. EABL has been awarded the accolade of the "Most Respected Company in East Africa", five years in a row (2000, 2001, 2002, 2003 & 2004) in a survey conducted by PricewaterhouseCoopers and the Nation Media Group. EABL faces stiff competition from imported beer and spirits, Kenya Wine Agencies Ltd (KWAL), Keroche Industries and the local illicit brews among others. EABL has stated its purpose as celebrating life every day, everywhere. Its ambition is to create the best performing, trusted and respected consumer products company in Africa. EABL's vision is to be the most celebrated business in every market in Eastern Africa (EABL, 2015).

Statement of the Problem

Kenya's manufacturing firms have declined steadily since 1970s and new firms have only a 35 per cent chance rate of surviving in the market (World Bank, 2014). The contribution of manufacturing to GDP and exports has been stagnant. A World Bank report of 2014 indicates that manufacturing growth trailed overall economic growth in Kenya between 2010 and 2013. Compared with other countries, manufacturing growth was lesser in Kenya. According to the report, the manufacturing sector only contributed

11% of GDP in 2013 and employed only 12% of the 2.3 million who make up Kenya's labor force translating to a partly 280,000 individuals. The manufacturing sector contributed 26% of Kenya's merchandise exports out of which 40% was sold in the East African Community (World Bank, 2014).

Manufacturing firms in Kenya are operating in a highly competitive environment where resources are scarce and where uncertainty in business opportunities is common. The market has therefore imposed high efficiency standards and firms that fail to meet them quickly lose their competitive edge (Elisa et al., 2013).

Kenya just like other developing countries has had scanty research on JIT manufacturing and its effect on operational performance (Adeyemi, 2010). Previous studies have concentrated on lean manufacturing practices in individual firms' case studies and not the whole manufacturing industry (Ondiek and Kisombe, 2012; Rono, 2013; Openda, 2013). The previous studies have not clearly detailed the implementation of JIT in manufacturing firms in Kenya and its implication on supply chain performance. This study therefore sought to investigate the effects of Just-In-Time implementation on supply chain performance in manufacturing sector in Kenya, a case of East African Breweries Limited.

LITERATURE REVIEW

Theoretical Review

Theories refers to ways of thinking that help to identify and analyze important factors and relationships within envisaged situations (Simons, 2009). There are different theories that have been employed in supply chain management and this study adopts the following theories; the resource based view theory, Technology, Organization, and Environment Model (TOE), Transaction cost economics (TCE) theory and collaborative theory.

Conceptualization

Organizational Policy

Implementing a philosophy such as JIT will inevitably have consequences for every aspect of the organization (Sanders & Reid, 2012). The entire organization is affected by JIT, primarily because organizational barriers are eliminated. Functions that have not had much communication with each other in the past must now work together. Included are functions such as marketing, manufacturing, and engineering, which in traditional systems have separate agendas but now need to work together to achieve the goals of the organization as a whole. It therefore affects inventory, production, human resource and quality management. JIT inventory principle advocates for having reliable suppliers which allows for a reduction in the number of suppliers and the associated costs. It allows for less contingency inventory and frees up capital avoiding wasted interest cost. The ideal goal in JIT is to have no inventory in order to completely eliminate or reduce buffer

and work-in- all inventory costs. According to JIT production principle, the ideal goal is synchronizing demand and production to no units of product until an order is given. This eliminates unneeded production, unwanted inventory, and all the waste associated with them. JIT human resource principle seeks long-term commitment in an environment where employees are comfortable. It seeks to continuously identify problems and continuous improvement is a requirement of JIT.

Information and Communication Technology Integration

Use of information technology for communication has been associated with performance (Mia & Winata, 2003). The relationship between IT investment and performance continues to interest academics and practitioners (Devaraj & Kohli, 2003; Vickery et al., 2003). There are two categories of IT integration: internal integration and external integration. Most discrete manufacturers implement their internal IT systems, such as material requirements planning (MRP), first and then expand the scope of their IT integration into the supply chain. Most studies suggest that IT investment leads to improved firm performance including lead time. Reducing lead times has been cited as an important reason for adopting IT integration programs. Internal integration connects the different functions in a firm such as manufacturing, purchasing, and materials management. In particular, internal integration is aimed at improving the performance of cross-functional processes that make up the order-to-cash process. ERP systems are one example of IT designed to achieve high levels of internal integration. These information systems can be used to generate information and facilitate information sharing within the firm, which can enhance a firm's production capabilities. External integration refers to information systems that connect a firm with its suppliers and customers. Studies such as Frohlich (2002) and Subramani (2004) find that IT integration with suppliers and customers lead to improved firm performance.

Demand Management

Demand management is the supply chain management process that balances the customers' requirements with the capabilities of the supply chain (Langabeer, 2000). It is the management of relationships between suppliers and customers to deliver the best value to the customer at the least cost to the supply chain as a whole. With the right process in place, management can match supply with demand proactively and execute the plan with minimal disruptions. The process is not limited to forecasting. It includes synchronizing supply and demand, increasing flexibility, and reducing variability. Demand management is about forecasting and synchronizing. The strategic process is comprised of sub-processes that are aimed at designing an efficient operational system for matching supply and demand. Once a firm has an effective internal synchronization process, management should consider integrating key suppliers and customers directly into it. Demand management is an important component of successful supply chain management. A well thought-out implementation and seamless execution of the process can have substantial benefits on the firm through, for example, reduced inventory levels, improved asset utilization and improved product availability. It is not enough to forecast

well and have a good operations planning system. Demand management should include finding ways to reduce demand variability and increase operational flexibility, and implementing a good contingency management system so that the firm can quickly react to unplanned issues (Langabeer, 2000).

Quality Management

Quality management refers to practices of organizations that implement principles such as customer focus, continuous improvement and teamwork to improve product and service quality (Zu, 2009). Quality management is therefore a set of coordinated activities to direct and control an organization in order to continually improve the effectiveness and efficiency of its performance. According to Oakland (2003) an organization should make strategic decision to adopt a quality management system based on the organization's strategy, objectives, structure, size, products and services offered. According to Aghazadeh (2003), quality management is an important role in JIT as it encourage workers to help in the development of cost savings measures to get job done, and many other areas of reduction. Quality management can be applied in team based initiatives. The basic worker focused concepts include visualizing the procedure in less steps if possible, remembering that inventory is a moving item not a stable one, placing emphasis on synchronization of each procedure, elimination of unnecessary activities and waste reduction. These basic steps can attribute to JIT success. Routine employees properly in the workshop can save labor cost without delaying the production flow (Oakland, 2003). JIT is a tool for senior management to implement quality management. JIT quality principle seeks long-term commitment to enhancing product quality and ensuring never ending task quality control efforts. It seeks to continuously identify and correct all quality related problems as continuous improvement is a requirement of JIT (Aghazadeh, 2003).

Supply Chain Performance

Supply chain management (SCM) has been a major component of competitive strategy to enhance organizational productivity and profitability (Gunasekaran, Patel, and McGaughey, 2004). Supply chain performance measurement and metrics have received much attention from researchers and practitioners. The role of these measures and metrics in the success of an organization cannot be overstated because they affect strategic, tactical and operational planning and control. Performance measurement and metrics have an important role to play in setting objectives, evaluating performance, and determining future courses of actions. Supply chain performance is defined as the overall output across the supply chain link which is aligned to the objectives of a firm in terms of profitability, stock turn over, market share, investment expenditure and customer satisfaction (Neely, 2005).

RESEARCH METHODOLOGY

This study employed descriptive research design. The study population comprised of 400 managers working at East Africa Breweries Limited in the following management positions: senior management, middle level management and lower level management. A 10% sample of the population was used in the study

Table: Target Population

Management Level	Target population	Sample Size
Senior management	29	3
Middle level Management	121	12
Lower level Management	252	25
Total	400	40

The respondents were selected in such a way that the sample consisted of all the three sub-groups of managers. A semi-structured questionnaire containing both open-ended and close-ended questions was used to collect primary data for this study. The questionnaires were distributed using drop-and-pick later method to the respondents.

DATA ANALYSIS AND INTERPRETATION

Organizational policy

The respondents were asked to indicate the extent that organizational policy on JIT implementation affected supply chain performance at EABL. Majority of the respondents indicated to a great extent (59.5%) while 32.4% of the respondents indicated to a moderate extent. Only 8.1% of the respondents indicated that organizational policy on JIT implementation affected supply chain performance at EABL to a little extent.

Respondents were asked to indicate the extent they agree or disagree with three statements in regard to organizational policy on JIT at EABL. They were to use a five point likert scale where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree. The results show that respondents agreed with the statement that synchronization of functions has been enhanced by organizational policy on JIT at EABL (M=4.09, SD=.348). The respondents also agreed with the statement that organizational policy on JIT has improved communication at EABL (M=4.00, SD=.458). The respondents were neutral on the statement that there are better human resource management practices at EABL that can be attributed to organizational policy on JIT (M=3.89, SD=.718).

Information Technology Integration

The respondents were asked to indicate whether Information Technology Integration on JIT implementation affect supply chain performance at EABL. Majority of the respondents (89.2%) indicated yes as compared to 10.8% of the respondents who indicated no.

Respondents were asked to indicate the extent they agree or disagree with three statements in regard to information technology integration on JIT at EABL. They were to use a five point likert scale where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree. The results show that respondents agreed with the statement that information technology integration on JIT implementation has been instrumental in establishing MRP systems at EABL (M=4.33, SD=.471) and that information technology integration on JIT implementation has facilitated information sharing (M=4.11, SD=.403). Respondents also agreed with the statement that ERP systems at EABL were established courtesy of Information Technology Integration on JIT implementation (M=4.00, SD=.372).

Demand Management

The respondents were asked to indicate whether demand management on JIT implementation affect supply chain performance at EABL. The results have shown that majority of the respondents (94.6%) indicated yes as compared to 5.4% of the respondents who indicated no. Figure 4.3 Shows these results.

Respondents were asked to indicate their agreement or disagreement with three statements regarding demand management. They were to use a five point likert scale where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree. The results show that respondents agreed with the statements that demand management on JIT implementation has made it possible to establish a contingency management system at EABL (M=4.46, SD=.730) and there is operational flexibility as a result of demand management on JIT implementation at EABL (M=4.00, SD=.707). Respondents also agreed with the statement that Demand management on JIT implementation has been vital in forecasting at EABL (M=4.07, SD=.687).

Quality Management

Respondents were asked to indicate whether quality management on JIT implementation affect supply chain performance at EABL. The results show that majority of the respondents (94.6%) indicated yes as compared to 5.4% of the respondents who indicated no.

The respondents were asked to indicate their agreement or disagreement with three statements regarding quality management at EABL. The results show that respondents agreed with the statements that there is continuous improvement as a result of quality

management on JIT implementation (M=4.03, SD=.499) and that customer focus in production has been improved as a result of quality management on JIT implementation at EABL (M=4.03, SD=.287). Respondents were neutral on the statement that quality management on JIT implementation has strengthened quality control at EABL (M=3.86, SD=.481).

Supply Chain Performance

Respondents were asked to indicate whether Just-In-Time implementation affected supply chain performance at EABL. The results show that majority of the respondents (94.6%) indicated yes as compared to 5.4% of the respondents who indicated no.

The respondents were asked to indicate their agreement or disagreement with three statements that measure supply chain performance. The results indicated that respondents agreed with the statements that profitability has increased as a result of JIT implementation at EABL (M=4.68, SD=.580) and customer satisfaction has improved as a result of JIT implementation at EABL (M=4.24, SD=.723). Respondents were neutral on the statement that EABL has a bigger market share that can be attributed to JIT implementation in the firm (M=3.78, SD=.584).

Regression Analysis Results

A multiple linear regression analysis was done to examine the relationship of the independent variables with the dependent variable. The model summary table shows that 81% of change in supply chain performance can be explained by four predictors namely quality management, organizational policy, information technology integration, and demand management.

Table: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.912 ^a	.831	.810	.14175

a. Predictors: (Constant), Quality Management, Organizational Policy, Information Technology Integration, Demand Management

Analysis of variance (ANOVA) was done to establish the fitness of the model used. The ANOVA table shows that the F-ratio (F=39.434, $p=.000$) was statistically significant. This means that the model used was appropriate and the relationship of the variables shown could not have occurred by chance.

Table: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.169	4	.792	39.434	.000 ^b
	Residual	.643	32	.020		
	Total	3.812	36			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Quality Management, Organizational Policy, Information Technology Integration, Demand Management

The coefficients of determination show the contribution of each independent variable to the change in the dependent variable. The coefficients table results show that Organizational Policy ($\beta=.144, p=.026$) positively and significantly affected supply chain performance at EABL. The results also show that Information Technology Integration ($\beta=.198, p=.008$) positively and significantly affected supply chain performance at EABL. Demand Management ($\beta=.229, p=.001$) and Quality Management ($\beta=.607, p=.000$) were found to positively and significantly affect supply chain performance at EABL.

Table: Coefficients of Determination

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.631	.407		-1.549	.131
	Organizational Policy	.144	.062	.185	2.336	.026
	Information Technology Integration	.198	.070	.236	2.851	.008
	Demand Management	.229	.066	.312	3.486	.001
	Quality Management	.607	.124	.461	4.901	.000

a. Dependent Variable: Supply Chain Performance

Summary of Findings

This study sought to ascertain the effects of Just-In-Time implementation on supply chain performance in manufacturing sector in Kenya, a case of East African Breweries Limited. The specific objectives that guided that study included to determine if organizational policy affect supply chain performance in manufacturing sector in Kenya; to assess if Information Technology Integration affect supply chain performance in manufacturing sector in Kenya; to find out if demand management affect supply chain performance in

manufacturing sector in Kenya; and to establish if Quality Management affect supply chain performance in manufacturing sector in Kenya. This study employed descriptive research design to achieve these objectives. The study population comprised of 400 managers working at East Africa Breweries Limited in the following management positions: senior management, middle level management and lower level management. This study sampled 10% of the target population using stratified random sampling technique. The sample size was 40 respondents. A semi-structured questionnaire containing both open-ended and close-ended questions was used to collect primary data for this study. The questionnaires were distributed using drop-and-pick later method to the respondents. A pilot study was carried out among 5 lower level managers (1.25%) who did not take part in the main study. Data collected was analyzed using descriptive, inferential and content analysis methods. A multiple linear regression analysis was used to analyze the effects of organization policy, ICT integration, demand management, and quality management on supply chain performance. IBM SPSS Statistics version 21 was used to aid in data analysis. Quantitative data analysis results were presented using charts and tables. Multiple linear regression results have shown that 81% of change in supply chain performance at EABL can be explained by four variables namely quality management, organizational policy, information technology integration, and demand management.

Organizational policy effect on supply chain performance

The results revealed that organizational policy on JIT implementation affected supply chain performance at EABL to a great extent (59.5%). The results have also shown that Organizational Policy ($\beta=.144$, $p=.026$) positively and significantly affected supply chain performance at EABL.

Information Technology Integration effect on supply chain performance

The findings have also shown that Information Technology Integration (89.2%). Information Technology Integration ($\beta=.198$, $p=.008$) also positively and significantly affected supply chain performance at EABL.

Demand management effect on supply chain performance

The findings have shown that demand management (94.6%). The results further show that demand management ($\beta=.229$, $p=.001$) was also found to positively and significantly affect supply chain performance at EABL.

Quality management effect on supply chain performance

The results have revealed that quality management (94.6%) affect supply chain performance at EABL. Quality management ($\beta=.607$, $p=.000$) was also found to positively and significantly affect supply chain performance at EABL.

Conclusion

This study concluded that having a clear organizational policy on JIT implementation is important in an organization as it has been found to positively affect supply chain performance. This study also concluded that Information Technology Integration is crucial to JIT implementation. Evidence have shown that Information Technology Integration in JIT implementation positively affect supply chain performance in organizations. This study concluded that in JIT implementation, it is important to consider the demand management ability as it have been revealed to positively affect supply chain performance. The same applies to quality management in JIT implementation.

Recommendations

This study recommends that EABL should review its organizational policy on JIT implementation to improve its supply chain performance especially in regards to better human resource management practices. EABL should also enhance its Information Technology Integration to promote information sharing and support its ERP systems. This study recommends that EABL should maintain or if possible improve its demand management in regards to forecasting, flexibility and having a contingency management system. The study recommends that EABL should utilize JIT to strengthen its quality control.

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