

THE IMPACT OF SUPPLY CHAIN COLLABORATION PRACTICE ON THE PERFORMANCE OF STEEL MANUFACTURING COMPANIES IN KENYA

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ABSTRACT: *The main purpose of this study was to assess the impact of supply chain collaboration practice on the performance of Steel Manufacturing Companies in Kenya which are the key contributors to the economic development of the country. The metrics for measuring the company's performance were the quality of product and customer satisfaction. The descriptive research design was used in the formulation of knowledge on the impact of supply chain collaboration practice on the performance of Steel manufacturing Companies in Kenya and provided solutions to areas that needed improvement. Structured questionnaires and oral interviews research techniques was used to get primary data from the senior managers in production department, marketing department, Information Technology department and Supply chain department while scheduled interviews was used for firm's procurement managers and observation checklists was used for comparison of records. Both quantitative and qualitative research techniques were used during data presentation using inferential statistics to draw conclusions from the nominal measurement scale. Purposive sampling technique was used to identify and select eligible participants for the study. The null hypothesis formulated was that there is significant relationship between supply chain collaboration practice and the performance of steel manufacturing Companies in Kenya. The sample size was determined using Cochran sampling frame for large population. The Spearman's Coefficient of correlation was used to measure the degree of association between the pair of rankings N objects and the null hypothesis was tested by use of F- ratio using a two way Fisher's Analysis of Variance [ANOVA] on assumption of the homogeneity of the variance of the sample that is normally distributed at 95% confidence interval. The study revealed that supply chain collaboration practice statistically significantly predicted the performance of Steel Manufacturing Companies in Kenya, $F(1, 242) = 41.319$, $p < .05$, $R^2 = .146$. The analysis further revealed that there is a significant and a moderate positive correlation between supply chain collaboration practice and the performance of Steel Manufacturing companies in Kenya ($r = 0.382$, $p < 0.01$). The study recommends that the Steel manufacturing companies in Kenya to incorporate supply chain collaboration practice in their business operations for them to realize improved performance.*

KEYWORDS: *Supply chain collaboration, Steel Manufacturing Companies in Kenya, Supply chain performance*

INTRODUCTION

The main dimensions of an effective supply chain include strategic collaboration with suppliers, customer relationship management and the level of information sharing among the supply chain partners. Kim (2006) argues that the major goal of supply chain management is to enhance competitive performance by integrating the internal functions within a company and linking them closely with the external operations of suppliers, customers and other members of the supply chain network. Collaboration of supply chain enables the cooperating members in the supply chain to improve performance of the organization in terms of revenue improvement, cost reductions, operational flexibility and to cope with high demand uncertainties (Simatupang *et al.*, 2005).

Chopra and Meindl (2010) asserts that SCM is about competing for value, collaborating with customers and suppliers to create a position of strength in the market place based on value derived from end consumer. The companies need to create strong collaboration that enable them to leverage their market orientations by responding to rapid changes in customers' value and competitor moves for them to acquire superior business performance (Martin & Grbac, 2003). Collaborative approaches have been shown to deliver a wide range of benefits which enhance competitiveness and performance in terms of better cost management, improved delivery time, improved resource management, improved risk management and delivering incremental business value and innovation (Lysons & Farrington, 2012). Handfield and Nichols (2003) argue that without a foundation of effective supply chain relationships, any effort taken to manage the flow of information or materials in a supply chain is likely to be unsuccessful. Collaborative relationship is multi- dimensional and might involve parties including external partners or alliances, suppliers and customers who work together.

Christopher (1998), states that the integration of key business processes in a supply chain is best achieved through collaboration of business partners. Collaboration occurs when firms in the chain set common goals and work jointly to achieve the overall supply chain performance and value to the customer. Resources and information are exchanged between the chain partners. Risks, profits and losses are shared fairly among the chain members. Collaboration can be understood as a form of co-operative inter-organizational relationships, which are socially contrived mechanisms for collective action. This co-operation can be achieved through either collaboration or compliance (Hardy & Philips, 1998).

Stank *et al.* (2001), propose that supply chain collaboration is the construct of coordination, participation and joint problem solving between supply chain partners. Supply chain collaboration can help in the coordination in supply chain. Chopra and Meindl (2010) argues that supply chain coordination occurs when all the different stages of supply chain work toward the objective of maximizing total supply chain profitability rather than each stage devoting itself to its own profitability.

Steel Manufacturing Companies have become more responsive to customers in order to ensure their supply chain operate with the absolute minimum of stock-out events, with prompt response to market fluctuations while at the same time carrying minimal buffer stocks. The Steel industry

globally has many players that make business coordination in this industry very difficult since in most cases steel producers and consumers depend on intermediaries to help in buying and selling materials (Goodwin *et al.*, 2000). The Steel industry is a high capital intensive and their products have relative long life-cycles, which means that low cost production is a prerequisite for any of this companies to become a market winner and they can not rely on increased prices to ensure their profitability (Standard & Poor's, 2007).

Manufacturing companies in developing countries in which Kenya is also included are now increasingly integrating the supply chain management practices in their business operations to ensure that they also compete favorably in the dynamic global market. Kenyan steel manufacturing companies have been exposed to global competition with the liberalization of the East African regional markets that were key importers of the Kenyan Steel products. The steel manufacturing companies from developed countries like China, Korea, Japan, USA and Russia have ensured that they compete in terms of cost, quality, technology, customer satisfaction and other competitive strategies as they pursue to achieve competitive advantage over the Kenyan Steel products. They are also able to adjust to complex consumer demands and global regulatory systems that require the organizations to operate in sustainable manner. Apart from stiff competition from these companies, Kenyan Steel manufacturing Companies faces the challenges of high cost of raw materials, poor transport network, high taxation, price volatility and high cost of energy that hinder them to compete favorably (KAM, 2012). With considerable empirical research on supply chain management as well as models aimed at solving problems experienced by business managers (Christopher, 1998), managers in most organizations are trying to implement the important supply chain management concepts to ensure that they achieve the combined benefits of improved cost, flexibility, dependability and quality (Hayes *et al.*, 2005).

Although a number of studies have been done on the concept and context of supply chain collaboration, there is limited information within the context of Steel Manufacturing industry in Kenya. Miller and Toulouse (1986) assert that research findings often differ systematically across different groups of firms and under different business environments since findings in one business environment may not be applicable in another environment. Hence there was need for an empirical study to be carried out in steel industry in Kenya.

LITERATURE REVIEW

Supply Chain Management Theory

Supply chain has its roots in Porter's (1985) value chain, which is the set of processes a firm uses to create value for its customers. Although originally described as a chain, supply chain can nowadays be defined as the network of organizations that are involved through upstream and downstream linkages in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer (Christopher, 1998). The chain involves two or more legally separated organizations that are linked together by material, information or financial flows and includes the ultimate customer.

The objectives of the supply chain are to provide service to customers, achieve low operating costs and minimize the assets in the chain (Scharj & Skjoett-Larsen, 2001). Many companies are now

looking at securing cost, quality, technology and other competitive advantages as strategies to pursue in a globally competitive environment and to achieve this many manufacturers are focusing on their supply chain management practices (Goh & Pinaikul, 1998).

Supply chain management is an important multi-disciplinary topic in modern business management and research. It enhances organizational productivity and profitability through a revolutionary philosophy to managing the business with sustained competitiveness (Gunasekaran *et al.*, 2004). Supply chain management emphasizes the overall and long-time benefit of all parties in the supply chain through co-operation and information sharing (Yu *et al.*, 2001). Simchi-Levi *et al.* (2004), define SCM as a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses and stores so that products are produced and distributed at the right quantities, to the right locations, and at the right time in order to minimize system-wide costs while satisfying service-level requirements. Scott and Westbrook (1991) describe supply chain management as the chain linking each element of the manufacturing and supply process from raw materials through to the end user, encompassing several organizational boundaries and treating all organizations within the value chain as a unified virtual business entity.

Supply Chain Management has the objective of governing all parts of the supply chain as a unit, instead of single organizational elements, in order to achieve increased competitiveness (Stadler & Kilger, 2005). Supply chain management focuses on how firms utilize their suppliers' processes, technology and capability to enhance competitive advantage (Farley, 1997). Since satisfying customer needs is the central purpose of any business (Doyle & Stern, 2006), this framework reflects the notion that customer focus in terms of satisfying needs and providing timely service is a key driving force of effective supply chain management. It seeks improve performance through better use of internal and external capabilities in order to create a seamlessly coordinated supply chain, thus elevating inter-company competition to inter-supply chain competition (Lummus *et al.*, 2003).

The Lean Supply Chain Theory

The core concept of lean thinking is the Japanese term *muda* exemplified by the practices of Japanese motor manufacturing (Lysons & Farrington, 2012). Muda means waste or any human activity that consumes resources but creates no value. In the lean paradigm, activities that consume resources but generate no redeeming value in the eyes of the consumer are waste that must be eliminated (Womack & Jones, 2003).

Lean Supply chain emphasizes on utilization of less time, less space, less inventory and even less money to produce products. It basically focuses on the elimination of seven types of wastes that are overproduction, waiting, transportation, inventory, defective units and over-processing. The main objectives of implementing the lean supply chain in an organization is improve flexibility, reduced cost, high inventory turns, shorter lead time and defect prevention.

The most popular example of lean manufacturing is the Toyota Production System that attributes supply chain success to ability to achieve economies of scale in manufacturing and procurement based on small batch size production units (Holweg, 2007). Lean supply chains consider cash-to-cash cycle times as a critical measure of performance. The longer it takes to convert inventories

into cash the more working capital is required and any reduction in this measure will mean the release of working capital and hence a reduction in cost (Christopher & Gattorna, 2005).

The Agile Supply Chain Theory

The concept of agile manufacturing was put forward by Iaccoca Institute of Lehigh University in 1991. The agile manufacturing focuses on the ability to respond to volatile market demand both in terms of volume and variety. The origins of agility as a business concept lie in flexible manufacturing systems. Agile manufacturing is based on lead time reduction and has shown to be effective whenever product life cycles are short and market demand is unpredictable (Towill & McCullen, 1999). Lumsden (1998) argues that an agile supply chain has a high capability to flexibility adapt to the fast changing environment and hence can easily gain customer satisfaction.

Yusuf *et al.* (1999) terms agility as the successful exploration of competitive bases of speed, flexibility, innovation proactivity, quality, and profitability through the integration of reconfigurable resources and best practices in a knowledge-rich environment to provide customer-driven products and services in a fast changing market environment. Christopher (2000) argues that leveraging supplier relations allows companies to create agile supply chains by reducing lead time between organizations. Lee (2004) emphasized that agility can help the supply chain respond to short-term changes quickly and manage the external disruptions smoothly.

When the market environment is more dynamic and turbulent, companies need to adopt an agile supply chain strategy. The company that are market driven can easily realize agility by investing in product research and modern information technology that enables it to react quickly to the fluctuations in product demand and sourcing problems. Agile organizations performs all physical activities quickly and accurately because of faster material, information and decision flow through the entire network of the supply chain and hence enabling the shorter response to the market needs (Naylor *et al.*, 1999). The faster that products, information, and decisions move through a supply chain, the faster it can respond to customer needs. Agile manufacturing uses market knowledge and a virtual corporation to exploit profitable opportunities in a volatile marketplace (Naylor *et al.*, 1999).

In order to increase the responsiveness in process industries, the organizations are implementing the use e-business to streamline business processes, provide windows into operations, integrate the supply chain, increase customer services and streamline distribution (Rao, 2002).

Supply Chain Integration Theory

Integration is a process of interaction and collaboration in which companies in a supply chain work together in a cooperative manner to achieve mutually acceptable outcomes (Pagell, 2004). Kim and Narasimhan (2002) asserts that supply chain integration links an organization with its customers, suppliers and other channel members by integrating their relationships, activities functions, processes and locations. According to Lambert (2004), successful supply chain management requires cross-functional integration of key business processes within the company and across the network of companies that consist of the supply chain. Organizations must integrate their operations with trading partners in order to sustain competitive advantage for the whole supply chain (Lambert & Cooper, 2000). Power (2005) asserts that integration involves the

cooperation, collaboration, information sharing, trust, partnerships, shared technology and a fundamental shift away from managing individual functional processes to managing integrated chains of processes. Kwon and Suh (2004) consider supply chain integration to be a strategic tool that aims to reduce costs and thus increase customer and shareholder value. Supply chain integration is a good approach for improving business performance in a highly competitive market (Narasimhan, Jayaram, & Carter, 2001). Frohlich and Westbrook (2001) assert that the highest levels of integration with both suppliers and customers have the highest correlation with high levels of an organization's performance

The major challenge in supply chain integration is to coordinate activities across the supply chain so that the enterprise can improve performance by reducing costs, increasing service levels, reducing the bullwhip effect, better utilization of resources and effectively responding to changes in the market place (Simchi-Levi et al., 2009). Chopra and Meindl (2010) argues that supply chain coordination occurs when all the different stages of supply chain work toward the objective of maximizing total supply chain profitability rather than each stage devoting itself to its own profitability.

RESEARCH METHODOLOGY

Research Design

Descriptive survey design was adopted in conducting this study. Creswell (2013) asserts that a descriptive research design is used when data are collected to describe persons, organizations, settings or phenomena. The design also has enough provision for protection of bias and maximized reliability (Kothari, 2009). It was appropriate for this study because it allowed the collection of information for independent and dependent variables using interview and questionnaires (Orodho, 2003). The descriptive approach was appropriate for this study not only in validating finding but also in the formulation of knowledge and providing solutions to the problems. The researcher used this approach since it involves data collection, measurement, classification, analysis, comparison and interpretation to provide report summary such as measures of central tendency and correlation between variables.

The research design also enabled the study to combine both quantitative and qualitative research approaches in assessing the impact of Supply Chain collaboration practice on the performance of Steel Manufacturing Companies in Kenya. Quantitative approach strives for precision by focusing on items that can be counted into predetermined categories and subjected to statistical analysis (Simiyu, 2012). Mugenda & Mugenda, (2008) asserts that qualitative methods can be used to gain more in depth information that may be difficult to convey quantitatively. The qualitative data were obtained by interviewing the procurement managers while quantitative data were obtained by administering the questionnaire to members of procurement department, Information Technology department, marketing department and production department.

Target Population

Population is defined as the entire group of people or things of interest that the researcher wishes to investigate (Sekaran, 2010). The population of this study was all registered steel manufacturing companies in the republic of Kenya. Kenya has 258 registered steel products manufacturers

(Africainvestor, 2011). The target population of this study were all employees working in the 32 Steel manufacturing companies in Kenya

Sampling Technique and Sample Size

The purposive sampling technique was used to identify and select eligible Steel manufacturing companies and the departments to be included in the study. Purposive sampling allows the researcher to use cases that have the required information with respect to the objectives of his or her study (Mugenda and Mugenda, 2008). Out of 258 registered steel manufacturing companies in Kenya, the researcher purposively sampled 32 companies for the study based on the theoretical assumption that the distribution is assumed to be normally distributed with a sample size of a above 30 objects. The sample size was determined using Cochran (1963) sampling frame for large population number. $\text{Sample Size} = z^2 pq / e^2 = (1.96)^2 (0.5)(0.5) / (0.05)^2 = 384$ where $z = 1.96$, $p = 0.5$, $q = 0.5$ and $e = 0.05$. The sample size of participate in this research was to be 384 respondents and each company was to contribute 12 respondents in the study. The sample size selected depends on what researcher wants to know, the purpose of the study, what is at stake, and what can be done with available time and resources (Paton, 2002). Simple random sampling was used to select participants from each department in the company. The sample size of 384 is more than the generally recommended sample size of 100 cases for statistical data analysis (Alreck *et al.*, 2004).

Research Instruments

This study used the questionnaires and interview guides in collecting the primary data while secondary data were obtained from journals, textbooks, Internet and Kenya association of Manufacturer magazines. Face to face in-depth interview was conducted to collect information from the Procurement Managers that helped to get a complete and detailed understanding of the impact of supply chain collaboration practice on the performance of Steel manufacturing companies in Kenya. Mugenda & Mugenda (2008) asserts that questionnaire is designed to address specific objective, research question or test hypothesis. This study used questionnaire because of its ability to collect large amount of information in a reasonably quick space of time and also is made the analysis is data simpler based on the research objective of the study. In addition, all questions were standardized and anonymity of the respondent was quarantined for the purpose of increasing the response rate. This mix of sources allowed for additional cross-checking of the findings for the purpose of evaluating the internal consistency and to increase reliability.

Validity and Reliability

Validity is the criteria for how effective the design is in employing methods of measurement that captures the data for the purpose of addressing the research questions. To ensure the results of the study reflect similar outcomes elsewhere and be generalized to other populations or situations, the researcher used triangulation to enhance the external validity of the research instrument. Triangulation refers to the attempt to get a true fix on a situation by combining different ways of looking at the findings. Triangulation validates the methodology by an examination of the results from several perspectives. This research used interviews and questionnaire as primary data and research journals, textbooks and other public documents as secondary data. By combining data sources and methods triangulation opens the way for more credible interpretations (Decrop, 2004). To ensure the reliability of the instrument Cronbach's Alpha was used to test the reliability of the proposed constructs. Known for its stability and flexibility, Cronbach's alpha is a function of

internal consistency or interrelatedness of items (Cortina, 1993). The alpha can take any value from zero (no internal consistency) to one (complete internal consistency).

Data Processing and Analysis

The researcher examined all the questionnaires for completeness and consistency and then categorized all the items before coding. The collected data was analyzed using SPSS version 20 (Statistical Package for Social Science) as the researcher obtained data using a standard questionnaire. Quantitative technique was used to code qualitative data. Trochim (2004) asserts that qualitative data can be coded quantitatively without detracting from the qualitative information. Descriptive statistics was used to examine the characteristics of the population. Mugenda and Mugenda (2008) assert that descriptive statistics enable the researcher to describe distribution of scores. Variable aggregation for different variables was undertaken in facilitation of further statistical analysis. The researcher applied "Collapsing Response" method in analyzing responses from a Likert scale measurement. This is done by adding the 'strongly agree' responses with the 'agree' responses and also adding the 'disagree' responses with 'strongly disagree' (Gwavuya, 2011).

The null hypothesis was tested by use of F- ratio using a two way Fisher's Analysis of Variance [ANOVA] on assumption of the homogeneity of the variance of the sample that is normally distributed at 95% confidence interval. This helped in determining the relationship between supply chain collaboration practice and the performance of Steel manufacturing companies in Kenya. Mugenda and Mugenda (2008) argue that the analysis of variance is used because it makes use of the F – test in terms of sums of squares residual.

RESEARCH FINDINGS

From the analysis in the table 4.33, the linear regression analysis models on the dependent variable which is performance of Steel manufacturing companies in Kenya and independent variable which is Supply chain collaboration practice, the coefficient of determination (R^2) and correlation coefficient (R) shows the degree of association between the supply chain collaboration practice and the performance of Steel manufacturing companies in Kenya. The results of the linear regression indicate that $R^2=0.146$ and $R= 0.382$ this is an indication that there is a moderate linear relationship between supply chain collaboration practice and the performance of Steel manufacturing companies in Kenya. The independent variable can only explain 14.6% of variability of dependent variable.

Table 4.33: *Model Summary for SCC practice X_1*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.382 ^a	.146	.142	.80631

a. Predictors: (Constant), SCC Practice X_1

Table 4.33 shows the results of ANOVA test which reveals that the variable Supply Chain collaboration practice statistically significantly predicted the performance of Steel Manufacturing Companies in Kenya, $F(1, 242) = 41.319$, $p < .05$, $R^2 = .146$.

Table 4.34: ANOVA^a (*F-Test*) Analysis for SCC practice X_1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.863	1	26.863	41.319	.000 ^b
	Residual	157.334	242	.650		
	Total	184.197	243			

a. Dependent Variable: Performance of Steel Manufacturing Companies in Kenya

b. Predictors: (Constant), SCC Practice X_1

From table 4.35, the linear regression model for Supply Chain collaboration practice, $Y = \beta_0 + \beta_1 X_1 + \varepsilon$ Where; Y = Performance of Steel Manufacturing Company in Kenya; $\beta_0, \beta_1, \varepsilon$ = Coefficient of Performance of Steel manufacturing company equation; X_1 = Supply chain collaboration practice is $Y = 2.423 + 0.329X_1 + \varepsilon$

Table 4.35: Coefficients^a for SCC practice X_1

Model		Unstandardized Coefficients			t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.423	.184		13.171	.000
	SCC Practice X_1	.329	.051	.382	6.428	.000

a. Dependent Variable: Performance of Steel Manufacturing Companies in Kenya

The study findings echo that of Ou *et. al.* (2010) arguing that a collaborative long-term relationship with suppliers facilitate in garnering positive results in an array of activities as reflected in superior product quality and agile customer service. These is also in harmony with Singh and Power (2009), who observes that organizations would enhance customer satisfaction and other positive business outcomes if they remain engaged in collaborative relationships with both customers and suppliers.

CONCLUSION

From the research findings, Supply chain collaboration practice significantly contributes to the performance of Steel manufacturing companies in Kenya. This is shown by the regression analysis value $F(1, 242) = 41.319, p < .05, R^2 = .146$. Correlation analysis revealed that there is a significant and a moderate positive correlation between Supply Chain Collaboration (SCC) practice X_1 and the performance of Steel Manufacturing companies in Kenya ($r = 0.382, p < 0.01$). Also descriptive analysis revealed that majority of the respondents, 65.2% agreed that Supply Chain Collaboration Practice significantly contributes to performance of Steel Manufacturing Companies in Kenya. Hence the steel manufacturing companies in Kenya should ensure the high supply chain collaboration at all levels between supplier and customer that will contribute significantly to their competitive advantage and improved performance. The company should create extensive coordination by involvement of suppliers in joint planning, involving them in product development process and having clear policy on managing the relationship. The company should standardize means of communication by creating environment that improves effective information and resource sharing among trading partners. This can only be realized when the steel manufacturing

companies ensure strong relationship with suppliers based on mutual understanding and mutual goals.

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