EFFECT OF COLLABORATIVE AWARENESS ON SUPPLY CHAIN AGILITY OF COSMETICS MANUFACTURING FIRMS IN THE COUNTY GOVERNMENT OF NAIROBI, KENYA

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ABSTRACT: *Global competition within firms has forced most manufacturing industries to become more innovative and strategic in their supply chain practices. One way of achieving this is through Supply Chain Agility. The study focussed to assess the Effect of Collaborative Awareness on Supply Chain Agility of Cosmetic Manufacturing Firms in the County Government of Nairobi, Kenya. 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 of the study reveal that collaborative awareness contributes positively to supply chain agility of cosmetics manufacturing firms in the County Government of Nairobi.Generally, majority of the respondents agreed that Collaborative Awareness contributes positively to Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi. The results also indicates that there is a positive and statistically significant correlation between collaborative awareness and supply chain agility (r=0.505, p<0.001). This implies that collaborative awareness enhances supply chain agility of cosmetics manufacturing firms in the County Government of Nairobi. As evidenced from the results it can be concluded that collaborative awareness positively affects the Supply Chain Agility of Cosmetics Manufacturing Firms and as such the firms should constantly be in collaboration with their partners since it one of the strategies employed by firms to deal with uncertainties. Interesting findings might be obtained from studies that explore integral relationship strategies in other industries or settings.*

KEYWORDS: Supply Chain Agility, Collaborative Awareness, Competitive Advantage, Resource Based View Theory, Relational View Theory, Strategy, Structure and Performance Theory

INTRODUCTION

Fierce competition in today's markets, the introduction of products with shorter life cycles, and the heightened expectations of customers have forced cosmetics manufacturing firms to invest in, and focus attention on their supply chains. Agility has been credited with helping firms to respond in a timely and effective manner to market volatility and other uncertainties. Cosmetics manufacturing firms are undergoing a revolution in terms of implementing new operational strategies and technologies in response to the challenges and demands of the 21st Century. The

Cosmetic industry in Kenya is a very lucrative, innovative, fast-paced industry. 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 variety (Narasimhan & Das, (1999); Christopher, (2000); Powersox *et al.,* (2001); Li & Lin, (2006); Kisperska-Moron & de Haan, (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 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. The resource competencies required are often difficult to mobilize and retain by single organizations. Collaborative Awareness is an important enabler of key processes in an organisation and its supply chain as reflected in a developed economy. The study therefore was designed to fill this knowledge gap by determining the effect of

Collaborative Awareness on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi.

Research Objective

To determine the effect of Collaborative Awareness on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi.

Research Hypotheses

Ho1: Collaborative Awareness has no significant effect on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi.

LITERATURE REVIEW

The section presents theories that was used to guide the study and formed the basis for testing the hypotheses. Theories are significant in any study since they provide the basis for the conceptualization of the variables under study. The theories utilized in this study included:

Resource Based View Theory, Relational View Theory, Strategy, Structure and Performance Theory and Technology Adoption Theory.

Resource Based View Theory (RBV)

The origins of the Resource Based View (RBV) theory can be traced to strategic management. It was introduced by (Barney, 1991). The premise of RBV is that firms that are able to accumulate resources and capabilities that are rare, valuable, non-substitutable, and difficult to imitate, will achieve a competitive advantage over competing firms (Wernerfelt, 1984). Resource rareness refers to the perceived scarcity of the resource within markets. Value is the extent to which the resources are aligned with the external environment to exploit opportunities and reduce threats.

Substitutability indicates the extent to which competitors can create equivalent resources.

The degree to which competitors cannot obtain or replicate the resources, or can only do so at a significant cost disadvantage, denotes inimitability (Hoskisson *et al.,* 1999). According to RBV, firms seek to identify resources that will most likely make them more competitive in the market, and then employ these resources to exploit their value (Sirmon *et al.,* 2007). The possession of resources alone is not sufficient to create superior firm performance (Sirmon *et al.,* 2007). Resources must also be effectively managed and exploited (Fawcett *et al.,* 2012). Through a systematic review of empirical research that used RBV as the theoretical base. According to Newbert (2008), combinations of resources is more likely to explain higher performance in firms than resources used in isolation. Combining resources that are dependent on other resources through causal relationships can create value for the firm above and beyond the value created by individual resources. Supply Chain Agility cannot easily be imitated. In relation to RBV, the capability of Supply Chain Agility is appropriate not only for large-scale companies but also for any-scale companies without high investment requirement (Ngai *et al.*, 2011). According to Swafford *et al.,* (2008), the higher the Supply Chain Agility, the higher the competitive business performance. The RBV also provides support for considering integral relationships as an antecedent to the development of firm supply chain agility.

The Relational View Theory (RVT)

Unlike the resource-based view of the firm (RBV) which proposes that a firm's superior performance originates from its own resource-based advantages (Barney 1991), the Relational

View (RV) theory suggests that a firm's sources of competitive advantage may extend beyond firm boundaries. Researchers have proved that superior performance can be achieved via relationspecific investments and collective efforts of the business partners (Dyer, 1996). They further argued that firms having strong ties with business partners have better prospects for achieving competitive advantage compared to firms operating in isolation. The view in RV theory supports that competitiveness emerges from inter-firm sources of advantage rather than from within-firm sources (Mesquita *et al.,* 2008). Relational View theory supports shift of focal point from the firm level to chain level of competition, and is an important extension to the

RBV (Choi, 2015). Therefore, supply chain agility is an essential practice that supply chain partnering firms should build and maintain. Supply Chain Agility cannot be developed without collaborating with the supply chain partners (Braunscheidel & Suresh, 2009). Supply Chain Agility is an outcome of firms' relational specific investments with supply chain members. Companies no longer compete against each other as autonomous entities; instead competition has shifted to supply chain against supply chain (Stank *et al.,* 2005). The identification of complementary resources and capabilities can help supply chain members combine their resources to more effectively respond to changes (Gligor & Holcomb, 2012).

Establishing knowledge-sharing routines across supply chain members is essential for a coordinated agile response (Christopher *et al.,* 2004). Further, agility research shows that shared information between supply chain partners can only be fully leveraged through process integration. This means collaborative working between buyers and suppliers, joint product development, and common systems (Christopher, 2000). This is consistent with the RV theory and suggests that in order to ensure a high degree of process integration, investments in relation-specific assets might be necessary. Firm supply chain agility is a dynamic capability that results from the firm's ability to reconfigure firm-level and supply chain-level resources.

Strategy, Structure and Performance Theory (SSP) Theory

Strategic management literature also provides a theory that can be used to develop a comprehensive strategic model of Supply Chain Agility. Several authors in the logistics discipline have hypothesized that the SSP relationship is applicable to the supply chain environment (Defee & Stannk, 2005). The SSP theory facilitates a strategic understanding of the Supply Chain Agility decision-making processes within the firm. The basic premise of the SSP paradigm is that a firm's strategy, created in consideration of external environmental factors, drives the development of organizational structure and processes to allow the firm to perform at a desired level. (Galbraith & Nathanson, 1978). The SSP theoretical framework suggests that firms who properly align strategy with structure should perform better than competitors who lack the same degree of strategic fit (Miles & Snow, 1984). A key to achieving SCA is that all members (suppliers, manufacturers, distributors and even customers) must work together to achieve an integrated supply chain (Christopher & Towill, 2001). This is consistent with the SSP paradigm. The concept of strategic fit (Galbraith & Nathanson, 1978) has been directly transferred to the supply chain (Defee & Stank, 2005).

Transferring the concept to a supply chain context does not imply that each firm's strategy needs to be the same across all supply chain members. Rather, it implies that strategies should be complementary across firms and mutually support the overall shared supply chain objective being agile response. Furthermore, agile strategies must be developed in consideration of the firm's supply chain orientation. Supply chain orientation has been defined as "the recognition by an organization of the systemic, strategic implications of the tactical activities involved in managing the various flows in a supply chain" (Mentzer *et al.*, 2001).

Collaborative Awareness and Supply Chain Agility

According to Barnes and Liao (2012), collaborative awareness is the study of relationship with organizational awareness and supply network competency. This relationship, exploits both the tacit and explicit knowledge of the networked firms resulting in creation of strategic Incentive alignment. Collaboration allows firms to partner by combining core competencies and expertise without the additional investment of intensive vertical integration (Cao & Zhang,

2011). While in collaboration, resources and capabilities of supply chain partners are leveraged to create new capabilities to respond to dynamic market needs (Fawcett *et al.,* 2012). In general, firms should derive more benefits from working together (efficiency, knowledge gain, cost reduction, performance improvement) than individual firms can gain on their own (Daugherty *et al.,* 2006). Additionally, supply chain collaboration may be one way for firms to cope with uncertainty (Davis,

1993). It refers to the process of sharing costs, risks, and benefits among supply chain partners (Simatupang & Sridharan, 2005).

Successful partnerships require participants to share gains and losses equitably, so that the collaboration outcomes are quantifiably beneficial to all (Manthou *et al.,* 2004). Supply chain members must align incentives which match its investment in order for the collaboration to work. It helps in motivating the members to act in a manner consistent with overall objectives such as revealing confidential and relevant information. It secures sufficient levels of cooperation and commitment (Harland *et al.,* 2004) and would allow the chain members to accept the importance of the potential rewards that can be achieved through collaboration even if the costs are to be shared (Simatupang & Sridharan, 2005). The interaction of incentive alignment with other features of collaboration has also been acknowledged to be significant as it motivates the chain members to align their actions to the mutual purpose of collaboration that would also enhance their individual profitability.

According to Fisher (1997), and Lee (2002), discussed collaborative strategies in the face of supply and demand uncertainty. Greater supply chain collaboration should help mitigate supply and demand uncertainties as partners' knowledge and resources are shared to remain efficient and responsive (agile) to customer needs (Fawcett & Magnan, 2004). In supply chain collaboration, partners are able to share information and expertise to reduce or eliminate certain types of uncertainty. However, there is a large financial cost as well as a number of characteristics (trust, desire and ability to share information, willingness to change processes) that need to occur for collaborations to be successful (Whipple *et al.,* 2010). Collaborative awareness looks at trusting, long-term relationship with the supplier.

Trust leads to commitment among collaborating members and commitment further leads to improvement in effectiveness of relationship among the collaborating partners thus supply chain agility. The key factor informing supply chain collaboration is the trust between all parties that is suppliers, manufacturers and customers. Further, trust leads to other factors such as mutual help, openness, and common development of interest and resource synchronization. Trust in the context of SCM, has been defined by different researchers (Doney and Cannon, (1997) and Ganesan,

(1994) "the extent to which supply chain partners perceive each other as credible and benevolent". Trust is not only a desired characteristic but a necessity for collaborative arrangement.

Concept of Supply Chain Agility

A firm's ability to respond to competitive challenges and to sustain its competitive advantage is a key element of success in today's global marketplace (Teece *et al.,* 1997; Cagliano *et al.,* 2004).

Being responsive is an increasingly important skill for firms in today's global economy, thus firms must be agile. A firm's level of supply chain agility represents the strength of the interface between the firm and its market. 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). This is captured by manufacturing lead time, new product introductions, development cycle time, delivery capability and responsive to market changes. Supply chain agility is a type of operational ability that applies to a firm's capability to conduct operational activities and channel partners to adapt or responds to market changes in a timely manner (Braunscheidel & Suresh, (2009); Swafford *et al.,* (2008).

Linked activities, such as manufacturing, design and delivery of products or services among channel members are normally included in the supply chain (SC). Firms should attempt to cooperate with their partners to devise these series of activities proficiently and mutually in handling the unpredictable nature of a marketplace in order to gain economic profit (Swafford *et al.,* 2006). Supply chain agility facilitates efficient and effective responses to operational changes, for example, market promotion, procurement, delivery and manufacturing (Swafford *et al.,* (2008);

Agarwal *et al.,* (2007); Ngai *et al.,* (2011). The authors also assert that it helps ensure a firm's competitiveness to provide customer receptiveness in ambiguous market circumstances.

According to Braunscheidel & Suresh (2009), supply chain agility is the capability of the firm, both internally and in conjunction with its key suppliers and customers, to adapt or respond in a speedy manner to market place changes as well as to potential and actual disruptions, contributing to the agility of the extended   supply chain. Developing this capability requires dedication of substantial planningand resources to understanding customers, cross-functional cooperation, changemanagement, people and information (Goldman *et al.,* 1995). This is best conceptualisedby Christopher (2000), who characterised agile supply chain as one that is built around sensitivity to market, virtual organisation, process integration and network integration. Therefore, the ability to continually monitor and interpret supply and demand market fluctuations is a key component of supply chain agility (Christopher, (2000); Overby *et al.,* (2006); Li *et al.,* (2009).

Using perspective that competencies are derived from capabilities (Teece *et al.,* 1997), agility is a capability derived from the synergy among flexibility in the supply chain functions (Sharifi & Zhang, 1999). Supply chain agility refers to complex coordination and integration of diverse channel members beyond the SC (Ngai *et al.,* 2011). In maintaining close and consolidating relationships, this suppleness requires firms to closely manage the legally divided but operationally interdependent parts, such as distribution, manufacturing and supply (Van Hoek *et al.,* 2001).

Therefore, it is quite evident from this requirement that the ASC eases a company's process through which it organizes and co-operates with channel partners to develop complete resources and provide knowledge distribution.

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

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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.

RESULTS AND DISCUSSION

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. 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 510 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 Collaborative Awareness on Supply Chain Agility

The study analysed the views of the respondents in respect to Collaborative Awareness and Supply Chain Agility.

Table 4.1 shows the results of the analysis.

Collaborative Awareness Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)	N	Min	Max	Mean	Std Dev
Our firm and this supply chain partner have integrated production systems.	1.0	9.0	25.7	50.0	14.3	210	1	5	3.68	0.864
Our firm has a supply chain arrangement with our supply partners that operate under the principle of shared rewards and risks.	4.3	8.1	20.5	52.4	14.8	210	1	5	3.68	0.972
Our firm has increased operational flexibility through our relationship with this suppliers.	1.0	3.8	13.3	50.0	31.9	210	1	5	4.08	0.829
Our firm benchmarks best practices or processes and shares results with this supply chain partners.	0.5	8.1	21.9	43.8	25.7	210	1	5	3.86	0.910
Inventory information is shared with alliance members.	1.4	5.2	28.1	41.4	23.8	210	1	5	3.81	0.908
Our firm has experienced improved supply chain performance by integrating operations with the supply chain partners.	1.0	2.4	10.5	56.2	30.7	210	1	5	4.12	0.758
The relationship that our firm has with our partners deserves our firm's maximum attention to maintain.	1.4	1.9	16.2	51.0	29.5	210	1	5	4.05	0.814
Our firm is always willing to develop a stable relationship with inter firm partners.	1.0	2.4	11.5	50.5	34.3	210	1	5	4.15	0.790

Our firm is willing to make short term sacrifices to maintain the relationship with our key suppliers and customers.	2.4	6.7	28.1	48.6	14.3	210	1	5	3.66	0.889
The supply chain members operate under the principle of shared returns.	0.5	6.7	36.7	39.5	16.7	210	1	5	3.65	0.852
Collaborative Communication among the relationship partners in our firm is always key in resolving disputes and aligns perceptions and expectations of supply chain partners.	0.0	2.9	14.8	51.4	31.0	210	2	5	4.10	0.750
Grand Mean = 3.89									
Valid N (Listwise) = 210									

The findings indicates that the respondents agreed (Mean = 4.15; Std Dev =0.790) with the statement that our firm is always willing to develop a stable relationship with inter firm partners. Respondents also agreed (Mean = 4.12; Std Dev =0.758) that their firm has experienced improved Supply Chain Performance by integrating operations with the supply chain partners. The findings further indicates that Collaborative Communication among the relationship partners (Mean = 4.10; Std Dev =0.750) in our firm is always key in resolving disputes and aligns perceptions and expectations of supply chain partners. In addition, respondents concurred (Mean = 4.08; Std Dev =0.829) that their firm had increased operational flexibility through their relationship with the suppliers. The study further indicates that the respondents agreed (Mean = 4.05; Std Dev =0.814) that the relationship that our firm has with our partners deserves our firms maximum attention to maintain.

Respondents also agreed (Mean = 3.86; Std Dev =0.910) that our firm benchmarks best practices or processes and shares results with this supply chain partners. The respondents also concurred

(Mean = 3.68; Std Dev =0.972) that our firm has a supply chain arrangement with our supply partners that operate under the principle of shared rewards and risks. Findings also indicate that respondents were in agreement (Mean = 3.68; Std Dev =0.864) that our firm and this supply chain partner have integrated production systems. Furthermore, the respondents agreed (Mean = 3.68; Std Dev =0.972) with the statement that our firm is willing to make short term sacrifices to maintain the relationship with our key suppliers and customers. Finally, the respondents concurred (Mean = 3.65; Std Dev =0.852) that the supply chain members operate under the principle of shared returns. Overall, the respondents agreed on the statements pertaining to collaborative awareness.

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 Statements	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 customer satisfaction in a turbulent and volatile market hence improved	0.5	1.4	15.2	45.2	37.6	210	1	5	4.18	0.774

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. 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 Collaborative Awareness and Supply Chain Agility

The study further sought to assess the Moderating effect of Technological Engagement on the Relationship between Collaborative Awareness 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
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 customers	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.

Correlation Analysis

Correlation between variables is a measure of how well the variables are related. The most common measure of correlation in statistics is the Pearson Correlation (technically called the Pearson Product Moment Correlation or PPMC), which shows the linear relationship between two variables. Results are between -1 and 1. A result of -1 means that there is a perfect negative correlation between the two values while a result of 1 means that there is a perfect positive correlation between the two variables. Result of 0 means that there is no correlation between the two variables (Gujarat, 2004). If the value of R is close to one, then it shows there is a strong correlation between the variables. If the value of R is close to zero, then the correlation is weak.

Correlation between Collaborative Awareness and Supply Chain Agility

The correlation between collaborative awareness and supply chain agility in cosmetics manufacturing firms in the County Government of Nairobi, Kenya was examined. The results are presented in Table 4.4

Table 4.4:   Correlation between Collaborative Awareness and Supply Chain Agility

Variable		Supply Chain Agility
Collaborative Awareness	Pearson Correlation	.505**
	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 collaborative awareness and supply chain agility (r=0.505, p<0.001). This implies that collaborative awareness enhances supply chain agility of cosmetics manufacturing firms in the County Government of Nairobi.

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 4.5: Chi- Square Tests between Collaborative Awareness and Supply Chain Agility

	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi Square	1327.561[a]	624	.000
Likelihood Ratio	408.421	624	1.000
Linear-by- Linear Association	52.816	1	.000
Sample size	208		

Table 4.5 shows a Chi-Square value = 1327.561, p = 0.000. The p value is less than 0.05 and hence there is a statistically significant association between Collaborative awareness and Supply Chain Agility. This meant that collaboration allows the firms to partner by combining core competencies with the supply chain partners.

Regression Analysis

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

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 Collaborative Awareness and Supply Chain Agility in cosmetics manufacturing firms in the county government of Nairobi, Kenya

Table 4.6 shows two model summary for collaborative awareness when moderator is included and when the effect of the moderator is not included.

Table 4.6 Regression Model summary for Collaborative Awareness

Model	R	R^2	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics F Change	Df1	Df2	Sig. F Change
1	.505[a]	.255	.252	.396	.255	70.566	1[a]	206	.000
2	.658[b]	.433	.427	.347	.178	64.286	1[b]	205	.000

a. Predictor (Constant), Collaborative Awareness

b. Predictor (Constant), Collaborative Awareness * Technological Engagement

Model 1 shows there is a positive relationship between Collaborative Awareness and Supply Chain Agility (R = 0.505, R^2 = 0.255) and (F (1,206) = 70.566, p=0.000). The R^2 explains the variations in the dependent variable that can be explained by the independent variables. R^2 of 0.252 indicates that 25.2% of the variations in the Supply Chain Agility in cosmetics manufacturing firms can be accounted for by Collaborative Awareness.

Model 2 shows the results after the interaction of the moderator (Collaborative Awareness*Technological Engagement) was introduced in the model. The results shows there is a positive relationship between Collaborative Awareness and Supply Chain Agility in cosmetics manufacturing firms with (R = 0.658, R^2 = 0.433) and (F (1,205) = 64.286, p=0.000). An R^2 of 0.433 indicates that 43.3% of the variations in the Supply Chain Agility in cosmetics manufacturing firms can be accounted for by Collaborative Awareness*Technological Engagement. The adjusted R-square is a modified version of R-squared that has been adjusted for the number of predictors in the model. The adjusted R-squared increases only if the new term improves the new model and it is always lower than the R-squared. Table 4.30 shows

adjusted Rsquare of 0.252 for model 1 and 0.427 for model 2. It is evident that the moderator improved our model.

The inclusion of the interaction term resulted in a R^2 change of .178 which indicates that the moderating effect explains 17.8% of the variation in the Supply Chain Agility above and beyond the variation explained by the Collaborative Awareness. The results obtained shows a significant presences of moderating effect of Technological Engagement on the relationship between Collaborative Awareness and Supply Chain Agility in Cosmetics Manufacturing Firms in the County Government of Nairobi, Kenya. Table 4.7 shows the significance test results with two models, the model with the inclusion of the interaction term and the other model without the moderator.

Table 4.7:   Significance Test Results for Collaborative Awareness

Model		Unstandardized Coefficients		Standardized Coefficient		
		B	Std. Error	Beta	T	Sig
1	(Constant)	2.134	.240		8.908	.000
	Collaborative Awareness	.514	.061	.505	8.400	.000
2	(Constant)	.731	.273		2.676	.008
	Collaborative Awareness	.327	.058	.321	5.604	.000
	Technological Engagement	.497	.062	.460	8.018	.000

a. Dependent Variable: Supply Chain Agility

Model 1 indicates that relationship between Collaborative Awareness and Supply Chain Agility was positive and significant (b1=0.514, p = 0.000,Beta = 0.505). Equation 4.1 shows the regression equation for model 1, for every unit increase in collaborative awareness, Supply Chain Agility is predicted to increase by 0.514.

OLS Model : Supply Chain Agility= 2.134+ 0.514 Collaborative Awareness

………………equation 4.1

This implies that an increase in information pertaining Collaborative awareness leads to increase in Supply Chain Agility amongst cosmetics manufacturing firms. The null hypothesis that states Collaborative Awareness has no significant effect on the Supply Chain Agility was rejected at 95% significance level. The study therefore fails to reject the alternative hypothesis and concludes that Collaborative Awareness 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 Collaborative Awareness and Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi, Kenya was positive and significant (b1=0.327,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 Collaborative awareness, Supply Chain Agility is predicted to have a change of 0.327 on condition 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 Collaborative Awareness and Supply Chain Agility.

 MMR Model : Supply Chain Agility = 0.731+ 0.327Collaborative Awareness + 0.497

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 hypothesis is rejected when the t-calculated is strictly greater than the t-tabulated. The hypothesized research hypothesis for collaborative awareness were stated as:

Ho: β_1=0: Collaborative Awareness has no significant effect on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of

Nairobi.

Ha: $\beta_1 \neq 0$: Collaborative Awareness 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 collaborative awareness. From Table 4.31, Model 1, the T value obtained was 8.400. 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 Collaborative Awareness has a significant effect on the Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS Summary of the Findings

The section presents the summary of the study on Effect of Collaborative Awareness on Supply Chain Agility in Cosmetics Manufacturing Firms in the County Government of Nairobi, Kenya.

Collaborative Awareness

The results of the study reveal that collaborative awareness contributes positively to supply chain agility of cosmetics manufacturing firms in the County Government of Nairobi.Generally, majority of the respondents agreed that Collaborative Awareness contributes positively to Supply Chain Agility of Cosmetics Manufacturing Firms in the County Government of Nairobi. The results also indicates that there is a positive and statistically significant correlation between collaborative awareness and supply chain agility (r=0.505, p<0.001). This implies that collaborative awareness enhances supply chain agility of cosmetics manufacturing firms in the County Government of Nairobi.

Conclusions of the study

Collaborative Awareness was found to positively affect supply chain agility of cosmetic manufacturing firms with coefficient relation (r=0.505, p<0.001). Collaborative Awareness is a concept that brings together supply chain partners by integrating key competencies and expertise. It enables the firms to respond to the changing demands of the market (Fawcett *et al.,* 2012). As evidenced from the results it can be concluded that collaborative awareness positively affects the Supply Chain Agility of Cosmetics Manufacturing Firms and as such the firms should constantly be in collaboration with their partners since it one of the strategies employed by firms to deal with uncertainties. It can also be concluded that technology Engagement in Cosmetics Manufacturing Firms strongly moderates the relationships between integral relationships and Supply Chain Agility and thus cannot be ignored. Hence the study concludes that technology engagement is a most significant factor and that Cosmetics Manufacturing Firms must engage it fully.

Recommendations of the study

The study therefore recommends that Companies that are coping with more highly dynamic environments need to be more agile and to enhance their integral relationships. To achieve a competitive advantage in a volatile business environment, the study recommends that firms should align with all the parties in the supply chain including the suppliers and customers. This will help to streamline operations and together achieve a level of agility beyond individual companies.

Recommendation for Future Research

Future research is needed to explore other supply chain agility attributes 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.

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