INFLUENCE OF SUPPLY CHAIN PERFORMANCE ON THE CHOICE OF FLORICULTURAL DISTRIBUTION CHANNELS IN KENYA

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ABSTRACT

The floriculture industry is amongst the fastest growing sectors of the Kenyan economy and this is evident through its growth within the last two decades. The industry has however lately experienced challenges due to continued depressed returns despite year on year increase in export volumes. This state of affairs threatens the livelihoods of millions of Kenyans who depend on floriculture. In that respect, an examination of the floriculture supply chain performance between the various distribution networks becomes a crucial subject as this forms a key determinant of the returns that accrue from the industry. The main objective of the research was to empirically investigate the influence of supply chain performance on the choice floricultural distribution channels. The research targeted Kenyan flower farms using a sample size of thirty farms which was arrived at after employing two sampling techniques namely purposeful sampling and simple random sampling and by use of a quantitative survey research design the study applied a self designed questionnaire to collect data from the sample population. The data collected was analyzed using both the descriptive and inferential analysis tools of weighted means, t - tests, chi square and correlation analysis supported by an SPSS programme. The study established that at the farm level not all supply chain performance indicators have a significant influence on the choice of distribution channels chosen by farms and of the four independent performance variables investigated only quality standards and lead time had a major and significant influence on the choice of distribution channel at the farm level. The researcher recommends that the study be extended to the downstream linkages within the supply chain as this is where the other performance variables could be having major impact.

Key Words: *supply chain performance, floricultural distribution channels, Kenya*

Introduction

This research study focused on the key supply chain performance indicators of the main floricultural distribution networks and how the performance results influence the choice of the distribution channels adopted by Kenyan farms. In the last decade, trade in fresh

horticultural products has become increasingly global and vertically integrated through contracts rather than control and ownership of the means of production (Hortwise, 2012). This trend has been encouraged by a liberalized international and national regulatory framework, associated with World Trade Organization (WTO), International Monetary Fund (IMF) and the World Bank policies. It's estimated that trade in fresh fruits, vegetables and cut flower is equivalent to 8 percent of global commodity trade-almost equivalent to that of crude petroleum (Jaffee & Henson, 2005).

The major developing African producers like Kenya, Egypt, Gambia, Ethiopia and Zambia have benefited from this trade by exporting specialty flowers and vegetables to the EU. While horticultural supply chain networks have become increasingly global, significant changes have also occurred in both consumer demands and retailing in the developed market economies (DMEs) (Goodman & Redcliff, 2008).This change in demand is consumer driven and is articulated in the EU, who are increasingly adopting a global sourcing policy to satisfy these new demands. Until the 1960s, demand for cut flowers from consumers around the world was predominantly met by local production and in Europe in particular, production was initially concentrated in the Netherlands. The energy crisis in 1973 put producers in the Netherlands and northern Europe under further competitive pressure because of the increase in cost for operating temperature-controlled greenhouses during the winter. As such, competition intensified especially when Israel began selling cut flowers at the Dutch flower auctions since it could produce cut flowers throughout the year in open fields or plastic tunnels. African producers, like Kenya, began to enter the European market in the 1990s (Fresh produce journal, 2011).

Trends in the Global Flower Trade and Distribution Networks

At present, African and European countries are the principal suppliers to the EU markets where as the North-American market is mainly supplied by Colombia and Ecuador. Japan and Hong Kong source primarily from Asia-Pacific countries (including China). Globally, trade in flowers is done predominantly either through the direct supermarket channels or through the flora Holland auction (Mungai, 2000). Kenyan players have joined hands with Dutch to create one of the most highly developed supply chain networks (Hortwise ,2012).With an estimated annual growth rate of 10 per cent the Kenyan flower sector has increased its export volumes from 19,807 to 120,000 tons between 1992 and 2011 (HCDA, 2011).As a result within a relatively short period of time, Kenya has surpassed both Israel and Columbia to become the largest cut flower exporter to the European Union commanding a 25 per cent market share. The Horticultural trade policy in Kenya is mainly driven by private sector (growers and exporters) interests and the government's pursuit to earn foreign exchange hence the policy measures in place in the horticultural sector are geared towards enhancing the marketing and distribution infrastructure, establishing an improved network of price information and strengthening of HCDA (Orina, 2001).

Supply Chain Performance Measures in Floriculture

SCM concepts form an essential part of modern management thinking in many sectors and its tools and techniques have helped companies in traditional areas such as manufacturing and retailing to achieve unprecedented levels of operational, quality and efficient supply chain performance and optimization. However the discipline is still rather incipient in the floricultural domain and this might explain why we have not seen a corresponding increase in the value of returns despite a phenomenal increase in exported volumes from Kenya in the recent past. While literature abounds with textbooks and publications about SCM in general, publications specific to cut flower enterprises are limited (Pollen's, 2006). Fierce competition in today's global markets and the heightened expectations of consumers have forced business enterprises to invest in and focus attention on the relationships with their customers and suppliers thus the focus on supply chain performance gaining elevated significance.

This research explored the concept of 'supply chain performance in the key floricultural distribution channels in order to illustrate its significance as essential tools of creating competitive advantage. Key performance measures or metrics used in the sector are geared towards improving customer satisfaction through good quality, minimal lead times, cost efficiencies and supply chain responsiveness (Pollen's, 2006) among others. Consequently, there is a need for SCM to cope with these challenges and this cannot be done by one party alone hence cooperation is needed to fulfill market demands for responsive, low cost and high quality deliveries. The intrinsic characteristic of cut flowers especially their perish ability and the necessity to maintain a high level of consumer confidence in product quality also makes the management of flowers supply chains particularly challenging. This is mainly because the perishability of cut flowers demands that the product is distributed quickly irrespective of the existing market prices (Folinas, 2006). Since most agribusinesses firms operate on narrow profit margins, many farms are compelled to adopt more than one supply chain strategies with an aim to distribute risks an approach which has had major implications on supply chain performance so far (Roth, 2008).

Kenyan Floricultural Distribution Networks

Many Kenyan horticulture firms are vertically integrated businesses with a history of growing and exporting horticultural crops for the UK and Dutch markets among others. However due to the growing competition, distribution systems dynamism and market segmentation, the supply chain networks have lately tended to assume very different channels once products have been air lifted and this diversity leads to huge variations on the sustainability and performance of some of the distribution channels (KFC,2011). Many firms have now adopted supply chain frameworks which embrace both the direct markets supply channels to major UK supermarkets like Sainsbury's, Marks and Spencer and Tesco or through the flower auction in Holland. Generally the distribution networks that form the direct supermarket supplies starts from the farm operations through to post harvest handling, inland transportation to the airport, handling at the Kenyan airport,clearance,freight handling at

destination airport, to wholesalers and finally to retailers and florists. There are operational variants to these channels. On the other hand the distribution channels that embrace the auction system will include importers and the auction stage before the wholesale and retail level in addition to all other linkages in the direct channels (UK fresh produce journal, June 2011). These distribution channels are adopted by different firms at one point or the other and the basis of the choice of one channel against the other is expected to be driven by the overall supply chain performance of a given channel. The choice of any particular channel is driven by many factors like prices, lead times, freight costs, quality demands from customers, and product availability among many other factors. Along the net works flowers are exposed to different and varying conditions of time, temperature and humidity which affect product quality in diverse ways and this has a major significance on the value of the final product by the ultimate customers. This state of affairs has led to a worrying reduction in the value of returns from flower exports as shown in table 1 below.

Table 1: Kenyan Horticultural Exports, 2010 and 2011

Crop	2010		2011		% Change	
	Quantity	Value	Quantity	Value	Quantity	Value
Flowers	120.2	35.6	121.9	32.5	+1	- 8.5
Vegetables	123.8	21.4	92.2	21.5	- 26	0
Fruits	32.5	2.8	13.0	3.6	+ 14	+30
Nuts	11.8	2.0	11.8	2.7	+10	+33

Source: USAID –KHCP

Key: Quantity x1000 Tonnes; Value x1 billion Ksh.

Statement of the Problem

Horticulture contributes 33 percent of the Kenyan Agricultural GDP which is 24 percent of the national GDP (Ksoll, Macchiavello & Morjaria, 2009). The exports value from horticulture rose from Ksh.1 billion in 1990 to a record over Kshs. 43 billion in 2008 surpassing tourism (HCDA, 2008). A survey by the fresh produce exporters association in two UK supermarkets indicated that wastage from Kenya's supplies of roses averaged 15 percent in 2010, (Fresh Produce Journal, 2011) worth 4 Ksh billions. As a result, net returns fell by an average of 5 percent during the same period (HCDA, 2011). At the same time, Kenya's cost of transporting a stem to international supermarkets has increased by 10 percent between the year 2008 and 2010 (Dolan et al, 2012). This scenario where export volumes increase without a corresponding increase in value of returns creates a very disturbing scenario for the sector.

According to Rikken (2011), poor supply chain planning leads to unreliable contractual arrangements where suppliers adopt inconsistent distribution channels leading to overall

supply chain inefficiencies. Shah (2012) did a study which confirmed that a well managed supply chain can positively influence floriculture distribution channels and this collaborates the study by Hendricks and Singhal (2009) which established a positive relationship between supply chain performance and distribution channels management. In Kenya there is little empirical evidence showing how supply chain performance in horticulture is influenced by the distribution channels adopted since the existing literature has focused more on other countries especially Netherlands in Europe and Colombia in South America and not much on Kenya (Fresh Produce Journal, 2011). This research study focused on the key supply chain performance indicators within the various distribution channels adopted by Kenyan farms since their performance has a major stake in determining the net returns on floricultural exports.

General Objective

The main objective of this study is to explore the influence supply chain performance has on the choice of floricultural distribution channels in Kenya.

Specific Objectives

1. To establish the influence of cool chain on the choice of floricultural distribution channels in Kenya.
2. To examine the influence of transportation costs on the choice of floricultural distribution channels in Kenya.
3. To evaluate the influence of quality standards on the choice of floricultural distribution channels in Kenya.
4. To establish the influence of lead times on the choice of floricultural distribution channels in Kenya.

Literature Review

Theoretical Reviews

A theoretical review is an account of the theories that have been published on a topic by accredited scholars and researchers. The purpose of this section is to convey to the reader what theories or models have been established on the research subject and what their strengths and weaknesses are. The theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge hence they form the structure that can hold or support a research study. Distribution channels are the chain of businesses or intermediaries through which a good or service passes until it reaches the end consumer and can include wholesalers, retailers, distributors and even the internet or the firms or individuals that participate in the movement of goods and services from raw material supplies to the final user (Lee, 2002) In this section distribution channels and supply chain performance measurement and metrics have been reviewed. The terms performance metric or

measure as applied in this study do overlap but carry the same meaning. Although measures are more concrete or objective attributes applicable at strategic levels, metrics are more abstract but somewhat subjective attributes mostly applied at the operational or tactical levels. Quality standards and cool chain effectiveness are important attributes but are hard to define objectively hence subjective thus considered as metrics. Transport costs and lead times on the other hand are measures which form the basis for metrics hence help us to measures the less tangible metrics. Measures are derived from interpretations of one or more metrics.

Supply chain performance measurement is the quantitative or qualitative assessment over a given time period the achievement of the objectives related to supply chain efficiency and effectiveness (Lysons Ken & Farrington., 2010).Neely, et al. (2002) defined a Performance Measurement System as a balanced and dynamic system that enables support of decision-making processes by gathering, elaborating and analyzing information.. Several theories and models for evaluating performance have been developed whose net effect is to increase customer value, profitability, reduced cycle times and costs, average inventory levels and better product design (William et al, 2007).Traditional measures include lead times, inventory turns, weeks of stock, defect rates or wastage, and service levels" (Ramdas & Spekman, 2000). These traditional measures focus on reducing costs for transactions, or improving efficiency but they do not measure the advantages related to end-customer satisfaction (Ramdas et al, 2000). A supply chain performance metric that focuses only on operational or financial items is not sufficient (Chen, 2004).Quantitative performance measures include cost minimization, Sales/profit, return on investments, fill rate maximization and lead time minimization. Various theories and models have been proposed towards holistic performance evaluation approaches and these include the balanced score card (BSC), (Kaplan & Norton, 1992), the performance measurement matrix, The SCOR Model, and the Game theories among others (Keegan et al, 1989).

The Balanced Score Card (BSC)

The Balanced score card (BSC) model postulates the use of a balanced set of measures that provides management with a quick but comprehensive view of the business from four important perspectives namely the shareholders (financial) perspective, the internal business perspective, the customer perspective and the innovation and learning perspective (Tangen, 2004). The model focuses on financial and non financial performance measures giving the results of actions already taken. It also complements the financial performance measures like activity based costing (ABC) with more operational non-financial measures, which are considered as drivers of future financial performance. By giving information from four perspectives, the BSC minimizes information overload. According to Lambert & Pohlein. (2001), the main weakness of this approach is that it is primarily designed to provide senior managers with an overall view of performance but it's not applicable at the operations level. Furthermore the BSC is constructed as a monitoring and controlling tool rather than an improvement tool hence it's not as flexible as the SCOR model. It does not specify any mathematical logical relationships among the individual's scorecard criteria thus it's difficult to make comparisons within and across firms using the BSC (Soni et al, 2010).

The SCOR Model

The SCOR model (Supply Chain Council, 2006) of performance measurement includes five basic processes namely plan, source, make, deliver, and return. The SCOR Model focuses on non financial perspectives mainly and is based on a balancing approach by measuring performance in multiple links concurrently (Aramyan , 2006). It represents several performance metrics like reliability, responsiveness, flexibility, cost, and asset attributes. The SCOR model is the only framework that links performance metrics, best practices and software requirements to a detailed business process model (lambert et al, 2001). The framework includes a systematic approach that helps to analyze and select the right key performance indicator groups and strategies for their accomplishment, to improve supply chain performance. Although The SCOR model is suitable for any type of business since it measures performance of overall supply chain management practices, it doesn't describe and measure every business activity and seems complicated to apply if the business adopts only simple management processes (Van hoek, 1998).

The Game Theories

The Game theories of performance measurements (Chinneck, 1990) represent an attempt to develop a decision theory under a particular condition in which once choice of action is determined by the possible alternative actions of an opponent playing the same game rather than just by the possibilities of several outcomes. Games in this context are viewed as a kind of conflict in which somebody must win and somebody looses. In a competitive situation, the decision maker is concerned with his own objectives and feasible strategies plus his anticipation of the opponent's strategies (Van hoek., 1998). This situation may be set out in form of a pay off matrix which associates a value or performance result with each end state. In a supply chain organized as a network of autonomous enterprises, the main objective of each partner or player is to optimize his efficiency with respect to his own economic criterion. Conflicts of interests and the distributed nature of the decision structure may induce a global loss of efficiency even though the enterprises within the same supply chain or given distribution network share a common goal which is to hold the market share (William et al., 2007).

Vah Hoeks (1998) studies postulate that Game theoretic models can be classified as non-cooperative / competitive or cooperative depending on the nature of the interaction among the players within the supply chain. The non cooperative games apply where members compete to improve their individual performance and the Nash and Stackelberg equilibrium is the solution concept used in non cooperative games where feasible actions called strategies can be adopted by the players. On the other hand players in a supply chain may agree to create contracts that coordinate their strategies in order to improve their overall performance as well as individual performance. This leads to cooperative games where members agree to implement an outcome better than the Nash and Stackelberg equilibrium and the feasible pay off solution is arrived through the Nash arbitration scheme. Whereas the Cooperative game theory is of great help in designing a supply chain by selecting an optimal coalition of

partners, a non-cooperative (also called strategic) approach is certainly more appropriate to determine the set of equilibrium points that can be reached in trade conditions. Therefore, the existence of Nash equilibrium points reduces the negotiation process to a one-shot exchange of information. The particular equilibrium reached in such an asymmetric game is called "Stackelberg equilibrium".

Conceptual Framework

Based on the reviewed literature and theories above a conceptual framework depicting the relationship between the independent supply chain performance measures or metrics being studied and the dependent distribution networks has been developed. The various components of the independent and dependent variables has been defined in the literature review whereby cool chain effectiveness is referring to the capacity to maintain perishable produce at within acceptable temperature regimes within the distribution chain to avoid wastage, transport and freight costs refer to the actual costs associated with freighting the product while quality standards compliance refers to costs implications and benefits resulting from getting a farm certified to trade in any specific distribution channel. Lead time is the time taken from order placement to delivery to final customer of the finished goods.

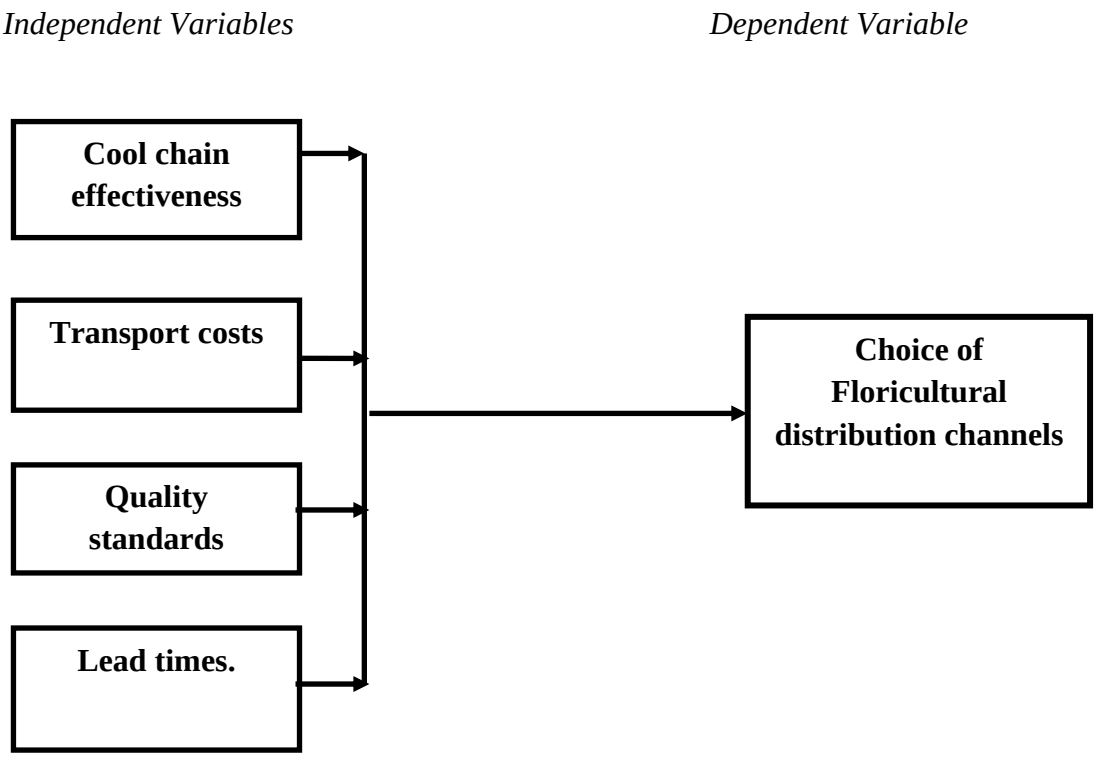
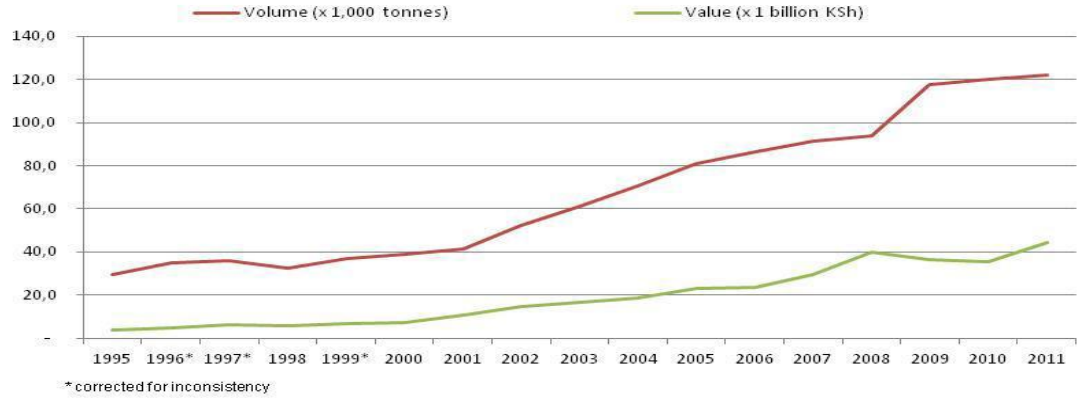


Figure 1: Conceptual framework of the study

Cool Chain Effectiveness

One challenge in managing fresh produce is that product value deteriorates with time in the supply chain at rates that are highly temperature and humidity dependent. As noted by van der Vorst (2006), it is imperative to analyze supply chains within the context of the full

complexity of their network structure and product type. Ahumada et al. (2009) suggested a cost minimization model for specific perishable product supply chain design, capturing the declining value of the product over time and developed a multi period supply chain network equilibrium model which addresses perishability of products as they move along different types of cool chain systems. In most studies, cool chain determines perishability hence the wastage levels and this has a strong correlation with the level of customer claims which is measured as the number of units of product that outdate (perish) or which the customer rejects (Sloof, Tijskens, and Wilkinson, 1996). Fujiwara and Perera (1993) developed EOQ models for inventory management under the assumption that product value diminishes over time according to an exponential distribution. A study by the Flower Council of Holland Confirms that in the past 5 years, the purchases of cut flowers in the UK have doubled (Flower watch, 2011) but despite this, the net returns have not been in line with this increases particularly due to the wastage and taxes within the supply chain.



Source: Hortiwise from HCDA and KFC (2012)

Figure 2: Development of Kenyan cut flower exports from 1995 – 2011

Transportation and Freight Cost Factors

Most large scale farmers have invested in costly sophisticated post harvest cold supply chain infrastructures and 90 percent of Kenya's flowers are handled by specialized air conditioned freight forwarders with the clearance process involving customs clearance and cargo inspection. As a result, the total cost of flowers from the farm to the market could be rationed as 30 percent farming, 6 percent post harvest handling and 64 percent transport and marketing based on the activity based model (Lusk, 2004). The cost and availability of air freight cargo space is a major determinant of Kenya's competitiveness. Ten years ago, airfreight used to represent 33% ($ 1.7/kg in 2004) of the price, but it has now jumped to 47% with the impact of higher insurance and fuel costs (CBS, 2012). Some of the major exporters pay between $1.75-2.0 per kilo if volumes exceed four tonnes per shipment in addition to other mandatory fees charged per consignment like airline pricing, agent documentation and transport costs, phytosanitary clearance fees and local taxes (KFC, 2012). It is estimated that air transport sustains directly 25% of GDP with 10% of this being contributed from dedicated air cargo for horticulture (Vega, 2008). The main concern for farmers and freight forwarders is the rate structure. In the time of IATA-regulated fares, there

were officially posted fares, but these were undermined by everyone causing the industry to deregulate. Now, the rate structure is unstable, making it difficult for exporters to manage their costs in light of fluctuating selling prices in the destination countries where as air freight is the exporter's responsibility coupled with directional imbalances (Vega, 2008).

Airfreight pricing varies depending on volumes being exported, agents and carriers being used and also the business season. Larger exporters negotiate BSA's (Blocked Space Agreements) which come at cheaper rates and guarantee uplift of product although these can also lead to dead freight charges which are imposed on the exporter by the agent if space is underutilized . Although air transport is very efficient, some features, stemming from its organization globally has potential negative impacts like unstable rates and directional imbalance which unfortunately depend on global trends and are beyond policy reach for the Government of Kenya (Fresh produce journal, June 2011).

Quality Standards Compliance

The rapid growth within the Dutch flower auction has exerted pressure on the auction related distribution net works. While production continues to flourish, Western Europe's cut flower markets are showing signs of saturation, with annual growth settling at a moderate 2 to 4% (Flower watch, 2011). A major shift in purchasing power – from wholesalers and the Dutch auction system towards large and demanding mass-market retailers and supermarkets is being observed and this is contributing to the general feeling that the industry is facing dramatic change. These combined factors are not only placing severe pressure on margins, but also changing the playing rules in the flower industry where lean and transparent supply chains characterized by consolidation and vertical integration which seem to favor the direct supermarket channels are coming up. The overall conclusion of the study, says Jeroen van der Hulst, Director of Flower Watch, is that the Kenyan-Dutch supply chain has reached the point at which it is struggling with the weight of its own success''. The Supermarket chains have developed quality standards for their supply base compliance to create a competitive advantage and are becoming the primary source of cut flowers leading to an increasing domination by retail chains (Dolan et al, 1999).

Consequently, production has shifted away from smallholders towards large farms mostly owned by exporters leading to vertical integrations in the supply chain whereby the stronger control over production processes enables compliance with quality standards to be achieved. As a result supermarkets have dominated the horticultural GVC leading to a buyer-driven and hierarchical management structure whose net effect is increased unit cost of exporting produce across the supply chain (Henson & Jaffee, 2006). Although the standards help to avoid multiple audits required by buyers through harmonized monitoring, they have effectively become a prerequisite for market access and inclusion within the GVCs that supply retailers in the UK and Netherlands thus acting as a form of non tariff barriers to trade (Henson & Reardon, 2005). Direct trade channels have by passed the auction system with more than 60% of the roses previously traded at the Flora Holland auction sold through the direct markets and the supermarkets currently (Lee, 2010; Mayer & Gereffi, 2010).Presently,

associations like the Kenya Flower Council (KFC) and the Fresh Produce Export Association of Kenya (FPEAK) facilitate their members in complying with international standards.

Lead Times in Floricultural Supply Chains

Within the horticultural supply chains extended lead times of up to ten days have been recorded causing massive quality deterioration and with no formal supply planning systems nor contracts specifying volumes to be supplied, the buyers push the financial risk from their end of the chain while at the same time creating inconsistencies on effective lead times (Rikken., 2011). What this means is that exporters cannot be sure beforehand how much resources to engage which puts the growers under extreme pressure to meet targets daily. This pressure is pushed up in the supply chain leading to inefficiencies and lead time uncertainties in an already unpredictable environment (Chopra & Meindl, 2008). The Success of a supply chain network depends on the exchange and processing of information between supplier and buyer. Hence, communication, a proactive intervention, plays important role in managing supply chains (Lamming, 2000). The push and pull models are important in determining lead time targets and the auction network relies more on the push model while the direct market network relies on the pull model (Chopra et al,. 2008).

Empirical literature Review

Available empirical studies state that floricultural supply chains are complex networks creating pathways from farms to consumers, involving production, processing, distribution, and disposal (Ahumada & Villalobos, 2009). Higher Consumers' expectation have encouraged the globalization of fresh produce markets (Cook, 2004).Statistics from the United Kingdom's Department of Agriculture (UKDA, 2011) as documented in the fresh produce journal indicate that the consumption of fresh flowers has increased at a much faster pace than the demand for traditional crops such as wheat and other grains. Given the thin profit margins in the flowers, product differentiation strategies are increasingly being used in stores and supermarkets through supply chain mapping and quality standards (Lusk and Hudson, 2004) hence retailers in UK have now adopted quality and safety management as a competitive advantage. Moreover, the high perishability of fresh cut flowers results into immense wastage and losses, which further strains the supply chains and the associated profitability (Sloof Tijskens & Wilkinson, 1996).

A number of distribution frameworks have been proposed for supply chain design. One of the first was introduced by Fisher (1997), who devises taxonomy for supply chains based on the nature of the demand for the product. For functional products (stable, predictable demand, long life cycle) Fisher argues that the supply chain should be designed for cost efficiency; for innovative products (volatile demand, short life cycle,) like the fresh produce he maintained that the supply chain should be designed to be fast and responsive. Specifically, Fisher sheds light on how product type affects the design, selection and classification of a distribution network hence SCN design and its responsiveness and efficiency is critically dependent on the product type. An efficient and responsive horticultural supply chain occurs where

customer satisfaction levels are maintained consistently, product wastage levels are kept minimal, costs of compliance and freight logistics are sustainable and lead times are as short as possible (Rich, & Peter, 1997).

Research Methodology

Research Design

The study adopted a quantitative strategy by employing a survey research design since it intended to present a methodology which is applicable when investigating large populations by selecting samples to analyze and discover occurrences (Orodho, 2003). Such a design provides numeric descriptions of some part of the population and describes situations as they are. The design was chosen due to its ability to facilitate rapid data collection and its ability to help understand a larger population from a part of it hence suitable for an extensive research like this one (Oso & Onen, 2011). The survey design was used throughout the entire study of the sample population of thirty flower farms.

Target Population

The research population was the Kenyan flower farms which were estimated to be close to 100 farms as at February 2014 (www.kenyaflowercouncil.org). The selection of approximately thirty percent of this flower exporting farms as the target study population was adopted after considering the size, geographical distribution, work force and crop types grown by the different farms. Kothari (2004) provides that at least a twenty five percent sample collected from the target population is representative enough for the entire population hence the thirty percent sample was considered suitable for the study. The thirty farms sample was purposely and randomly selected to respond to a self designed questionnaire on lead times, quality standards for each distribution channel, transportation costs structure and cool chain facilities effectiveness.

Sample Size and Sampling Technique

The researcher used the KFC list of registered flower growers as at February 2014 plus the list of flower exporters who aren't KFC registered to develop a sampling frame where thirty percent of the growers which is close to thirty farms in number were selected (See appendix four). From the list of farms, the researcher purposely and randomly sampled the thirty growers taking into consideration their declared acreage, crops grown and geographical location within Kenya. The study employed two different sampling techniques which was executed in two stages to arrive at the final sample size. Firstly the researcher employed a non – probability strategy of purposive sampling technique to identify a shortlist of potential farms. The choice of this technique at this stage was advised by the need to ensure preselected farms represented the diversity discussed in the population section above which helped identify relevant farms to include in order to get focused information hence helped to

pre select typical and useful cases only. This stage resulted in a shortlist of fifty farms. After this stage the researcher then applied the Probability sampling technique of simple random sampling approach to select sample farms from the fifty preselected ones with an aim to arriving at conclusions affecting the target population .The choice of simple random sampling at this stage was adopted to ensure all farms preselected from the sub sample identified from the first stage above had an equal and independent chance of being selected without any bias (Amin , 2003). This is how the final sample population of thirty farms as listed in appendix four was arrived at.

Instruments of Data Collection

A self designed questionnaire was used for data collection for all the variables under investigation and this was designed and distributed by the researcher. A questionnaire is a tool which comprises a collection of items like questions to which a respondent is expected to respond to usually in writing or through an interview. The tool helps to collect a lot of information within a short time and is suitable where the study population is literate and large and where time is a limiting factor. The designed questionnaire was based on a five likert scale in order to provide the extent of the respondents feelings or opinions on the impact of the various supply chain performance variables under consideration where by a scale of one represented strong agreement with an issue or statement while a scale of five represented a strong disagreement with an issue in that order. The choice of this instrument was justified by the fact that the respondents would be expected to be literate and the information required would be easily described in a consistently written manner. The choice was also based on the precept that time factor and the respondents diversity would enable yield the relevant feedback which required personal opinions and views which are best expressed in written form (Kothari, 2004).The self designed questionnaire is shown in appendix two.

Data Collection Procedure

By use of the questionnaire described above the researcher proceeded to lay the foundation for collecting data from the sampled farms during the months of March and April 2014. With the universities approval the researcher commenced data collection by preparing the study sample population from the list of the target population as described in the sampling technique, making personalized contacts through telephone and email to all the sampled farms key staff whose contacts' were obtained by various means like the official yellow pages, company websites and networking among others. After making this initial contact, respondents were identified from each of the sample farms and were provided with a brief background to the study on phone after which they were given the opportunity to choose whether to use a hand delivered questionnaire or one sent via email. After this the researcher proceeded to distribute the questionnaires to all the sampled farms. All respondents were requested to respond within one month's time in order to ensure they had ample time in responding. This time also allowed the respondents to seek any further clarifications from the researcher on any areas that provided challenges to comprehend to any respondent.

Pilot Test

The researcher planned and executed a pilot study to start with in order to test the reliability and suitability of the questionnaire in gathering relevant information during the study and also reduce any effect of extraneous variables. The pilot test was conducted using five respondent farms which represented five percent of the target population or fifteen percent of the sample population and these were selected randomly from the sample population .The pilot test was done in order to confirm that the instrument was capable of correctly measuring the content it was intended to measure (Nunnally,1978) . A Cronbach's alpha test was used to test the internal consistency and stability of the instrument such that the study would assure consistent results are obtained and that these would be stable and replicable should the same instrument be administered a second time to the same population. Results of this pilot study are presented in chapter four as well. Internal consistency is usually measured using the Cronbach's alpha, a statistic calculated from the pair wise correlations between items where it ranges between zero and one. A commonly-accepted rule of thumb is that an α of 0.6-0.7 indicates acceptable reliability, and 0.7 or higher indicates good reliability. High reliabilities (0.95 or higher) are not necessarily desirable, as this indicates that the items may be entirely redundant. The goal in designing a reliable instrument is for scores on similar items to be related (internally consistent), but for each to contribute some unique information as well.

Data Processing and Analysis

The data collected from questionnaires was recorded in a consistent and quantitative manner such that the generated data from the five likert rating scale was analyzable statistically and the completed questionnaires were used as the primary source of the data.Pleriminary information on the sample population was collected using the same questionnaire and this focused on basic farm information like acreage, workforce and communication on supply chain performance feedback and the extent of distribution channels adopted by the farms. Raw data was collected on the basic farm information and relevant study variables and this was tabulated first in form of percentages, weighted means and corresponding standard deviations. Tables were used to present the data and not figures since they are more precise.

After collation of the basic data on farms and the variables, the response rate was computed after which data analysis was executed using various descriptive and inferential tools at various but consistent stages of analysis in order to achieve coherent and consistent results from which inferences would be made. Weighted means on general supply chain performances on all objectives was done after which independent t- tests were applied to check if the differences in means observed at the first stage were significantly different between the two distribution channels. Results of the mean scores obtained on each independent variable (Objective) were cross tabulated against each distribution channel to check for any basic relationship between the objectives and the distribution channels after which Chi square tests were done to determine the degree of association between distribution channels adopted and each independent variable or objective investigated .Finally after analyzing each of the independent variables the study proceeded to check for any possible

correlations between supply chain performance and distribution channels chosen at the farm level using the Pearson's correlation analysis at 95 % ($\alpha = 0.05$) confidence level. All the analysis was supported by the statistical package for social sciences package (SPSS) version 20. These tools were adopted since the research aimed at comparing similarities and differences between several supply chain performance variables under the same population in addition to helping reduce complex observations into simple components during the data analysis (Amin, 2003). These tools are also best used when data is made up of individual scores and are also applicable where the research aims to estimate individual performance variables within a channel as well as difference between several distribution channels.

Research Results and Discussions

From the findings in chapter four the study established that most farms provide supply chain performance feedback as seen in table 4.3.The study also found that although there are more farms that do not choose to trade through the direct supermarkets channel which is about 20.8 % of the farms compared to only 16.7 % which do not trade via the auction channel most of the flowers were actually traded through the direct supermarkets channel with 70 % of the farms distributing more than 30 % of their flowers through these channel as opposed to only about 50 % of the farms that distributed more than 30 % of their flowers through the auction channel. This confirms that the supermarket distribution channel has become more popular with Kenyan farms than the auction channel and this collaborates the 2012 study done by the flower watch. The study also established that overall farms that predominantly chose the direct supermarkets channels record better overall supply chain performance with regard to cool chain effectiveness, transportation costs and quality standards where as farms employing the flower auctions channel recorded better performance with regard to lead time achieved. However t-tests conducted to check the level of significance of the means of the supply chain performance mentioned above indicated that there was actually no significant difference on the means of all the performance variables apart from quality standards which implies that any recorded difference on the performance means of the other variables could as well be attributed to sampling error and not due to any substantial statistical difference. However further analysis through the Pearson's Chi square did actually confirm there also exists a relation between lead time achieved and the choice of direct supermarket channels but in an inverse manner.

Cool Chain Effectiveness

Results on cool chain effectiveness show that 56.3 % of the farms choosing direct supermarkets channels as their preferred distribution channel recorded better cool chain effectiveness as opposed to only 33 % of those farms choosing the auction channels. An investigation of a possible association between distribution channels and cool chain effectiveness using a Pearson Chi – square testing at a p value of 0.05 depicted no real association between the two.

Transportations Costs

Results on costs of transportation indicated that 83.3 % of farms predominantly choosing the auction distribution channels recorded better performance as compared to 75 % of the farms choosing the direct supermarket channels. This difference is however minimal and this was confirmed through a chi – square test for any degree of association between the distribution channel and transportation costs which depicted that there is no association between the two as shown in table 4.13.

Quality Standards

Results on the influence of quality standards indicated that 81.3 % of farms which predominantly choose the direct supermarket channels recorded better performance compared to only 16.7 % of the farms that chose the auction channels. Consequently the Pearson chi square test to check for any association between choice of distribution channel and quality standards confirmed that there was a strong significant but negative association between the auction channels and the quality standards. This collaborates results established at the preliminary analysis of general supply chain performance and also the studies seen in the literature review.

Lead Time

Results of the influence of lead time indicated that almost all (100 %) of the farms predominantly choosing the auction channels recorded better performances compared to only 62.6 % of the farms using the direct supermarket channels. The Pearson chi square test for any association between lead time and distribution channel however indicated a slightly insignificant association between the two although the likelihood of such an association at a p value of 0.02 indicated there could be a weak association between lead time and choice of distribution channel. A further correlation analysis did however confirm that there actually does exist an inverse relation between the choice of direct supermarkets as a channel and the lead time.

Finally a correlation analysis at a 95 % confidence level (alpha = 0.05) was conducted to ascertain the correlation coefficients between distribution channels and the supply chain performances. Results obtained indicated that there were insignificant and low correlation coefficients established between auction channels and cool chain effectiveness and Transport costs. However the study established that the choice of auction channels had a strong and significant correlation coefficient with quality standards but a negative one which hence collaborates results from tables 4.15 and 4.16.The study also established that there was a significant correlation coefficient between lead time and direct supermarkets. This correlation was also negative in nature.

Conclusions

This study on the influence of supply chain performance in choosing a given flowers distribution channel was intended to demonstrate and explain how supply chain performance affects returns and hence profitability back to the farms. The study specifically investigated how four main supply chain performance variables namely cool chain effectiveness, transportation costs, quality standards and lead time will affect supply chain performance hence the choice of any channel. The study established that overall at the farm level the cool chain effectiveness and transportation costs do not influence the choice of any given distribution channel while lead times does influence the choice of distribution channels. Quality standards were found to also significantly influence the choice of any distribution channel at the farm level. Although the research findings do not rule out the effect the that cool chain effectiveness and transportation costs may have on the choice of a given distribution channel there is need to ascertain at what level of the supply chain besides the farm level where these two factors may be considered to have a significant influence on the choice of a given channel. This then implies that at the farm level of the supply chain quality standards and lead times are key factors that influence the choice of a given distribution channel.. The study concludes that focusing on improving and maintaining quality standards at the farm level and minimizing lead times has a bearing on the choice of a given channel and returns back to the farm. This is the conclusion of the study.

Recommendations

From the research findings, the researcher has discussed the factors that influence or do not influence the choice of a given distribution channel at the farm level with the findings that quality management and lead time are the most important performance factors and its against this back ground that the below recommendations are made. Since the study has helped to understand that not all assumed supply chain performance variables are considered critical at the farm level as was initially assumed before the study, this has formed part of the solution to the problem. The researcher would recommend that proper implementation of quality standards be extended beyond the farm level so that the benefits resulting from implementing these quality standards can be felt across the entire supply chain. The researcher would also propose government intervention in the floriculture industry which at the moment seems to be controlled by the markets entirely. The intervention by the government should be in form of harmonizing policy frameworks that control and guide the industry such that the markets do not impose standards that may contradict local regulations.

Additionally, the researcher wishes to point out that although the scope of the study was within the farms exporting its also worth funding similar studies geared towards the local horticulture consumers as well. This is particularly important when considering the need to strengthen the local capacity for the industry which would then build on the confidence levels that other stake holders in the sector place on the exporters. This would be in the way of

streamlining operations of stake holder institutions within the Kenyan horticulture industry like KEPHIS, KFC, HCDA, PCPB and many more.

Suggestions for Further Research

Despite its limitations the study should be extended to the other links in the flowers supply chain like cargo handling and clearance, freighting and distribution. Any future related study should also consider other factors that would affect the choice of any given channels like market or retail prices, selection of air lines and crop types offered for sale. Other factors like raw material availability, goverment policy framework and infrastructural impact on the performance of the floricultural supply chains are areas worth researching on in terms of how they impact on the supply chain performance within this very important division of the Kenyan agricultural sector.

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