

Effects of Supply Chain Integration on Performance of Public Health Supply Chains: A Kenyan Perspective

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Abstract: Research has accumulated a stock of knowledge on the importance of supply chain integration (SCI), but little is known about its worth in public health supply chains. For over a decade now the Kenyan government has considerably increased funding to the Kenya Medical Supplies Authority (KEMSA) but logistical shortcomings and weak links in the health supply chain have greatly hampered the performance of the health supply chain. This study sought to establish the relationship between SCI and organizational performance of public health supply chains using the case of KEMSA. Specifically, the study examined the effect of supplier integration, internal integration, customer integration and information integration on organizational performance. The study was anchored on Process-Based Management Theory, Network Theory, Stakeholder Theory and Transaction Cost Theory. Stratified random sampling technique was used to obtain the sample size of ninety three (93) respondents from various departments of the organization. Primary data was collected through research questionnaire whereas secondary data was obtained from the company's website and from the ministry of public health. Findings from the research revealed that supplier integration, internal integration and customer integration have a positive and statistically significant effect on organizational performance. Information integration was found not to have significant influence on organizational performance. Results also showed that the effect of the overall supply chain integration dimensions have positive and statistically significant effect on organizational performance. This study contributes to theory and practice by establishing that Process based-management, stakeholder theory and transaction cost theory are elaborate in describing supply chain integration from an organization point of view. The study also makes contribution to public management practice by establishing that supplier integration, internal integration and customer integration complements organizational performance.

Keywords: Supply Chain Integration, Supply Chain Performance, Public Health supply Chains.

I. INTRODUCTION

Supply Chain Integration (SCI) refers to the linkages between departments, functions, or business units within a firm, including the network of direct suppliers and their suppliers, and direct customers and their customers (Jespersen & Larsen, 2005). This relationship which has become a key issue in understanding the effectiveness of the concept of supply chain in organizations management, is changing inter-organizational relationships as we know them today (Zhao, Huo, Selen, & Yeung, 2011). This association has been studied since the pioneering work by Lee and Whang (2004) with most literature explicitly or implicitly implying that firms should pursue maximal SCI to achieve the best performance outcomes. However, in public health supply chains, SCI has not been as straight forward as it appears on paper (Msimangira, 2010).

Although research has brought forth the importance of SCI in regard to the performance of the firm, Msimangira (2010) claims that the impact of SCI on organizational performance of public health supply chains - a network of interconnected organizations or actors that procure health items for the public – has not been established. The public health supply chain mainly comprises the departments of procurement, planning, and drug regulatory board, human resources, and health programs in the ministries of health; central medical stores; donors; non-governmental organizations; regions and districts; health facilities; community health workers; and private sector partners like third-party logistics providers, and drug manufacturers and distributors.

The body of literature on SCI in the public domain is inclined to the typical view that the more a firm is integrated the better is its performance results (Rosenzweig, 2009). However, the validity of this view may not apply in the context of public health supply chains, as the effects of SCI on public health supply chains is yet to be understood. More importantly supply managers in the public sector must comply with constraining transparency and regulatory rules which do not apply in the private owned supply chains. Despite this and other constraints, they can achieve substantial savings by integrating the public sector requirements with private sector supply chain management concepts. However, current studies on the subject have not interrogated the relationship between SCI and the performance of public sector organizations. There is also no doubt that research on SCI in the public sector has not matched what has been undertaken in the private manufacturing and service sectors (Msimangira, 2014).

Organizational performance is the efficiency and effectiveness of a firm (McCann, 2004) or how an organization achieves its market and financial goals (Kaplan & Norton, 2005). On the other hand performance measurement entails quantifying - quantitatively or qualitatively - the input, output or level of activity of an event or process (Kaplan & Norton, 2005). Hofer (1983) contends that organization performance is a contextual concept associated with the phenomenon being studied. Finally, Pandey (1999) is of the view that financial measures have been used in the history of the firm to measure organizational performance including profit, return on investment, and earnings per share, market share, revenue growth and current ratio.

Extensive literature that is largely inclined to private firms indicates that SCI has a positive impact on organizational performance, although the link is not fully conclusive. On one hand, SCI has been associated with efficiency related improvements, such as shortened process lead times, due to a seamless flow of information, materials and improved responsiveness (Bowersox *et al.*, 2003; Frohlich and Westbrook, 2001), decrease in pipeline inventory levels, arising from better information visibility and improved decision making (Bagchi *et al.*, 2005). On the other hand, studies by Koufteros *et al.* (2005) and Gimenez & Ventura (2005), found no relationship between internal integration and operational performance. Further, the study by Stank *et al* (2001) found no association between supplier integration and operational performance.

Although research has established that a strong health system cannot function without a well-designed, well-operated, and well-maintained supply chain management system, the Kenya public health supply chain is under increased pressure to operate efficiently (Amemba, 2014) in order to cope with its widening portfolio and the expansion of health services in the new devolved units. These developments have called for a flexible supply chain capable of responding to the changing environment. However, in spite of increased funding to KEMSA, the health supply chain still exhibits weak links which remain a hindrance in accessing essential health products (Johnson, Hazemba, Kimeu, Kirika, & Thuo, 2008; Njagi & Ogutu, 2014).

In Kenya, the total supply cost does not constitute a major portion of the direct overall healthcare expenditure, but the importance of supply chain integration cannot be overemphasized. However, an effective supply chain could bring down the direct cost of providing patient care, and offer other important benefits like ensuring availability, reducing counterfeits, increasing responsiveness, increasing resilience, and increasing choices, reducing waste, increasing drug utilization, and reducing medication errors. A robust and effective supply system will also relieve the caregivers the duties and stress associated with concerns regarding availability and quality of medicine, thus allowing them to focus on their core mandates (Msimangira, 2010).

Since the inception of KEMSA in 2000 there have been multiple projects and initiatives to improve its performance, but in spite of these efforts, KEMSA like any other organization in the public sector, continues to struggle to effectively deliver its mandate (Yadav, 2014). Additionally, KEMSA has experienced significant operational changes with the coming of the 47 devolved governments in 2013. This is despite the fact that the government, donors and policymakers are keen on each link in this supply chains to perform optimally. This calls for a strong and fully integrated public health supply system that is well-designed, well-operated, and well-maintained-one that can ensure an adequate supply of essential health commodities to the citizens.

II. STATEMENT OF THE PROBLEM

Since 2003 the Kenya government has generously increased financial allocation to KEMSA, but the organization capability to dispense essential health products to the public has been hampered by weak links that exist within the public health supply chain. These challenges have had serious impact on the quality of human health care in the country, necessitating research on supply chain integration (SCI) in public health supply chains (Yadav, 2014).

The typical view in the existing literature on SCI is that a greater level of integration leads to better firm performance (Cannon *et al.*, 2010; Rosenzweig, 2009). Proponents of this position argue that SCI reduces transaction costs of producing and distributing goods and services, increases revenue by reducing uncertainties for both buyers and suppliers, and enhances supply chain responsiveness (Vallet-Bellmunt & Rivera-Torres 2013). However, opponents of this view have raised doubts on the impact of SCI on organization performance, adding that empirical studies have shown that supply chain integration does not necessarily enhance firm performance. SCI negative effects are to be expected if firms do not find a fit between integration and the environment in which they operate (Van der Vaart & Van Donk, 2008; Zhou & Benton, 2007).

Even though the debate on SCI is incomplete current studies on the subject have focused on the private sector (Cannon *et al.*, 2010; Rosenzweig, 2009), which significantly differ from the public sector (Zhao *et al.*, 2007). Moreover, the findings of these studies may not apply in the context of public corporations. Hence, we have insufficient knowledge on how SCI in public health supply chain influences organizational performance. Further, in the context of this study, extant literature has hardly examined the relationship between SCI and organizational performance in state corporations (Johnson *et al.*, 2008). This thesis aimed at closing the research gap by analyzing the relationship between supply chain integration and organizational performance of public health supply chains using a case of KEMSA.

III. OBJECTIVES OF THE STUDY

The general objective of this study was to analyze the relationship between supply chain integration and organizational performance of public health supply chains. The study was guided by the following specific objectives;

- i) To establish the relationship between supplier integration and organizational performance of KEMSA
- ii) To determine the relationship between internal integration and organizational performance of KEMSA
- iii) To assess the relationship between customer integration and organizational performance of KEMSA
- iv) To establish the relationship between information integration and organizational performance of KEMSA

IV. RESEARCH HYPOTHESIS

The following null hypotheses guided the study;

H₀₁: There is no significant relationship between Supplier integration and Organizational Performance of KEMSA

H₀₂: There is no significant relationship between Internal Integration and Organizational Performance of KEMSA

H₀₃: There is no significant relationship between Customer Integration and Organizational Performance of KEMSA

H₀₄: There is no significant relationship between Information integration and Organizational Performance of KEMSA

V. THEORETICAL REVIEW

According to Storey *et al.*, (2006), supply chain management is an emergent discipline in terms of both theory and practice, and only few practitioners have been able, or even seriously aspired, to manage their supply chains in the manner prescribed by a number of modern theories. Over time studies in supply chain integration have utilised different theories including: Process-Based Management Theory, Network Theory, Stakeholder Theory and Transaction Cost Theory. A number of scholars have also utilised the SCOR reference model to study supply chain integration and performance.

Process-Based Management Theory:

According to Lambert (2008), many researchers have recognized SCI as a process-based initiative, but they have different emphasis on SCM and SCI initiatives; and they exhibit little knowledge on how process-based management theory can be utilized to improve organizational performance. Further, Van Hoek (1998), Lambert, *et al.*, (1998) and Lambert (2008), argue that most researchers regard SCI as a mere technological challenge rather than a process and management

challenge; and although many scholars are now familiar with the SCI concept (Hammer, 2001), many companies have had problems in actualizing it. Hence, there is the need for further research to enhance the process-based theory because previous studies on the concept have been biased towards the manufacturing and service sectors, especially in examining the influence of supplier integration, internal integration, customer integration and information integration on organizational performance. This theory was important in explaining how the implementation of supply chain integration has since remained as a theory which is viewed as a technological challenge by many companies and not much effort has been made to make SCI a reality.

Network Theory:

The network theory also known as networks perspective is mostly concerned with the value generation through inter-organizational relations. Harland (1996) defines a network as a specific type of relation linking a defined set of persons, objects or events. McNichols & Brennan (2006) observe that network theory focuses on both dyadic relationships and multi-party relationships. Network theory was first developed between the 1970s and the 1980s with researchers focusing on relationships between two entities, or strategic alliances, towards an approach that entailed multiple relationships between different counters throughout the supply chain (Wellenbrock, 2013). According to Chang, Chiang and Pai (2012), a supply chain network is a complicated network model whose specific context depends on the relationships among the network members (Hakansson & Ford, 2002). Peck (2005) and Zhao, Anand & Mitchell (2005) affirm that networks perspective has been employed in studying both global supply chains and local specific industries supply chains. However, little is known on how networks perspective can provide understanding of organizational performance. This theory was useful in explaining the relationship between the different supply networks in the health supply chain and how they are linked for efficient and effective organization performance.

Stakeholder Theory:

Friedman and Miles (2006) state that an organization is a grouping of stakeholders, and is designed to manage their interests, needs and viewpoints. Recent research on stakeholder theory has majored on defining stakeholders and identifying who are the stakeholders (Tate, Ellram & Brown, 2009). Typically stakeholders comprise customers, employees, local communities, suppliers and distributors (Friedman, 2006). The stakeholder theory is premised on the fact that in contemporary business environment, individual businesses do not only compete as autonomous entities, but they also face competition from organizational supply chains (Drucker, 1998). Thus it is increasingly complex to define and identify the key stakeholders associated with a business processes. The stakeholder theory was used in this study to establish how different stakeholders in the health supply chain including departments of procurement, planning, drug regulatory board, human resources, and health programs of the ministries of health; central medical stores; donors; nongovernmental organizations (NGOs); regions and districts; health facilities; teams of community health workers; and private sector partners, such as third-party logistics providers, drug manufacturers, distributors, and private service providers influence the integration and how it affects the organizational performance of KEMSA.

Transaction Cost Theory:

Use of information technology in SCI has facilitated the reduction of coordination costs (Bakker *et al*, 2008). It is now a fact that the use of IT in electronic market places reduces the cost of searching information about product offerings and prices (Bakker *et al*, 2008). Similarly, collaboration through information sharing can lower transaction costs, reduce supply chain uncertainties, and ease the cost of contracting. Arrowsmith (2002) observes that when a supplier is unable to accurately predict the price of his product inputs, he will be reluctant to enter into a contract, which locks him into a fixed price for an extended period of time. The manufacturing sector supply chains have historically experienced uncertainty out of uncertainties in supply, demand, new product development, and technology (Koufteros, 1999). The transaction cost theory clarifies our understanding of how firms are linked together through supply chain integration. In explaining supply chain integration, the theory suggests that both internal and external integration components are included. According to Stank *et al.*, (2001), the application of the transaction cost theory provides a theoretical grounding to the developed theoretical framework across the levels of external supplier, external customer and internal company integration. In the context of this study, uncertainties in the health supply chain affects the stakeholders. The transaction cost theory was used to establish how information technology can be used to reduce transaction costs in the supply chain.

VI. EMPIRICAL REVIEW

Supplier Integration and Organizational Performance:

Lambert (2004) established that for a supply chain management to be successful it needs a cross-functional integration of key business processes within the firm and across the network of companies that form part of its supply chain. He observes that when manufacturing firms integrate with suppliers, they are able to share order and inventory information with suppliers, and prepare high-quality materials and services on time.

When Frohlich and Westbrook (2001) investigated supplier and customer integration, they identified five different SCI strategies which they characterized as various “arc(s) of integration”, with the high degree of “arc” representing high levels of supplier and customer integration. Their findings showed that companies which had the widest degree of arc for supplier and customer integration attained an optimal level of operational performance. Their research findings were collaborated by a follow up study by Frohlich (2002) which established that the operational performance of manufacturers with high level integration outperformed their counterparts with low level integration, in such metrics like delivery time, transaction costs, and inventory turnover.

Lee (2007) found out that supplier integration, including communication, sharing of information on matters pertaining to inventory data and production scheduling, and working with suppliers, reduced upstream complexity thus improving schedule attainment. The work by Bozarth *et al.* (2009) collaborated these findings by establishing that manufacturers reduced the bullwhip effect by working with suppliers on matters pertaining to sharing information about production plans and demand forecasts, which are related to schedule attainment. Zhao *et al.*, (2008) carried out a research from transaction cost theory perspective and found out that supplier integration can reduce transaction costs. They found that opportunistic behaviors are greatly reduced whenever supplier integration accorded opportunities for visions and cooperative goals to be shared. Their research was collaborated by that of Flynn *et al.*, (2010) which established that supplier integration can reduce transaction costs by reducing uncertainties. Flynn *et al.*, (2010) established that environment uncertainties are greatly reduced by investing in information systems and dedicated people to facilitate information sharing.

Frizelle and Efstathiou (2003), established that supplier integration plays a vital role in reducing production costs. They argued that high-level supplier integration involves few suppliers which translate to economies of scale in general, with overall net reduction in material and product costs. Second, when manufacturers and suppliers enter into mutual trust and cooperation, the former invest more in R&D and fixed assets in order to improve suppliers’ product and process quality thus reducing production costs. Others studies, notably (Devarajet *et al.*, 2007; Sanders and Premus, 2005; Frohlich, 2002; Frohlich and Westbrook, 2001; and, Shin *et al.*, 2000;) have established that whenever manufacturers share information and work with suppliers, supplier integration helps the former reduce inventory, improve delivery speed, quality, and customer service. Although there are only a few empirical studies that deal directly with the relationship between supplier integration and customer satisfaction, the literature in public domain indicates indirect effects about the link. Swink *et al.* (2007) also found that customer satisfaction is easily achieved when strategic supplier integration is mediated by manufacturing competitive capabilities. Finally, Frohlich and Westbrook (2001) and Vickery *et al.* (2003) established that firms achieve better customer service if they have high levels of SCI. Manufacturers get satisfied with materials or services that suppliers provide when the two have high-level supplier integration. This research investigated how supplier integration leads to customer satisfaction.

Internal Integration and Organizational Performance:

According to Germain and Iyer (2006), internal integration is said to exist if internal functions and firm-wide standards and norms are coordinated. Internal integration helps in the attainment of product scheduling. Rosenzweig *et al.*, (2003) say that firms are able to meet schedules requirements through cross-functional coordination and working together, production planning and scheduling, customer order management, and demand planning. They are also able to allocate available resources at suitable schedule costs whenever information on customer orders, inventory level, and purchasing and production schedule are effectively communicated among functions. Thus, according to Lee *et al.*, (1997) good communication among functions quickly delivers demand information, thus reducing the bullwhip effect and schedule modifications. Swink *et al.*, (2007) observes that a large body of empirical research has highlighted the benefits of internal integration in improving competitive performance. For instance, Rosenzweig *et al.*, (2003) demonstrated that the direct relationship between internal and external integration intensity to be positive. Similarly, Koufteros *et al.* (2005)

used data from 244 manufacturing firms in the US, to make a conclusion that internal integration positively influences product innovation and quality. Swink *et al.* (2007) also established that internal product process technology integration improves manufacturing capabilities of firms when it comes to quality, delivery, process, and new product flexibility.

Rosenzweig *et al.*, (2003) are of the view that internal integration, can help create and transfer knowledge effectively. With such arrangements, experts from different functions work as a team to meet customers' demands, irrespective of whether they are either new product developments or product quality improvements. Several researchers like Stratman & Roth (2002), Sanders & Premus (2005), and, Germain & Iyer (2006) have also stated that internal integration may also include the application of enterprise software systems like SAP, production planning and scheduling, and other integrated software platforms. Similarly, Ahmad and Schroeder (2001) and Hendricks *et al.*, (2007) have separately done system information research whose findings indicate that manufacturers that adopted enterprise resource planning and other integrated software platforms posted better operational performance than those who did not do so; results that went far and beyond to support the positive effects of internal integration on operational performance.

According to Yang (2007), internal integration, via information transfer from marketing/sales departments, facilitates the entire company to understand customer requirements. Furthermore, integrated customer order fulfillment processes, are more rapid where all activities, functions, and departments involved in fulfilling the order are integrated, and customer satisfaction is attained when production time is shortened, development costs are reduced, and delivery speed is increased. For instance, when a firm wants to add a new product into the market, the new product gets formulated after the marketing department presents the needs of the customer, followed by interactions between the R&D, marketing, and production departments experts to develop product designs in accordance to the needs of the customer (Yang 2007).

Furthermore, empirical works by Stank *et al.*, 2001, Vickery *et al.*, 2003, and Swink *et al.*, 2007, have highlighted how internal integration is beneficial to customer satisfaction. For instance, Vickery *et al.*, (2003) carried out a research in 57 first-tier automotive suppliers to the North American Big Three automobile manufacturers and established a direct relationship between SCI and customer service. Finally, Swink *et al.*, (2007) also found that customer satisfaction is improved when internal product-process technology integration improves manufacturing capabilities.

Customer Integration and Organizational Performance:

Swink (2007) argues that manufacturing firms discover customer preference and improve demand forecasts when they practice strategic integration that is focused on customers. Indeed manufacturers improve on production schedules and reduce frequent schedule modifications when they work with customers. Likewise, manufacturers reduce bullwhip effects when they effectively share information with customers. They are also able to adjust their production scheduling and capacity in advance when order information and capacity is communicated well by customers (Lee *et al.*, 2007).

The works by Koufteros *et al.*, (2005), Germain & Iyer (2006), and Swink (2007) have also shown that customer integration leads to competitive benefits. Kulp (2004) demonstrated that there exists a positive association between the performance of a manufacturer and their sharing of either inventory levels or customer information requirement with retailers. The study by Koufteros *et al.* (2005), which surveyed new product developments in 244 manufacturing firms in the US, cited in the last section, showed that there exist a direct relationship between customer integration and competitive capabilities when measured by product innovation and quality performance. Swink *et al.*, (2007) also confirmed the same results. Finally, Germain and Iyer (2006) found that integration with customers has a positive relationship with logistical performance.

And whenever Manufacturers and customers interact closely they are accorded the opportunities to develop mutual forbearance and improve information accuracy. Swink *et al.*, (2007) established that manufacturers speed up product design, improve production planning, and reduce inventory obsolescence, when they get accurate information about customer demand, preferences, and frequent information updates. Businesses are also able to reduce costs, create more value for customers, and easily detect critical demand changes to design and respond with speed, when customer integration allows for the leveraging of the intelligence embedded in the collaborative processes (Swink *et al.*, 2007). Moreover, manufacturers are able to understand customer preferences and quickly respond to their needs when customer integration is in place (Swink *et al.*, 2007). Customer integration allows manufacturers to effectively and efficiently meet the needs of customers through surveys of customer needs, involving them in product design, and getting feedback on product quality and product performance. This way, manufacturers are able meet the satisfaction of their customers by providing high-quality and low-priced products.

Information Integration and Organizational Performance:

The act of coordinating activities in a supply chain is very important. This is particularly crucial in the areas of information management, information management systems and data transaction. Research has already established that coordinated and appropriate information between partners has positive impact on speed, accuracy, quality and other aspects of a firm. Elahi *et al*, (2009) posit that information integration is the degree to which operational, tactical and strategic information are transferred between business partners and the central company. On the same breadth, Frohlich and Westbrook (2001) say that that information flows from bottom to top should support the downward flow of material in a supply chain.

In any case, the integration of business processes and information flow between business partners has been shown to make significant progress in supply chain management (Kalakota and Robinson, 2010). According to Lai *et al* (2007) information integration is the use of information and communication technology to coordinate decisions and activities between organizations and their partners. In an organization, there exists a positive relationship between information integration and organization performance (Jayaram & Tan, 2010). This research reviews information integration through information technology (technical aspect) and information sharing (social dimension aspect). It affirms that organizations can firmly associate with each other by placing emphasis on information technology and having the will to share critical information.

VII. RESEARCH METHODOLOGY

The study targeted a population of one hundred and twenty three (123) respondents within the management and supervisory staff of the organization. Stratified random sampling technique was used to obtain the sample size of ninety three (93) respondents from various departments of the organization. Primary data was collected through administering a research questionnaire whereas secondary data was obtained from the company’s website and from the ministry of public health. Data was analyzed through descriptive statistics, correlation and multiple regressions.

VIII. FINDINGS

Supplier Integration and Organization Performance:

The study specifically sought to establish the effect of supplier integration on organizational performance as a dimension of supply chain integration. Ordinary least squares regression was carried out to determine this relationship. The regression model $Y = \beta_0 + \beta_1 X_1 + e$ was thus fitted from the data where X_1 represented supplier integration and Y denoted organizational performance. From Table 1(b), the regression model of X_1 and Y was significant ($F(1, 74) = 25.321$, $P\text{-value} = 0.000 < 0.05$) implying that supplier integration is a valid predictor in the model. The results in table 1 (a) indicate value of R and R^2 as 0.505 and 0.255 respectively. The R value of 0.505 showed that there is a positive linear relationship between supplier integration and organizational performance. The R^2 value (0.255) indicate that 25.5% of the variation in organizational performance is explained by the model $Y = \beta_0 + \beta_1 X_1 + e$.

Table 1: Supplier Integration and Organizational Performance

a) Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.505 ^a	.255	.245	.376		
b) ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.574	1	3.574	25.324	.000 ^b
	Residual	10.443	74	.141		
	Total	14.017	75			
c) Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.086	.180		17.152	.000
	Supplier Integration	.211	.042	.505	5.032	.000

a. Dependent Variable: Performance

This study hypothesized H_{01} : There is no significant relationship between supplier integration and organizational performance. The results revealed that there is a positive and significant relationship between supplier integration and organizational performance. ($\beta_1 = .211$, $t = 5.032$, $p\text{-value} = 0.000 < 0.05$). Therefore, the null hypothesis is rejected ($\beta_1 = .211$,

$t=5.032$, $p\text{-value}= 0.000 < 0.05$) and conclude that supplier integration (X_1) significantly influences organizational performance (Y). The results of coefficients to the model $Y=3.086+.211X_1$ estimates were both significant at the 0.05 level of significance. The constant term implied that at zero supplier integration, supply chain performed at 3.086 measures. A unit increase in supplier integration increased the organizational performance by 0.211 measures. Therefore, supplier integration is a good predictor of organizational performance.

The results support the findings of Frizelle and Efstathiou (2003), who established that supplier integration plays an important role in reducing production costs and thereby increasing firm performance. On one hand, higher-level supplier integration is usually related with fewer suppliers, which can lead to economies of scale for suppliers; this in turn reduces material and product costs. On the other hand, with trust and cooperation with suppliers, manufacturers are willing to invest in fixed assets and R&D activities to improve their suppliers' product and process quality, which reduces production costs.

Again, the results compare well with the findings of Lee (2007) who established that supplier integration, including communication, sharing information regarding inventory data and production scheduling, and working together with suppliers, can reduce upstream complexity which negatively affects schedule attainment. His research findings were collaborated by Bozarth *et al.* (2009) who found out that working together and sharing information about production plans and demand forecasts with suppliers can reduce the bullwhip effect, which is highly related to schedule attainment. Similarly, the findings of this research are consistent with Zhao *et al.*, (2008) and Flynn *et al.*, (2010) whose research from transaction cost theory perspective found out that supplier integration can improve organizational performance through reduced transaction costs since opportunistic behaviors are greatly reduced under shared visions and cooperative goals in supplier integration. Further, the findings of this research agree with the empirical results from the works of (Shin *et al.*, 2000; Frohlich and Westbrook 2001; Frohlich, 2002; Sanders and Premus, 2005; Devaraj *et al.*, 2007) which established that supplier integration has a positive effect on organizational performance; as it reduces inventory and also improves delivery speed, quality, and customer service through sharing information and working together with suppliers. However, research findings of this study contrast the findings of some scholars including Swink *et al.* (2007); Frohlich and Westbrook (2001) and Vickery *et al.* (2003) who found that strategic supplier integration is negatively associated with organizational performance.

Internal Integration and Organizational Performance:

To determine the relationship between internal integration and organizational performance, ordinary least squares regression was carried out. The regression model $Y= \beta_0 + \beta_2X_2$ was thus fitted from the data where X_2 represented internal integration and Y denoted organizational performance. Results in 2 (b) show that the regression model of X_2 and Y was significant ($F(1, 74) =25.503$, $p\text{-value} =0.000 < 0.05$), implying that internal integration is a valid predictor in the model. Results in Table 2 (a) reveal the values of R and R^2 were 0.506 and 0.256 respectively. The R value of 0.506 showed that there was a positive linear relationship between internal integration and organizational performance. The R^2 (0.256) value indicated that the explanatory power of the independent variable was 0.256. This means that 25.6% of the variation in organizational performance was explained by the model $Y= \beta_0 + \beta_2X_2$.

Table 2: Internal Integration and Organizational Performance

a) Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.506 ^a	.256	.246	.375		
b) ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.593	1	3.593	25.503	.000 ^b
	Residual	10.424	74	.141		
	Total	14.017	75			
c) Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.184	.160		19.845	.000
	Internal Integration	.206	.041	.506	5.050	.000

a. Dependent Variable: Performance

b. Predictors: (Constant), Internal Integration

The study hypothesized H_{02} : There is no significant relationship between internal integration and organizational performance. To test the relationship, the regression model fitted was $Y = \beta_0 + \beta_2 X_2 + e$. The results of the survey revealed that there was positive relationship between internal integration and organizational performance ($\beta_2 = 0.206$, $t = .141$, $p\text{-value} = 0.000 < 0.05$). The null hypothesis (H_{02}): There is no significant relationship between Internal Integration and organizational performance is therefore rejected ($\beta_2 = 0.206$, $t = .141$, $p\text{-value} = 0.000 < 0.05$) and we conclude that Internal Integration (X_2) significantly influences organizational performance (Y). The Model equation is: $Y = 3.184 + 0.206X_2$. The results of coefficients to the model $Y = 3.184 + 0.206X_2$ estimates were both significant at the 0.05 level of significance. The constant term implied that at zero internal integration, organizational performance is at 3.184 measures, and increasing internal integration by one unit increased organizational performance by 0.206 measures. The findings of this research are in tandem with that of Rosenzweig *et al.*, (2003) who established a positive direct relationship between internal integration and organizational performance. Similarly, this study's results collaborates the findings of Koufteros *et al.* (2005) who established that internal integration positively influences organizational performance. Again, the results support the findings of Swink *et al.* (2007) who established that internal product process technology integration improves manufacturing capabilities in terms of quality, delivery, process, and new product flexibility.

Rosenzweig *et al.*, 2003, is of the view that internal integration the effective creation and transfer of knowledge. Essentially, experts from different functions work together as a team to meet the requirements of customers, especially for new product development and improvements in product quality. In addition, internal integration usually includes the application of enterprise software systems, such as SAP, production planning and scheduling, and other integrated software platforms (Stratman and Roth, 2002; Sanders and Premus, 2005; Germain and Iyer, 2006). A notable extant information system research has demonstrated that enterprise resource planning or other integrated software platforms adopters have better operational performance than non-adopters (Ahmad and Schroeder, 2001; Hendricks *et al.*, 2007), thus supporting the positive effects of internal integration on operational performance.

Similarly, internal integration can improve customer satisfaction in many aspects. First, with internal integration, customer requirements are well understood by the whole company via information transfer from marketing/sales departments to other departments. Furthermore, integrated customer order fulfillment processes, in which all activities, functions, and departments involved in fulfilling the order are integrated, can shorten production time, reduce development costs, and increase the speed to market, which in turn improves customer satisfaction. For example, when a firm wants to introduce a new product, the marketing department must first state the customers' needs to determine the product that is to be introduced, and expertise from the R&D department interacts with marketing and manufacturing departments to develop the product design to fulfill the customers' requirements.

Previous empirical research has also highlighted the benefit of internal integration on customer satisfaction (Stank *et al.*, 2001; Vickery *et al.*, 2003; Swink *et al.*, 2007). Using data from 57 first-tier automotive suppliers to the Big Three automobile manufacturers in North America, Vickery *et al.*, (2003) found a direct relationship between SCI (including cross functional team integration) and customer service. Swink *et al.*, (2007) also found that internal product-process technology integration improves manufacturing capabilities, which in turn improves customer satisfaction.

Customer Integration and Organizational Performance:

To determine the relationship between customer integration and organizational performance, ordinary least squares regression was carried out. The regression model $Y = \beta_0 + \beta_3 X_3 + e$ was thus fitted from the data where X_3 represented customer integration and Y denoted organizational performance. Results in Table 3 (b) shows that the regression model of X_3 and Y was significant ($F(1, 74) = 4.441$, $p\text{-value} = 0.038 < 0.05$), implying that customer integration is a valid predictor in the model. In Table 3 (a), the value of R and R^2 were 0.238 and 0.057 respectively. The R value of 0.238 showed that there was a positive linear relationship between customer integration and organizational performance. The R^2 value indicated that the explanatory power of the independent variable (customer integration) was 0.057. This means that 5.7% of the variation in organizational performance is explained by the model $Y = \beta_0 + \beta_3 X_3 + e$.

Table 3: Customer Integration and Organizational Performance

a) Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.238 ^a	.057	.044	.423
a. Predictors: (Constant), Customer Integration				
b) ANOVA^a				

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.794	1	.794	4.441	.038 ^b
	Residual	13.223	74	.179		
	Total	14.017	75			

c) Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.362	.195		22.398	.000
	Customer Integration	.106	.050	.238	2.107	.038

a. Dependent Variable: Performance

b. Predictors: (Constant), Customer Integration

The study hypothesized H_{03} : There is no significant relationship between customer integration and organizational performance. The research findings revealed that there is a positive and statistically significant relationship between customer integration and organizational performance ($\beta_3=0.106$, $t= 2.107$, $p\text{-value} =0.038$). The null hypothesis (H_{03}) is therefore rejected ($\beta_3=0.106$, $t= 2.107$, $p\text{-value} =0.038$) and we conclude that customer integration (X_3) significantly influences organizational performance (Y). The Model equation is: $Y= 4.362 + 0.106X_3$. The constant term implied that at zero customer integration, organizational performance was at 4.362 measures. Increasing customer integration by one unit increased organizational performance by 0.106 measures.

Strategic integration with customers highlights frequent customer interactions during which firms discover customer preference and improve demand forecasts (Swink, 2007). When manufacturers work together with customers, their production schedules can be more accurate and it can reduce frequent schedule modifications. Bullwhip effects can be also reduced through effective information sharing and cooperation between manufacturers and customers. Furthermore, the communication of order information and capacity makes it easier for manufacturers to adjust their production scheduling and capacity in advance (Lee *et al.*, 2007).

Previous empirical research has shown that customer integration can lead to competitive benefits (Koufteros *et al.*, 2005; Germain and Iyer, 2006; Swink 2007). Kulp (2004) revealed that the act of manufacturers sharing either inventory levels or customer requirement information with retailers is positively associated with manufacturers' performance. In a survey of new product development in 244 manufacturing firms in USA, Koufteros *et al.* (2005) demonstrated that customer integration directly influences competitive capabilities in terms of product innovation and quality performance. Germain and Iyer (2006) found that downstream integration with customers positively influenced logistical performance.

Swink *et al.* (2007) also confirmed that strategic customer integration is positively associated with manufacturing competitive capabilities. Close interactions between customers and manufacturers offer opportunities for them to develop mutual forbearance and improve information accuracy. More accurate information about customer demand and customer preferences, as well as frequent updating of information, can speed up product design, improve production planning, and reduce inventory obsolescence. Customer integration also generates remarkable opportunities to leverage the intelligence embedded in the collaborative processes, enabling businesses to reduce costs, create more value for customers, and quickly detect critical demand changes to design and execute optimal responses.

Moreover, customer integration helps manufacturers enhance the understanding of customer preferences (Swink *et al.*, 2007), which can make manufacturers more responsive to their customers' needs. Close customer integration makes it easier for manufacturers to meet customers' requirements effectively and efficiently. By surveying customer needs, involving customers in product design, and receiving feedback on product quality and performance, manufacturers provide high-quality and low-price products to customers with great responsiveness, which in turn leads to customer satisfaction.

Information Integration and Organizational Performance:

To determine the relationship between Information Integration and Organizational Performance, ordinary least squares regression was carried out. The regression model $Y= \beta_0 + \beta_4X_4$ was thus fitted from the data where X_4 represented Information Integration and Y denoted Organizational Performance. Results in Table 4 show that the regression model of X_4 and Y was statistically insignificant ($F(1, 74) t= 2.066$, $p\text{-value} =0.155>0.05$), implying that Information Integration is not a valid predictor in the model. The null hypothesis (H_{04}): There is no significant relationship between Information Integration and Organizational Performance is therefore accepted and we conclude that Information Integration (X_4) has insignificant influence on Organizational Performance (Y).

Table 4: Information Integration and Organizational Performance

a) Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.165 ^a	.027	.014	.429		
b) ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.381	1	.381	2.066	.155 ^b
	Residual	13.636	74	.184		
	Total	14.017	75			
c) Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.718	.179		20.787	.000
	Information Integration	.071	.049	.165	1.437	.155

a. Dependent Variable: Performance
 b. Predictors: (Constant), Information Integration

The results are consistent with the findings of Lee (2007) who found out that supplier integration, including communication, sharing information regarding inventory data and production scheduling, and working together with suppliers, can reduce upstream complexity which negatively affects schedule attainment. Similarly, this research findings are collaborated by the work of Bozarth *et al.* (2009) who found out that working together and sharing information about production plans and demand forecasts with suppliers can reduce the bullwhip effect, which is highly related to schedule attainment. Kalakota and Robinson (2010) suggested that significant progress in supply chain management can be achieved through the integration of business processes and information flow between business partners. Lai et al (2007) defined information integration as using information and communication technology in order to coordinate decisions and activities between an organization and its partner. Jayaram and Tan (2010) concluded that information integration has positive relationship with organizational performance of an organization. Information integration in this study is reviewed through two dimensions of information technology (technical) and information sharing (social dimension). Importantly, the emphasis on information technology without the willingness to share critical information will not significantly associate organizations.

Overall Regression Analysis:

A regression analysis was run in order to assess the influence of the joint relationship between supply chain integration dimensions and organizational performance. The study used multiple regression analysis to establish the joint effects of the study variables: supplier integration (X₁), internal integration(X₂), Customer integration (X₃) and Information Integration(X₄) aggregated together as supply chain integration (SCI) and regressed on the dependent variable, Organization Performance (Y). To test the hypothesis the following model was fitted:

$$\text{Model 1: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Results in Table 5 (b) show that the regression model was significant (F (4, 71) = 14.432, p-value=0.000<0.05) implying that SCI dimensions were a valid predictor of organizational performance. The value of R and R² were 0.670 and 0.448 respectively. The R value of 0.670 showed that there is a positive linear relationship between SCI dimensions and organizational performance. The R² value indicated that the explanatory power of the SCI dimensions (as a variable) was 0.448. This means that 44.8% of the variation in organizational performance in KEMSA was explained by the model $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$.

Table 5: Supply Chain Integration and Organization Performance

a) Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.670 ^a	.448	.417	.330		
b) ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.286	4	1.571	14.432	.000 ^b
	Residual	7.731	71	.109		
	Total	14.017	75			

c) Coefficients ^a		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.788	.271		10.274	.000
	Supplier Integration	.162	.039	.387	4.140	.000
	Internal Integration	.140	.038	.343	3.646	.001
	Customer Integration	.087	.040	.194	2.146	.035
	Information Integration	.085	.039	.199	2.207	.031

a. Dependent Variable: Performance

b. Predictors: (Constant), Information Integration, Supplier Integration, Customer Integration, Internal Integration

The results of the study reveal that there is positive and statistically significant relationship between the joint SCI dimensions and organizational performance ($p\text{-value } 0.000 < 0.05$). The results revealed that there is a positive and statistically significant relationship between the joint SCI dimensions and organizational performance. The study established the joint influence of supplier integration, customer integration, and internal integration on organizational performance was greater than that of their individual influence.

The Regression Model is $Y = 2.788 + 0.162X_1 + 0.140X_2 + 0.087X_3 + 0.085X_4$

Where: Y is organization performance

X₁ is supplier integration

X₂ is internal integration

X₃ is customer integration

X₄ is information integration

The results are consistent with the findings of several scholars (Rosenzweig, 2009; Msimangira, 2014; Bowersox *et al.*, 2003; Frohlich and Westbrook, 2001; Koufteros *et al.* 2005 and Gimenez & Ventura 2005) which established that a greater level of supply chain integration leads to better firm performance. This is achieved through reduced transaction costs through the reduction of uncertainties. On one hand, higher-level supply chain integration is usually related with fewer suppliers, which leads to economies of scale for suppliers; and eventually a reduction material and product costs. On the other hand, empirical studies done by numerous scholars (Shin *et al.*, 2000; Frohlich and Westbrook, 2001; Frohlich, 2002; Sanders and Premus, 2005; Devaraj *et al.*, 2007) show that supply chain integration is helpful in reducing inventory and improving delivery speed, quality, and customer service, through sharing information and working with suppliers which have the overall effect of enhancing firm performance.

IX. CONCLUSIONS

The primary objective of this research was to assess the association between supply chain integration and organizational performance. This was done through exploring the supply chain integration dimensions using the process-based management and transaction cost theories. This study examined the relationship between supplier integration; internal integration, customer integration and information integration and organization performance. A conceptual model was developed and empirically tested these relationships. The descriptive statistics indicate that KEMSA certainly continues to pursue supply chain integration through supplier integration, internal integration, customer integration and information integration. The descriptive statistics again indicate that KEMSA seeks to continuously improve its organizational performance through implementing various supply chain strategies. In addition, the descriptive statistics show that the integration of supply chain has proven to be a critical success factor for the company's performance. Most respondents agreed that when strategy and practice are properly combined, the firm performances improve. On the regression statistics, it was revealed that supplier integration had a positive and statistically significant influence on organization performance. Internal integration not only improves customer satisfaction but also improves customer order fulfillment processes, in which all activities, functions, and departments involved in fulfilling the order are integrated which in turn shorten production time, reduce development costs, and increase the speed to market, which in turn improves firm performance. The regression analysis on internal integration also showed that it has a positive and statistically significant effect on organizational performance. Similarly, it was revealed that customer integration has a positive and statically significant influence on organization performance. Therefore, these results lead to the conclusion that greater level of supplier, internal and customer integration complements organization performance in KEMSA. However, the relationship between information integration and organization performance was statistically insignificant.

X. RECOMMENDATIONS

Based on the study's findings, the following recommendations are made;

The study recommends for enhanced utilization of supplier integration approaches to enhance organizational performance in reducing not only the transactional cost but also improving process efficiency. Through integration with suppliers, organizations share order and inventory information with suppliers, cross-functional integration of key business processes helps suppliers prepare high-quality materials and services on time which ultimately enhances organizational performance. The study also recommends for the strategic use of internal integration and customer integration as a policy tool for coordination, production planning and scheduling, customer order management, and demand planning in order to enhance organization performance.

XI. RESEARCH CONTRIBUTION TO THEORY AND PRACTICE

The debate on supply chain integration is incomplete. Extant literature on supply chain integration is largely driven by the typical view that a greater level of integration leads to better firm performance. However, some scholars continue to raise doubts on the effect of supply chain integration on organization performance. This study sought to empirically establish this relationship. The study results will not only stimulate deeper academic discourse on supply chain integration and firm performance but also have contribution to theory and practice. This study was mainly anchored on Processes-based management theory and Transaction cost theory. On one hand, the study established that Process based-management theory is an elaborate theory in describing supply chain integration from an organization view point where supply chain integration is recognized as a process-based initiative whereby supplier integration, internal integration, customer integration and information integration are processes. On the other hand, the study established the diversity of transactional cost theory in explaining organizational performance. The study also makes contribution to public management practice by establishing that supplier integration, internal integration and customer integration complements organizational performance.

XII. FURTHER RESEARCH

This research was primarily focused on assessing the relationship between supply chain integration and performance of KEMSA which is a state owned organization. The study can be replicated in the future in a private sector set-up to establish if similar results can be achieved. Alternatively, future research can use cross-sectional survey design to establish whether similar results can be replicated since this study used a case study research design which is associated case subjectivity.

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