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EFFECT OF CROSS-FUNCTIONAL INFORMATION SHARING ON SUPPLY CHAIN AGILITY OF COSMETICS MANUFACTURING FIRMS IN THE COUNTY GOVERNMENT OF NAIROBI, KENYA

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ABSTRACT: *Supply Chain Agility is widely regarded as a critical element that affects firms' competitiveness at the strategic level. This is because firms with Supply Chain Agility have better performance in responding to unforeseen events. The purpose of this study, was to assess the effect of Cross Functional Information Sharing on Supply Chain Agility of Cosmetics Manufacturing firms in the County Government of Nairobi. Cross Functional Information Sharing is generally considered an enabler of a firm's Supply Chain Agility. Information Sharing has significant effects on the performance of Cosmetics Manufacturing Firms. These trends have led to expanding the scale of procurement and reducing operating and purchase costs in order to improve the responsiveness of the supply chain. Relational View theory, Resource Based View Theory and Stategy, Structure and Performance Theory was adopted in the study. Cross-sectional survey research design was used in the study. The target population of the study was 714 employees working in the Cosmetic Manufacturing Firms in the County Government of Nairobi, Kenya. A sample of 256 was selected from the target population using a Multi Stage Sampling Technique. Both descriptive and inferential statistics was used to analyse the collected data. The results indicates that there is a positive and statistically significant correlation between Cross Functional Information Sharing and Supply Chain Agility ($r=.582$, $p < 0.01$). This is a clear indication that any effort to improve the communications channels making it more informative will lead to an increase in supply chain agility. Therefore the study concludes that Cross functional information sharing is a pertinent factor as it affects the Supply Chain Agility of Firms. With the growing technological advances and the emergence of the global information infrastructure, firms should possess the suitable competitive inter-organisational informational systems to enable them to achieve the rapid and effective response to the customer needs and changing expectations.*

KEYWORDS: Supply Chain agility, Cross-Functional Information Sharing, Competitiveness, Performance

INTRODUCTION

In today's competitive economy, focus has steadily increased on delivering value to the customers. Globalization, technological change and demanding customers make the marketplace more fiercely competitive than ever before (Fawcett *et al.*, (2007). Concurrent to the focus on customer value, the marketplace in which businesses operate today is widely recognized as being complex and turbulent (Christopher, 2000). Hence, organizations are urged to improve their operations, by becoming more interconnected and interdependent than before. The expansion of supply chains, while enhancing profitability, customer responsiveness and the ability to deliver value to the customers, has at the same increased the interconnections and interdependencies among organizations. The global marketplace has become very volatile, with customers demanding lower prices, faster delivery, and higher quality and increasing

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variety (Narasimhan & Das, (1999); Christopher, (2000); Powersox *et al.,* (2001); Li & Lin, (2006); Kisperska-Moron & de Haan, (2011).

Shortened product life cycles (Vonderembse *et al.,* 2006), market uncertainty in the global economic (Flint, 2004). According to Hervani *et al.,* (2005), pressure from competitive forces may force organization's to reinvestigate how their supply chains are structured and managed, in order to respond to the increasing market complexity, turbulence and uncertainty. In many industries, complexity and uncertainty have increased to the point that competing autonomously is no longer an option. The characteristics of products produced and processes involved in manufacturing contribute to the complexity of the relationship. Speed, quality, and flexibility are being emphasized as means of responding to the unique needs of customers and markets. However, the core resource competencies required to realize the extended range of objectives are often difficult to mobilize and retain by individual companies (Gunasekaran & Yusuf, 2002).

Thus, in an agile supply chain, a high degree of cooperation between members of the supply chain is required. It is recommended that the key to survival for organization's dealing with more innovative products such as cosmetics is creation of responsive or agile supply chains. According to Yusuf *et al.,* (1999), agility is a system with extraordinary capabilities to meet the rapidly changing needs of the marketplace. Supply chain agility is the ability to respond rapidly to changes in customer demand, both in product volume and variety (Christopher, (2000); van Hoek *et al.,* 2001). It is a system that responds quickly to new product models or between product lines, ideally in real-time response to customer demand.

Purpose of the Research

The purpose of this study, was to assess the effect of Cross Functional Information Sharing on Supply Chain Agility of Cosmetics Manufacturing firms in the County Government of Nairobi. Cross Functional Information Sharing is generally considered an enabler of a firm's Supply Chain

Agility. Information Sharing has significant effects on the performance of Cosmetics Manufacturing Firms. These trends have led to expanding the scale of procurement and reducing operating and purchase costs in order to improve the responsiveness of the supply chain. Consequently, its diversity in the service, price transparency, emphasis on fast, convenient times and formats all working in the information technology (Sorescu*et al*., 2011).

Statement of the Problem

Cosmetic companies in Kenya compete in a market where rivalry is intense with a plethora of brands and sub brands occupying both the lower and upper tiers of the price continuum. Despite its fast growth, past research done on this sector reveals that there are quite a number of supply chain challenges, which includes: securing a reliable internal operation capabilities, supply chain disruptions, complexities in the supply chain, inconsistencies of quality supplies, poor visibility of demand, lack of cooperation among supply chain members, conflicts among supply chain members, lack of trust among supply chain members, short product life cycles and competition from other supply chains Gordon Otila, (2011); Betty, CJ.(2014); Anderson M. (2012). Cosmetics manufacturers are stressing flexibility and agility in order to respond to the unique needs of customers and markets in real time. According to a research from the Future Foundation (2015), more than 70% of the Kenyan Cosmetic Manufacturing Firms have not

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embraced technology. This is reflected by the 87% of the people who are still not able to shop online, and more than 50% who are not able to shop cosmetics products via mobile phones due to lack of technology. This has led to low productivity, poor quality products, inefficiency of operations, and in the long run, impact on the competitive of the Industry. This calls for more integration with supply chain partners who are able to cope with technological changes, provide critical components of products and services and reduce uncertainty and respond to changes accordingly. Cross fucntional Information Sharing is an important enabler of key processes in an organisation and its supply chain as reflected in a developed economy. As such little research has been done on this particular area, especially on the effect of Cross Functional Information Sharing on Supply Chain agility of Cosmetics Manufacturing Firms. This becomes quite fundamental because information sharing is regarded as an essential tool, commonly accepted today that has significant effects on the productivity of Cosmetics industries and to enhance the competitiveness of the economy of a developing country like Kenya. These effects will only be fully realized if, and when, IT are widely spread and used. This becomes essential to be addressed as Cross fucntional Information Sharing often enable processes across supply chain and their implications for agility must be fully recognized and examined in a developing economy. The study therefore was designed to fill this knowledge gap by assessing the Effect of Cross-Functional Information Sharing on Supply Chain Agility in Cosmetics Manufacturing Firms in the County Government of Nairobi, Kenya.

Research Hypothesis

Ho_1: Cross Functional Information Sharing has no significant effect on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi.

Significance of the research

Cross functional information sharing facilitates a firm's customer agility and competitive activity. This is because Cosmetics Manufacturing organizations need to develop superior firm-wide IT capabilities to manage their operations successfully and realize the agility. Customer agility captures the extent to which a firm is able to sense and respond quickly to customer-based opportunities for innovation and competitive action. Cross functional information sharing plays a significant role in facilitating a "knowledge creating" synergy derived from interaction between a firm's web-based customer infrastructure and its analytical ability. A typical premise is that greater IT investment enables such firms to be agiler (Lu and Ram, 2011).

LITERATURE REVIEW

Central to collaboration is the exchange of large amounts of information along the supply chain, including planning and operational data, real time information, and communication. Information is seen as the 'glue' that holds together the business structures that allow supply chains to be agile in responding to competitive challenges. The backbone of the supply chain business is IT which is used to acquire, process, and share information among supply chain partners for effective decision making (Sanders & Premus, (2002); Paulraj *et al.*, (2008). The idea that information technology (IT) is a source of competitive advantage and fundamental to a firm's survival and growth is well-established (Prajogo & Olhager, 2012). Through information technologies, coordination costs and the risks associated with inter-organizational

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relations can been reduced. Information technology allows buyers and suppliers to communicate directly over data-rich, easyto-use information channels that reduce coordination costs (Lewis & Talalayevsky, 2000).

Indeed, many organizations feel it necessary to engage in information technologies system such as B2B e-commerce. If they do not, those competitors that do make use of such technologies threaten to outpace them in efficiency gains and hence jeopardize their market position (Kaefer & Bendoly, 2004). The strategic supply chain information allows supply chain partners in making strategic decision in their operations (Li *et al.,* 2006). Information sharing becomes crucial in these turbulent economic times as it drives the firm into becoming a collaborative structure. It requires firms to exchange strategic supply chain information apart from transactional data, leading to improvement in the relationship and integration between the SC partners ((Hsu *et al.,* 2008).

According to Klein & Rai (2009), buyer and supplier strategic information flows positively impact the relationship-specific performance of both sharing and receiving parties. Moreover, quality of information sharing refers to the extent to which a firm shares a variety of relevant, accurate, complete and confidential information in a timely manner with its supply chain partners (Yen & Chae, 2006). While information sharing is important, the impact of it on SCM depends on the quality with which it is shared (Holmberg, 2000). Given these predispositions, levels of information sharing as well as quality of information shared become critical aspects in deciding the supply chain success. The success of a company's SCM depends upon the accuracy and speed of the information provided by each business partner (Chong *et al.,* 2009). Information Sharing (IS) refers to the extent to which critical and proprietary information is communicated among supply chain members with regards to market, product and customer information (Mentzer *et al.,* 2001). The Resource-Based View of the firm emphasizes on the ability of firms in generating new knowledge and ability in facilitating information sharing. Knowledge acquisition, assimilation, transformation and exploitation which are termed as absorptive capacity in literature are important dimensions of organizational capability. Therefore, cross functional information sharing with partners is considered as important elements of supply chain capability. Wu *et al.,* (2006) conceptualized information exchange as one of the constructs representing supply chain capabilities. The effort in providing information and making it visible to other parties in the supply chain allows for faster and accurate business decisions that translates as a source of competitive advantage (Moberg *et al.,* 2003).

Information sharing is regarded as the terminator of "bullwhip effect" (Fiala, 2005), that reduces the total cost of the supply chain in delivering efficient supply chain performance (Gavirneni, 2006). This implies that a successful sharing of useful information between the supply chain partners can result in a reduction in inventory and manufacturing cost, better understanding of customer needs, and faster response to market changes (Li *et al.,* 2006). Cross-Functional Information sharing requires firms to exchange strategic supply chain information apart from transactional data, leading to improvement in the relationship and integration between the SC partners. Information Sharing (IS) refers to the extent to which critical and proprietary information is communicated among supply chain members with regards to market, product and customer information (Mentzer *et al.,* 2001).

A key characteristic of supply chain agility is the instant availability of information to manage an 'on demand' business operation. IS integration provides the basis for information sharing and exchange of organizations (Auramo *et al.,* 2005). Cross functional information sharing

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requires the integration of communication, data and application (Muller *et al.,* 2007) to enable consistent and real-time connectivity among function units across supply chains (Rai *et al.,* 2006). Information sharing integration within and among organizations enables them to capture data on demand, leading to customer-focused supply chains (Christopher, 2000). Firms are more likely to gain competitive advantage through fast delivery and product variety rather than price. Therefore, the effectiveness of supply chains can be measured by its responsiveness (Lee & Billington, 1992).

RESEARCH METHODOLOGY

Cross-sectional survey research design was used in the study. According to Saunders & Lewis (2009), survey is a popular and common method in business and management research. It is used to answer who, what, where and how questions. Further, survey design allowed for collection of large amount of data from a sizeable population in a highly economical way. A cross-sectional study design is used when the purpose of the study is descriptive, often in the form of a survey (Crewell, 2003). Orodho and Kombo (2002) asserts that the central feature of survey is that it allows the collection of a large amount of data from a sizeable population in a highly economical way and gives the researcher control over the research process.

The target population of the study consisted of 714 employees working in the Cosmetic Manufacturing Firms in County Government of Nairobi. The study adopted Yamane (1967) formula for calculating sample size.to determine the sample size. The sample size for the study therefore, was 256 respondents. Purposive and Simple random sampling methods was used. Structured and unstructured questionnaires was developed basing on the objectives of the study. The researcher used questionnaire and interviews to collect primary data. Quantitative data was analyzed using descriptive statistical measures such as, mean, standard deviation and variance to give a glimpse of the general trend with the aid of Statistical Package for Social Scientist (SPSS) version 24. Inferential statistics was also applied in the study.

RESEARCH FINDINGS

The researcher administered questionnaires to 256 respondents who were sampled out as per the methodology described in the previous chapter. 210 duly filled questionnaires were returned. This represents a response rate of 93.75 %. According to Sekaran, (2006), a response rate of 30% is considered acceptable for surveys. Thus, the response rate achieved in this study can be considered sufficient to give the findings adequate reliability. From the results, majority 56.7% (119) were Male and 43.3% (91) were Female. This is a clear indication that male individuals form the backbone of the cosmetic manufacturing companies. The study also sought to determine respondent's education level. The findings of the study indicate 2.9% (6) of the respondents who were picked had secondary education, 31.0% (65) of the respondents who were picked were certificate/diploma holders, and 52.9% (111) were graduate. While the rest 13.3% (28) were Masters Holders. This was an indication that most of the employees had relevant skills needed in the cosmetic manufacturing firms. The study sought to find out the duration the respondents have been working since they were employed. It is evident from the findings that majority 42.9% (90) of the respondents have been working in the Firm for a period of between 3-6 years, 16.2% (34) have worked in the firms for a period of between 6-10 years.

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Those who have worked in the firm for over 10 years were 7.1% (15), 30% (63) have worked in the firm for a period between 1-3 years whereas 3.8% (8) are the respondents who have less than one year experience working in the Cosmetics Manufacturing Firm.

This is an indication that most of the respondents have been working for a length of period hence were able to provide relevant and reliable information for the study. This also implies that Cosmetics Manufacturing Firms in Nairobi had attracted and retained skilled labour as evidenced by their experience and the duration of the employee in the job. Length of service with the cosmetic company was important in order to determine the respondent's level of understanding regarding internal information pertinent to the company. The period worked in the firm is usually in line with experience, responsibility and skills of the business person (Karanja, 2011). The study also sought to ascertain how long the Cosmetics Manufacturing Firms have been in existence. The study found that most firms 32.4% (68) have been in existence for a period of 5-10 years, 22.9% (48) of the firms have been in existence between 11-15 years, 17.1% (36) of the firms have been in existence between 16-20 years, 15.7% (33) of the firms have been in existence for 20 years and above whereas those of have existed for less than 5 years were 11.9% (25). This is a clear indication that the information that was captured was sufficient since most of the firms sampled had existed for a long period that is 5-10 years.

Effect of Cross Functional Information Sharing and Supply Chain Agility

The study sought to determine on the effect of Cross Functional Information Sharing on Supply

Chain Agility. The results are presented in Table 4.1

Table 4.1: Descriptive Statistics for Cross Functional Information Sharing

Cross Functional Information Sharing Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)	N	Min	Max	Mean	Std Dev
Up to date data and information of the company is always readily available for all the parties	2.9	5.7	20	53.3	18.1	210	1	5	3.78	0.907
We inform supply chain partners in advance of changing needs	0	1.9	11.9	60.5	25.7	210	2	5	4.10	0.667
We keep each other informed about events or changes that may affect the other party	0	3.3	14.8	44.8	37.1	210	2	5	4.16	0.794
Unforeseen challenges are properly communicated to our suppliers	0.5	3.3	20.0	44.3	31.9	210	1	5	4.04	0.835

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Exchange of information takes place frequently, and/or in a timely manner	0	2.9	13.3	58.1	25.7	210	2	5	4.07	0.709
Information exchange between us and our supply chain partners is always timely, fast and accurate	1.9	1.0	16.2	50.0	31.0	210	1	5	4.07	0.824
Information exchanged between us and our supply chain partners is often adequate	1.0	4.3	17.2	50.2	27.3	210	1	5	3.99	0.841
Information exchanged between us and our supply chain partners is often reliable	0.5	1.4	14.3	47.1	36.7	210	1	5	4.18	0.761
Information exchanged between us and our supply chain partners is quite complete	1.4	3.3	19.5	48.1	27.6	210	1	5	3.97	0.858
Grand Mean = 4.04										
Valid N (Listwise) = 210										

The findings reveal that the respondents admitted (Mean =4.18; Std Dev =0.761) that Information exchanged between them and their supply chain partners is often reliable. Respondents were also in agreement (Mean =4.16; Std Dev =0.794) that they keep each other informed about events or changes that may affect the other party. The findings further indicated (Mean =4.10; Std Dev =0.667) that they inform their supply chain partners in advance of changing needs. The respondents also concurred (Mean =4.07; Std Dev =0.824) with the statement that Information exchanged between us and our supply chain partners is often adequate. Findings also revealed that respondents were in agreement (Mean =4.07; Std Dev =0.709) that exchange of information takes place frequently, and/or in a timely manner. Findings further indicated the respondents were in agreement (Mean =4.06; Std Dev =0.813) with the statement that their firm provides substantial information to the parties in the relationship which is of great use in order to improve their products. In addition, the respondents agreed (Mean =4.04; Std Dev =0.709) that unforeseen challenges are properly communicated to our suppliers. Further, findings revealed (Mean =3.99 Std Dev =0.841) that information exchanged between us and our supply chain partners is often adequate. Furthermore, respondents agreed (Mean =3.97 Std Dev =0.858) that Information exchanged between us and our supply chain partners is quite complete. Finally, findings revealed that

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(Mean =3.78 Std Dev =0.907) up to date data and information of the company is always readily available for all the parties. The respondents generally agreed on the statements pertaining to cross functional information sharing.

Supply Chain Agility

The study also sought to determine the respondent's level of agreement with effect of Supply Chain Agility on the performance of Cosmetics Manufacturing Firms in the County Government of Nairobi. Table 4.2 shows the findings.

Table 4.2: Descriptive Statistics for Supply Chain Agility

Supply Chain Agility Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	N	Min	Max	Mean	Std Dev
Our company is able to survive and prosper in a competitive environment of continuous and unpredictable changes by reacting quickly and effectively to changing markets	3.3	1.9	9.0	63.3	22.4	210	1	5	3.99	0.832
Our firm is able to proactively establish virtual manufacturing with an efficient product development system so as to meet changing market requirements	1.0	3.8	13.8	52.4	29.0	210	1	5	4.29	3.609
We have the capability both internally and in conjunction with our key suppliers to adapt and respond in a speedy manner to changes as well as potential or actual disruptions	0	2.9	16.2	48.1	32.9	210	2	5	4.11	0.772
Supply chain agility has led to improved delivery and reliability hence competitiveness of the firm	1.9	1.4	13.3	48.1	35.2	210	1	5	4.13	0.837
Supply chain agility has led to products and services with high information and value adding content	0	1.9	9.5	53.8	34.8	210	2	5	4.21	0.689
Our firm through supply chain agility has led to	0.5	1.4	15.2	45.2	37.6	210	1	5	4.18	0.774

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customer satisfaction in a turbulent and volatile market hence improved responsiveness to customer needs.										
Supply chain agility has led to agile manufacturing that in turn enables the firm to meet changing market requirements with high quality goods on a consistent basis	0.5	1.0	13.8	51.0	33.8	210	1	5	4.16	0.729
The firm is always ready to produce a broad range of low cost, high quality products with short lead times in varying low sizes, built to individual customer specifications	1.0	2.9	11.9	45.2	39.0	210	1	5	4.19	0.824
We are always ever ready to deliver value to the customer in an environment where customer requirements are becoming more customized	0.5	2.4	8.1	48.6	40.5	210	1	5	4.26	0.747
There is instant availability of information to manage an on demand business operation in the organization	1.0	1.4	13.3	57.1	27.1	210	1	5	4.08	0.737
Grand Mean = 4.13										
Valid N (Listwise) = 210										

The results indicates that respondents were in agreement (Mean =4.29; Std Dev =3.609) that Our firm is able to proactively establish virtual manufacturing with an efficient product development system so as to meet changing market requirements. Further, the respondents concurred (Mean =4.26; Std Dev =0.747) that we are always ever ready to deliver value to the customer in an environment where customer requirements are becoming more customized. It is also evident from the results that Supply Chain Agility (Mean =4.21; Std Dev =0.689) has led to products and services with high information and value adding content. In addition, respondents agreed (Mean =4.19; Std Dev =0.824) that the firm is always ready to produce a broad range of low cost, high quality products with short lead times in varying low sizes, built to individual customer specifications. The respondents also agreed (Mean =4.18; Std Dev =0.774) with the statement that our firm through supply chain agility has led to customer satisfaction in a turbulent and volatile market hence improved responsiveness to customer needs. Further, respondents concurred that Supply Chain Agility (Mean =4.16; Std Dev =0.729) has led to agile manufacturing that in turn enables the firm to meet changing market requirements with high quality goods on a consistent basis.

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Findings also indicated that Supply Chain agility (Mean =4.13; Std Dev =0.837) has led to improved delivery and reliability hence competitiveness of the firm. It is also evident from the results (Mean =4.11; Std Dev =0.772) that the respondents agreed that the firms have the capability both internally and in conjunction with our key suppliers to adapt and respond in a speedy manner to changes as well as potential or actual disruptions.Findings further indicates that the respondents agreed (Mean =4.08; Std Dev =0.737) that there is instant availability of information to manage an on demand business operation in the organization. Finally, the respondents also agreed (Mean =3.99; Std Dev =0.832) with the statement that our company is able to survive and prosper in a competitive environment of continuous and unpredictable changes by reacting quickly and effectively to changing markets. Supply chain agility represents the speed with which a firm's internal supply chain functions can be adapt to marketplace changes (Swafford *et al.,* 2008). It is captured by manufacturing lead time, new product introductions, development cycle time, delivery capability and responsive to market changes. Overall, the respondents agreed on the statements pertaining to supply chain agility.

The Moderating effect of Technological Engagement on the relationship between Cross Functional Information Sharing and Supply Chain Agility

The study further sought to assess the Moderating effect of Technological Engagement on the Relationship between Cross functional Information Sharing and Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi. The results are presented in Table 4.3.

Table 4.3: Descriptive Statistics for Technological Engagement

Technological Engagement Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)	N	Min	Max	Mean	Std Dev
Information Technology in our firm has quite improved the quality of communication	1.4	1.4	7.6	53.8	35.7	210	1	5	4.21	0.760
Adoption of technology has led to added value to supply chain functions through greater efficiency and information transparency.	0	1.0	10.0	51.0	38.1	210	2	5	4.26	0.673
Technology engagement in our firm has led to better coordination and integration of information flows and activities within and between boundaries.	0.5	0	9.0	43.8	46.7	210	1	5	4.36	0.686
Adoption of technology has led to the development of new services, products, functions and formation of alliances.	0.5	1.0	11.9	41.0	45.7	210	1	5	4.30	0.753

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Our firm's use of IT has improved our transaction speed thus reduced lead time	0	0	5.7	44.8	49.5	210	3	5	4.44	0.602
Technology engagement in our firm has led to reduction in costs, increased efficiency across the extended supply chain and enhanced work flow	0.5	1.4	6.7	52.4	39.0	210	1	5	4.28	0.693
The use of technology in our firm has led to improved service delivery to our	0.5	0.5	7.1	49.5	42.4	210	1	5	4.33	0.672
Technology use in our firm has allowed planning, tracking and estimating lead times based on real data	0	2.4	18.6	39.5	39.5	210	2	5	4.16	0.808

Grand Mean = 4.29

Valid N (Listwise) = 210

The findings reveal that the respondents were in agreement (Mean =4.44; Std Dev =0.602) that Our firm's use of IT has improved our transaction speed thus reduced lead time. Respondents were also in agreement that Technology Engagement (Mean =4.36; Std Dev =0.686) in our firm has led to better coordination and integration of information flows and activities within and between boundaries. The respondents also concurred with the statement that the use of Technology in our firm (Mean =4.33; Std Dev =0.672) has led to improved service delivery to our customers.

Further, findings reveal that respondents agreed that adoption of technology (Mean =4.30; Std Dev =0.753) has led to the development of new services, products, functions and formation of alliances. It is also evident from the findings that technology engagement in the firms (Mean =4.28; Std Dev =0.693) has led to reduction in costs, increased efficiency across the extended supply chain and enhanced work flow. Further, the respondents agreed (Mean =4.26; Std Dev =0.673) with the statement that Adoption of technology has led to added value to supply chain functions through greater efficiency and information transparency. Respondents also concurred (Mean =4.21; Std Dev =0.760) that Information Technology in our firm has quite improved the quality of communication. Finally, the respondents were in agreement (Mean =4.16; Std Dev =0.808) that Technology use in our firm has allowed planning, tracking and estimating lead times based on real data. Overall, the respondents agreed on the information pertaining to Technological Engagement.

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Correlation between Cross Functional Information Sharing and Supply Chain Agility
The relationship between Cross Functional Information Sharing and Supply Chain Agility was also examined. The results of correlation analysis are presented in Table 4.3.

Table 4.31: Correlation between Cross Functional Information Sharing and Supply Chain Agility

Variable		Supply Chain Agility
Cross Functional Information sharing	Pearson Correlation	.582**
	Sig. (2-tailed)	.000
	N	210

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

The results indicates that there is a positive and statistically significant correlation between Cross Functional Information Sharing and Supply Chain Agility ($r=.582$, $p < 0.01$). This is a clear indication that any effort to improve the communications channels making it more informative will lead to an increase in supply chain agility.

Chi Square Test

To examine the strength of associations between the bivariate categorical variables, a Chi-Square test for association was done for the independent variables, dependent and moderating variable.

Table 4.42: Chi- Square Tests between Cross Functional Information Sharing and Supply Chain Agility

	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi Square	1470.099[a]	600	.000
Likelihood Ratio	393.586	600	1.000
Linear-by- Linear Association	69.894	1	.000
Sample size	207		

Strength of the Associations between Cross Functional Information Sharing and Supply Chain Agility was also tested. Table 4.3 shows a Chi-Square value = 1470.099, p = 0.000. The p value is less than 0.05 and hence there is a statistically significant association between Cross Functional Information Sharing and Supply Chain Agility. This is a clear indication that information technology is a source of competitive advantage and fundamental to firm's survival and growth is well established.

Regression Analysis

Multiple regression analysis was conducted so as to determine the relationship between supply chain agility, Technological engagement and the independent variables

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Model definitions based on Moderated Multiple Regression Analysis

Regression model were generated at two levels. The first level without the interaction term and the second level with the moderator.

Relationship between Cross Functional Information Sharing and Supply Chain Agility in Cosmetics Manufacturing Firms in the County Government of Nairobi, Kenya

Table 4.5 show two model summary for Cross Functional Information Sharing when moderator is included and when the effect of the moderator is not included.

Table 4.5: Regression Model summary for Cross Functional Information Sharing

				Std. Error	Change Statistics				
Model	R	R^2	Adjusted R Square	of the Estimate	R Square Change	F Change	Df1	Df2	Sig. F Change
1	.582[a]	.339	.336	.374	.339	105.272	1[a]	205	.000
2	.670[b]	.449	.443	.343	.110	40.531	1[b]	204	.000

a. Predictor (Constant), Cross Functional Information Sharing b. Predictor (Constant), Cross Functional Information Sharing * Technological Engagement

Model 1 shows there is a positive relationship between Cross Functional Information Sharing and Supply Chain Agility (R = 0.582, R^2 = 0.339) and (F (1,205) = 105.272, p=0.000). The R^2 explains the variations in the dependent variable that can be explained by the independent variables. R^2 of 0.339 indicates that 33.9% of the variations in the Supply Chain Agility of cosmetics manufacturing firms can be accounted for by Cross Functional Information Sharing.

Model 2 shows the results after the interaction of the moderator (Cross Functional Information Sharing*****Technological Engagement) was introduced in the model. The results shows there is a positive relationship between Cross Functional Information Sharing and Supply Chain Agility in cosmetics manufacturing firms with (R = 0.670, R^2 = 0.449) and (F (1,204) = 40.531, p=0.000). An R^2 of 0.449 indicates that 44.9% of the variations in the Supply Chain Agility in cosmetics manufacturing firms can be accounted for by Cross Functional Information Sharing *Technological Engagement.

The inclusion of the interaction term resulted in a R^2 change of .110 which indicates that the moderating effect explains 11% of the variation in the Supply Chain Agility above and beyond the variation explained by the Cross Functional Information Sharing. The results obtained shows a significant presences of moderating effect of Technological Engagement on the relationship between Cross Functional Information Sharing and Supply Chain Agility in cosmetics manufacturing firms in the county government of Nairobi, Kenya. Table 4.6 shows the significance test results with two models, the model with the inclusion of the interaction term and the other model without the moderator.

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Table 4.6: Significance Test Results for Cross Functional Information Sharing

Model		Unstandardized Coefficients		Standardized Coefficient Beta		
		B	Std. Error		T	Sig
1	(Constant)	1.803	.229		7.890	.000
	Cross Functional Information Sharing	.577	.056	.582	10.26 0	.000
2	(Constant)	.819	.260		3.147	.002
	Cross Functional Information Sharing	.367	.061	.370	5.997	.000
	Technological Engagement	.427	.067	.393	6.366	.000

a. Dependent Variable: Supply Chain Agility

Model 1 indicates that relationship between Cross Functional Information Sharing and Supply Chain Agility was positive and significant (b1=0.577, p = 0.000, Beta = 0.582). Equation 4.1 shows the regression equation for model 1, for every unit increase in Cross Functional Information Sharing, Supply Chain Agility is predicted to increase by 0.577.

OLS Model : Supply Chain Agility= 1.803+ 0. 577Cross Functional Information Sharing

……..equation 4.1

This implies that an increase in information pertaining Cross Functional Information Sharing leads to increase in Supply Chain Agility amongst cosmetics manufacturing firms. The null hypothesis that states Cross Functional Information Sharing has no significant effect on the Supply Chain Agility was rejected at 95% signifance level. The study therefore fails to reject the alternative hypothesis and concludes that Cross Functional Information Sharing has a significant effect on Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi. Model 2 shows that the moderating effect of Technological Engagement on the Relationship between Cross Functional Information Sharing and Supply Chain Agility of cosmetics manufacturing firms in the county government of Nairobi, Kenya was positive and significant (b1=0.367, p = .000, Beta = 0.321).

Equation 4.2 below shows the regression equation with the inclusion of the moderator, the equation implies that for every unit increase in Cross Functional Information Sharing, Supply Chain Agility is predicted to have a change of 0.367 given that Technological Engagement is kept constant. The null hypothesis is therefore rejected at 95% significance level and it is concluded that Technological Engagement moderates the relationship between Cross Functional Information Sharing and Supply Chain Agility.

MMR Model : Supply Chain Agility = 0.819+ 0.367 Cross Functional Information Sharing +

0.427 Technological Engagement……..equation 4.2 **HYPOTHESIS TESTING**

To test for individual significance of a coefficient, t-test was used under the null hypothesis. The test was done at 95% level of significance (α=0.05), critical value t=1.96. The null

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hypothesis is rejected when the t-calculated is strictly greater than the t-tabulated. The hypothesized research hypothesis for Cross Functional Information Sharing were stated as:

Ho: $\beta_2 = 0$: Cross Functional Information Sharing has no significant effect on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi.

Ha: $\beta_2 \neq 0$: Cross Functional Information Sharing has a significant effect on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi

The test was done at 95% level of significance (α=0.05), critical value t=1.96. T-test statistic was used to test for the significance of Cross Functional Information Sharing. The T value obtained was 10.260. Comparing the t-tabulated and t-calculated values statistically, it is evident that the t_calc > t_ α. The study therefore rejects the null hypothesis and concludes that Cross Functional Information Sharing has a significant effect on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi.

SUMMARY OF THE FINDINGS

Cross Functional Information Sharing plays a significant role in supply chain management as an enabler in achieving supply chain integration and agility (Gunasekaran & Ngai, 2004, Power *et al.*, 2010). From the findings, majority of the respondents agreed that informing supply chain partners in advance of change in needs, exchanging of information frequently in a timely manner and availing up-to data and information of the company to all the supply chain parties highly affected the supply chain agility of the firms. The findings are supported by previous works of Harisson *et al.*,(1999) who emphasized on the important role played by information sharing and information technology for achieving agility. The findings reveal that the respondents admitted that Information exchanged between them and their supply chain partners is often reliable. Respondents were also in agreement that they keep each other informed about events or changes that may affect the other party.

The findings further indicated that they inform their supply chain partners in advance of changing needs. The respondents also concurred that Information exchanged between us and our supply chain partners is often adequate. Findings also revealed that respondents were in agreement that exchange of information takes place frequently, and/or in a timely manner. The results indicates that there is a positive and statistically significant correlation between Cross Functional Information Sharing and Supply Chain Agility (r=.582, $p < 0.01$). This is a clear indication that any effort to improve the communications channels making it more informative will lead to an increase in supply chain agility.

The impact of Cross-Functional information sharing on Supply Chain Agility

With the growing technological advances and the emergence of the global information infrastructure, the companies should possess the suitable competitive inter-organizational informational systems to enable them to achieve the rapid and effective response to the customer needs and changing expectations (Hsu et al., 2008). The authors further argue that firms with inadequate or insufficient information sharing will be limited in achieving the supportive benefits from the relationships with other supply chain partners. The information and communication tools can enable the business activities to be integrated across the whole supply chain through the information flows which is required to coordinate the business process

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as a whole (Rippa,2009). Schonsleben (2000) suggest the importance of information technologies to agility since they argue that agile companies are competing through the use of "knowledge and competency". Power et al., (2001) also argue that in their analysis for "less agile" and "more agile" companies, the "more agile" companies are more willing to use high technology. Martin and Grbac (2003) argue that Cross Functional information sharing has a positive impact on supplier flexibility and that supplier flexibility has a positive effect on profit, customer loyalty, and responsiveness (cited in Kannan and Tan, 2006).

DISCUSSION

Cosmetics Manufacturing Firms is a Fast Moving Consumer Goods industry and as such, the business environment can be considered as dynamic and complex one. This has enforced the companies working within this type of business to search for adapting agility within their supply chains. In order to be able to achieve their goals and to respond with such high level of uncertainty, cross functional information sharing is considered as the successful way to stay competitive in the market place. The emphasis on the importance of information sharing and technological tools has been also supported in a conceptual framework showing the important characteristics for agile supply chain suggested by Harrison et al. (1999). They emphasis on the important role played by information sharing and information technology for achieving agility. The research provides a proposed conceptual framework showing the importance of developing and maintaining supply chain agility within FMCGs industry. The research has conducted its empirical study within Cosmetics Manufacturing Firms in the County Government of Nairobi where there is little literature on this context. The research also helps in building on the existing knowledge on supply chain agility attributes as well as on the impact of Cross Functional Information sharing and information technology on achieving agility within FMCGs, particularly on the Cosmetics Manufacturing firms.

Research Limitation

As this research has its own contributions, it has also some limitations. First, the conceptual framework was generated from a cross sectional survey of Cosmetics Manufacturing Firms found in one county only, which is the County Government of Nairobi, Kenya. This is a FMCGs industry and therefore the research results can't be generalized in other types of industries, such as the service sector. Therefore future research is needed to explore other supply chain agility attributes in other counties as well as in other types of business, industries as well as service sector. Interesting findings might be obtained from studies that explore integral relationship strategies in other industries or settings. Like for instance, further qualitative research could be conducted in supply chains of different types. This would help to validate and improve the generalizability of the findings.

CONCLUSION

Nowadays businesses have to possess means to meet rapid market changes in an effective manner to satisfy its customers. Agility has been introduced to be applied to the supply chain context to enable the business entity to face the business environmental changes and to deal with them. Agility can enable the business entity to be differentiated from other competitors as competition has been very high and especially after globalization. From this point, this paper

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contributes to the existing literature by emphasizing on the importance of Cross-Functional Information Sharing on implementing high level of agility within Fast Moving Consumer Goods industry, such as Cosmetics Manufacturing Firms. This is particularly true especially when screening at the industry as well as its required attributes for the applying of agility within the supply chain of such type of industry. Cross functional information systems are seen to assume a fundamental role in developing Supply Chain Agility. IT plays a key role in the integration of processes, for instance synchronizing suppliers in the network by providing real time information. Therefore the study concludes that Cross functional information sharing is a pertinent factor as it affects the Supply Chain Agility of Firms.

The research has managerial implications as it provides guidance for the Cosmetics Manufacturing Companies, particularly those in the developing countries like Kenya, and especially those working within FMCGs industry to the importance of Cross functional information sharing as an antecedent to Supply Chain Agility. The attribute derived from this research can be considered as a checklist for companies to determine the required attributes necessary for achieving agility within their supply chain.

The study recommends that firms should focus more on Supply Chain Technologies because these technologies enable supply chain members to make real-time decisions which could impact the cost structure and ultimately the competitive position of the firm.

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