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Advanced Supply Chain Planning Systems, Supplier Relationship, Supply Chain Agility and Firm Supply Chain Performance among Selected Manufacturing Firms in Nairobi County, Kenya

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ABSTRACT: Supply chain performances have been touted as improving the performance of organizations which participates in advance planning system. As a result, managers not only have to re-establish their companies to produce higher-quality products and services, decrease waste, respond rapidly to the market, but also to handle their supply chain performance efficiently. However, supply chain performance has received attention and focused on the adaptation of technology to facilitate supply chain performance, but still significant gaps remain in the literature. Most organizations are faced with an array of challenges as they strive to compete in today's dynamic global markets. Main aim of the study was to determine the conditional effect of supplier relationship on the relationship between advance planning system, and the supply chain performance via. The study was anchored on positivist paradigm and employed explanatory research design. A target population of 591 manufacturing firms of sample of 233 firms were studied. Questionnaires were used as a method of collecting data. The collected data was analyzed using multiple regression models. Results showed that supply advanced planning system significantly influences supply chain organizational performance positively ($\beta = 0.6769, p = 0.000 < 0.05$). Further, supply chain agility (SCA) significantly affected the supply chain organizational performance (SCOP) with coefficients and the probabilities $\beta = 0.2730$ ($p = 0.000 < 0.05$). Further, the effect of supplier relationship (SR) on relationship between supply chain advanced planning system (SCAPS) and supply chain organization performance (SCOP) was strongly positive ($\beta = .0600, p = 0.0049 < 0.05$). The moderated mediation further was positive ($\beta = 0.0451$) and significant while mediating role of supply chain agility became insignificant to influence supply chain organizational performance. The difference association between insignificant mediating effect of SCA and significant moderated mediation effect can be attributed to the strong moderating role of SR on the link between supply chain advanced planning and the organizational performance. Meaning the supplier relation is critical player because of its effect. In conclusions that supply chain advanced planning improves performance of the overall value of the supply chain by reducing costs and increasing efficiency with leaner operations. It is incredibly significant for manufacturing firms to enhance supply chain organizational performance of the firms competing in global markets to respond to the competitive challenges they encounter in the industry and leveraging these skills to gain a competitive advantage over other. It is a strategic decision for the manufacturing firms to maintain their long-term effectiveness in variable and movable market conditions and to attach importance to agility to be successful. Agile innovation is expressed as shifts in instruments, procedures and initiatives that enable the creation of a facility or business under uncertain circumstances. Agile manufacturing firms should not only encourage facility to adapt efficiently to consumer requirements but also includes reacting with the unpredictable speed to quickly respond to operations and strategic alliances.

KEYWORDS: Supply chain advance planning system, supply chain agility, supply chain performance and manufacturing firms.

INTRODUCTION

Market globalization has intensified competition, and this has forced organizations to put more emphasis on customer orientation which in turn catalyzes the interest in supply chain performance (Gunasekaran *et al.,* 2001). Supply chain performance is viewed as critical to establishing a lasting competitive advantage via enhanced inter- and intra-firm interactions (Luzzini *et al*., 2015). Supply chain planning systems track costs based on the activities that drive costs in manufacturing (Brewer, 2000; Attaran & Attaran, 2007). Raw resources and manufacturing capacity are allocated optimally in an APS. They can't boost efficiency on their own because efficiency is only attained by combining advanced planning methods (Jacyna-Gołda *et al*., 2015). According to Zheng *et al*. (2004), efficient planning systems require a coordinated effort to improve all supply chain functions, transforming supply

chain performance from a functional to a general and integrative process. To examine supply chain performance integration and advance planning systems, Wook Kim (2006) used data from an empirical survey. As a consequence of the study, an organization's supply chain performance is improved by implementing an advanced planning system. Thus, successful supply chain performance integration can be achieved by systematic use of Enterprise resource planning (ERP), Activity Based Costing (ABC), Material requirement planning (MRP), Collaborative planning, forecasting and replenishment (CPFR) and Vendor managed inventory (VMI) (Wisner *et al.,* 2014; Hansen & Mouritsen, 2007).

Despite the introduction of the mentioned technological practices (advance planning systems), some of the studies have yielded inconsistent results which have suggested the incorporation of moderation and the mediation to establish the relationship between advance planning systems and supply chain performance so as to advance greater understanding of the same (Mishra et al., 2014); Tseng *et al.,* 2013). However, due to inconsistence raised by the above variables the researcher had to mediate and moderate to give a more compressive and significant SCP. The study examines Agility (mediator) and Supplier Relationship (moderator). As the environment changes, customer preferences shift, and competitive dynamics shift, so does supply chain agility. It measures how quickly organizations can adapt their supply chains to changes. The literature has mostly focused on production flexibility, supply chain speed, or lean manufacturing (Wilding et al., 2012 Gligor, 2019; Ivanov, 2018). Supplier Relationship Management (moderator) is a complete approach to procurement management and post-contract value capture (Day & Lichtenstein, 2006; Shakeel et *al.,* 2018 Memia, 2018). A better relationship with suppliers allows procurement to function at a strategic level, resulting in higher value in terms of innovation and efficiency Chong and Ooi (2008).

Studies on supply chain techniques have been conducted both globally and locally. Internationally, SCOP implementation studies have focused on manufacturing enterprises (Sandberg and Abrahamsson, 2010) and retailers (Sandberg, 2007) who recognize the value of SCOP. Based on his research, Kyengo (2012) discovered that the ability to obtain products from distant suppliers affects supply chain effectiveness. In recent years, research on production and supply chain management has emphasized the link between agility and performance. Currently, the idea is particularly popular in manufacturing, where agility is a new competitive weapon (Kasarda and Rondinelli 1998). However, supply chain organization performance has received attention and significant gaps remain in the literature on how organization should maintain supply chain performance especially in manufacturing to remain competitive in their industry. To keep consumers and remain competitive, businesses must recognize the value of supply chain practices that improve both their own and their partners' performance. Despite advances in research and practice, many organizations still struggle to understand the complex issues associated with coordinated planning and supply chain activities among members of their supply networks. Therefore, the researcher intended to further the findings by incorporating APS variables, Supplier relationship (moderator), Agility (mediator) and its impact towards Supply chain performance of the manufacturing firms.

OBJECTIVES OF THE STUDY

1. To establish the effect of supply chain advance planning systems on supply chain organizational performance.
2. To determine the effect of supply chain advance planning systems on supply chain agility
3. To examine the effect of supply chain agility on supply chain organizational performance
4. To establish the mediating effect of supply chain agility on the relationship between supply chain advance planning systems and supply chain organizational performance
5. Moderating effect of supplier relationship on the relationship between supply chain planning systems and supply chain agility.

EMPIRICAL REVIEW

Supply Chain Advanced Planning Systems and supply chain Performance.

IT tools can help cope with supply chain planning complexity directly or indirectly. Input/output systems are used to integrate data and manage inventory (Jacobs et al., 2011; Chen et al., 2017). Due to its focus on a particularly relevant topic in supply chains, APS systems are actively debated nowadays. As a result, each supply chain's performance should be assessed in relation to the variable's impact on overall supply chain efficiency (Hult *et al.,* 2004; Sezen, 2008; Charan *et al.,* 2008). Using ERP, ABC, MRP, collaborative planning, forecasting, and replenishment can successfully integrate supply chain performance (VMI) (Govindasamy, 2006; Knolmayer *et al.,* 2002; Kim, 2005).

ERP software suites enable firms combine information flow and business processes (Lengnick-Hall *et al.,* 2004; Xu *et al.,* 2002; Ndede-Amadi, 2004). Each department or function is supported by a single database that collects and stores data in real time. ERP systems can help businesses cut cycle time, improve financial management, establish the framework for e-commerce, and make tacit knowledge apparent (Su & Yang, 2010; Maguire *et al.,* 2007). Due to rising overhead (or indirect) costs from automation and

technology utilisation, activity-based costing (ABC) advocates assigning final cost objects to all activities that assist production and delivery of commodities (Lea & Fredendall, 2002). Less non-value-added costs with ABC data (Hilton, 2005; Tsai & Hung, 2009; Tsai & Hung, 2009). Two views exist in an ABC system: cost assignment and performance measurement. Thus, ABC is one method for improving SCP in organizations (Baykasoglu and Kaplanoglu, 2008; Tsai *et al.,* 2008).

MRP, MRPII and MRP systems manage order fulfilment by matching material and resource availability to customer demand (Kuo et al., 2016). Using these technologies effectively assist resource planning and save inventory by releasing purchase and/or work orders only when required (Koh, 2004; Stevenson *et al*., 2005). Using MRP, MRPII, and ERP effectively could reduce manufacturing lead times and inventory levels. CPR is a crucial corporate procedure for managing demand unpredictability, sales data, and promotional and replenishment programs (Simatupang *et al.,* 2004; Tsironis *et al.,* 2019; Zhang, 2004). For effective implementations of CPFR, the Voluntary Inter Industry Commerce Standards (VICS) Association established it (VICS merged with GS1 US, Inc., in 2012). The adoption of CPFR attempts to remove impediments to supply chain performance. Incomplete or erroneous knowledge leads to non-optimal decisions (Barratt and Oliveira, 2001a). The CPFR initiative is designed to facilitate collaboration. Firms in a supply chain can use the application to connect demand and supply planning and execution.

Vendor-managed inventory (VMI) is an inventory and supply chain management technique in which the provider selects when and how much inventory to refresh. This tool is also known as automated replenishment or continuous replenishment (Blatherwick) (1998). Some research has suggested using moderation and mediation to investigate the relationship between advanced planning systems and supply chain performance (Mishra et al., 2014; Tseng et al., 2013). This is because the researcher had to mediate and moderate to give a more compressive and substantial SCP.

$\boldsymbol{H_{01}}$**:** Supply chain advance planning systems have a significant effect on supply chain organizational performance.

Effect of supply chain advance planning systems on supply chain agility

A supply chain's ability to respond to changing market conditions depends on agility (Christopher and Towill, 2000; Mavengere, 2013; Prater *et al.,* 2001; Gligor *et al.,* 2013). We've built up a number of supply chain agility definitions using conceptual and structural models (Swafford et al., 2008, Gligor and Holocomb, 2012). Many attributes and measures are utilised to approach it: flexibility (Swafford *et al.,* 2006), market sensitivity (Agarwal *et al.,* 2007), awareness (Braunscheidel and Suresh, 2009), data accessibility, speed, and data quality (Gligor *et al.,* 2013). There are two basic dimensions to supply chain agility (Sharifi *et al.,* 2006; Giannakis & Louis, 2016; Chiang *et al.,* 2012).

Agility refers to a supply chain's capacity to respond quickly to unanticipated external events (Ngai *et al.,* 2011; Braunscheidel & Suresh, 2009). Demand must be perceived without distortions or latencies. Visibility of information promotes demand sensitivity and thus supply chain responsiveness (Giannakis *et al.,* 2019; Hashemi, 2015). Supply and demand uncertainties, as well as supply chain hazards, necessitate rapid supply chain adjustment (Richey *et al.,* 2021; Stadtler, 2005). A second trait of responsiveness is the ability to detect and respond quickly to supply chain threats (Handfield & Bechtel, 2002). A third measure of responsiveness is the speed of supply chain companies delivering goods or services (Reinhert and Holweg, 2007).

Supply chain agility is the capacity to restructure operations, reorganise capabilities, or realign strategic objectives in response to unpredictability in demand (Swafford *et al.,* 2006; Roh *et al.,* 2011). We all know how tough it is to be flexible in operations and SCM. A versatile product/service mix, the ability to launch new or altered items, and a flexible delivery period (delivery flexibility) (Reichhart and Holweg, 2007). It is well proven that IT integration promotes supply chain flexibility, agility, and ultimately corporate performance (Swafford et al., 2008). e-commerce, ERP, and advance planning systems (APS) have all been used to improve SCM (Moyaux and Chaib-draa, 2006). Successful e-commerce demands cutting-edge information systems that can handle the complexities of supply chain procedures and interpret the massive amounts of “big data” accessible today (Daneshvar & Gargeya, 2019; Zhong *et al.,* 2016. The latest ERP and APS systems allow strong supply chain process integration via internet-based applications (Link and Back, 2015). It is split into internal corporate procedures or a dual context of co-operation (Botta *et al.,* 2005).

H_{02}: Supply chain advance planning systems has influence on supply chain agility

The mediating role of supply chain agility on the on the Relationship between Advance Supply Chain Planning System and organization supply chain performance

A focused firm's supply chain must be flexible to meet changing client demands (Duclos et al., 2003; Wisner, 2003). Demand fluctuations and short product life cycles require a flexible supply chain (Blome *et al.,* 2013; Gligor *et al.,* 2015). To satisfy changing customer demands, supply chain agility is critical (Qi et al., 2011 and Yusuf *et al.,* (2004). Zara's supply chain is so responsive that new designs are ready for worldwide retail in just 15 days (Lee 2004; Ferdows *et al.,* 2004). For example, Seven-Eleven replenishes its stores within twelve hours of receiving orders (Ferdows *et al.,* 2004). Supply chain agility accounts for both.

Supply- and demand-side skills are the assets or resources needed to achieve supply chain agility, according to the Resource Based View (Brusset, 2016; Feizabadi *et al.,* 2019). This relates to the idea that having heterogeneous resources is no longer sufficient, but their configuration and utilisation is (Barney *et al.,* 2011; Eisenhardt and Martin 2000). Moreover, supply chain agility is a higher-order capacity "derived through combining lower-order capabilities and resources" (Vickery *et al.,* 2010). More difficult to imitate than lower-order competencies (Grant 1996). A more powerful model would add supply chain agility as a mediator (Blome *et al.,* 2013; Yang, 2014; Chan *et al.,* 2017).

Also, because practically every business, including manufacturing and retail, faces dynamic surroundings and unpredictable changes, supply chain competencies alone may not be enough to achieve optimal operational efficiency. As a result, supply and demand-side competencies must be developed into capabilities in order to contribute most effectively to the firm's operational success (Swafford et al. 2008, Vickery *et al.,* 2010). Supply chain agility is the capacity to adjust to changing environments and ultimately improve performance (Swafford *et al.,* 2006). According to Vickery et al., (2010); Chhabi Ram Matawale (2016); Chan, Ngai, and Moon (2016) employed structural equation modelling to explore the impact of supply chain agility, strategy, and manufacturing flexibility on firm performance (Alan, 2016).

H_{03}: There is statistically significant mediating effect of supply chain agility on the relationship between supply chain advance planning systems and supply chain organizational performance

Moderating effect of Supplier relationship on the Relationship between Advance Supply Chain Planning System and organization supply chain performance

Strategic Supplier Partnership is the process of building long-term relationships with suppliers (Li et al., 2005; Monczka et al., 1998; Agus, A., & Hassan, 2008; Qrunfleh & Tarafdar, 2013; Prajogo & Olhager, 2012). Suppliers are selected based on joint planning, issue solving, and continuous improvement programmes (Maloni and Benton 1997; Li et al., 2005). It enables close collaboration between the company and its suppliers. It allows for collaborative product design and knowledge exchange with suppliers, allowing for flexibility (Baihaqi & Sohal, 2013; Makarius, E. E., & Srinivasan, M. (2017; Kumar, et al., 2014; Kumar et al., 2016). Sourcing demand and detecting changes in technologies/products early allows the focal firm to be responsive and adaptable (Whitten *et al.,* 2012).

Product diversity is influenced by consumer wants, market competitiveness, and personalization (Silveira, 1998), therefore each SC participant must provide the best product or service for clients (Jeong and Hong, 2007). The product, as well as the entire SC from raw material acquisition to final consumption, must meet consumer expectations (Zokaei and Hines, 2007). The product, as well as the entire SC from raw material acquisition to ultimate consumption, must be handled successfully and efficiently to match end-consumer expectations (Zokaei and Hines, 2007). Fisher et al. (1995) recommend two techniques to reduce undesired product variety: better customer relationships to verify current products meet customer needs and removing obsolete items.

Supplier relations and management are crucial for any company that subcontracts component design and production. For example, an automobile comprises around 15,000 components, just a few of which are produced in-house. So, to get the greatest quality parts at the best price, managers must choose between long-term relationships and mutual cooperation with suppliers, or more in-house development and manufacture (Abernathy, 1979; Monte- verde and Teece, 1982). Supplier relations are therefore critical for organizations seeking to expand their market access, reduce costs, or otherwise benefit from multi-national or global operations (Kang *et al.,* 2012; Kogut, 1985; Barlett and Ghoshal, 1987; Panizzolo *et al.,* 2012; Ghoshal, 1987; Acs *et al.,* 1997; Porter, 1987)

Collaboration (such as supply chain coordination, cooperation, and information exchange) is required, according to various scholars (Barratt and Oliveira, 2001; Bowersox *et al.,* 2000; Soosay & Hyland, 2015; Vereecke and Muylle, 2006; Xu and Beamon, 2006). It is important to note that while collaborative planning and information sharing have been found to increase supply chain performance, the quality of shared information and trust between organizations must (Monczka et *al.,* 1998; Peterson *et al.,* 2005). According to Mohr and Spekman (1994), firm-firm collaborations succeed when they are coordinated and committed. As described by Lee (2004), the finest supply chains are collaborative and information-sharing among supply chain participants.

In their study, Tan *et al.,* (2002) found very minor links between supplier or customer collaboration and performance improvement, with little indication that better performing organisations interact more. However, despite the potential benefits, implementation is generally difficult, time-consuming, and costly (Hammer, 2001; Xu and Beamon, 2006). This means integrating inter-organizational supplier information systems with supply chain planning (da Silveira and Cagliano, 2006). A few recent studies examined the supply chain from both upstream and downstream perspectives. Tan *et al.,* (2004) investigated supplier management, customer interactions, and organisational performance.

H_{04}: There is statistically significant moderating effect of supplier relationship on the relationship between supply chain planning systems and supply chain agility.

The relationship between Supply Chain Agility and supplier relationship on organizational supply chain performance

Agile organizations deliver faster product launches and better product development (Cooper & Sommer, 2016; Sambamurthy *et al.,* 2003; Highsmith, 2009; Swafford *et al.,* 2006; Youndt and Snell, 2004; Masson et al., 2007). Today's practitioners have emphasised the importance of supplier relationships in boosting agility. Outsourcing, according to Barrar and Gervais (2006), improves performance, agility, and customer service. Most buyer–supplier outsourcing cooperation focus on product release and enhancement agility for buyers.

But the research on enhancing agility through collaboration and trust in buyer-supplier collaborations is lacking. This study uses contingency theory to better understand how collaboration affects (agility) performance. Agility performance requires supplier collaboration (Heric and Singh, 2010; Narayanan *et al.,* 2015). Utilization of international suppliers' investments, innovations, and professional expertise (Quinn and Hilmer, 1994). Contrary to popular belief, establishing agility performance through supply partnerships is still difficult (Heric and Singh, 2010). So, a study of how collaboration affects performance in strategic buyer-supplier collaborations is needed.

Collaboration is defined by shared ideals, standards of collaboration, information sharing, and managerial participation (Cannon *et al.,* 2000; Hoegl and Wagner, 2005). Collaboration can help improve agility performance (Narasimhan and Das, 2001; Vickery *et al.,* 2003; Tarafdar & Qrunfleh, 2017). Collaboration has several advantages (Holcomb and Hitt, 2007; Jap, 1999; Quinn and Hilmer, 1994), but it can also impair sourcing relationships (Anderson and Jap, 2005; Al-Doori, 2019; Jap, 1999; Rossetti and Choi, 2005; Villena *et al.,* 2011). Prior study may have found inconsistent results due to the exclusion of critical moderators that increase or detract from the link. Thus, elements that influence the relationship between collaboration and agility are examined.

TCE research identifies uncertainty and asset specificity as transaction cost drivers (Walker, 1994; Walker and Poppo, 1991). Using specialised assets increases buyer performance (Handfield and Bechtel, 2002). There is no empirical research on specific assets and their role in buyer-supplier collaboration. According to De Vita *et al.,* (2011), the impact of asset specificity on buyer–supplier partnership results is understudied.

Business process agility refers to an organization's ability to quickly adapt to changing market conditions (Tallon, 2008). It stresses the need for a firm to quickly adapt to changes in the environment and response to consumers and stakeholders (Mathiyakalan *et al.,* 2005). Business process agility is a key way for companies to interact with the market (Van Oosterhout et al., 2006; Raschke, 2010). Agile business procedures are anticipated to reduce costs by stressing speed and ease of responding to market changes. They also help firms to innovate and compete (Sambamurthy et al., 2003; Seethamraju, 2006). Although organisations are increasingly focusing on process agility, little is understood about how to really become more agile (Sambamurthy et al., 2003). Businesses must be agile in their process. It also enables firms to quickly adapt to changing market conditions (Raschke, 2010). This method is embedded in organizational routines, making it difficult for competitors to identify valuable portions or procedures. So, business process agility is hard to duplicate and non-replaceable. A strategic organizational competency, business process agility helps organizations better acquire and deploy resources to meet their market environment.

Supply chain agility allows organizations to better adapt to unexpected developments by synchronising supply and demand (Swafford *et al.,* 2008; Siagian *et al.,* 2021; Ahmed *et al.,* 2019). Because enterprises no longer compete as autonomous entities, synchronising supply and demand necessitates integration of internal processes, suppliers, and customers (Narasimhan, 1997). Supply chain vs. supply chain (Mentzer *et al.,* 2001; Christopher, 2000; Tarn *et al.,* 2002; Lambert and Cooper, 2000; Christopher and Towill, 2001). In order to obtain a competitive advantage, companies should align with their suppliers, suppliers of suppliers, consumers, and even competitors (van Hoek, 2001; Sahay & Mohan, 2003; Sheffi, 2007; McAdam & McCormack, 2001). The supply chain must be able to quickly respond to changing market and customer demand.

H_{05}: There is no statistically significant moderating effect of supplier relationship on the indirect relationship between supply chain advance planning systems and organizational supply chain performance via supply chain agility.

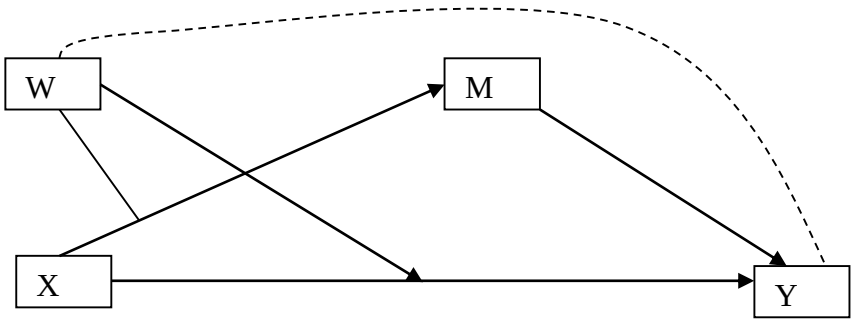
METHODOLOGY

Explanatory research design was utilized in this study. According to Cooper and Schindler (2000) describe explanatory research as a type of inquiry that focuses on why questions. The survey was done in Nairobi County, Kenya, among significant private manufacturing organizations that are members of the Kenya Association of Manufacturers (KAM). A target population of 591 manufacturing firms of sample of 233 firms were studied. Questionnaires was used to collect primary data in which Likert scale was adopted. Statistically, the Cronbach's alpha can be used to determine an instrument's dependability. Many researchers

consider dependability ratings of 0.70 and above satisfactory (Cooper & Schindler, 2006; Malhotra & Birks, 2006). For construct validity, exploratory factor analyses of the constructs were performed, which helped select viable items for each study concept.

Data Analysis

Field data was coded, cleaned, and processed into SPSS version 22 for analysis. Cross-tabulations and frequency distributions were used to compare and contrast Advance planning systems and supply chain performance. Inferential statistical analysis for example. Multiple regression model and uni-variate correlation analysis will be done. Multiple regression and correlation analysis were used to evaluate the acquired data; the significance of each independent variable was determined at a 95% confidence level. The regression equation of the study was applied as shown below.



i) $Y = \beta_0 + \beta_1 X + \varepsilon$ $Ho_1 = R^2$

ii) $Y = \beta_0 + \beta_1 X + \beta_2 M + \varepsilon$ $Ho_2 \Delta R^2$

iii) $Y = \beta_0 + \beta_1 X + \beta_2 M + \beta_3 W + \varepsilon$ $Ho_3 \Delta R^2$

$M = i_M + a_1 X + a_2 W + a_3 XW + e_M$…….

Where; X advance planning system

W supplier relation

M supply chain agility

Y supply chain performance

Test for Normality

Figure 1 presents the test for normality. In statistical analysis, it is essential to check for normality before making statistical inference because the entire statistical framework is usually grounded on the assumption that population from the sampled data follows a normal distribution. If this assumption is violated, then the inference breaks down. It was therefore paramount to check for normality before making statistical inference. During data analysis, histogram was used to check for normality. This was done by plotting predicted and expected residual. The histogram displays descriptive statistics of residuals in that include Jarque-Bera test for normality. Visual inspection of figure 1 shows that the histogram is belled-shaped implying that the sampled data was from a normally distributed population.

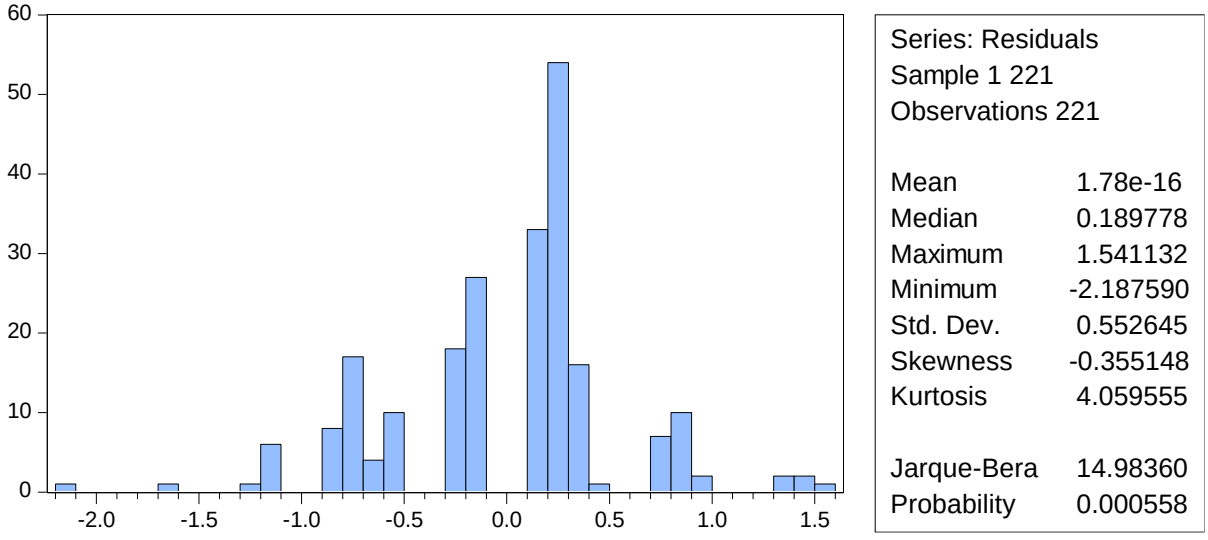


Figure 1: Histogram for Normality Test

Source: Survey Data, 2021

Test for Correlation Analysis

The purpose of correlation analysis is to identify the direction and the magnitude of the correlation between two variables. It shows how variable can influence one another. There are several methods of identifying the correlation. These are Kendal's, Spearman rank and Pearson correlation coefficient. In this study Pearson correlation coefficient was used and results are presented in Table 2. Supplier chain advanced planning system (SCAPS) and supply chain organizational performance (SCOP) have a negative $\rho = -0.051, p = 0.447$ though insignificant correlation with each other. This indicates that SCAPS and SCOP have weak correlation. The correlation between supply chain agility (SCA) and SCOP have a strong positive and significant correlation of 66.9 percent. Further supply relation (SR) and SCOP also had 58.9 percent correlation. However, SCAPS and SCA, SCAPS and SR have weak and negative insignificant correlation with each other respectively. Though insignificant we can say that these variables are identically independent distributed which shows that there is no multicollinearity.

Table 2: Pearson Correlation Analysis

Correlations					
		SCOP	**SCAPS**	**SCA**	**SR**
SCOP	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	221			
SCAPS	Pearson Correlation	-.051	1		
	Sig. (2-tailed)	.447			
	N	221	221		
SCA	Pearson Correlation	.669**	-.023	1	
	Sig. (2-tailed)	.000	.730		
	N	221	221	221	
SR	Pearson Correlation	.589**	-.007	.921**	1
	Sig. (2-tailed)	.000	.913	.000	
	N	221	221	221	221

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

Source: Survey Data, 2021

Test for Multicollinearity

Table 3 presents the output for multicollinearity test. VIF is used to measure the level of collinearity between independent variables in analysis and it shows how much the variance has been inflated. The centered VIF which is numerically identical to the ratio of variance of the coefficient estimates divided by the variance from the coefficient estimate of the equation with only that regressors and the constant while the uncentered omits the constant. The calculated centered value is all below 5, then it was concluded that there was no multicollinearity.

Table 3 Test for Multicollinearity

Variance Inflation Factors

Included observations: 221

		Uncentered	**Centered**
Variable	**Coefficient variance**	**VIF**	**VIF**
SCAPS	0.001089	11.81962	1.012092
SR	0.004090	53.70045	3.654690
SCA	0.004759	66.53608	3.637856
C	0.041794	29.82993	NA

Source: Survey Data, 2021

Moderated Mediation of SCA

In the first direct model, where the independent variable insignificantly affected the organizational performance. In this case, SCAPS significantly affects SCOP positively (β = .7519, p = 0.000). Mediating variable (SCA) also showed a significant effects on SCOP ($\beta = 0.3127, p = 0.000$). The moderator further showed a negative insignificant influence on SCOP ($\beta = -.0724, p = .2473$). The interaction term (SCAPS*SR) which measures the moderation effects was significant ($\beta = .0049$) implies that supplier relation plays an important role in enhancing the supplier chain advanced planning influences the organizational performance, and this can be strengthened further through supplier relation.

The moderated mediation further was positive ($\beta = 0.0451$) and significant. This is because the bootstrap lower limit confidence interval (BootLLCI) and bootsrap upper limit confidence interval (BootULCI) is nonzero or using other method where t-value can be calculated as 0.0451/0.0225 = 2.004 which is greater than 1.96 at 5 percent level of significance. There was no mediating effect of supply chain agility. This is because the confidence interval contains zero (BootLLCI = 0.1640, BootULCI = 0.0021) as shown in the lower part of Table 4

Table 4: Moderated Mediation Analysis

Y=SCOP						
X=SCAPS						
M=SCA						
W=SR						
Sample	221					
OUTCOME VARIABLE						
SCA						
Model Summary						
R	**R-sq**	**MSE**	**F**	**Df1**	**Df2**	**p**
.9290	.8631	.1337	455.8603	3	217	0.000
	Coeff.	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant	1.0996	.1231	8.9322	.0000	.8569	1.3422
SCAPS	.1556	.0752	2.0705	.0396	.0075	.3038
SR	.7475	.0270	27.6573	.0000	.6943	.8008
Int_1	-.0072	.0194	-.3724	.7100	-.0456	.0311
Product terms key:						
Int_1:	SCAPS*SR					
Test (s) of highest order unconditional interaction (s)						
	R2-Change	**F**	**Df1**	**Df2**	**p**	
X*W	0.0064	9.6838	1	217	0.0021	
Conditional effects of the focal predictor at values of the moderator (s)						
SR	**Effect**	**se**	**t**	**p**	**LLCI**	**ULCI**
	-.1178	.0405	-2.9076	.0040	-.1976	-.0379
OUTCOME VARIABLE						
SCOP						
Model Summary						
R	**R-sq**	**MSE**	**F**	**Df1**	**Df2**	**p**
.8772	.7695	.1576	180.2648	4	216	.000
Model	**Coeff.**	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant	3.2477	.1563	20.7740	.0000	2.9395	3.5558
SCAPS	.7519	.0824	9.1214	.0000	.5894	.9143
SCA	.3127	.0737	4.2417	.0000	.1674	.4580
SR	-.0724	.0624	-1.1601	.2473	-.1955	.0506
Int_1	.0600	.0211	2.8430	.0049	.1017	.1840
Product terms key:						
Int_1:	SCAPS*SR					

Test (s) of highest order unconditional interaction (s)						
	R2-Change	**F**	**Df1**	**Df2**	**P**	
X*W	0.0235	9.6946	1	216	0.0021	
Focal predict: SCAPS (X)						
Mod var: SR (W)						
Conditional direct effect(s) of X on Y						
SR	**Effect**	**se**	**T**	**p**	**LLCI**	**ULCI**
3.000	-.1938	.0658	-2.9456	.0036	-.3235	-.0641
Conditional indirect effects of X on Y						
INDIRECT EFFECTS						
SCAPS -> SCA -> SCOP						
SR	**Effect**	**BootSE**	**BootLLCI**	**BootULCI**		
3.000	-.0736	.0425	-.1640	.0021		
Index of moderated mediation:						
	Index	**BootSE**	**BootLLCI**	**BootULCI**		
SR	.0451	.0225	.0040	.0931		

Source: Survey Data, 2021

Hypotheses testing

The results of Supply Chain Advance Planning Systems have no significant effect on Organization Supply Chain Performance which shows that the coefficient is β=.6769 and significant at p=.000 which is less than 5 percent significant level. Therefore, H_{01}: Supply chain advance planning systems have no significant effect on organization supply chain performance was rejected and concluded that the study did have sufficient evidence to justify that supply chain advanced planning does affect organizational performance and therefore the alternative hypothesis holds.

The second objective was to investigate how supply chain advanced planning affects the supply chain agility. Results showed that the relationship was significant at 5 percent level with β=.5120,(p=.000), thus, the hypothesis H02: Supply chain advance planning systems (SCAPS) has significant effect on supply chain agility (SCA) was accepted and concluded that the study did have sufficient evidence that supply chain advanced planning systems do affect the supply chain agility**.**

One of the objectives was to evaluate the significant mediating role of the supply chain agility (SCA) on the relationship between supply chain advanced planning system (SCAPS) and supply chain organizational performance (SCOP). In mediation analysis, there are steps suggested by Zhao et al., (2010). The first step is called path 'a' that shows the effect of an independent variable and the mediator. In this case, results indicates that the relationship between the independent variable (SCAPS) and the mediator have a positive and significant relationship (β=.5120,p=.000). The second is path 'b' where the mediator affects the dependent. Results indicate that the effect of mediator (SCA) on the dependent variable was positive and significant (β=.2730,p=.000). The last one is path 'c' where the independent variable affects the dependent in the presence of the mediator. Results found that SCAPS also negatively and insignificantly affect SCOP with coefficient β=-.0272 (p=.477). It can be proven according to Barron and Kenney (2012) and Zhao et.al., (2010) that ab+c'= c. That is .5120*.2730+.5371=.6768. The significance of path ab indicates mediation effect. In this study, the coefficient is -.0118 and insignificant because the bootstraps confidence interval contains zero because the bootLLCI was negative (-.0752) and bootULCI was positive (.0469). We conclude that there was no mediation effect of SCA on the relationship between supply chain advanced planning systems and the supply chain organizational performance. Therefore, the hypothesis H03: Supply chain agility has no mediating effect on the relationship between supply chain advance planning systems and organizational supply chain performance failed to be rejected and the study concludes that SCA does not intervene the relationship between SCAPS and SCOP. This means that SCAPS does not affect SCOP through SCA. The negative sign can be associated with the fact that SCAPS negative affected SCA.

Lastly, the study investigated the moderated mediation effects of supplier relation on the link between SCAPS and SCOP. First, the relation between SCAPS and SCOP was found to be insignificant. Secondly, the mediation effect of SCA on the relationship between SCAPS and SCOP was also insignificant. Third, the moderation of SR was significant. Finally, the result for the moderated mediation was found to be positive (β=0.0451) significant (bootstrap confidence interval is nonzero). This shows that the hypothesis H07: Supplier relationship has no moderating mediation effect on the relationship between supply chain planning systems and

organization supply chain performance was rejected and the conclusion is that supplier relation moderates the mediation link of SCA on the relationship between SCAPS and SCOP.

This insignificant mediation role of SCA and the significance of the moderated mediation can be associated with the fact that SR was a strong moderator. It was a strong moderator because the coefficient has been improved. The researcher can argue that SR influences the SCA which in return influences the SCAPS and thus gives good supply chain performance. When the mediated link between supply chain agility and supply chain advanced systems and organizational performance was dependent on the extent of supplier relationship, a substantial moderated mediation emerged. That is, when the mediation relationship's strength is dependent on the moderator's level (Preacher, Rucker, and Hayes 2007).

CONCLUSIONS

Based on results that supply chain advanced planning systems and supply chain agility have a positive and significant influence on supply chain organizational performance when moderated with supplier relation, and that supply relation being a strong moderator (enhanced the coefficients of direct effects), the study made some conclusions that supply chain advanced planning enhances supply chain performance by lowering costs and increasing efficiency through leaner operations. Additionally, it balances supply and demand tactically and strategically in order to maximise operational benefits and manage timely inputs to business operations.

Supply chain agility improves daily operations and customer service, resulting in increased profitability and variety. Supply chain agility is important for addressing service quality concerns and improving business performance in dynamic contexts with high levels of customization. Industry success depends on the ability to innovate, foster creativity, and develop new products. Global competitiveness has developed a dynamic retail climate in which it is impossible for existing brands to boost sales. Change in revenue and market share is increasingly dependent on a producer's ability to expand or penetrate an established demand by providing new goods and services.

RECOMMENDATIONS

The study made the following recommendations regarding the study findings.

It is critical for manufacturing enterprises to improve supply chain organizational performance in order to adapt to competitive challenges in the industry and leverage these talents to acquire a competitive advantage over competitors. Companies must make a strategic decision to sustain their long-term efficacy amid varied and mobile market conditions and to prioritise agility in order to succeed. Agile innovation is defined as adjustments to instruments, processes, and projects that enable the establishment of a facility or business in the face of uncertainty. Agile manufacturing not only promotes a facility to adapt efficiently to changing market demands, but also to react with unpredictable speed in order to respond rapidly to operational and strategic alliance needs. In some circumstances, agile manufacturing also incorporates idea development to fulfil the particular requirements of individual customers. Agile manufacturing, in a wide sense, refers to the capacity to respond swiftly to technical or environmental unexpected.

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