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Influence of Lean Supply Chain Management Practices on the Performance of Manufacturing Firms in Kenya, a Case Study of Unilever Kenya Ltd.

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ABSTRACT

Lean Supply Chain Management is key for enhancing organizational performance in manufacturing firms. Despite many efforts to address lean supply chain management practices in manufacturing firms, there exist limited literature on the influence of lean supply chain management practices on the performance of manufacturing firms. Manufacturing companies face performance challenges which include an inadequate volume of sales, low profitability, uncompetitive market share, poor customer satisfaction associated with lean supply chain management practices. To fill this gap, the study sought to study the influence of lean supply chain management practices on the performance of manufacturing firms. In specific, the study aimed to assess the influence of just-in-time procurement on performance, to examine the influence of Sigma Six on performance, and to establish the influence of Total quality management on performance. The study used a descriptive research design. The target population was 400 employees from five departments which forms the internal supply chain of Unilever Kenya Limited. A stratified random sampling technique was employed in attaining a representative sample from the target population. The study used a 20% sample size from the target population which is represented by 80 respondents. Data collection was done using structured open and closed-ended questionnaires. To test the validity and reliability of the research instruments a pilot test was conducted which involved a pilot sample of 16 staff who were excluded from the actual research study. The data were analyzed by use of descriptive statistics and inferential analysis through statistical package for social sciences (SPSS) version 21 software. Regression analysis results revealed that Just in Time Procurement had an insignificant negative influence on performance, Six Sigma lean supply chain practice had a significant positive influence on performance and Total quality management had an insignificant positive influence on performance. The study concluded that Just in Time Procurement, Total quality management have no notable influence on performance. However, Six Sigma is a good driver of organizational performance. The study recommends that manufacturing companies should deploy more resources towards the implementation of Just in Time Procurement policies. For Total quality management study recommends that manufacturing firms should adopt a continuous quality improvement strategy across all functions within the organization. Generally, resources (e.g. finances, system-process integration infrastructure, operational staff involvement,

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and top management support, etc.) are key from implementation to adoption and success of lean supply chain practices for contribution to the performance of manufacturing firms.

Keywords: Just In Time (JIT), Six Sigma, Total Quality Management (TQM), Lean Supply Chain (LSC).

1. Introduction

The lean supply chain management concept is widely turning into a viable practice for supply chain management businesses worldwide. Value addition is a key driver for manufacturing firms strategizing on lean supply chain systems (Tersine & Hummingbird, 1995). The system is described as the entire logistical chain from inbound, outbound and to final product consumption. the effectiveness of a company's response to swiftly changing marketplace conditions is be largely determined through the competencies of its buying and selling partners. Lean philosophy, which commenced with the Toyota production system (TPS) is one of the frameworks that makes use of few resources. TPS guarantees a clear output from alike a large scale manufacturing framework while contributing supported assortments for the end user (Womack, Jones& Ross, 1990). The revolution of Supply Chain Management (SCM) in the last decade is an advancement to strategic market positioning towards enhancement of manufacturing firms' performance past their competitors (Skjoett-Larsen, 2013). A lean manufacturing company understands consumer concern and centers its key importance to constantly improve it. According to Liker (2014). As long as it minimizes costs at the functional level, lean supply chain management is key element of firms' performance. Lean supply chain management practices target waste, errors, defects from all processes while also improving information flow along the value chain (McManus, 2012).

Multinational companies (MNC) performs their businesses in global structures that have growing complexities due to interconnected tactics of globalization and internationalization of firms (Ball et al., 2008 & Boschman, 2006). Therefore increased competition compels the companies to adapt to new supply management techniques to survive in their economic sectors (Ogutu & Samuel, 2011). For many manufacturing companies round the globe, lean supply chain remains a leading hub in organizational performance (Naylor, 1999). Many western countries have experienced a relative decline in the performance of the manufacturing industry. For instance, manufacturing industry in Australian has contributed a GDP value of less than half of what it did in the last four years (Anthony, 2014). This was attributed to poor strategic supply chain leading to rise in costs of manufacturing resulting in the gross running income margin for the manufacturing firms to fall from 9.5% within the year 2013 to 7.8% in the year 2014.

In Africa, manufacturing firm performance in the manufacturing sector has been poor over the past decade. A decline in performance of the manufacturing companies in Nigeria resulted to a decline in GDP from 9.6% in the year 2006 to 5.0% in the 12 months 2013.This in turn attributed to the high cost of manufacturing especially in the oil and gasoline sector and beside the point investment in system and machinery because of negative supply chain management (Nigerian Manufacturing Enterprises Survey-NMES, 2013).Decline in manufacturing firm performance resulted to a decline in the worldwide Gross Domestic Product (GDP) from 5% in the year 2010 to 3.08 % within the 12 months 2011. As per KNBS (2012), Kenya's manufacturing enterprise has declined its value addition to the country's GDP. Some of the reasons for such a decline include poor stock control and decreased customer powerful demand due to poor techniques in supply chains. Some statistics show that the terrible manufacturing firm performance of the manufacturing companies in Kenya contributed to a decline in GDP. The country's GDP value declined from 7.0 % performed in the year 2007to 1.5 % in the 12 months 2008 (Ondiek, 2012). The GDP rose to 2.7 % in the year 2009 and a similarly 5.8 % within the year 2010. However, this growth declined to 4.4% in the year 2011. This attributed to poor resources utilization, decreased purchasing power, delays in fulfilling customer's orders and lack of proper supply chain strategies.

According to Farole and Mukim (2013), the manufacturing sector in Kenya has a growing number of firms that competes globally but has derailed due to ineffective supply chain network for many years. The issues which hinder supply chain network includes waste of resources, low capital budget, old technology, high costs and non-value adding activities. Kenya's holds an approximate 0.02% share of manufacturing to the global market compared with rest COMESA (Ministry of trade and organizations,

2011).The manufacturing industry in Kenya reported an increase of 3.8% in 2018 in comparison to 3.6% in 2017 (Ministry of trade and organizations, 2011). The increase was fueled by reduced cost of production, increased production of goods and minimized waste of resources (Kenya Institute for Public Policy Research and Analysis, 2013). According to Kovac (2013), lean supply chain (LSC) in any business effectively and continuously aims at reducing costs and wastes. Additionally, the LSC practices like kanban, Sigma Six, JIT, poka yoke and Total quality management are primary for organizations that need to undertake changes (Nightingale, 2005). As a key tool, LSC makes use of partnerships and strategic alliances as its primary key feature related to a spectrum of collaborative relationships and coordination mechanisms. Although lean supply chain management is not well implemented in Kenya, the use of lean supply chain principles and concepts are experienced through minimized costs of production, increased sales, maximized resources and reduced wastes in most firms. Kenyan manufacturing firms are thus faced with competition in the growing market, as they try to come up with tight practices of coping with competitive supply chains in a bid to enhance performance.

2. Statement of the problem

Lean supply chain management (LSCM) is increasingly commanding a significant contribution in daily performance of most manufacturing organizations (Kootanaee et al., 2013). Adoption of LSCM by the organizations has given rise to competitive edge in the global market via constant supply of quality products at affordable costs thus commanding good market share and reaping high profits (Gupta, 2012). Adeyemi (2010) stated that in the developing countries there is a lot of confusion as to how to organize an efficient LSCM system to optimize production associated with performance of industries. Increase in demand to find strategies to create and give value to customers with lean resources while minimizing wastes and rationalizing supply base has become a value stream emerging trend (Farah, 2013).

Globally manufacturing firms face supply chain challenges while trying to competently maximize profits and usage of resources to meet their customer's demand (Christopher, 2005). Some of these challenges include inadequate volume of sales, low profitability, uncompetitive market share, poor customer satisfaction , low return on investment associated with high supply chain costs, wastes, supply and demand imbalances, low-quality products, stiff competition which in the long run affects firm performance (Weru, 2015). According to Rexhepi and Shrestha (2011), lean supply chain practices greatly increases production sales volumes and hence progressively improve on the performance of manufacturing firms. Kumar (2009) agrees that competitive market share, earnings on investment and customer experience partly form the uptake of lean-to supply chain adoption. Tourki (2010) also argued that adopting lean manufacturing practices contributes greatly to increased profitability and production efficiency in manufacturing organizations. Musyoka (2015) suggested that product quality, profitability and firm competition as major reasons as to why organizations seek to go lean. He further recommended that the management of organizations should invest more in LSCM. Carolyne 2013) did a research on lean supply manufacturing impact on performance of organizations listed at the Nairobi securities exchange, where she exuded that lean is the next quality e-commerce practice.

Smart et al. (2001) criticized that lean philosophy for acquiring its efficiency focuses on profitability and customers rather than, efficiency and reliability and hence the down fall. Many researchers have carried out studies on firms which practice lean and agile manufacturing practices. However, they didn't amicably addresses the influence of lean supply chain management practices on performance of the manufacturing firms. Founded on these facts and to add more knowledge to existing literature, the study was carried out to fill the gap by assessing the influence of lean supply chain management practices on performance of manufacturing firms.

3. Objectives of the study

The general objective of this study was to assess the influence of lean supply chain management practices on performance of manufacturing firms in Kenya. The Specific Objectives are:

i. To examine the influence of just in time on performance of Unilever Kenya Limited.

ii. To establish the influence of Six Sigma on performance of Unilever Kenya Limited.

iii. To ascertain the influence of Total quality management on performance of Unilever Kenya Limited.

4. Theoretical review

Theoretical review advances background understanding of theories and models that have been explored by scholars to give insight to lean supply chain management practices (Evenett and Hoekman, 2005).

4.1 Lean thinking concept theory

Lean concept was originated with thinking of waste reduction. Krafcik (1988) a principal innovator in the International Motor Vehicle program (IMVP). Sparks (1836) advanced that the guidelines related to lean concept provided by Benjamen Franklin through a journal known as The Way to Wealth. Papadopoulou & Özbayrak (2005) later coined what is described today as the Lean Manufacturing. The key output of the IMVP research efforts was the publication of the book- A Machine that changed the world-The theory of lean production (Womack, Jones and Roos, 1990). The book acknowledged the evolution of the automobile industry from craft production to mass production and finally to lean Production. It makes use of its tools to strive for zero inventories, zero downtimes, zero defects, and zero delays in the production process. Waste can be described as the opposite side of value on a Lean coin. According to Womack and Jones (1996) Value is all the aspects of a product that a customer is willing to spend his/her money on. Lean emphasizes the need for an organization to develop a culture of continuous improvement in quality, cost, delivery and design (Bhasin and Burcher, 2006).

4.2 Theory of Constraints (TOC)

Lean supply chain system key objective is to inherently prioritize improvement of activities in a system which successfully leads to increased profits of organizations. According to Goldratt (2004) the theory identifies the most critical constraint that hinders performance and ways on how to continuously improve that constraint until it is no more a limiting factor. In supply chain, the limits are referred to as the bottlenecks. It assumes that every complex system and process is formed by chain of activities, of which one of them acts as a weak link in the entire supply chain network. The background of TOC assumes that any system is limited in performance of achieving its goals by at least one constraint and therefore should focus on methodology for creating rapid improvement (Mabin & Steven, 2000). Thus the theory seeks to continuously identify the bottlenecks to realign them with the rest of the system. It do this by unlocking the limitations through lead times reduction, inventory optimization, cost reduction and waste reduction thus improving efficiency for better organizational performance. The theory therefore can be used in manufacturing firms through optimized production technology and material requirement planning to identify performance constraints. The key focus of most manufacturing firms is profitability and return on equity. The Theory offers a vital technique for achieving profitability and equity returns. The theory of constraints therefore focuses on method of detecting and eliminating bottlenecks, analyzing/resolving problems and result analysis which are pillars to performance improvement.

4.3 Transaction Cost Analysis (TCA)

TCA suggests that supply chain costs should be minimized to the lowest level to realize sufficient returns (Halldorsson et al., 2007). TCA is widely realized in many areas, more so in accounting and firm's performance. Williamson (1998) suggests that organizations can reduce their transactional costs through cooperation and integration. The cooperation is likely to reduce the costs of inventory management and releasing capital held in idle inventories thus improving the performance. The cost reduction, which include the transactional costs incurred across the supply chain network, is a key goal of any firm.

4.4 Resource based view theory

Gerald (2010) deduced that partners in the supply chain should have synergy in seeking greater performance and market sustainability. In this theory, firms depend on the resources provided by stakeholders to sustain growth and market share (Paloviita & Luoma-aho, 2010). In lean supply chain management, resources control, utilization and maximization are prime in any organization that has supply chain network with goal of performance improvement. Organizations requires to control to

maximize utilization of resources along value chain network by adopting lean supply chain management practices.

5. Conceptual framework

The framework highlights the study variables and illustrates the underlying relationships (Thomas, 2010). The dependent variable in the study is performance and the independent variables are JIT, Sigma Six and Total quality management.

This study engaged a conceptual framework to assess the influence of lean supply chain management practices on performance of manufacturing firms in Kenya.

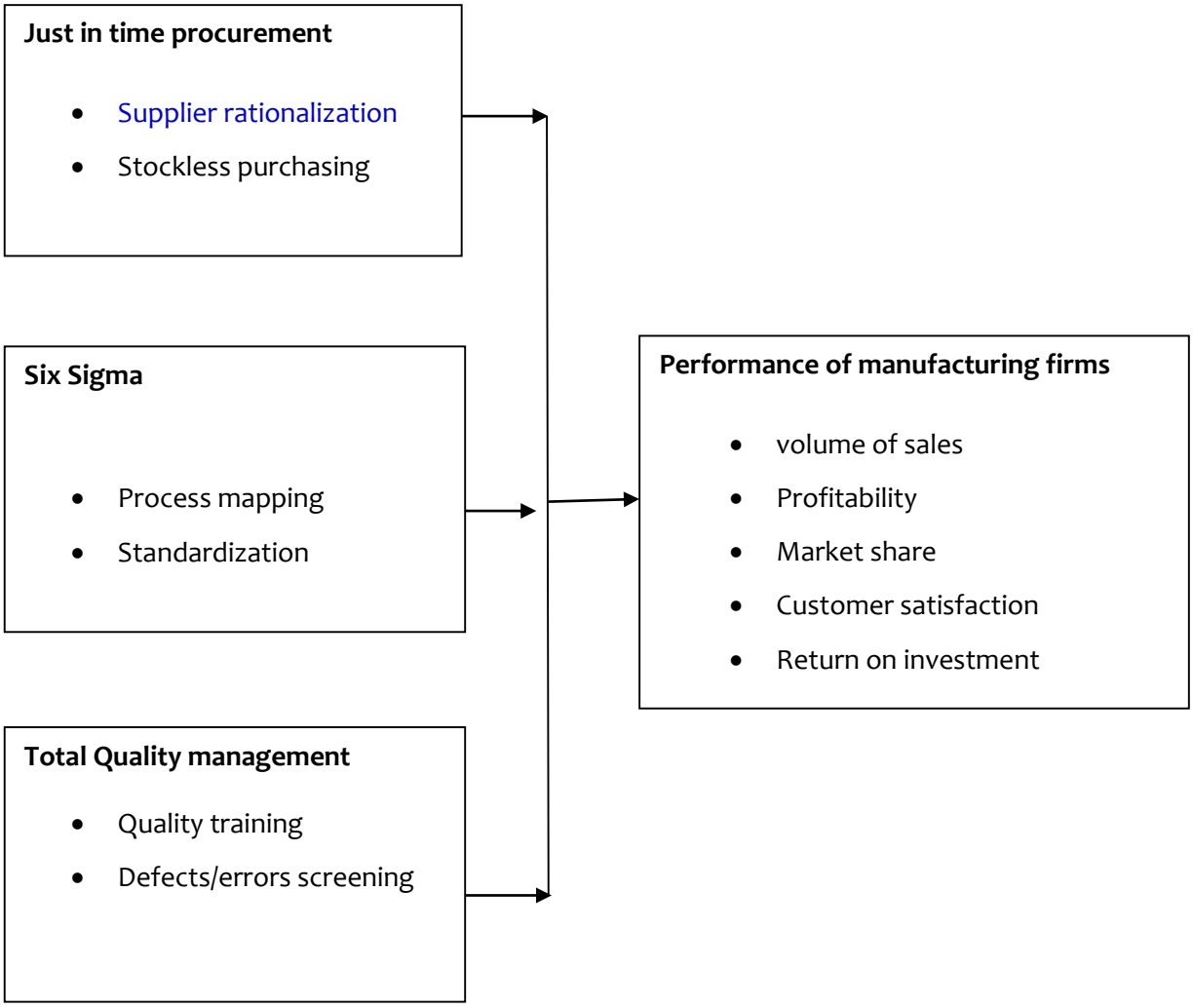

Figure 1. Conceptual framework

5.1 Just In Time (JIT) Procurement

According to Easton (2008), JIT is a stock control philosophy whose target is to preserve just enough material in only the right place at just the right time to make just the right quantity of product. In this system, there are few selected suppliers who has the obligation of delivering the materials to the assembly line in short lead time. JIT requires supplier commitment in providing quick services to provide effective supply of materials needed. JIT requires minimum levels of inventory in the production line whereby inventories quantities should equate production units (Donald, 2003). These means supplier commitment plays a vital role in order to assure production lines operates efficiently without interruptions. The precept that underpins JIT is that manufacturing should be 'pulled through' as opposed to 'pushed through (Boyle, 2011). The integration of Just in time and the lean techniques

considerably contributes to financial performance of firms (Yasin et.al., 1997). The main focus of just in time is to eradicate stocks in a rotation to another point in the value chain. Inventories are minimized by providing materials in real-time when wanted in manufacturing work. JIT should be integrated with other systems like kanban to achieve effective leanness in supply chain management. Kanban is a system that controls the supply of materials with the help of bin cards that are managed along the manufacturing system. Kanban offers signaling for reorder or replenishment of stock as well as stock repurchase. Lean manufacturing systems use the Kanban as a technique to keep inventory levels as low as possible. The demand-pull system which

is opposite to push is technique that does not allow production from upstream until a demand is identified from the downstream supply chain (Womack & Jones, 1996). Only real consumption triggers production or delivery in small lots, as a way of reducing stocks. When Kanban is properly utilized, businesses rarely run out of stocks. Kanban systems has a lot of benefits which include minimal, decreased storage needs and reduced excess manufacturing, minimized costs tied up in work in progress (WIP). According to McManus, (2012) the achievement of Kanban relies on Material requirement planning (MRP). Material requirement system attempts to keep good enough stock levels to assure that the required resources are available when required.

5.2 Six Sigma

Martin (2007) refers to Six Sigma as the philosophy and practices organizations use to cast off defects and errors of their products. It uses an interactive five-cycle system to improve existing processes. This five cycle stand for define-measure –analyze-improve-control (DMAIC). Carlos (2007) General Electric (GE), who were likely the high-quality known of the early adopters of Six Sigma, described it as a disciplined methodology of defining, measuring, reading, improving and controlling the excellent in each one of the employer's products, methods and transactions with the target of getting rid of all defects. Whereas Lean serve to eradicate waste, Sigma Six reduces system variations in pursuit for excellence. It the two are employed, the resultant is a system that improve processes, eradicate errors and defects in operations basically to reduce set-up times and speed up operations. Sigma Six also acts as a Value Stream Mapping (VSM) process in the course of value addition of merchandise and approaches alongside the supply network. VSM enables managers to identify activities for cost reduction, starting from production until delivery to the final customer (Cudney and Elrod, 2011).

5.3 Total Quality Management (TQM)

Sighn and Singh (2009) stated that many lean practices that contributes to the Total quality management include; Total Preventive Maintenance (TPM), Suggestion System, kaizen costing, Quality Control Circles (QCC) or Quality Circle (QC), Toyota Manufacturing System (TPS), poke-yoke (errors proofing). Womack and Jones (1996) argued that the concept of perfection in lean thinking refers to Continuous Quality Improvement (CQI). CQI is a quality control practice that advances the manufacturing approach to adopt quality systems (Oakland, 2004). Deming (1986) suggested that no high quality management system can excel in absence of commitment to key quality drivers in all organization sections as it presents an enterprise with a plan to do away with poor quality control problems via effective managerial practices.

Quality circles are formed by a group of staff who convene often to check and solve challenges related to manufacturing and quality of goods or services. Ross and Ross (1982) suggested that staff are taught basic techniques of problem solution, as well as various quality control and measurement techniques, including fish-bone diagrams, pareto analysis, pictograms, and various types of checklists. The initiative is designed to draw talent potential for creative-problem solving within an organizational work team (Steel & Shane, 1986).

5.4 Performance of manufacturing firm

Yamin, et al. (1999) defined manufacturing firm performance as a degree of the way effective an organization achieves its financial profitability. Musyoka (2015) recommended that manufacturing firm performance in the supply chain should be measured by means of the use of high accuracy in costing,

high sales, continuous buyer-supplier relationship and advanced coordination between functions. Rexhepi and Shrestha (2011) listed the main lean practices that drive firms performance: They included the Five S's (Sort, Set, Shine, Standardize and Sustain), Kanban, Kaizen, TQM, Six sigma, Value Stream Mapping, Poka Yoke, Jidoka, Mura, Muri, Process mapping and Just-in-time practices in supply chain. Bhasin and Burcher (2006) mapped these practices into components of the supply chain as lean supplier practices, lean procurement practices, lean transportation practices, lean customer practices, and lean manufacturing practices.

Lean manufacturing practices (LMP) represents a concept that contributes to firm's growth when integrated together. According to Richard et.al (2009) performance encompasses three vital missions of company, financial overall performance, Product marketplace overall performance, and shareholder return. Daft (2007) notes that using financial measures overlooks the fact that what enables an enterprise to attain or deliver better financial results from its operations is the achievement of strategic targets that improve its competitiveness and market power. The Lean supply chain system outcomes are realized through financial profits and customer satisfaction (Harry, 2000). Regardless of its impact in financial performance, lean supply chain effect varies throughout adopters of its new paradigm (Nahm, et al., 2003). One source of the version is managers 'piecemeal adoption of lean philosophy.

6. Empirical review

There exists a study on lean supply chain practices implementation in Malaysia's electrical and electronics enterprise and its impacts on enterprise performance. The study tested the implementation of JIT and innovation use with the aid of interviewing senior managers. Azman (2010) found out that the growth of performance in many firm are faced with low adoption of lean supply chain management techniques. Another study on lean supply chain management in manufacturing companies in Kenya by Wanjiku (2013) suggested that lean supply chain management adoption is slowly being consumed by firms in Kenya through lean thinking at slow rate. Farah (2013) explored the interrelationship among lean supply chain and firms performance in the many public water s firms in Kenya. He found out that there are three symbiotic lean supply chain management practices namely waste control, standardization and demand management that has great impact on performance. Ugochukwu (2012) studied on lean practices within the supply chain management on previous studies of research articles. His study showed that procurement practitioners and researchers study lean as a progression into lean management which transforms into a competitive lean supply chain management.

Kimani (2013) researched on lean supply chain management in production sector in Kenya and concluded that organizations were at early stages of implementing lean supply chain concepts. He attached existence of weak adoption of lean practices to high costs, bureaucratic, market rivalry and protective maintenance. Rono (2013) made research study on lean supply manufacturing practices in Kenyan cement manufacturing industry. He revealed that organizations base lean manufacturing practices on systems and processes in place e.g. continuous development, standardization of labor, poka-yoke, manufacturing smoothening, Total quality management and total efficient productive maintenance. He drew conclusions that progressive manufacturing firm performance of a business, multiskilling of workers, cost control, waste reduction, stakeholder's relationship, value addition in the value chain accrue to benefits of lean manufacturing. The study did not attach lean supply chain practices to performance of firms. Musyoka (2015) had researched on lean supply chain management practices effect on performance of production companies in Kenya. His study related firm performance to lean concepts and suggested that enterprises seek lean expecting elimination of costs, return on investments and strategic positioning. Though the studies suggested the combination of lean practices in firm's improvement strategies, it did not deal with the influence of lean supply chain management practices on performance of firms.

7. Research gap

Leans supply chain management practices have broadly been adopted in first world countries like the United States, the United Kingdom among others. Developing countries especially in east and central Africa are yet to realize the benefits lean supply chain management practices and thus adopt lean.

Macharia (2014) considers the acceptance of a lean supply chain as an essential technique in enabling firms reduce operational waste and improve performance. Lean supply chain management practices purpose at integrating the functional areas of any company by making sure that the business and its suppliers have a shared system that allows them to work together. This enables organizations to supply tailor-made products and services that particularly meet customer demands. In their associated research on "Strategic and operational approach to evaluate the lean performance in radial Tire manufacturing in India", Gupta et.al (2013) established that financial functionality of a company can support lean manufacturing practices. Their study ventured into a lean performance approach and but did not discover the influence of lean supply chain practices on performance. In another research lean manufacturing and operational performance in the Brazil automotive supply chain, Marodin et.al. (2017) stated that manufacturing firm performance of the lean concept implementation was not uniform among firms.

Exploring lean operations on Chinese manufacturing firms may also provide insight into the research gap by Shahram and Morosan (2011) who realized that lean manufacturing firm performance factors are strongly related to operational practices and manufacturing system. Their findings, however, were based on the lean operations on manufacturing companies in China which is not in Kenyan set up. There exist few scholarly work addressing the influence of lean supply chain practices on the performance of the manufacturing sector in Kenya. Many researchers have carried study on lean management, agile and lean concept in the manufacturing sector. However the researchers were silent on influence of lean supply chain management practices on performance of local manufacturing firms. The rare scholarly studies on the influence of lean supply chain management practices on performance prompted this study to fill in the study gap. This research study, hence explored to assess the influence of lean supply chain management practices on performance of manufacturing sector in Kenya.

8. Data and methodology

8.1 Research design

The study used descriptive research design. Descriptive research design is favored as it sought to obtain data that describes present phenomena via asking individuals about their perceptions, attitude and behavior or values (Mugenda &Mugenda, 2003).

8.2 Population

The target population for this study incorporated 400 staff (procurement department- 30 staff, production department- 170 staff, sales and marketing department- 60 staff, transport and logistics department- 40 staff and warehousing department- 100 staff who formed an internal supply chain of Unilever Kenya limited.

8.3 Sample size

The research study used 20% of target population as sample size, which was 80 staff of total population. In descriptive study, a sample size of 10-50% is adequate to represent the target population (Mugenda & Mugenda, 2003). Below Yamane (1967) formulae was used to determine the sample size; Eq (01): n = N / (1 + Ne^2); Where; n= sample size, N = population size, e = Margin of error, e = 0.05 at 95% confidence level.

8.4 Sampling technique

Stratified random sampling technique was adopted in attaining a representative sample from the target population. Stratified random sampling is a method in which the population targeted is divided into a various strata (Cooper & Schindler, 2014).

8.5 Research instruments

Structured questionnaires with close and open ended questions were used as data collection instruments. The questionnaire was divided into Six parts: Part A covered the respondent's profile; Part B - influence of just in time procurement on performance; Part C established influence of Six Sigma on

performance Part D examined the influence of Total quality management on performance and Part E assessed the lean supply chain management practices.

8.6 Data collection procedure

The questionnaires were administered using drop-and-pick criteria. The respondents were given one week to fill the questionnaires. The participants were allowed to answer question freely to the best of their knowledge. The respondents' rights, confidentiality, anonymity and opinions in the study was guaranteed through seeking consent of engagement.

8.7 Pilot test

The reliability and validity was ensured through piloted questionnaires that were issued to 16 staffs working in relevant departments and the staff were excluded in the actual study. The results obtained were as presented below.

Table 1.

Pilot test results.

Variable	No. Of Items	Cronbach Alpha
Just in Time Procurement	5	0.8256
Six Sigma	5	0.7998
Total quality management	5	0.8373
Performance of manufacturing firms	5	0.8007

N=16

The Cronbach alpha coefficient was used to test the reliability and consistency of the research instruments. According to Cronbach (1975), an alpha coefficient of 0.7 and above indicates that data collected is reliable. The coefficient of JIT was 0.8256, Six sigma was 0.7998, TQM was 0.8373 and performance of manufacturing companies was 0.8007 thus making all question items reliable. This clearly indicated that the data collection instrument for influence of lean supply chain management practices on the performance of Unilever Kenya limited was valid and reliable as all the Cronbach Alpha were closer to 1 and greater than 0.7. The study used content validity method (logical validity). To instill validity on test analysis the questions were modified to improve the rational validity.

8.8 Data analysis and presentation

The data was analyzed and processed using Statistical Package for Social Sciences (version 12) computer software. Data was presented in form of tables, and figures to generalize the sample findings of the population. Linear regression analysis was used to test the relationship between the independent and the dependent variables. Multiple regression model equation was expressed as Eq (02): $Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+e$;

Y –Performance of manufacturing firms

β_0 - Constant (coefficient of intercept)

X_1 – just in time procurement

X_2 – Six Sigma

X_3 – Total quality management

e – Error term

β_1, β_2, β_3, β_4 –Regression coefficient for four variables

9. Results and discussions

The study sought to assess the influence of lean supply chain management practices on performance of manufacturing firms in Kenya. In specific the study focused on JIT, Sigma Six and TQM. The empirical findings and deductions of the variables by use of descriptive analysis were obtained. Data was collected and subjected to a 5-point Liker scale then analyzed, interpreted the research findings and finally conclusions and recommendations were arrived. Out of 80 questionnaires administered, 94% (75 respondents) of the questionnaires were fully filled and returned while 6% (5 respondents) were none responsive. Response rate above 70% is appropriate (Mugenda and Mugenda, 2003) and thus 94%

response rate was considered appropriate to derive the inferences regarding the objectives of the research.

9.1 Correlation analysis

Correlation analysis examines the joint variation between more than two variables Pearson's coefficient of correlation is was used to measure the degree of relationship among independent and dependent variables as shown by the matrix of correlation coefficients below.

Table 2.

Correlation between Lean Supply Chain Practices and Performance.

Correlations					
		x1JIT	x3sixsigma	X4TQM	X5performance
x1JIT	r	1	.752**	.662**	.011
	Sig. (2-tailed)		.000	.000	.926
x3sixsigma	r	.752**	.837**	.868**	.194
	Sig. (2-tailed)	.000	.000	.000	.096
X4TQM	r	.662**	1	1	.068
	Sig. (2-tailed)	.000	.868**		.560
X5performance	r	.011	.000	.068	1
	Sig. (2-tailed)	.926	.194	.560	
			.096		

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

r- Pearson Correlation

The results in Table 01 shows that there was an insignificant weak positive correlation between JIT and performance (r= 0.011). That means the more the JIT was practiced the slight it had an influence on organizational performance and vice versa. Sigma six had an insignificant weak positive correlation with performance (r= 0.194). This implied that increased implementation of sigma Six did not necessarily resonate to improved organizational performance. There an insignificant weak positive correlation between TQM and performance (r= 0.068) which indicates that more TQM implementation led to minor increase in performance.

9.2 Regression analysis

A Multiple regression model was used to establish the relationship between Lean Supply Chain Practices and Performance of manufacturing firms as in table 02 below.

Table 3.

Regression model summary[b].

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.419[a]	.175	.128	.67188

a. Predictors: (constant), X3TQM, X1JIT, X2Sixsigma,

b. Dependent variable: X4Performance

R is the correlation between the observed and predicted values of dependent variable implying the association of 0.419 between JIT, Six Sigma, Total quality management and the performance of manufacturing firm.

R Square is the proportion of variance between dependent variable and performance that was explained by deviations in the independent variables JIT, Six Sigma and TQM. R-squared takes the values from 0 to 1, where: R-square = 0, that means not any of the variability data was explained by the chosen model; R- square= 1, means all data variability has been explained by the model. This implies that there exist correlation of 0.175 between variables in general but does not reflect how the independent variables; JIT, Six Sigma and TQM were associated with the performance.

Adjusted R2 with a value of 0.128, is called the coefficient of determination which indicates the variation of performance for Unilever Kenya Limited with JIT, Six Sigma and TQM. The standard error was .67188. The model summary results shows that 17.5%, change in organizational performance can be

explained by four predictors namely JIT, Six Sigma and TQM whereas remaining variation in Organizational performance not explained could be contributed by other factors not covered in the study.

9.3 Anova[b]

Below table present results for goodness of fit of the regression model.

Table 4.

Goodness of Fit.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.720	4	1.680	3.722	.008[a]
Residual	31.600	70	.451		
Total	38.320	74			

a. independent variables: (constant), X3TQM, X1JIT, X2Sixsigma,

b. Dependent variable: X4Performance.

Anova results tests whether the regression model achieve the goodness of fit. Table 03 shows the total variance value 38.320 which is the difference between variance which can be explained by the independent variables (Model) and the variance which was not explained by the independent variables (Error). To the explained whether lean supply chain management practices influence performance, the results in table indicate that the model had an F-ratio of 3.722, with significance P=0.008<0.05. These results ascertain that the regression model adopted by the study was appropriate and the relationship of the variables could not have occurred by chance.

9.4 Beta regression coefficients

The results on Table below shows the regression coefficients analysis.

Table 5.

Beta Regression Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	8.569	1.910		4.487	.000		
X1JIT	-.400	.649	-.114	-.616	.540	.343	2.912
X2SIXSIGMA	.969	.328	.736	2.955	.004	.190	5.261
X3TQM	.200	.425	.156	.471	.639	.107	9.312

a. Predictors: (constant), X3TQM, X1JIT, X2Sixsigma

b. Dependent variable: X4Performance

The resultant regression model took the form:

Eq (03): $Y=8.569-0.114X1+0.736X2+0.156X3+e$.

10. Findings

According to the regression model in Table 04, holding all predictor variables constant the organization performance was 8.569 units The regression results indicates that predictor JIT had a negative and insignificant contribution to the Performance at $\beta 1= 0.114$, P=0.540, t=0.616. This clearly indicated that a unit change in JIT led to a decrease in Performance by 0.114. These could be due to possible existence of discrepancies in stock levels, abrupt increase in demand by high production of fast consumer goods without buffer stocks to support production. The results differed with Kimani (2013) findings, that manufacturing industry implemented lean supply chain practices such as JIT thus reducing time wastage and cost reduction hence increased profitability for sustainability of firms' performance. The findings were contrary to Yasin (1997) who argued that companies working towards JIT are related to increased earnings.

From the regression results, predictor Six Sigma had a positive significant impact on Performance at β1 =0.736, P=0.004, t=2.955. This indicated that a unit change in Six Sigma lean supply chain practice would lead to increase in Performance by 0.736. The findings were supported by Martin (2007) that Six Sigma turns out as an effective method that provides organization with tools to improve their business operating capacity whose philosophy and practices organizations use to cast off defects and errors of their products. The results also concurred with Martin (2007), that a blend of Lean practices and Sigma Six is very critical because lean techniques and Sigma Six can improve system flow and minimize costs towards return on investment.

Further regression results indicated that predictor TQM had a positive and insignificant influence on Performance at β1 =0.156, P=0.639, t=0.471. This means a unit change in TQM will lead to a 0.156 increase in organization performance. The positive insignificant influence on performance would mean that TQM was not fully utilized or was partially implemented. This means if TQM was well utilized it can contribute to improvement of organizational performance. The results differed with Shahram (2011) that TQM as a customer and procedure-oriented approach to do business renders to increased pleasure and pride for both customers and employees. The results aligned to Deming (1986), who suggested that no high quality management system can excel in absence of commitment to key quality drivers in all organization sections.

However, at 5% level of significance and 95% level of confidence, sigma six had a significant influence on the organizational performance with P-value and 0.004 and therefore the coefficient should be retained in the final model. The P-values of 0.540 and 0.639 associated with the coefficient for JIT and TQM respectively has an implication that their influence on organizational performance was insignificant and so they may be dropped in reporting the final model. The results further infers that of all the predictors considered in the study, six sigma contributes significantly to the organizational performance.

11. Conclusions

The study concluded that increase in JIT would lead to insignificant decrease in performance. Deployment of JIT procurement practices did not empower the firm to benefit from vendor based inventory, procure materials based on demand, rationalize supply base for effective cooperation, foster suppliers attainment of ISO certified and did not result to remarkable reduction in stockholding costs. Since JIT advocates for minimized inventory there is need to have buffer stock to produce the fast moving consumer goods (FMCG) which requires raw materials readily available. With no buffer stocks any FMCG supply chain can face acute backdrop in delivery delays and poor serviced orders for customers. When there is disruptions in market supply chain the production will not be able to meet demand and also will negatively affect the company's performance.

The study concluded that Six Sigma had a significant, positive influence on Performance. Six Sigma's goals were to reduce defects and variation so that processes are more consistent and predictable. Six Sigma practices enhanced supply chain processes standardization, minimized wastage of resources, timely detected errors and defects along the supply, led to production of high quality materials and fostered establishment of material requirement planning. Six Sigma thus influenced performance by improving production which increased its profitability, return on investment, market share and the customer experience as well as improvement in sale volumes.

The study concluded that Total quality management had an insignificant impact on performance. This could have been contributed by insufficient staff awareness and training on TQM, lack of proper employees' involvement, inadequate top management support, inadequate resources deployment towards TQM empowerment, lack of leadership and coordination on TQM enrolment, lack of company quality-oriented culture, inefficient TQM practices communication, weak change plan towards TQM adoption, inadequate teamwork upon adoption; failure to develop employee participation, failure to build a learning organization that enhances continuous quality improvement, Failure to incorporate quality improvement initiatives in all departments, lack of quality improvement measurements and access to data, Insufficient resource allocation to support TQM. Thus utilization of Total quality management did not visibly lead to notable profitability, market share, sale volumes and return on investment as well as improving customer satisfaction.

12. Recommendations

From the findings, the study would recommend that management of manufacturing companies should embrace JIT as a supply chain management policy and also deploy more resources towards its implementation as a lean supply chain management practice. That means every aspect of JIT production must be synchronized with other practices and this requires investment in a good procurement system to enable instant notification when orders are received and deliveries are made. Manufacturing companies requires good system to handle; frequent orders that renders JIT system ineffective, fluctuations in demand and products requirements, quality checker for products to avoid defects and waste in production, system which can smoothen lengthy and erratic downtimes since JIT alone does not eradicate variability or unpredictability in production. Unilever as an FMCG requires buffer stocks and good supplier collaboration to ensure materials are always available and supplies are seamless. These would eventually result into timely production and improved sales volumes, increased profitability and return on investment from sales, improved market share and good customer satisfaction.

The study found out that Six Sigma contributed significantly to Performance. Six Sigma as a lean supply chain practice has fostered supply chain processes standardization, experience minimal wastage of resources, assisted to timely detect errors and defects along the supply network, influenced production of high quality materials and fostered establishment of material requirement planning. Six sigma can therefore improve organizational performance by reducing defects, errors and wastes, thus it's a viable contributor for consideration performance improvement. Sigma Six basically focuses on methods of improving the performance of firms operations implying that manpower cannot solely be relied on to deliver good quality products, hence requirement for Six sigma to eliminate the chances of human error in the system. Companies therefore should focus more on eliminating defects and errors by carefully designing and analyzing their processes. Six Sigma therefore helps to identify and remove defects by reducing the inconsistencies in the manufacturing processes. Manufacturing firms should therefore put more effort and resources in training staff and support implementation of sigma six. When Six Sigma practice is well utilized, manufacturing companies can achieve powerful business improvement strategy that maximizes return on investments, good quality and lasting customer experience, increase in profitability, market share, customer satisfaction as well as improvement in sale volumes.

The management of manufacturing companies should invest more on fostering Total quality management as a continuous improvement policy. This will enhance quality production as a key engine for improving organizational performance. TQM envision an organization as a pool of processes and therefore it should be enshrined in formation of business strategic plans. It ascertains that organizations must endeavor to continuously improve processes by training and tapping the knowledge and experiences of staff. The basic goal of TQM is "do the rightful things right, the first-time and every time thereafter." The management of manufacturing firms should therefore put more resources in training staff from the initiation stage, create TQM training cycles, develop supervision and coordination of TQM programs by top management, deploy more resources towards TQM system support, entrench a quality-oriented culture in their strategy, empower and motivate staff towards quality achievement, build a learning organization that promotes continuous quality improvement, incorporate quality standards in all operations and also adopt tools for monitoring and measuring quality improvement e.g. pareto principle, check lists, control charts etc.

13. Suggestion for further study

The study would recommend mobilization of adequate resources and policy review towards implementation of lean supply chain management practices. The study therefore suggests that further study should be carried out to examine the relationship between lean supply chain management practices and resource allocation in performance of manufacturing firms.

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