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INFLUENCE OF AGILE SUPPLY CHAIN MANAGEMENT ON PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Indeed, due to global advancement, rapid technological innovation, and enhancing regional influence, agile supply chain (SC) has become an essential element. Now, competition has shifted from organization to industry level; any disruption can not only disturb organization but also affect the whole industry. With regards to documentation, global supply chains, unlike domestic ones, have to contend with the need for multiple documentations in order for customs clearance to be effected. Moreover, referring to systems integration, global supply chains face more challenges related to the capacity to coordinate the various supply chain processes in order to ensure order fulfillment occurs within the required or agreed time. The general objective was to analyze the effect of agile supply chain management practices on performance of manufacturing firms in Nairobi City County, Kenya. The specific objectives were: To determine the effect of information integration on performance of manufacturing firms in Nairobi City County, to assess the effect of demand forecasting on performance of manufacturing firms in Nairobi City County. To achieve this, the research design used was descriptive research approach combing both quantitative and qualitative research designs. A sample size of 88 respondents was used. Data was analyzed by employing descriptive statistics and inferential analysis using statistical package for social science (SPSS version 24.). Presentation of data was done in form of quantitative and qualitative reports, which were presented in forms of tables and essay. For the quantitative reports, the tables consisted of mean and standard deviation values that are used to make interpretation of the analysis. Percentage, mean and standard deviation were used to show the frequency of responses. Tables were used to display the rate of responses and to facilitate comparison. Qualitative reports were presented in form of essay, which was discussed as per the study objectives aligned with the theories and empirical study. The collected research data was checked for any errors and omissions, coded, defined and then entered into Statistical Package for Social Science (SPSS Version 24). The study found that information integration and demand forecasting have a great impact on performance of manufacturing firms in Nairobi City County. Consequently, the study recommends. The study recommends that firms should adopt information integration, demand forecasting, order fulfillment and supplier relationship management to improve on their performance.

Key Words: Agile Supply Chain Management Practices, Information Integration, Demand Forecasting

Background of the Study

The turbulent market conditions in the 21st century have heightened the need for more competitive strategies to be developed for growth (Sanchez and Perez, 2017). Business, economics and the political environments are increasingly subjected to unexpected shocks and discontinuities. Many strategic issues that confront business today stem from: the new rules of competition, globalization down pressure on price and the customer taking control. Also, as a result of the recent economic meltdown, companies around the world are confronted by a perfect storm: frozen credit market and long global recession. Events are moving so rapidly that it is almost impossible to access the implication of the meltdown for the days ahead, let alone the years to come (Njoroge, 2019).

The world is in the era of supply chain competition, where organisation no longer acts in isolation as an independent entity, but as a supply chain to create value delivery systems that are more responsive to fast-changing markets, more consistent and reliable (Christopher, 2005, Pandey and Gaug, 2009). The core capabilities of a company lie in its ability to design and manage its supply chain in order to gain maximum advantage in the market where competitive forces are changing. New managerial practices and unique business models emerge and fade constantly as managers strive to help their companies succeed in this less-kind, less gentle and less predictable world (Fawcett, Ellram and Ogden, 2007). The best word to describe the global market today is volatility. Organizations have to develop strategies in order to respond to ever-increasing levels of volatility in demand (Vinodh, Sundaraj and Devadasan, 2009). The big question is: How are supply chain executives coping with the changing business environment and what strategy can be implemented to achieve competitive advantage in their supply chain? Agility has the ability to rapidly respond to changes in market and customer demands as the bearer of competitive advantage. Despite the obvious benefits of agility, organizations are faced with challenges in implementing the measures necessary to increase their agility (Ismail and Sharifi, 2006:431).

Firm performance depends on whether or not a firm can create and commercialize knowledge in a timely and cost-efficient manner (Sampson, 2017). Performance of firms is of vital importance for stakeholders and economy at large. For investors the return on their investments is highly valuable, and a well performing business can bring high and long-term returns for their investors (Mirza and Javed, 2013). To garner performance benefits, firms need capability from overall operations (Flynn et al., 2010; Wu et al., 2010). The capabilities that enable firms to cope with uncertainty and gain performance through supply chain collaboration are imperative. Successful implementation of supply chain collaboration (SCC) by Wal-Mart has encouraged many manufacturing companies to initiate collaboration (Ramanathan, 2011). Subsequently, collaboration between suppliers and retailers has become a common practice in many recent supply chains. However, measuring the benefits of collaboration is still a big challenge. Based on supply chain literature and practice few studies have assessed role of supply chain collaboration on performance of manufacturing firms in emerging economy such as Kenya.

Statement of the Problem

The manufacturing sector plays a pivotal role in the economy of Kenya. Apart from being a significant creator of employment opportunities, it also generates significant export revenues, and contributes up to a tenth of the country's GDP (World Bank, 2014). Previous studies have documented the link between enhanced supply chain performance within manufacturing firms, arising from the optimization of supplier relationship management (e.g. Flynn et al., 2010). However, as pointed out by Tangus, Oyugi, & Rambo (2015), the majority of the studies carried out have focused on the industrialised countries.

Manufacturing is usually a small sector in African economies in terms of share of total output or employment, however, growth of this sector has long been considered crucial for economic development. Green *et al.,* (2012) pointed that the special interest in manufacturing stems from the belief that the sector is a potential engine of modernization, a creator of skilled jobs, and a generator of positive spillover effects. Manufacturing firms in Kenya have been experiencing problems in the performance of their production and operations management (Wanyama, 2010). In the year 2000 manufacturing sector was the second largest sub sector of the economy after agriculture (R.o.K, 2011) but in 2012, it was in the fourth place behind agriculture, wholesale and retail trade, transport and communication (World Bank, 2013). As a result, the sector had seen a reduction in its contribution to GDP from 13.6% in the early 90's to 9.2 % in 2015 (R.o.K, 2015).

Very few of the studies have focused on developing countries such as Kenya, therefore presenting a significant research gap which merits attention. Among the few studies which have evaluated the effect of SRM on the supply chain performance, within the specific confines of the Kenyan manufacturing industry, include the research studies of: Onyango et al (2015), Maraka, Kibet & Iravo (2015), and Yegon, Kosgey, & Lagat (2015). Although these few studies focused on the manufacturing industry, none of them focused on the manufacturing sector in Nairobi County, which as highlighted earlier by the World Bank (2014), is the most dominant sector within the Kenyan manufacturing industry, and accounts for up to 32% of the total manufacturing output in the country. The current study seeks to find out the effect of agile supply chain management practices management practices on performance of manufacturing firms in Nairobi City County.

General Objective

The general objective was to analyze the effect of agile supply chain management practices management practices on performance of manufacturing firms in Nairobi City County.

Specific Objectives

The specific objectives are:

1. To determine the effect of information integration on performance of manufacturing firms in Nairobi City County.
2. To assess the effect of demand forecasting on performance of manufacturing firms in Nairobi City County.

Theoretical Review

Resource Based View Theory

The RBV theory guides the identification of firm supply chain agility strategic antecedents. According to RBV, the identification and possession of internal strategic resources contributes to a firm's ability to create and maintain a competitive advantage (Barney 1991; Hart 1995; Crook et al. 2008). The dynamic perspective of RBV helps explain a firm's competitive advantage in changing environments and, therefore, facilitates a better understanding of how firm supply chain agility impacts performance (Priem and Butler 2001).

This theory states that firms earn sustained competitive advantage because they have access to strategic resources. These resources have unique characteristics which are rare, valuable, cannot be imitated, and have no close substitute. When these conditions are met, competitive advantage is created. This theory deals with competitive advantages related to the firm's possession of heterogeneous resources (financial, physical, human, technological, organizational, and reputational) and capabilities (combination of two or more resources) (Grant, 1991). These

resources and capabilities constitute the core competence of the particular firm and serve ultimately as its source of competitive advantage (Herbert *et al*., 2007).

The RBV consider a firm's core competence to be its ability to react quickly to situational changes and build further competencies or dynamic capabilities (Eisenhardt & Martin, 2000). Hence, a firm's competitiveness is associated with the configuration of resources and capabilities as the markets evolve. However, inter-organizational relationships may also facilitate and advance the learning processes of individual firms. As such, relationships are not only output-oriented but also learning oriented (Grant, 1991; Herbert *et al*., 2007). Efficiency may not only be explained in terms of productivity or operational measures, but also in terms of the opportunity to access another firm's core competencies through cooperative arrangements as an alternative to building such competencies in-house (Haakansson *et al*., 1999). Often, outsourcing decisions are based on the idea of focusing on core competencies and outsourcing complementary competencies to external partners. For example, TPL and outsourcing of standard components and processes enables manufacturing firms to achieve their competitive edge.

Resources and capabilities can only be acquired from the market to a limited degree. Under certain circumstances, firms in the supply chain interact closely on a long-term basis exchanging confidential information. Hence, TPL is both a means of improving the logistics services of the TPL buyer and a way to achieve a mutual transfer of logistics experience (Herbert *et al*., 2007). A long-term mutual commitment and adjustments as well as a customized rather than standardized solution contribute to the uniqueness and heterogeneity of logistics resources and capabilities. Resource based view could help manufacturing firms to understand how to use TPL to shortcut an upcoming need for competence configuration. The primary aim of every company is to maximize the overall value generated throughout logistics process. Success criteria of a generic supply chain should be measured for the overall chain profit, not at any specific level of the chain, because sticking to a portion of the chain not only makes no commitment to maximizing overall chain profit but also reduces the whole supply chain profitability (Eisenhardt & Martin, 2000). Therefore, food and beverages manufacturing firms should be able to evaluate 3PL providers to ensure that they choose competent companies to handle their logistics activities.

Firm supply chain agility is a dynamic capability that results from the firm's ability to reconfigure firm-level and supply chain-level resources. The relational view (RV) theory suggests that a firm's sources of competitive advantage may extend beyond firm boundaries. While RBV helps examine within-firm determinants of supply chain agility, the Relational View helps explain the role of inter-firm resources in achieving supply chain agility. Finally, the Strategy-Structure-Performance paradigm provides another useful theoretical framework for examining the theoretical model put forth. This theoretical lens helps examine the nature of the strategic planning required for the development of supply chain agility. The theory supports the variable information integration.

The Relational View (RV) theory

The relational view posits that firms are able to develop key relationships as relational assets to achieve competitive advantage (Dyer and Singh 1998). For this reason, the relational view of strategy is frequently perceived as a development of the resource-based view, indicating that inter-organizational relations constitute a company's strategic, idiosyncratic and invisible resources (Arya and Lin 2007; Wong 2011). On the other hand, however, the relational view also links the evolutionary view and the associated business ecosystem, (Iansiti and Levien 2004), indicating that organizations are not atomistic entities, but are anchored in dyads and network relations (Yang et al. 2011; Li et al. 2017), which can be shaped emergently, taking into consideration the mechanisms of self-organization.

Many studies (e.g. Donaldson and O'Toole 2007; Baum et al. 2014) have shown that inter-organizational relations constitute the basis for strategic actions by contemporary companies that want to collaborate with other parties in order to gain additional economic rents, which are called relational rents. (Dyer and Singh 1998; Kobayashi 2014). The relational rent is defined as a supernormal profit generated from the joint efforts of partners that invest in relation-specific assets, share knowledge, combine complementary resources and use effective governance mechanisms (Dyer and Singh 1998). Seeking relational rents is thus the main motivation for creating inter-organizational relations systems, at the same time determining the relational view of a firm. This view is expressed in a firm's relational orientation, which is a kind of strategic orientation. Scholars commonly define strategic orientation as the principles underlying the activities, processes, and strategic directions that a firm undertakes to create behaviors necessary for achieving superior performance (Gatignon and Xuereb 1997). Strategic orientation is the business philosophy and reflects a firm's perspective on how to conduct business (Mu et al. 2017). From this point of view, the relational orientation as the strategic orientation of the firm is defined as the extent to which firms emphasize developing and maintaining relationships with customers, suppliers, competitors and other partners that result in mutual exchange and benefits (Panayides 2007; Ho et al. 2016). This orientation is expressed not only in the formation and development of many diverse relationships with individual parties in the environment (Lavie 2006), but also in the knowledge of the mutual expectations of the partners, clearly defined goals of the cooperation, the meeting of reciprocal needs (Ritala and Ellonen 2010), as well as conscious management of interorganizational relations (Gulati 1998; Child et al. 2005) through the use of various dedicated tools (e.g., CRM, SCM). The expectations of collaboration partners should be taken into account in a firm's strategy so as to effectively build and manage a portfolio of heterogeneous relations (Hoffmann 2007).

For the relational orientation of the firm, an important factor is the attitude of managers to building competitive advantage based on value from relations. The way in which top managers conceptualize their firm and its relationships with stakeholders in an environment is what Crilly and Sloan (2012) define as 'enterprise logic'. Using the stakeholders and dominant theories of logic, they distinguish three types of logic: firm-centric, industry network, and extended enterprise. The first concerns value capture. Inter-organizational relations are not numerous and are characterized by the relative independence of the parties (trans-actionality). The second type of logic focuses on economic value creation through relational rents. The underlying strategic intent is to use collaboration with market stakeholders to create value and, in doing so, to gain competitive advantage, reputation, and a capacity for innovation. Inter-organizational relations are relatively dense (they are numerous and are formed with diverse partners) and have a transactional-relational nature. The third type is related to value creation not only for the firm, but also for other actors in society. Inter-organizational relations are numerous and diverse (dense network of relations) and have the relational character (based on trust). This 'enterprise logic' plays a role in determining the variety of stakeholders that a firm attends to. Specifically, 'enterprise logic' may constrain or facilitate a firm's capacities to deal with a variety of market partners and to attend to multiple partners simultaneously.

Conceptual Framework

A conceptual framework is a model of presentation where a researcher conceptualizes or represents the relationships between variables in the study and shows the relationship graphically or diagrammatically. Mugenda (2008) and Orodho (2008) define a variable as a measurable characteristic that assumes different values among units of specific population. The independent variable of the study will be information integration and demand forecasting, while the dependent variable will be the performance of manufacturing companies in Nairobi County.

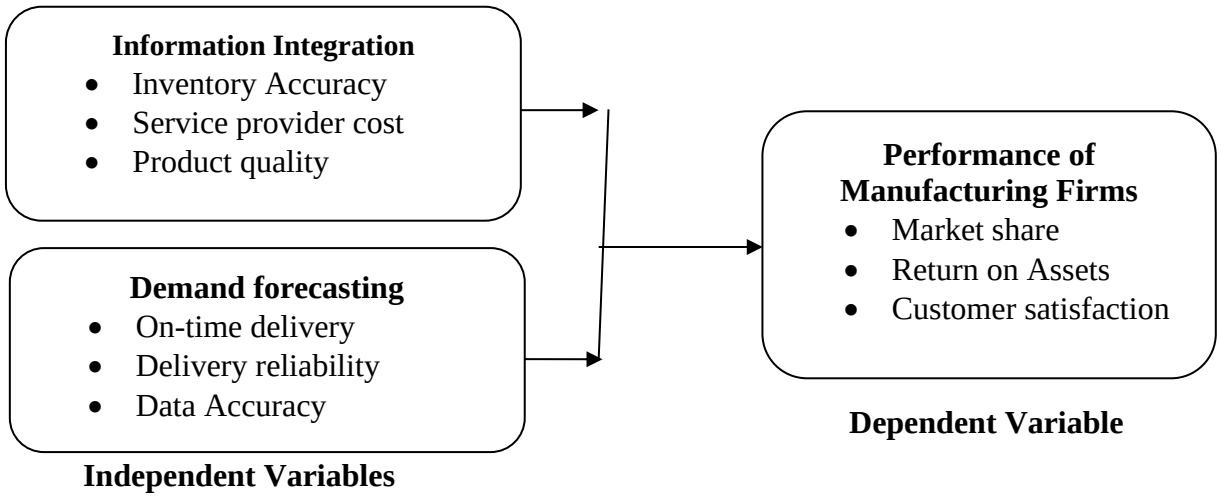

Figure 2. 1: Conceptual framework

Information Integration

Information Integration considered an operational imperative in today's competitive environment, it is also a growth area and one of the key issues purchasing and supply executives need to face now and in the near future (Davila and Palmer, 2008). Although forecasts on the use of Technology have been downgraded with the burst of the internet bubble in 2011 (Davila, 2013), statistic still show an increased growth in the use of technology, for example a recent survey indicated that Technology of direct goods is now exceeding that of indirect goods (Bartels, 2013). Reason for the continued growth in e-procurement use is due to the significant benefits both supplier and buyer organizations achieve through its use. Benefits include; lower transaction costs, lower staffing requirements, shorter procurement cycles, reduced inventory levels, higher degree of transparency and increased communication between supplier and buyer organizations (Davila et al., 2003). Yet, for all the benefits outlined there are many organizations that are taking a 'wait and see' approach to the implementation of e-procurement technologies (Davila et al., 2013).

According to (Bielefied, 2009)), electronic procurement is the business-to-business purchase and sale of supplies and services through the internet, as well as other information and networking systems, such as EDI and ERP. As an important part of many business sites, e-procurement is sometimes referred to by other terms, such as supplier exchange. Typically, e-procurement websites allow qualified and registered users to look for buyers or sellers of goods and services.

Information technology and in particular the Internet, have played a fundamental role in helping companies reach the goals of supply chain integration. The Internet can change the role and type of relationships between the various players, creating new value networks and developing new business model (Muffatto and Payaro, 2004). These systems must fit within the organizational requirements of the supply chain/network members, or else the overall acceptance may not be adequate for the system‟s use (Volkoff et al., 1999).

Information systems in particular have contributed to the establishing of Supply chain management systems which link suppliers to the buyer organization promoting supplier intimacy (Landon and Landon 2005). It has also led to the application internet in the application of Electronic data exchange systems. The Internet has given companies even greater tools for tightly orchestrating relationships across the entire supply chain and creating strategic partnerships and operational linkages with a dynamic web of large and small firms spanning all continents. Internet-enabled shared information helps break down organizational policies and functional fences, helping supply chain alliance members develop a common understanding of the competitive environment (Boyson et al., 1999).

Information Systems researchers have mainly focused on the impact of IT in reducing coordination costs. This includes the cost of exchanging information and incorporating that information into decision processes as well as the cost incurred by the firm due to delays in the communication channel (Clemons et al. 1993). Within the context of transaction cost theory, this is a major component of transaction costs. However, the other major component, transaction risk, includes the risk of opportunistic behavior as well as the risk due to information asymmetry among the parties. One party could avoid responsibilities due to the inability of the other party to monitor. In addition, as indicated earlier, one party could take advantage of the relation-specific investments of the other. In addition to coordination cost, IT can reduce transaction risk by providing effective monitoring capabilities (Clemons et al. 2013).

Demand Forecasting

Forecasting plays a crucial role in every functional activity of the firm. It is predicting and estimating future demand to provide demand forecasts for company. Many companies needed a reliable forecast as they do not know their future demands and have to rely on demand forecasts to plan for long term business strategies and ensuring that the supply chain operates effectively on a day-to-day basis. Therefore forecasting is one of the important planning tools in decision making (Yassin and Ramlan,2011) and important issue for manufacturing companies (Kalchschmidt,2007). The ability to forecast future demand accurately now plays an important part in the need for organization to integrate the internal and external supply chain (Bowersox, Closs and Cooper,1999; Sanders and Ritzman,2004).

Supply chain management if conducted in a proper way can add value for smoothen operations of the manufacturing process that can help in maintaining the delivery schedule. Strategies to produce better quality product in an accurate timing are extremely important in manufacturing companies, however meeting the increasing time demands of customers will become important. Strategies to shorter the production lead-time will be the strategic focus for at least the next 10 years. Measurement for time in seconds, minutes, hours, days, months or years has been increasingly emphasized among firms, especially the manufacturing companies(KaesandAzeem,2009).In every supply chain management, demand forecasting act as an important method to sustain profitability in business operation. Therefore, improving demand forecasting performance has long been a concern of every management level involved in every industry (Amrstrong and Grohman, 1972).

In manufacturing companies, several decision making processes need accurate forecasts in order to choose proper actions relevant to production planning, sales budgeting, transportation mode and schedule delivery arrangement. In order to streamlining the manufacturing process, practitioners and academics have placed a particular attention to how forecasting can be improved to increase forecast accuracy. (Armstrong, 2001;Caniato, Kalchschmidt, Verganti, 2002). Research shows that improved forecasting techniques are useful mainly for different organization department including decision making and planning processes (Winklehofer, Diamantopoulos and Witt, 1996). However, not all the techniques are applicable for each category of the materials used in production line. Proper implementation of the appropriate technique with the right parts is very much important for accurate demand forecasting.

Thall (1992) and Agrawal and Schorling (1997) indicated that accurate demand forecasting plays a significant role in profitable production operations while poor forecasting results in under stock or overstock that directly affects the cost and management of the inventory. The common practice of forecasting demand in supply chain planning ranging from simple naïve methods to sophisticated quantitative methods and from simple judgmental methods to complex qualitative methods are available. Qualitative methods rely on managerial judgment and opinions by each

profession as different individuals can provide different perspective from the same information. Qualitative methods are used when data are un reliable or unavailable or when time is limited. Quantitative methods rely on mathematical models and depend on the historical data that can be combined into reliable estimation of the future. Quantitative practices include time series decomposition, exponential smoothing, time series regression and autoregressive and integrated moving average(ARIMA) models. In forecasting, each method is suited to different conditions (WaddellandSohal,1994).

According to Bon and Leng (2009), most of manufacturing companies in Malaysia determined forecast for their production using judgmental forecast or common quantitative forecast method such as simple moving average and simple exponential smoothing method. Kerkkanen, Korpela, Huiskonen (2009) stated that the imitation of concepts, targets and principle of forecasting method among consumer product, risk for unrealistic accuracy targets and deceptive error measures. Therefore special circumstance should be monitored and analysed before any methods or techniques are applied (Wilson and Keating, 2009). Therefore, the objectives of this paper is to analyses the demand forecasting techniques adopted by a manufacturing company and implement different demand forecasting method for the products demand. Then, evaluation among different methods is conducted to determine the best suitable technique to forecast the demand parts for the company.

Empirical Review

Information Integration

Like Nidomolu (1995), Sriram & Stump (2004) found that ICT integration helped improve trust and commitment in the buyer-supplier relationship, which in turn had a positive impact on supply chain performance. The researchers evaluated the role which ICT integration plays in enhancing collaborative communication, inter-organizational relationships, and supply chain performance. They found that ICT integration helped enhance inter-firm relationships, which in turn boosted supply chain performance. Similar findings were also reported by Kent & Mentzer (2003). Kent & Mentzer (2003) established that ICT integration helped to enhance trust, commitment to the buyer-supplier relationship, dependence, as well as a long term orientation towards the relationship. These supplier relationship behavioral constructs were in turn found to have a significant and positive effect on the efficiency of the firms' logistics.

Kocoglu et al (2011) focused their study on 158 manufacturing firms in Turkey. Their study viewed ICT integration as involving customers, suppliers, as well as inter-organizational integration. The findings of their study demonstrated that ICT integration is instrumental in the optimization of supplier relationships. Apart from reinforcing connectedness, ICT integration was seen as strengthening buyer-supplier coordination and collaboration. This occurred as a result of information sharing with the customers, suppliers, across functional areas, and with other organizations. Through reinforcing connectedness, coordination and collaboration; ICT integration ultimately led to lower costs, better utilization of assets, higher supply chain reliability, and better flexibility and responsiveness of the supply chain.

Demand Forecasting

Withers & Ebrahimpour (2012) focused on the analysis of how the use of ethical codes has led to responsible demand forecasting on supply chain practices, whether the ethical codes have been shared with supply chain members, and its impact on the behaviour of the partners within the supply chain. The analysis of these issues was done comparatively, with large, and small and medium enterprises (SMEs) in mind. They analyzed their data using the ANOVA and factor analysis methods, and found that the majority of large organizations and SMEs had adopted ethical

codes. The majority of the organizations not only communicate these codes to their employees, but they also trained their employees on the right ethical behaviour mandated by these codes.

Nevertheless, the adoption of the ethical codes was found to be more effective when the ethical codes were communicated to others, and when both the subordinate employees and managers were committed to the ethical behaviour implied by the codes. Larger organizations shared their ethical codes more with their supply chain partners compared to the SMEs, but the sharing by both categories of organizations only had minimal effect on the behaviour of the vendors or customers.

Also in agreement with this position are Giuseppe & Stocchetti (2002), who aver that demand forecasting avails a number of tools or applications which can help automate the routine processes required to perform the various buyer-supplier relationship activities. From this perspective therefore, demand forecasting is seen as positively impacting supplier relations (and therefore supply chain performance) in a number of ways. Firstly, use of ERPs is useful in automating information flow procedures required for order fulfillment and in coordinating the information flows emanating externally with the firm's internal production system (Giuseppe & Stocchetti, 2002). Use of groupware can facilitate teamwork and collaboration. For instance, it can allow partners in the supply chain to co-design and co-produce products remotely, without additional transactional costs In doing so, ICT integration can help firms to achieve: shorter to-market times, quicker planning and production scheduling, and reductions in idle time (Giuseppe & Stocchetti, 2002).

RESEARCH METHODOLOGY

Research Design

The study adopted the descriptive research design According to Orodho (2012); research design refers to all the procedures selected by a researcher for studying a particular set of questions or hypothesis and a framework for the collection and analysis of data that is suited to the research question. It is a programme to guide the researcher in collecting, analysis and interpreting observed facts.

This study used descriptive cross sectional survey design The descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individual (Orodho, 2012).The descriptive research design is proposed for this study because of the ability to provide description of the state of affairs as it exists at present. Creswell 2013 observes that a descriptive research design is used when data are collected to describe persons, organizations, settings or phenomena. The descriptive design also has enough provision for protection of bias and maximized reliability, Kothari, (2011). Further, it enables the researcher to obtain a cross-reference data, some independent confirmation of data and a range of options. The descriptive studies are not only restricted to facts finding, but might often result in the formation of important principles of knowledge and solution to significant problems.

Target Population

The population refers to an entire group of persons or elements that have at least one thing in common. The target population compromises of IT department managers, operation managers, supply chain managers and suppliers,

Table 3. 1:Target Population

Sector	No. Distribution Firms
IT managers	25
Operations Managers	25
Supply Chain Managers	25
Suppliers	30
Total	**105**

Research (2020)

Sample size and Sampling Technique

Sampling is the process of selecting units from a population of interest. It is done by selecting a part of the subject on which measurement is being taken in a population; conclusions may be drawn about the entire population (Kothari and Nikolayev, 2012). This method is also economic and time saving According to Trochim Orodho, (2012); sampling technique can be either probabilistic or non-probabilistic. Probabilistic sampling ensures that every unit of the population has an equal chance of being selected unlike the non-probabilistic where other elements have no chance of being selected (source). Probabilistic sampling can be either simple random, systematic and stratified or multi stage sampling (Creswell, 2013).

Various formulas have been proposed for sample size determinations. However, this study followed the formula proposed by Yamane, (1967) since it is simple to use, it is scientific and can be used in cases of large populations. Therefore, to calculate the sample size from 125 employees working in various Manufacturing Firms in Kenya Nairobi county. Yamane (1967) formula was used $n=N/1+N(e)^2$

Where;

n=sample size

N=total population i.e. 125 employees

e=Error tolerance. The study confidence level was 95%, which give a margin error of 0.05

The sample size is calculated as follows;(Corlatti, 2015)

$n=125\ (1+80*0.05^2)$

n=125/1.2

n=88

Table 3. 2**:** Proportionate Distribution of Sample

Sector	Target population.	Sample Size.
IT managers	25	20
Operations Managers	25	20
Supply Chain Managers	25	20
Suppliers	30	28
Total	105	**88**

Data Collection Instrument

This study used both primary and secondary data. Questionnaire collected data that can be ideally analyzed both qualitatively and quantitatively in line with the inquiry mode. According to Saunders,

Lewis and Thornbill (2009) a questionnaire allow data to be standardized thus enabling easy comparison.

The questionnaire was used as the main one for this study because it allows for pretesting, reliability and consistency in addition to cost and time factor. Primary data was obtained through questionnaire designed to gather information from respondents who in this case were the various managers identified as playing having a role in agile supply chain management practices. Such information and the design of questionnaire was based on secondary data obtained from literature reviewed, the government and other related agencies.

The field data aims at providing empirical information in respect of the agile supply chain management practices activities as the variables affecting performance of manufacturing firms in Kenya. Secondary data was obtained from KAM (2019) about the target population. The primary data of the study was collected by the use of questionnaire. The questionnaire covered the demographic information and the information pertaining to variables of the study. Kothari (2011) defines a questionnaire as a research instrument consisting of series of questions and other prompts for gathering information from the respondents. It is an easier method of collecting data because it is economical and convenient to administer in terms of time and cost. The questionnaire had standardized questions that make it simple to compile data. The questionnaire contained both open and close-ended questions.

Pilot Testing

The Pilot testing was carried out to help find out if the questions were able to measure what they are supposed to measure, appropriateness and practicality, the clarity of the wording and whether the respondents interpreted the questions in the same way (Kothari, 2011). The researcher conducted a pilot study by administering 12 questionnaires to different procurement professionals using random sampling in Distribution Firms In Kenya. The pre-test sample was 10% of the sample size as advocated by Mugenda & Mugenda (2012). The 12 respondents were selected randomly to establish the validity and reliability of the research instrument before the actual collection of data for the study.

The preliminary or first draft of questionnaires will be given to a panel of ten experts in the field of green supply chain. These experts were asked to review the instrument and make recommendations for improving its validity. These recommendations were then then incorporated into a second draft of the instrument which was then given to a small sample of relevant professionals. This pilot sample was asked to comment on the ease with which they understood and completed the test questions. Where relevant, these comments were incorporated into a third draft of the test instrument. This third draft constituted to the final test instrument where the open-ended questions on the survey instrument will be analyzed qualitatively; that is, they were simply reported for each of the three groups of the respondents.

Data Analysis and Presentation

Data presentation is method by which people summarize, organize and communicate information using a variety of tools, such as diagrams, distribution charts, histograms and graphs (Schindler2002). Presentation of data was done in form of quantitative and qualitative reports, which were presented in forms of tables and essay. For the quantitative reports, the tables consisted of mean and standard deviation values that are used to make interpretation of the analysis. Percentage, mean and standard deviation were used to show the frequency of responses. Tables were used to display the rate of responses and to facilitate comparison. Qualitative reports were presented in form of essay, which was discussed as per the study objectives aligned with the theories and empirical study. The collected research data was checked for any errors and

omissions, coded, defined and then entered into Statistical Package for Social Science (SPSS Version 24).

Quantitative data were coded into numerical codes, which represented various variables. These codes were then being captured into computer for analysis. These data was analyzed using descriptive analysis such as frequency, percentage, mean and standard deviation. Qualitative data was collected from open-ended questionnaires. Qualitative data was transcribed and summarized according to themes and contents (Bryman & Bell, 2015). These themes and contents were used to confirm or refute quantitative responses drawn from closed ended questions in the questionnaire.

Inferential statistics included both correlation, to show the strength of the relationship between independent and the dependent variable

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

Where: Y = Performance of Manufacturing Firms In Kenya

β_0 = Constant Term;

$\beta_1, \beta_2, \beta_3$ andβ_4 =

Beta coefficients;

X_1= Information integration

X_2= Demand forecasting

ε = Error term.

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

Descriptive statistics Analysis

Information integration

This section of the analysis focuses on the effect of information integration on performance of manufacturing firms in Nairobi City County. The findings are as presented in Table 4.1. From the findings in the table, 24 (27.2%) and 29 (33%) of the respondents strongly agreed and agreed and respectively that information integration led to lower staffing requirements, 31 (35.2%) were neutral that information integration led to lower staffing requirements while only 4 (4.6%) of the respondents disagreed and were not sure whether information integration led to lower staffing requirements giving a mean response of 3.73 and a standard deviation of 0.892 indicating agreement by majority of the respondents.

From the study findings, 39(44.3%) and 38(43.2%) of the respondents agreed and strongly agreed respectively that they enjoy low cost advantage by the use of information technology, 9 (10.2%) were neutral that that they enjoy low cost advantage by the use of information technology while 2 (2.3%) of the respondents disagreed and were not sure that they enjoy low cost advantage by the use of information technology thus giving a mean response of 4.13 (SD = 0.869) indicating agreement by majority of the managers.

Also from the study findings, 19 (21.5%) and 40 (45.5%) of the respondents agreed and strongly agreed respectively that they have developed strong capability in research through technology, 15 (17.1%) were neutral that have developed strong capability in research through technology while 8(9.1%) and 6 (6.8%) of the respondents strongly disagreed and disagreed that they have

developed strong capability in research through technology giving a mean response of 3.84 (SD = 0.905) indicating agreement by majority of the managers.

Additionally, of the 88 respondents 39 (39.8%) and 25 (25.5%) of the respondents agreed and strongly agreed respectively that they Have reputation in product and service quality, while 2(2%), 3 (3.1%) and 19 (29.6%) of the respondents strongly disagreed, disagreed and were not sure respectively that they have reputation in product and service quality giving a mean response of 3.84 (SD = 0.916) indicating agreement by majority of the managers.

Finally, the results revealed that 43 (48.7 %) and 15 (17.4%) of the respondents agreed and strongly agreed respectively that they increased communication between supplier and buyer organizations, while 3 (3.4%), 8 (9.1%)and 19 (21.6%) of the respondents strongly disagreed and were not sure respectively giving a mean response of 3.84(SD = 0.769) indicating agreement by majority of the respondents. The overall mean response was 3.87 (SD = 0.87) which showed agreement by majority of the respondents on information integration on increased communication between supplier and buyer organization.

Table 4. 1: Information integration

		SD	**D**	**N**	**A**	**SA**	**Mean**	**Std. Deviation**
Lower staffing requirements	Freq.	0	4	31	29	24	3.73	0.892
	%	0	4.6	35.2	33	27.2		
We enjoy low cost advantage	Freq.	0	2	9	39	38	4.13	0.869
	%	0	2.3	10.2	44.3	43.2		
We have developed strong capability in research through technology	Freq.	6	8	15	40	19	3.84	0.905
	%	6.8	9.1	17.1	45.5	21.5		
Have reputation in product and service quality	Freq.	2	3	19	39	25	3.84	0.916
	%	2.3	3.4	21.6	44.3	28.4		
Increased communication between supplier and buyer organizations	Freq.	3	8	19	43	15	3.84	0.769
	%	3.4	9.1	21.6	48.7	17.4		
Information integration							**3.87**	**0.87**

Demand forecasting

Demand Forecasting plays a crucial role in every functional activity of the firm. It is predicting and estimating future demand to provide demand forecasts for company. Many companies needed a reliable forecast as they do not know their future demands and have to rely on demand forecasts to plan for long term business strategies and ensuring that the supply chain operates effectively on a day-to-day basis. This section of the analysis delved into the effect of demand forecasting on performance of manufacturing firms in Nairobi City County. The findings in Table 4.4 revealed, that 27 (30.7%) and 28 (31.8%) of the respondents agreed and strongly agreed respectively that they demand forecasting is helping in timely delivery, while 5 (5.7%), 3 (3.4%) and 25 (28.4%) of the respondents strongly disagreed, disagreed and were not sure respectively that demand

forecasting is helping in timely delivery giving a mean response of 3.91(SD = 0.95) indicating agreement by majority of the respondents that demand forecasting is helpful in predicting and estimating future demand.

Furthermore, 46(46.9%) and 34(34.7%) of the respondents agreed and strongly agreed respectively that demand forecasting is helpful in predicting and estimating future demand, while 6 (6.8%), 7 (8%) and 10 (11.4%) of the respondents disagreed and were not sure of that demand forecasting is helpful in predicting and estimating future demand respectively thus giving a mean response of 4.14 (SD = 0.76) indicating agreement by majority of the respondents that demand forecasting is helpful in predicting and estimating future demand.

Moreover, the findings revealed, that 30 (34.1%) and 40 (45.5%) of the respondents agreed and strongly agreed respectively that demand forecasting helps in Ensuring that the supply chain operates, while 2 (2.3%), 5 (5.7%) and 10(11.4%) of the respondents strongly disagreed and were not sure respectively that demand forecasting helps in Ensuring that the supply chain operates giving a mean response of 4.22(SD = 0.71) indicating agreement by majority of the respondents that demand forecasting helps in Ensuring that the supply chain operates.

Additionally, the findings revealed that 28 (31.08%) and 32 (36.4%) of the respondents agreed and strongly agreed respectively that demand forecasting helps top integrate the internal and external supply chain, while 5(5.7%), 8(9.1%) and 15 (17.1%) of the respondents disagreed and were not sure respectively that demand forecasting helps top integrate the internal and external supply chain giving a mean response of 4.09(SD = 1.05) indicating agreement by majority of the respondents that demand forecasting helps top integrate the internal and external supply chain.

The results also revealed that 28 (31.8%) and 25 (28.4%) of the respondents agreed and strongly agreed respectively that demand forecasting help in cost effective flow of raw materials, while 7 (8%), 6(6.8%) and 22(25%) of the respondents strongly disagreed, disagreed and were not sure respectively that demand forecasting help in cost effective flow of raw materials giving a mean response of 3.46(SD = 1.45) indicating agreement by majority of the respondents. The overall mean response was 3.96 (SD = 0.98) which showed agreement by majority of the respondents on demand forecasting that demand forecasting help in cost effective flow of raw materials.

The results also revealed that 23 (26.1%) and 33 (37.5%) of the respondents agreed and strongly agreed respectively that demand forecasting helps in sorting and recycling of products and materials, while 8 (9.1%), 9(10.2%) and 15(17.21%) of the respondents strongly disagreed, disagreed and were not sure respectively that demand forecasting sorting and recycling of products and materials giving a mean response of 3.46(SD = 1.45) indicating agreement by majority of the respondents. The overall mean response was 3.96 (SD = 0.98) which showed agreement by majority of the respondents on demand forecasting that demand forecasting sorting and recycling of products and materials.

The results also revealed that 27 (30.7%) and 31 (35.2%) of the respondents agreed and strongly agreed respectively that demand forecasting leads to improved operations, while 6(6.8%), 7(8%) and 17(19.3%) of the respondents strongly disagreed, disagreed and were not sure respectively that demand forecasting leads to improved operations giving a mean response of 3.46(SD = 1.45) indicating agreement by majority of the respondents. The overall mean response was 3.96 (SD = 0.98) which showed agreement by majority of the respondents on demand forecasting that demand forecasting leads to improved operations.

Table 4. 2: Demand forecasting

		SD	D	N	A	SA	Mean	Std. Dev
Demand forecasting is helping in timely delivery	Freq.	5	3	25	28	27	3.91	0.95
	%	5.7	3.4	28.4	31.8	30.7		
Predicting and estimating future demand	Freq.	6	7	10	35	30	4.14	0.76
	%	6.8	8	11.4	39.8	34		
Ensuring that the supply chain operates effectively	Freq.	2	5	10	40	30	4.22	0.71
	%	2.3	5.7	11.4	45.5	34.1		
Integrate the internal and external supply chain	Freq.	5	8	15	32	28	4.09	1.05
	%	5.7	9.1	17.1	36.4	31.8		
DF help in cost effective flow of raw materials	Freq.	7	6	22	25	28	3.46	1.45
	%	8	6.8	25	28.4	31.8		
There is sorting and recycling of products and materials	Freq.	8	9	15	33	23	4.09	1.05
	%	9.1	10.2	17.1	37.5	26.1		
demand forecasting leads to improved operations	Freq.	6	7	17	31	27	4.09	1.05
	%	6.8	8	19.3	35.2	30.7		
Demand forecasting							**3.96**	**0.98**

Correlation Results

The study used Pearson Product Moment correlation analysis to assess the nature of the relationship between the independent variables and the dependent variable as well as the relationships among the independent variables (Wong &Hiew, 2005; Jahangir & Begum 2008). Wong and Hiew (2005) further posit that the correlation coefficient value (*r*) ranging from 0.10 to 0.29 is considered weak; from 0.30 to 0.49 is considered medium, and from 0.50 to 1.0 is considered strong. There was a strong relationship between information integration and performance of manufacturing firms in Nairobi City County ($r = 0.562$, p-value < .01). Similarly, a strong relationship was exhibited between demand forecasting and performance of manufacturing firms in Nairobi City County ($r = 0$ .535, p-value < .01).

Table 4. 3: Correlation

		Performance	Information integration	Demand forecasting
Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
Information integration	Pearson Correlation	. 562**	1	
	Sig. (2-tailed)	0.00		
Demand forecasting	Pearson Correlation	.535**	.550**	1
	Sig. (2-tailed)	0.00	0.00	

Regression Analysis

From the correlation matrix, regression analysis was carried out in order to develop a model showing the relationship between agile supply chain management practices (independent variables) and performance of manufacturing firms in Nairobi City County (dependent variable). The purpose of the regression analysis was to get the relationship between the variables and come up with predictions model.

Model Summary

Table 4.10 illustrates the model summary of multiple regression model, the results showed that all the four agile supply chain management practices parameters (information integration, demand forecasting) explained .840a percent variation of performance of manufacturing firms (R squared =0.706).

Table 4.4: Model Summary

Model Summary Statistics	
R	.840a
R Square	0.706
Adjusted R Square	0.692
Std. Error of the Estimate	5.98
Change Statistics	
R Square Change	0.706
F Change	26.46
df1	4
df2	86
Sig. F Change	0.002

a Predictors: (Constant), Information integration, Demand forecasting,

Overall Model Significance/Fit

Study findings in table 4.5 indicated that the above discussed coefficient of determination was significant as evidence of F ratio of 26.46 is Significant with p value 0.002 <0.05 (level of significance). Thus, the model was fit for determining the effect of agile supply chain management practices on performance of manufacturing firms in Nairobi City County.

Table 4.5: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.746	2	12.994	26.46	.002
Residual	27.98	86	0.247		
Total	**52.726**	**90**			

a Dependent Variable: Performance of manufacturing firms
b Predictors: (Constant), Information integration , Demand forecasting,

Analysis of variance determines whether mean scores of the effect of agile supply chain management practices components on performance of manufacturing firms differ significantly

from each other. It also determines whether the various variables interact significantly with each other.

Analysis of variance (ANOVA) for regression coefficients, the results demonstrate that the significance of F statistics is 0.00 which is less than 0.05 confidence level. Therefore, it implies that there is a significant relationship between agile supply chain management practices and performance of manufacturing firms. An F ratio of more than 1 implies that each of the identified factors have an effect on performance of manufacturing firms.

Coefficients of Estimate

Findings showed that information integration had coefficients of estimate which was significant basing on $\beta_4 = 0.220$ (p-value = 0.001 which is less than $\alpha = 0.05$). This suggests that there is up to 0.220 unit increase in performance of manufacturing firms for each unit increase in information integration. The effect of information integration is thrice the effect attributed to the error, this is indicated by the t-test value = 3.818. In tally with the findings, Bièvre et al., 2015 affirmed that information integration is vital in enhancing firm performance since it ensures that measurement results are comparable in time and space.

The second objective of the study sought to analyze the effect of demand forecasting on performance of manufacturing firms in Nairobi City County. Study findings showed that had coefficients of estimate which was significant basing on $\beta_3 = 0.212$ (p-value = 0.001 which is less than $\alpha = 0.05$) hence demand forecasting has a significant effect on performance of manufacturing firms. This indicates that for each unit increase in demand forecasting, there is up to 0.075 units increase in performance of manufacturing firms. The effect of demand forecasting is stated by the t-test value = 2.15 which point out that the effect of demand forecasting is over 5 times that of the error associated with it. In conformity with the results, Li et al. (2014) established a positive relation between demand forecasting and operational performance.\

Table 4.6: Coefficients of Estimate

	Unstandardized Coefficients			**Standardized Coefficients**	
	B	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	0.223	0.298		0.747	0.002
Information integration	0.220	0.097	0.322	3.309	0.001
Demand forecasting	0.212	0.087	0.21	2.547	0.001

a Dependent Variable: Performance of manufacturing firms

The correlation matrix coefficients were used to derive a prediction model for the effects of agile supply chain management practices on performance of manufacturing firms. Thus, the correlation coefficients derived from the matrix have been used to come up with a standard prediction model.

The following equation was derived from the regression coefficients in the matrix.

$Y = 0.22+0.22X_1+0.21X_2$

Conclusion

Information integration

Information integration is associated with an improved performance of manufacturing firms. Notably, the firms have a database with information on suppliers' experiences and their previous

clientele. Besides, there is adequate information sharing within the supply chain since the firms can electronically consult references for predict/service quality and distribute their information to the relevant suppliers. The eventual result is enhanced performance of the manufacturing firms.

Demand forecasting

Additionally, demand forecasting positively influenced the performance of manufacturing firms. Undoubtedly, this form of traceability is at the crux of the production process. The safety and quality of the final firm products are largely dependent on demand forecasting. Besides that, the consequences of the firms' production process established through demand forecasting. Accordingly, improved firm performance is realized through demand forecasting.

Recommendations

Information integration

Firstly, information integration is instrumental in enhancing the performance of manufacturing firms. Consequently, firms must gather information on suppliers' experiences and previous clientele electronically. Besides, it is essential to consult references for product quality and electronic distribution of information on pricing and any other information.

Demand forecasting

Notably, improved performance of manufacturing firms is associated with demand forecasting. Therefore, firms need to ensure there are processes in place to track their raw materials from the farmers to suppliers and eventually to the factory. As well, they should be at the forefront in assessing the environmental consequences of their different production processes. Finally, they must keep track of the supply network of their inputs.

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