



## **DEMAND FORECASTING AND PERFORMANCE OF HORTICULTURE EXPORTING FIRMS IN KENYA**

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### **ABSTRACT**

This paper focused on the effect of demand forecasting on performance of horticulture exporting firms in Kenya and sought to establish the moderating effect of regulatory framework compliance on demand forecasting and performance of horticulture exporting firms in Kenya. The study was guided by theory of Constraints. Descriptive and causal-comparative research design designs were used. The target population was all 236 horticulture exporting firms in Kenya. The unit of analysis were horticulture exporting firms while the unit of observation was supply chain managers. These respondents were selected because they are directly involved with supply chain and are in a position to provide the information needed on the influence of demand forecasting. The study used a census approach and therefore the target population was the 236 supply chain managers in horticulture exporting firms. Semi-structured questionnaires and data collection tools were used for data collection. Qualitative data collected were analysed using content analysis and presented in prose form. Qualitative data was analysed using SPSS version 26 where descriptive statistics such as such as frequency distribution, mean (measure of dispersion), standard deviation, and percentages were used. The study also computed inferential data analysis which included regression analysis and Pearson correlation coefficient analysis. The findings were presented in tables and figures. The study found that demand forecasting positively and significantly relates with performance of horticulture exporting firms in Kenya. Furthermore, regulatory framework compliance had significant moderating effect on the relationship between demand forecasting and performance of horticulture exporting firms in Kenya. Therefore, it is recommended that horticulture exporting firms should improve their demand forecasting capabilities, and ensure compliance with the regulatory framework.

**Key Words:** demand forecasting, supply chain customer centric, performance, horticulture exporting firms

## Background of the Study

Organizations are battling to thrive in the extremely competitive business world of today as Product Lifecycles have gotten shorter, clock-speed has gotten faster, and the ramifications of disenchanting a consumer have gotten worse (Bolton & Lemon 2019). Because these qualities have an impact on their performance, firms are searching for strategies to become more innovative, competitive, and creative. Different factors have an impact on how well companies succeed. Customer-centric performance is among such factors and it involves how customers view the organization's performance (Anderson, 2016). Customer-centric performance is demonstrated by dependability, responsiveness, rapid delivery, customization, and customer pleasure (Evans & Lindsay, 2017). In the corporate world, slogans like "The Customer Comes First" or "The Customer Is King" are fairly prevalent. These catchphrases are employed to highlight the importance of the customer to various parties, including the management and staff of a service organisation (Olsen et al., 2018).

Since efficiency-based, cost-saving supply chains are more prone to unanticipated changes in consumer demand, the conventional supply chain approach that views customers as the final goal of all supply chain activities is no longer appropriate (Lee, 2018). In today's economy, supplier chains compete with one another rather than individual businesses (Farahani et al., 2018). The outdated focus of the supply chain has traditionally focused on how to lower operational costs for businesses through increased efficiency in the processes of production planning, outsourcing, and logistics. Increased productivity across the whole supply chain can boost a company's competitiveness, but it won't guarantee success. The argument is that increasing efficiency alone won't enable the business to distinguish its goods and services from those of its competitors (Roh et al., 2018).

In horticulture businesses, customer-centric supply chain operations are the procedures or methods used to meet customers' expectations (Omur, 2020). Implementing these principles gives a firm competitive advantage in terms of performance, allowing it to either maintain its existing place in the market or advance among its rivals. Managing customised value-added products, communicating real-time information with suppliers and consumers, on-time delivery, and supply chain innovations are a few examples of these techniques.

According to Ahmed (2016), businesses must give customers the goods they want when they want it in order to keep them happy. Due to forecasting's ability to assist businesses anticipate demand, companies are able to complete consumer orders promptly and with little lead time as they come in. Companies must continue to look for novel methods to engage with both new and current customers in order to attract and keep them as customers.

The majority of Kenyan horticultural production companies have their own farms and also buy a greater proportion of their supplies from small-scale farmers. These businesses cultivate, gather, pack, and deliver horticultural goods to airports for export. Due to exporters' diminished support of small-scale farmers' production in recent years, the quality of horticulture produce has decreased. Due to rising competition from other producing nations, Kenya's competitiveness in the horticultural export market has decreased as a result. Fresh horticulture product trade has expanded to a more global scale. Kenya has 236 licenced horticulture export companies (Agriculture and Food Authority, 2020). To remain competitive in today's market, horticulture exporters must make their supply chains more customer-driven. They must take into account consumer perception if they want to increase their market share globally. This includes demand forecasting which this paper focused on.

## Statement of the Problem

Horticulture forms an integral and important component in the economy of a nation. It contributes significantly to the Gross Domestic Product (GDP) and provides employment to more than six million Kenyans directly and indirectly. Even though Kenya is the most successful producer and exporter of fresh produce and flowers in sub-Saharan Africa, other African nations and those on other continents also present fierce competition that may eventually capture a significant portion of the global horticulture industry. Over the last ten years, Kenya's horticultural export subsector has remained unchanged. Long travel times, increased production costs, and lax regulatory compliance are thought to be the causes of the slow growth rate (KHCP report, 2019). In 2020, Kenya exported approximately 314 thousand metric tons of fresh horticultural products. As of 2022, Kenya earned roughly 152.3 billion Kenyan shillings (KSh), roughly 1 billion U.S. dollars, with the export of fresh horticultural products. The export value decreased by over 8.8% in comparison to the previous year. Kenya's revenue from horticultural exports fell by 9.7% in 2022 due to high inflation in Europe amid weaker currencies. Revenue from horticultural sales abroad amounted to 120.26 billion Shillings (\$930.6 million) in 2022 from 133.23 billion Shillings in the prior year. Earnings from the sale of vegetables declined by almost 25% to 27.34 billion shillings, while the value of cut flowers fell by 10.21% to 54.25 billion Shillings (Central Bank of Kenya, 2022).

The market share globally has also declined by 2% from 2017-2021 and the growth in value added horticultural products from 5by 1.6% in the same period. The decline has been attributed to multiple taxation locally and internationally, high cost of agricultural inputs, competition from developed countries that have fully embraced technology in horticultural production, high cost of power, logistics challenges, and change in consumer tastes and preferences (Fresh Produce Exporters Association of Kenya, 2021).

According to Awour's (2016) study on the impact of customer orientation on the fruit exporting businesses in Nairobi City County, customer orientation is a source of fresh thinking and creativity that can help businesses adapt to changing consumer expectations. According to a study by Muse, Njeru, and Waiganjo (2016), local horticulture firms are having trouble expanding their market share abroad because they only hold 18 percent of the market, which represents their appalling performance in the foreign market compared to Egypt, Ivory Coast, and Zimbabwe, which have market shares of 23, 20, and 19 percent, respectively. Gathigia (2016) issued a warning against the shrinking market share of local horticulture exporters in foreign markets despite the existence of a ready market for horticultural products, which could result in the closure of some businesses, which would cause job losses and a loss of revenue for the nation. However, none of the existing studies in Kenya focuses on customer centric supply chain practices and performance of horticulture export firms. This creates a scope gap which this study sought to establish the effect of customer centric supply chain practices (demand forecasting) on performance of horticulture exporting firms in Kenya.

## Objectives of the Study

- i. To find out the effect of demand forecasting on performance of horticulture exporting firms in Kenya.
- ii. To examine the moderating effect of regulatory framework compliance on relationship between demand forecasting and performance of horticulture exporting firms in Kenya.

## Research Hypothesis

H<sub>01</sub>: There is no significant relationship between demand forecasting and performance of horticulture exporting firms in Kenya

H<sub>02</sub>: There is no statistically significant moderating effect of regulatory framework compliance on the relationship between demand forecasting and performance of horticulture exporting firms in Kenya

## Theoretical Review

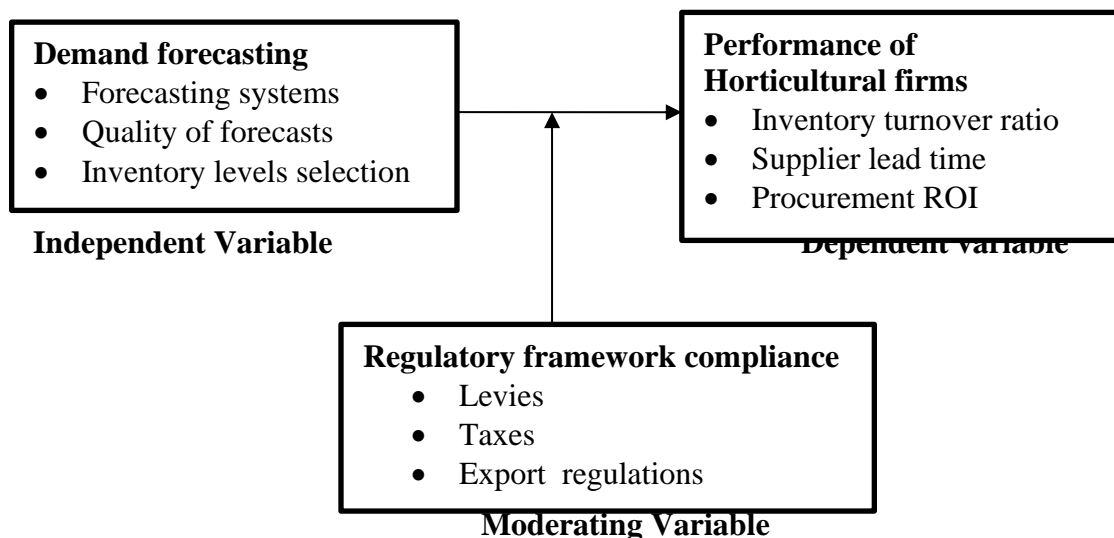
### Theory of Constraints

Eliyahu Goldratt created the theory of limitations (1984). The Theory of Constraints is an approach for identifying the biggest restriction (or limiting factor) standing in the way of achieving a goal and progressively eliminating it until it is no longer a restriction. In manufacturing, the constraint is commonly referred to as a bottleneck. The theory talks about production efficiency. This theory states that procedures that are restricting a manufacturing system's efficiency can be identified and addressed in order to increase it (Nan, 2017). The key principle of the theory is that a chain's weakest link determines how strong and effective it is. Addressing the weakest links in the chain is essential for making it strong and effective. These weakest spots in the supply chain can be observed in businesses that have long lead times, unfulfilled orders, overtimes, high working capital, stock shortages, and orders with the incorrect supplies (Goldratt, 2017). These are the challenges that manufacturing companies may face particularly in a multi-echelon supply chain. To improve their operations and achieve the expected performance, they must implement the appropriate solutions.

The hypothesis is founded on the assumption that a company that maximises each machine's production would not function better in comparison to an organization that makes sure that the materials are available on time and end products meet desired value (Sukalová & Ceniga, 2015). The theory of constraints places a strong emphasis on controlling these constraints' capacity and capability effectively if one wants to boost an organization's performance. Companies have found it difficult to invest in the organisational and technological frameworks necessary to achieve the current system synchronisation that enhances collaboration in the distribution channel (Fawcett & Magnan, 2016). According to this theory, manufacturing companies' systems have an impact on performance (Nagurney, Daniele & Shukla, 2017). Theory of Constraints, emphasises the impact of multi-echelon distribution systems on performance depending. This depends on the degree to which a distribution control system improves a company's operational performance and serves as evidence of its efficacy.

This theory supports demand predicting in multi-echelon distribution systems, which is important to the current investigation. The hypothesis aids the study's comprehension of how limitations can impair the productivity of Kenyan enterprises that export horticulture. Organizations can use time series, casual, qualitative, quantitative, and other methodologies to forecast demand. The technique or combination of techniques utilised is primarily determined by the circumstances. Due to a variety of limitations in their operating environment, institutions have struggled to select the best demand forecasting methodology. Additionally, demand forecasting techniques contain flaws that can prohibit devolved units of governance from anticipating client demand in a proactive manner (Xu et al., 2017).

## Conceptual Framework



**Figure 1: Conceptual Framework**

### Demand Forecasting

Forecasting is the estimation of market trends in future. It serves as a foundation for key management decision making process and displays the future value of interest for a given term (Stevenson, 2016). The basic goal of forecasting is to assist a business behave pro-actively in anticipating client demand. More specifically, forecasting aims to identify, analyse, and estimate a likely future consumer demand so that a business can match that demand with its capacity. This enables services provides and products manufactures to satisfy end users' needs at the lowest possible cost. A key component of demand management, forecasting maximises customer satisfaction by utilising supply chain capabilities. It affects the satisfaction of client requirements, risk mitigation, and process improvement measurement (van der Laan, 2016). Demand forecasting aims at estimating how many products or services customers will need in the future. Demand forecasting is done using a variety of techniques; qualitative, quantitative, casual, and time series approaches (Datta, 2017).

Quantitative approaches use historical data to forecast future values of the same quantities. The last period's demand, simple and weighted moving averages, and multiplicative seasonal indices are a few examples of quantitative forecasting techniques. Each one uses a different formula to estimate the future sales of goods and services (Stevenson, 2016). The subjective nature of the qualitative approach relies heavily on the judgement and emotions of subject-matter specialists regarding the anticipated course of a given product on the market. The prior life cycle of a product and market research are important factors in the experts' conclusions. This strategy must be used in conjunction with other approaches because it is unreliable when used alone.

However, it is the preferred way when prior sales figures or volumes are not readily available to support the use of a quantitative method of forecasting (Datta, 2017). Time series could be based on frequencies or timelines. This approach makes the presumption that future product sales will behave in the same way they did in the past. Therefore, using historical data, one may be able to anticipate future sales (Arnold et al., 2018; Cheng & Wu, 2017). Time series analysis accounts for a wide range of demand parameters, such as unpredictability, stability, trend, and cycle (Mentzer & Moon, 2017). The premise behind informal techniques of demand forecasting is that there are basic occurrences or events that have an impact on the sales of goods and services. These occasions or occurrences include seasons and holidays. Christmas and New Year's celebrations may be the two times of the year when a boutique sells more goods than at any other time. Businesses that

estimate sales based on seasons or events may be better able to plan their inventory and staffing levels to meet rising demand (Xu et al., 2017).

### **Regulatory Framework Compliance**

A political party or organisation may adopt a plan of action to decide the scope of its operations. Another definition of a policy is a set of guiding principles or plans that serve as the foundation for decision-making (Akinyemi & Adejumo, 2018). A regulatory framework, according to Awino and Marendi-Getuno (2014), consists of the laws, rules, and policies put in place to oversee an organisation or an activity. A good policy regulatory framework in the procurement process contributes to organization performance. When organization operate within the environment of honesty, fairness, and fair competition, they have better chances of delivering quality products and high performance (Schapper, Veiga & Gilbert, 2016). According to Koech and Namusonge (2015), compliance with procurement regulatory framework plays an important role in improving organization performance through transparent and professional procurement.

An organization's understanding of public entrepreneurship can be improved by a necessary and effective government policy (Akinyemi & Adejumo, 2018; Obaji & Olugu, 2014). In order to meet new demands for public service and to encourage a business oriented attitude in diverse public institutions, it is believed that the responsibility of government is to adopt creative and aggressive public policies. As a result, public entrepreneurship appears to quickly improve public organisational performance through quality service delivery (Kareem & Haseeni, 2015; Sandfort, Selden, & Sowa, 2008). The government's efforts to create a favourable business climate for horticulture exporting enterprises and ultimately to improve their performance are the main subject of this research study.

### **Export Performance**

Export performance is a firm's actions in export markets. Additionally, it refers to the firm's success in the global market through volume of exported products. Growth of export sales, export performance, export sales volume, market share, and export profits are common indicators of export performance (Kimutai, & Awuor, 2016). According to Ayse and Akehurst (2003), both subjective and objective metrics may be used to measure an organization's export performance because they both produce reliable data. They pointed out that whereas subjective metrics focus on how well a business is performing relative to its top competitors or to its own expectations, objective measures are more focused on actual performance indicators.

According to a study by Mania and Rieber (2019), a nation's exports are crucial because they serve as a foundation for the expansion of its economy, which is fueled by higher foreign exchange revenues. According to Muendo, Tschirley, and Weber (2016), considering its rapidly expanding export sector in significant importing nations like European countries and United States of America, horticulture production in Kenya has drawn significant interest from international NGOs and Governments. It is clear that horticultural exports in Kenya contribute significantly to economic growth by creating jobs, bringing in foreign cash, and attracting investment. The increase in air freight arrivals at Kenya's main export destinations has contributed to the country's growth in the exportation of high-quality horticulture products. The decline in horticultural exports, on the other hand, has been closely linked to unpredictable weather patterns that led to low yields, a lack of technology that adds value, an increase in post-harvest losses, and horticultural farmers inability to procure planting materials of the right quality (Nayioma, 2016). To evaluate the direct and indirect implications of such partnerships, this research study concentrates on the effects of customer-centric supply chains on company performance.

## **Empirical Review**

### **Demand Forecasting and Performance**

A study was carried out by Albarune and Habib (2017) to illustrate forecasting techniques used in supply chain management (SCM) in several industries, including FMCG, retail chains, and life sciences. They represented the role of SCM, demand management, cooperative coordination, and demand estimations. Data was collected from secondary sources. The study also showed that forecasting has its limitations and that there aren't many workable solutions for it in corporate organisations. Lubis et al (2022) examined production and demand forecasting analysis of rice in North Sumatra, Indonesia. The study investigated the most suitable method for forecasting rice production and demand between the use of linear, quadratic, and exponential trend analysis from 2010-2021. The findings indicated that the quadratic trend analysis was the best method to highlight production and demand forecasts. The study established that there was a high production of rice due to the continuous increase in demand for rice.

Kot, Grondys, and Szopa (2017) noted that effective supply chain management is crucial for delivering the greatest possible level of customer service and aiming to minimise the expenses produced by movement across the links. Excessive inventory levels across the chain are typically the root reason of steadily rising expenses. The oversupply of goods that resulted from the market's incorrect matching of supply and demand is what is to blame for the current crisis. In order to reduce inventory levels, all the supply chain's elements must work together to estimate market demand using market projections.

According to Agigi, Niemann, and Kotze (2016), businesses are becoming increasingly sensitive to supply chain disruptions that can occur both inside and outside to the supply chain in today's globalised and complicated business world. By using design strategies that reduce the effects of disruption, the supply chain is better able to react to disrupting occurrences. The researchers looked into the supply chain threats encountered by food producers in South Africa and investigated supply chain design strategies that support supply chain resilience. The results indicated that South African grocery manufacturers face certain risks. Supply chains are nevertheless susceptible to unanticipated dangers, despite the fact that supply chain risk management studies have given businesses explicit guidance to avoid risk.

In Nigeria, Kazeem, Orsarh, Ehumadu, and Igbinoba (2016) highlighted the significance of having an appropriate demand forecasting model in a fruit processing company. The aim was to demonstrate how crucial it is to use a forecasting model that is appropriate and pertinent to the firm's offering. Moving average, exponential smoothing, weighted moving average, and linear regression models were the four that were examined. It was decided that the model with the lowest mean absolute percentage error was the most appropriate because it reduced forecasting error. For demand forecasting at a Nigerian company that manufactures fruit juice, the authors suggested using a moving average model.

Mersha et al. (2018) assessed the impact of the Integrated Water Resources Management (IWRM) policy on demand satisfaction and water availability in Ethiopia. The study conducted scenario analysis in the Awash Basin in Ethiopia. It observed monthly stream-flow against the simulated flows at five control points over a period of 15 years. The results established that irrigation plans established to combat food insecurity led to overexploitation of the water resources. The repercussion is increased inequity between commercial farmers and smallholders.

### **Regulatory Framework Compliance and Performance**

Bouazza, Ardjouman and Abada (2015) investigated the factors affecting the growth of SMEs in Algeria. The study objective was to analyze the external and internal factors affecting the growth

of MSEs in Algeria. Data was collected using questionnaires. The results findings reflected in the study indicated that unfair competition from the informal sector, cumbersome and costly bureaucratic procedures, burdensome laws, policies, and regulations, an inefficient tax system, a lack of access to industrial real estate, a lack of access to external financing, and low human resources capacities are the key business environmental factors affecting Algerian MSEs.

Kimuru (2018) study sought to investigate the determinants of growth in youth owned Micro and Small Enterprises in Kenya. The research employed a descriptive survey research design. The study sample size of 127 MSEs. Both primary and secondary data were used in this study. Primary data was collected using questionnaires while secondary data was collected from business records. The study found that legal and regulatory, access to the market, adoption of technology and entrepreneurial characteristics have a great positive influence on the growth of youth owned MSEs. The study also noted that high taxation was a major reason as to why some MSEs failed to comply with the requirement of the tax requirements.

Simiyu (2018) investigated how government interventions affect growth of female owned businesses in Trans Nzoia County, Kenya. Mixed study designs were employed. The study targeted 700 business owners. Convenience sampling was used to sample 254 women. The study only sample women who had benefitted from government business training, and women empowerment funds. Findings showed that experience in entrepreneurship, business loans, and risk taking behaviour, and business proactiveness significantly affected business growth. Mwasiagi (2019) researched on effect of regulatory policies on manufacturing firms' performance. The study sample included the staff and senior management staff of the firms. Study results showed that performance of manufacturing firms was negatively affected by the regulatory frame work including high taxation, export and importing policies, trade regulations, licensing, credit policies, labor laws and regulations. Conclusions were that government policies are essential in creating a conducive environment for doing business.

## **RESEARCH METHODOLOGY**

The study used a mixed research design approach whereby both descriptive and a causal-comparative research designs were used. The study targeted 236 registered horticulture exporting firms in Kenya as at 10<sup>th</sup> December, 2020 (AFA, 2020). Therefore, the unit of analysis was horticulture exporting firms in Kenya. The unit of observation was supply chain managers because they are directly involved with supply chain and are best suited to provide information needed information. Therefore, the study population was 236 supply chain managers. This study adopted stratified random sampling technique to sample 150 procurement managers. The study used primary and secondary data. With the use of the Statistical Package for Social Sciences, descriptive and inferential statistics were used to analyse quantitative data (SPSS version 26). Descriptive statistics included percentages, frequency distribution, mean (a measure of dispersion), and standard deviation. Regression analysis and Pearson correlation coefficient analysis were used to undertake inferential data analysis.

## **RESEARCH FINDINGS**

The sample size for the study was 150 supply chain managers of horticulture exporting firms in Kenya. The returned questionnaires were crosschecked for accuracy and completeness and 139 were found to be valid and reliable and could be used for further analysis and reporting. The returned questionnaires formed a response rate of 92.7%. As explained by Sekaran and Bougie (2016), a response rate of 50% and above is adequate for analysis, 60% and above is good while that of 70% and above is excellent. Therefore, the response rate of 92.7% was excellent for further analysis and reporting.



## Descriptive Analysis

### Demand Forecasting

The first objective of the study was to find out the effect of demand forecasting on performance of horticulture exporting firms in Kenya. Regarding this objective, respondents were asked to indicate which method they use to forecast demand of products that they supply. Table 1 presents summary of the findings obtained.

**Table 1: Demand Forecasting Method Used**

Forecasting Method	Frequency	Percent
Time series methods	32	23.0
Casual methods	40	28.8
Qualitative methods	18	12.9
quantitative methods	49	35.3
<b>Total</b>	<b>139</b>	<b>100.00</b>

The findings that quantitative forecasting methods were the most commonly used (35.3%) by horticulture exporting firms in Kenya is consistent with the literature on supply chain forecasting. Quantitative methods use statistical models and historical data to make predictions about future demand, and are often considered more accurate than qualitative methods, which rely on expert opinions and subjective judgments (Mentzer et al., 2001). Time series methods (23.0%) and causal methods (28.8%) were also commonly used by the firms. Time series methods use historical data to identify patterns and trends, while causal methods use data on external factors that can influence demand, such as economic indicators or marketing campaigns (Makridakis et al., 2018). Qualitative methods (12.9%), which include techniques such as market research and customer surveys, were used less frequently. These methods can be useful when there is limited historical data or when external factors are difficult to predict, but they are generally considered less accurate than quantitative methods (Mentzer et al., 2001).

The use of various demand forecasting methods would enable the firms to understand the customer demands better and prepare the stocks in advance to ensure that they meet the market demands. This would also help the firm to identify constraints that would derail them from producing to capacity as demanded by the market. The constraint theory state that addressing the weakest links in the chain is essential for making it strong and effective. Therefore, the findings suggest that horticulture exporting firms in Kenya are using a variety of forecasting methods to predict demand, with a preference for quantitative methods. This is consistent with the broader literature on supply chain forecasting, which emphasizes the importance of using a combination of quantitative and qualitative methods to achieve the most accurate and reliable forecasts (Makridakis et al., 2018).

On the same objective, respondents were asked to indicate their level of agreement on the statements on firm demand forecasting. The findings were as presented in Table 2.

**Table 2: Descriptive Statistics on Demand Forecasting**

Statements	Mean	Std. Dev.
The firm shares forecasting activities with its major suppliers and customers to ensure adequate inventory management	3.89	0.323
Forecasting helps horticultural firms to fulfill the customer orders as and when they arise with short lead time and on time.	3.883	0.526
The management help guard against the biases and inconsistencies that have been found to degrade forecast quality	3.716	0.248
Our forecasting process takes place at a level where individual forecasters review and adjust statistical forecasts	3.708	0.332
Quality of forecasts at the lower levels of product hierarchies affects forecasting performance	3.662	0.734
Our statistical forecasts are generated by the organization's forecasting software/system and adjusted by the forecaster based on information not captured	3.655	0.885
Forecasting helps horticultural firms to predict product demand	3.613	0.45
<b>Aggregate Score</b>	<b>3.732</b>	<b>0.500</b>

The findings show that the respondents were in agreement that the firm shares forecasting activities with its major suppliers and customers to ensure adequate inventory management ( $M= 3.89$ ,  $SD= 0.323$ ); that forecasting helps horticultural firms to fulfil the customer orders as and when they arise with short lead time and on time ( $M= 3.883$ ,  $SD= 0.526$ ); and that the management help guard against the biases and inconsistencies that have been found to degrade forecast quality ( $M= 3.716$ ,  $SD= 0.248$ ). They were also in agreement that their forecasting process takes place at a level where individual forecasters review and adjust statistical forecasts ( $M= 3.708$ ,  $SD= 0.332$ ); that quality of forecasts at the lower levels of product hierarchies affects forecasting performance ( $M= 3.662$ ,  $SD= 0.734$ ); that their statistical forecasts are generated by the organization's forecasting software/system and adjusted by the forecaster based on information not captured ( $M= 3.655$ ,  $SD= 0.885$ ); and that forecasting helps horticultural firms to predict product demand ( $M= 3.613$ ,  $SD= 0.45$ ).

According to the theory of constrains, a firm would maximize its production by ensuring that materials are available on time and the end products meet desired value. The findings above suggest that demand forecasting affects performance of horticulture exporting firms in Kenya and this is supported by an aggregate mean score of 3.732 ( $SD= 0.500$ ). The finding that demand forecasting affects the performance of horticulture exporting firms in Kenya is consistent with the existing literature on supply chain management. Accurate forecasting of demand is crucial for firms to plan their production and inventory levels, and to meet customer needs in a timely and efficient manner. Studies have shown that effective demand forecasting can lead to improved inventory management, reduced stockouts, increased customer satisfaction, and ultimately, improved financial performance (Chopra & Meindl, 2016; Mentzer et al., 2017). On the other hand, inaccurate or ineffective forecasting can lead to overstocking, understocking, increased costs, and lost sales, all of which can negatively impact firm performance. The study findings also highlight the importance of choosing appropriate forecasting methods, which is consistent with the literature on demand forecasting. Different forecasting methods are suitable for different situations, and the choice of method can impact the accuracy and reliability of the forecasts (Makridakis et al., 2018). Therefore, the findings suggest that firms in the horticulture export industry in Kenya are using a variety of forecasting methods, with a preference for quantitative methods. This is consistent with the literature, which suggests that a combination of quantitative

and qualitative methods can lead to more accurate and reliable forecasts (Makridakis et al., 2018; Mentzer et al., 2001).

### Regulatory Framework Compliance

The second objective of the study was to examine the moderating effect of regulatory framework compliance on relationship between demand forecasting and performance of horticulture exporting firms in Kenya

respondents were asked to indicate their level of agreement on the statements on regulatory framework. Table 3 presents summary of the findings obtained.

**Table 3: Descriptive Statistics on Regulatory Framework Compliance**

Statements	Mean	Std. Dev.
Policy framework ensures adherence to ethical procurement conduct	4.019	0.895
Ease of regulatory framework on horticultural exporting increases exporting capacity	3.93	0.664
Government offers research and extension services to horticulture exporting firms	3.861	1.018
The firm operate within the environment of honesty, fairness, and fair competition	3.725	0.572
Government assists in marketing and promotion of Kenya's horticultural products in the global market	3.698	0.726
Respecting criteria when issuing certificates for export helps acceptability of Kenyan horticultural produce abroad	3.638	0.409
<b>Aggregate Score</b>	<b>3.812</b>	<b>0.714</b>

Based on the findings the respondents agreed that policy framework ensures adherence to ethical procurement conduct (M = 4.019, SD= 0.895); that there is ease of regulatory framework on horticultural exporting increases exporting capacity(M= 3.93, SD= 0.664); and that government offers research and extension services to horticulture exporting firms (M= 3.861, SD= 1.018). They were also in agreement that the firm operate within the environment of honesty, fairness, and fair competition (M= 3.725, SD= 0.572); that government assists in marketing and promotion of Kenya's horticultural products in the global market (M= 3.698, SD= 0.726); and that respecting criteria when issuing certificates for export helps acceptability of Kenyan horticultural produce abroad (M= 3.638, SD= 0.409).

The findings above supported by an aggregate mean of 3.812 (SD= 0.714) show that regulatory framework compliance affects relationship between customer centric supply chain practices and performance of horticulture exporting firms in Kenya. The performance of the firms depends on the joint efforts of all stakeholders and departments rather than just one department which is in support of the systems theory. The horticulture firms must abide by the laws and regulations set the by industry regulators. This agrees with Karnsomdee (2021) who suggests that regulatory compliance is an important factor in the success of supply chain management practices in different industries. In the horticulture industry, compliance with regulations related to quality standards, export procedures, and product labelling is critical to maintain customer trust and satisfaction. Failure to comply with these regulations can lead to legal penalties, loss of market share, and damage to the firm's reputation. The study's findings suggest that compliance with regulatory frameworks is an important factor to consider when implementing customer-centric supply chain practices in horticulture exporting firms in Kenya. Firms that comply with regulations related to levies, taxes, and import regulations are more likely to achieve better performance outcomes when

implementing customer-centric supply chain practices. This highlights the importance of a comprehensive approach to supply chain management that considers regulatory compliance as a critical aspect of overall performance.

### Firm Performance

The main objective of the study was to establish the effect of demand forecasting on performance of horticulture exporting firms in Kenya. Therefore, on a scale of 1-5 (**5**-Very high, **4**-High, **3**-Moderate, **2**-Poor, **1**-Very poor) respondents were asked to rank their organization's performance aspects. Table 4.14 presents findings.

**Table 4: Descriptive Statistics on Firm Performance**

Performance indicators	Mean	Std. Dev.
Market share	4.04	0.502
Sales volume	4.032	0.786
Sales growth	4.027	0.805
Profitability	3.854	0.49
Clients/supplier satisfaction	3.647	0.211

The findings show that the highest ranked performance indicator is market share, with a mean of 4.04, indicating that the respondents perceive their organization's market share to be very high. This is followed by sales growth and sales volume, both of which have means above 4, indicating that the respondents perceive their organization's sales to be growing and the volume to be high. Profitability also has a high mean of 3.854, indicating that the respondents perceive their organization's profitability to be high, but slightly lower than the other performance indicators mentioned above. Client/supplier satisfaction has the lowest mean of 3.647, indicating that the respondents perceive their organization's client and supplier satisfaction to be moderate.

The findings are consistent with Augusto and Bastos (2018) that market share, sales growth, and sales volume are important performance indicators in the horticulture industry. Profitability is also an important indicator, as it is a measure of the financial success of the organization. Also, according to Muendo, Tschirley, and Weber (2016), client and supplier satisfaction is an important indicator of the organization's ability to meet the needs and expectations of its customers and suppliers, and is therefore an important determinant of long-term success. Therefore, the findings suggest that the organizations represented by the respondents are performing well in terms of market share, sales growth, sales volume, and profitability, but may need to focus more on improving client and supplier satisfaction to achieve sustained success in the long term.

The researcher further collected secondary data to measure performance of the horticulture firms. The data collected was on the volume (kgs) and export earnings (Ksh.) The data was grouped into three main categories of the horticultural sector in Kenya which are; cut flowers, vegetables, and fruits. Findings are presented in Table 5.

**Table 5: Secondary Data on Firm Performance**

Horticultural crops	Export Vol. (Kgs)	Export earnings Kshs. (Billion)
Fruits	405,390,247.4	71,839.2
Vegetables	330,870,341.2	131,686.7
Cut flowers	813,757,856.4	517,913.8
<b>Total</b>	<b>1,219,279,790.5</b>	<b>721,439.7</b>

The data shows that there is fluctuation on volume of export and value of exports in the five years that were observed. Cut lowers make the largest share of the total horticulture export earnings as

they are high-value crops. Earnings from horticulture remains the leading foreign exchange earner in Kenya. Vegetable is the second foreign exchange earner while fruits are the least foreign exchange earner in the horticulture sector in Kenya.

### Inferential Analysis

#### Correlation Analysis

**Table 5: Correlation Analysis**

		Performance	Demand forecasting
Performance of horticulture exporting firms	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	139	
Demand forecasting	Pearson Correlation	.784**	1
	Sig. (2-tailed)	.001	
	N	139	139

The correlation coefficient between performance and demand forecasting is 0.784 ( $p < 0.05$ ), which suggests a strong positive relationship. This indicates that firms that use effective demand forecasting methods are more likely to perform well. This finding is consistent with previous study by Albarune and Habib (2017) that accurate demand forecasting is essential for effective supply chain management.

#### Test for Hypothesis One

The first objective of the study was to find out the effect of demand forecasting on performance of horticulture exporting firms in Kenya. The corresponding hypothesis was:

H<sub>03</sub>: There is no significant relationship between demand forecasting and performance of horticulture exporting firms in Kenya. A univariate analysis was therefore conducted to test the null hypothesis.

**Table 6: Model Summary for Demand Forecasting on Performance of Horticulture Exporting Firms**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.498 <sup>a</sup>	.248	.239	.654367

a. Predictors: (Constant), Demand Forecasting

From the model summary findings in Table 6, the r-squared for the relationship between demand forecasting and performance of horticulture exporting firms in Kenya was 0.248; this is an indication that at 95% confidence interval, 24.8% variation in performance of horticulture exporting firms in Kenya can be attributed to changes in demand forecasting. However, the remaining 75.2% variation in performance of horticulture exporting firms in Kenya suggests that there are other factors other than demand forecasting that explain performance of horticulture exporting firms in Kenya. The finding that demand forecasting explains 24.8% of the variation in performance of horticulture exporting firms in Kenya is consistent with previous research that has demonstrated the importance of demand forecasting in supply chain management. For instance, research by Chen et al. (2019) found that effective demand forecasting can lead to significant reductions in inventory costs and improved customer satisfaction. Similarly, research by Choi and Hong (2020) found that demand forecasting plays a critical role in reducing supply chain disruptions and improving overall supply chain performance. However, the finding that there are other factors beyond demand forecasting that explain performance of horticulture exporting firms in Kenya is also consistent with Ghadge and Dani (2019) who found that while demand forecasting

is important, other factors such as supply chain agility, supply chain visibility, and supplier collaboration also play critical roles in improving supply chain performance. The findings generally suggest that demand forecasting is an important aspect of supply chain management, but it needs to be complemented with other strategies to achieve optimal performance

**Table 7: ANOVA for Demand Forecasting on Performance of Horticulture Exporting Firms**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	40.933	1	40.933	81.571	.000b
Residual	68.774	137	0.502		
Total	109.707	138			

a. Dependent Variable: Performance of Horticulture Exporting Firms

b. Predictors: (Constant), Demand Forecasting

Analysis of variance was used to determine whether the regression model is a good fit for the data. From the analysis of variance (ANOVA) findings in Table 7, the study found out that that  $Prob > F_{1,137} = 0.000$  was less than the selected 0.05 level of significance. This suggests that the model as constituted was fit to predict performance of horticulture exporting firms in Kenya. Further, the F-calculated, from the table (81.571) was greater than the F-critical, from f-distribution tables (3.910) supporting the findings that demand forecasting can be used to performance of horticulture exporting firms in Kenya. This is consistent with the existing literature, which has identified demand forecasting as a key element of supply chain management that can help firms to optimize their production and inventory levels, minimize costs, and improve customer satisfaction (e.g., Li et al., 2019; Wang et al., 2016). The F-calculated value being greater than the F-critical value also supports the notion that demand forecasting is a significant predictor of performance in this context.

**Table 8: Beta Coefficients for Demand Forecasting on Performance of Horticulture Exporting Firms**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.808	.215		3.758	.003
Demand Forecasting	.269	.052	.264	5.173	.000

a. Dependent Variable: Performance of Horticulture Exporting Firms

From the results in table 8, the following regression model was fitted.

$$Y = 0.808 + 0.269 X_1$$

( $X_1$  is Demand Forecasting)

The coefficient results showed that the constant had a coefficient of 0,808 suggesting that if demand forecasting was held constant at zero, performance of horticulture exporting firms in Kenya would be at 0,808 units. In addition, results showed that demand forecasting coefficient was 0.269 indicating that a unit increase in demand forecasting would result in a 0.269 improvement in performance of horticulture exporting firms in Kenya. It was also noted that the P-value for demand forecasting coefficient was 0.000 was less than the set 0.05 significance level indicating that demand forecasting was significant. Based on these results, the study rejected the null hypothesis that there is no significant relationship between demand forecasting and performance of horticulture exporting firms in Kenya. The findings suggest that demand forecasting is an important predictor of performance for horticulture exporting firms in Kenya. This is consistent with previous research by Kot, Grondys, and Szopa (2017) that emphasized the

importance of demand forecasting for firms operating in dynamic and uncertain environments, such as the horticulture industry.

### Test for Hypothesis Two

Hierarchical regression model was done to test for the moderating effect. This helped to achieve the fifth research hypothesis and test the second research hypothesis.

The second objective of the study was to examine the moderating effect of regulatory framework compliance on relationship between demand forecasting and performance of horticulture exporting firms in Kenya.

Ho<sub>2</sub>: There is no statistically significant moderating effect of regulatory framework compliance on the relationship between demand forecasting and performance of horticulture exporting firms in Kenya.

**Table 9: Model Summary for Moderation Effect**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.484 <sup>a</sup>	.235	.232	.55681	.235	97.776	1	117	.000
2	.662 <sup>b</sup>	.438	.435	.47783	.204	115.170	3	135	.000

a. Predictors: (Constant), Demand forecasting  
b. Predictors: (Constant), Demand forecasting, regulatory framework compliance, Interaction

From the model summary findings in Table 9, the first model for which is the regression between demand forecasting (X) without moderator and interaction, the value of R-squared was 0.235 which suggests that 23.5% change in performance of horticulture exporting firms in Kenya can be explained by changes in demand forecasting. The p-value for the first model (0.000) was less than the selected level of significance (0.05) suggesting that the model was significant.

The findings in the second model which constituted demand forecasting, regulatory framework compliance and interaction term (X\*M) as predictors, the r-squared was 0.654. This implies that the introduction of regulatory framework compliance in the second model led a 0.204 increase in r-squared, showing that regulatory framework compliance positively moderates the relationship between demand forecasting and performance of horticulture exporting firms in Kenya. This is supported by prior studies that have shown that compliance with regulations and standards can enhance supply chain performance (Kannan, Diabat, & Alrefaei, 2017; Khan et al., 2019). These findings highlight the importance of implementing demand forecasting and complying with regulations in order to improve the performance of horticulture exporting firms in Kenya.

**Table 10: ANOVA for Moderation Effect**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.314	1	30.314	97.776	.000 <sup>b</sup>
	Residual	42.47	137	.310		
	Total	72.784	138			
2	Regression	92.88	3	30.960	270.098	.000 <sup>c</sup>
	Residual	15.525	135	.115		
	Total	108.405	138			

a. Dependent Variable: Performance of horticulture exporting firms

b. Predictors: (Constant), Demand forecasting

c. Predictors: (Constant), Demand forecasting, regulatory framework compliance, Interaction

From the model summary findings in Table 10, the F-calculated for the first model, was 97.776 and for the second model was 270.098. Since the F-calculated for the two models were more than the F-critical, 3.910 (first model) and 2.672 (second model), the two models were good fit for the data and hence they could be used in predicting the moderating effect of regulatory framework compliance on relationship between demand forecasting and performance of horticulture exporting firms in Kenya.

The findings suggest that the models developed in the study are suitable for predicting the moderating effect of regulatory framework compliance on the relationship between demand forecasting and performance of horticulture exporting firms in Kenya. This is consistent with previous literature that highlights the importance of regulatory compliance in ensuring successful implementation of supply chain practices (e.g., Christopher, 2016; Pagell et al., 2010). Additionally, the finding that the F-calculated values were greater than the F-critical values is consistent with the concept that a good model fit is indicated by a significant F-value (Kline, 2016).

**Table 12: Beta Coefficients for Moderation Effect**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	1.008	0.191	5.277	.000	
	demand forecasting	.211	0.052	.284	4.058	.000
2	(Constant)	1.915	.108	1.679	17.788	.000
	demand forecasting	.302	0.063	.365	4.794	.000
	Regulatory framework compliance	.315	0.108	.379	2.917	.000
	Interaction (X*M)	.293	0.115	.312	2.548	.000

a. Dependent Variable: Performance of horticulture exporting firms

Further, by substituting the beta values as well as the constant term from the coefficient's findings in Table 12 for the first step regression modelling, the following regression model will be fitted:

$$Y = 1.008 + 0.211 X$$

Where X is demand forecasting and Y is performance of horticulture exporting firms

The findings show that when demand forecasting is held to a constant zero, performance of horticulture exporting firms in Kenya will be at a constant value of 1.008. The findings also show that demand forecasting has a statistically significant effect on performance of horticulture exporting firms in Kenya as shown by a regression coefficient of 0.211 (p-value= .000). The finding is consistent with research by Mentzer et al. (2001) posits that customer centricity is an essential aspect of supply chain management that can improve customer satisfaction, increase profitability, and enhance competitive advantage.

By substituting the beta values as well as the constant term from model 2 emanating from the second step in regression modelling the following regression model was fitted:

$$Y = 1.915 + 0.302 X + 0.315 M + 0.293 X * M$$

Where X is demand forecasting; M is Regulatory framework compliance and X\*M is the interaction term between demand forecasting and Regulatory framework compliance.

The findings show that when demand forecasting, regulatory framework and the interaction term (X\*M) are held to a constant zero, performance of horticulture exporting firms in Kenya will be



at a constant value of 1.915. The model also indicated that demand forecasting had a positive and statistically significant effect on performance of horticulture exporting firms as shown by a regression coefficient of 0.302 (p-value= 0.000). It is also seen that regulatory framework compliance had a positive and significant effect on performance of horticulture exporting firms in Kenya as shown by a regression coefficient 0.315. The finding that regulatory framework compliance has a positive influence on the performance of horticulture exporting firms in Kenya.

On the other hand, interaction of demand forecasting and regulatory framework compliance ( $X*M$ ) also had a positive and significant effect on horticulture exporting firms as shown by a regression coefficient of 0.293 (p-value= 0.000). It is therefore seen that demand forecasting on its own has 21.1% effect on performance of manufacturing firms in Kenya. However, when interacted with customer demand, it has an effect of 29.3%. This is a clear indication that introduction of regulatory framework compliance as moderating variable has positive influence on performance of horticulture exporting firms in Kenya. The study therefore rejects the null hypothesis that there is no statistically significant moderating effect of regulatory framework compliance on the relationship between demand forecasting and performance of horticulture exporting firms in Kenya.

### **Conclusions**

The first null hypothesis test was 'There is no significant relationship between demand forecasting and performance of horticulture exporting firms in Kenya'. The study found that demand forecasting is statistically significant in explaining performance of horticulture exporting firms in Kenya. The influence was found to be positive. This means that unit improvement in demand forecasting would lead to an increase in performance of horticulture exporting firms in Kenya. Based on the findings, the study concluded that demand forecasting positively and significantly relates with performance of horticulture exporting firms in Kenya.

The second research hypothesis tested was that 'There is no statistical significant moderating effect of regulatory framework compliance on the relationship between demand forecasting and performance of horticulture exporting firms in Kenya'. The study revealed that regulatory framework compliance is statistically significant in explaining performance of horticulture exporting firms in Kenya. It was also found that the interaction between demand forecasting and regulatory framework compliance had positive, statistically significant effect on performance of horticulture exporting firms in Kenya. Based on the findings, the study concludes that regulatory framework compliance has significant moderating effect on the relationship between demand forecasting and performance of horticulture exporting firms in Kenya

### **Recommendations**

The study recommends that horticulture exporting firms in Kenya should prioritize accurate demand forecasting to improve their performance. This could include investing in data analytics and forecasting tools to improve accuracy and reliability, developing partnerships with distributors and retailers to share data and insights, and leveraging customer feedback and market research to inform forecasting decisions. Firms could also consider implementing flexible production processes and inventory management practices to respond to changes in demand and minimize waste.

The study recommends that horticulture exporting firms in Kenya should prioritize compliance with regulatory frameworks to improve their performance. This could include investing in compliance programs and procedures to ensure that they meet their regulatory obligations, developing partnerships with government agencies and other stakeholders to stay up-to-date on regulatory changes, and adopting a proactive approach to compliance management. Firms could

also consider leveraging compliance as a competitive advantage by communicating their commitment to ethical and responsible business practices to customers and stakeholders.

### Recommendations for Further Studies

To better understand the unique challenges and opportunities faced by horticulture exporting firms, future studies could compare the performance and supply chain practices of firms in different countries. This could provide insights into best practices and identify areas for improvement.

Technology adoption has become increasingly important in improving supply chain performance. Future studies could explore the impact of technology adoption on the performance of horticulture exporting firms, and identify the specific technologies that are most effective in this industry.

This study found that regulatory framework compliance is important in the success of customer-centric supply chain practices. Future studies could investigate the role of government policies in supply chain management, including how they affect the competitiveness of horticulture exporting firms and the overall performance of the industry.

This study provided a snapshot of the performance and supply chain practices of horticulture exporting firms in Kenya. Future studies could conduct longitudinal research to track changes in performance and supply chain practices over time, and identify factors that contribute to these changes.

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