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# The Impact of COVID-19 Pandemic on the Performance of the Floriculture Sector in Kenya: A Case Study of Karen Roses, Ravine Branch, Baringo County (2016-2021)

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*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

This study examined the impact of COVID-19 pandemic on the performance of the floriculture sector in Kenya with a specific reference and focus on Karen Roses from the year 2016 to 2021.The floriculture industry is one of the largest sectors that helps in the contribution of the Kenyan GDP. Kenya has been the leading exporter to Europe with about 25 percent on the market share. COVID-19 has had a particularly negative impact on Kenya's cut-flower industry, which have long been a vital supplier for shops, weddings, and funerals in Europe and abroad. The company lost a crucial portion of its logistical supply chain due to restrictions on international flights and

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domestic transportation. Weddings, funerals, and other public gatherings all came to a halt and were severely reduced around the world, and demand for the commodity peaked. As a result, several flower growers, including Karen Roses, were compelled to throw away unsold blossoms. The study specifically focused on the following objectives: to investigate how the COVID-19 affected the production of the flowers, to determine the effects of Health Protocols on the Performance of Floriculture and to find out the policies and programs they implemented to cope up with COVID-19 pandemic. The study's target population was 220 flower farms in Kenya with Karen Roses being the study population. The primary data was collected using questionnaires both open and closed methods and secondary data analyzed with Microsoft Excel and presented using descriptive statistics such as the pie charts and graphs. In order to understand how to recover from the COVID-19 pandemic and be ready to handle in the event of a future pandemic, this research project will also benefit the management sector of other flower farms, which will use it to make policy decisions. The key findings of this study were as follows; on the first research question which was to determine the effect of COVID-19 on the production of flowers, we found out that the descriptive statistics showed that production was affected by COVID-19, however, the inferential statistic implied the opposite that production was not affected by COVID-19, on the second research question which was to determine how the health protocols affected the performance of floriculture sector, we found out that both the descriptive statistics and inferential statistic showed that health protocols affected the performance of floriculture sector, hence we achieved our objective, on the third research question which was to find out if the measures that they implemented helped them cope up with COVID-19 pandemic, we found out that both the descriptive statistics and inferential statistic showed that the measures implemented affected the performance of floriculture sector, hence we achieved our objective. The study recommends the following policies which will help in case of any pandemic in the future; subsidy policy, monetary policy, fiscal policy and non-restrictions for the cargo freights policy. Other recommendations for further research were to use the logistic linear model because the data is categorical, in the event that new ideas are developed as a result of our work, we advise that existing hypotheses be reviewed and expanded during subsequent research and based on a case study that includes the majority of Kenya's flower farms, we advise conducting more research on the overall impact of COVID-19 on the performance of the floriculture sector.

*Keywords: Floriculture; COVID-19; cut flowers stems.*

## 1. INTRODUCTION

Floriculture has been a rapidly expanding global industry with substantial changes in the distribution network [1]. Germany 11 percent, Italy 18 percent, and the Netherlands 14 percent produced the most cut flowers by the year 2010 [2]. One of the most essential aspects of floriculture is that it has always been a good way to provide economic work for urban and rural teenagers and women [3]. As the floriculture industry has progressed toward higher-value-added products, the supply chain's quality, as well as the labor involved with it, has improved. Kenya, for example, altered its export focus from lower-value stems to higher-value bouquets [4]. Floriculture in Kenya dates back to 1960, when a group of European settlers started selling flowers in Europe [5]. Kenya's economy is heavily based on agriculture, which accounts for 25.3 percent of Gross Domestic Products (GDP). The horticulture sub-sector accounts for 2.63 percent of national GDP, while the flower business accounts for 1.29 percent. The Kenyan floriculture business had been seeing an increase in the number of floral projects, with some of them investing heavily in the production and selling of high-quality fresh flowers. In the 1960s, European settlers started cultivating Kenyan flowers for export markets. Kenyan flower output and export have increased at a fantastic rate during the previous two decades. Floriculture is Kenya's fastest-growing industry and, after tea, the country's second-largest source of foreign money, generating more than $250 million per year [6]. The Kenyan flower industry's structure is characterized by a growing trend toward large-scale floral enterprises. More than a quarter of all exported flowers are supplied directly to these multiples, allowing for value addition at the source through tagging, and arrangement creation. Lake Naivasha, Mount Kenya, Nairobi, Thika, Kiambu and Nakuru are the primary production locations. Kenya, known for tourism and coffee, shipped 400 million flowers in the year 2013, placing it sixth in the

world after traditional flower growers such as the Netherlands, Israel, and Colombia. Kenya's floriculture business was the most developed in the country, accounting for over 40% of total horticultural exports [7]. After a while, Kenya became the fourth-largest producer of flowers in the world, accounting for 7% of global output [8]. Export production was centered in over 60 medium - sized businesses to large-sized flower businesses, with the 25 largest producers accounting for more than 60 percent of aggregate exports. The bigger cut-flower enterprises had production areas ranging from 20 to over 100 hectares and employed between 250 and 6000 people. Around 50 medium-scale commercial farmers and an estimated 500 small growers supplemented these larger growers [9].

The emergence of the COVID-19 pandemic in 2020 wreaked havoc on Kenya's economy, particularly the floriculture industry [10]. On March 12, 2020, the Kenyan government announced a country-wide lockdown, affecting business activities. Florists were forced to close their doors, and buyers preferred rice to roses and beans to begonias. A few people in the sector did not face the consequences, from the farm laborers in Africa up to the London's best florists, Kenya being one of the country's leading flower exporters. The floriculture sub-sector was impacted in 2020 following the shutdown of the Dutch auction, where Kenya flowers were sold. To lessen the effects of COVID-19 on the horticulture sector, the government set aside 15 million US dollars to help horticultural and flower producers maintain access to international markets [7]. Kenya's horticulture industry is labor-intensive and employs a large workforce which is over 4.5 million people. Many employees were laid off as a consequence of the containment practices adopted, which included social isolation at work [11]. Horticulture losses in the European Union (EU) reached an estimated total of 4.12 billion euros in March and April 2020 in 17 EU nations, accounting for almost to 10 percent of the annual total EU market value across the cut flowers, pot plants, bulbs, and nursery stock sectors [12]. In 2018, there was introduction of direct flights between Kenya and the United States and therefore encouraged more exports of flowers. With the advent of direct freight connections to the United States in October 2018, the Kenya Flower Council (KFC) expected even more development in the future [7]. Although with emergence of the COVID-19 pandemic, large number of cargo planes transporting flowers from African and South American farms were canceled. The Fairtrade Foundation branded the crisis in Kenya, which sources a third of all cut-flower roses exported to the EU, as a "humanitarian crisis". Over 100,000 employee flower farms in Kenya, according to a recent research study, were given poor compensation and were consequently subjected to sudden income losses.

## 1.1 Statement of the Problem

Cut flowers exports has been a crucial driver of growth in horticulture which accounts for over 70% of total horticultural export value and contributes roughly 1.45% of national GDP [13]. It has also been the largest employer of female labor, accounting for over 75% of all workers in Kenya's flower industry [4]. In 2017, horticulture exports increased by 13.6 percent in value to Ksh.115.3 billion, according to the Horticultural Development Crops Authority 71.3 percent of the 115.3 billion were cut flowers. The rise was due to a 19.7 percentage increase in export volumes. Cut flower exports was expected to expand in the coming years [14].

However, with the emergence of COVID-19 pandemic, the world was in an economic crisis. Africa for instance, faced a significant economic downturn as a result of the pandemic. It was estimated that Africa’s GDP could contract by 3.4% in 2020 which could result in a recession [15]. Africa’s exports, cut flowers included, was expected to decrease by 8% in 2020, and imports, about 6% [16]. In the second quarter of 2020, COVID-19-related job losses in Africa were equivalent to around 60 million full-time jobs [17].

Policies responses such as curfews, lockdowns, border closures and flight cancellations to specific parts of the world all were adopted which reduced volumes of trade [17]. In Africa, trade volumes were projected to decrease by 8% for exports and about 16% for imports for 2020, compared with previous historic trend estimates [18].

Kenya recorded its first case of Covid-19 on 16 March 2020 and the economy subsequently went into lockdown. A ban on all inbound and outbound international flights led to real GDP contracting by 3.3%, owing to severe disruption to the global and domestic economy caused by the pandemic [19]. The flower sector was losing about 250 million Kenya Shillings every day, and by the end of 2020, it was predicted to have lost half of its value. Kenya's flower exports

plummeted by more than half, with forecasts predicting low production of less than 10% and the industry on the verge of collapse [20]. As of March 2020, direct sales orders had been cut by 50%, sales on the Dutch auction market were down by 70% and prices reduced. Around 1,000 seasonal workers had contracts terminated [16].

## 1.2 Research Objectives

### 1.2.1 General objective

**The general objective was:**

To determine the impact of COVID-19 on the performance of floriculture sector in Kenya: A case study of Karen Roses

### 1.2.2 Specific objectives

**The specific objectives were:**

I. To investigate how the COVID-19 affected the production of the flowers.
II. To determine the effects of health protocols on the performance of floriculture Sector.
III. To find out the measures they implemented to cope up with COVID-19 pandemic.

## 1.3 Research Questions

**The research questions were:**

I. What were the effects of COVID-19 on the production of flowers?
II. How did the health protocols affect the performance of floriculture sector?
III. What were the measures implemented to cope up with the COVID-19 pandemic?

## 1.4 Justification of the Study

The emergence of COVID-19 impacted a wide range of economic industries, including floriculture. This project research will add to the body of knowledge about COVID-19 and its impact on floriculture performance in Kenya, which will be useful to researchers. It will also give research recommendations for the future. As a result of our findings, future researchers will be able to pick up on these subjects and investigate them further. This research project will also aid the management sector of other flower farms, who will utilize it to make policy decisions with the overarching goal of understanding how to recover from the COVID-19 pandemic and being prepared to deal in the event of a future pandemic.

## 1.5 Scope of the Study

There are many other flower farms in Kenya on which we could have based our research project, but owing to inadequate resources and limited time, we were unable to do so. We chose Karen Roses, Eldama-Ravine branch, because it was convenient and is regarded as one of Kenya's largest flower farms, as it sells majority of its flowers to Europe. The research project looked into how the Karen Roses' output was impacted in terms of production and how they dealt with the COVID-19 pandemic.

# 2. LITERATURE REVIEW

## 2.1 Introduction

This section concentrates on the review of relevant existing literature on the topic of the study. The chapter discussed the literature review in the following subtitles: Theoretical review, empirical review, and summary of the reviewed literature in that order.

## 2.2 Theoretical Framework

### 2.2.1 Cobb-Douglas theory of production

Paul Douglas and Charles Cobb proposed and tested this theory using statistical evidence in 1928. For the first time, they used the Cobb-Douglas function in their work, which covered the subject of producer theory [21]. Using least squares, they arrived at a value of 0.75 for the exponent of labor, which was later validated by the National Bureau of Economic Research as 0.741. Later work in the 1940s inspired them to allow for variation in the exponents on K and L, resulting in estimates that later proved to be extremely close to improved productivity measures produced at the time.

In economics, the Cobb-Douglas production function shows the link between input and output. The level of production can be affected by the input factor, which includes capital and labor. Technology and other factors can have an impact on manufacturing as it progresses**.**

While the forecasts for the production function seemed to be correct at the time, they were built on limited data which was impossible to trust them. Paul Douglas remarked that he was

disheartened by the critique and considered giving up, but that something compelled him to keep going. The discovery came from a vast set of observations in cross-sectional US census data. Douglas presented the results of these discoveries, as well as results from other countries, in his address as president of the American Economic Association (AEA) in 1947. In his Solow Growth Model, Robert Solow adopted this Cobb-Douglas theory of production, assuming that the production function had constant returns to scale. If we double the amount of capital stock and labor, we will have exactly twice the level of output, according to this premise. As a result, the Solow model's mathematical analysis concentrates on output per worker and capital per worker rather than total output and capital stock [22].

### 2.2.2 The protection motivation theory

Rogers (1975) propounded the idea, which explains how to urge people to behave in a protective manner in order to avoid a given health calamity [23]. Rodgers (1983) expanded the Protection Motivation Theory to include a more inclusive look at the impact of persuasive communication, with a focus on cognitive processes that influence behavioral changes [23]. Protection Motivation Theory (PMT) was used in two ways: as a foundation for developing and evaluating persuasive messages, and as a model for predicting health behavior [24]. According to the revised version, he claimed that personal drive for self-protection was required to adopt a protective behavior against health hazards. Fear was assessed in PMT to predict and encourage protective behaviors, as well as to explain the thought processes involved in threat and coping assessments. Threat and coping assessments can result in objective or subjective reactions, both of which represent health risks. Threat assessment in PMT is based on the following variables; risk perception, perceived fragility, and perceived incentives, with higher perceived risk and fragility and lower perceived incentives indicating a higher tendency for engaging in health-promoting practices. Performance expectancy, self-efficacy, and perceived response efficacy are all factors in coping appraisal in PMT. In general, coping assessment is supposed to be reinforced by response efficacy and self-efficacy, while response cost is predicted to be reduced. Fear is a mediator between perceived vulnerability, risk perception, and threat evaluation, according to this theory. As a result, if one feels unsafe to a major health hazard, one's fear level rises, and one is more motivated to take precautionary measures. Protection motivation, as an intervening variable, starts, sustains, and directs behavior. Protection desire may cause an explicit conduct as a coping response [23].

It also helps us grasp a better comprehension of the health protocols applied during COVID-19, such as social distancing behavior [25] and the implementation of dusk-dawn curfew, and how these influenced people's health decisions. People were fearful and anxious once the COVID-19 pandemic broke out, and they knew there was no definitive remedy for the sickness. Fears of higher patient morbidity and mortality sparked public outrage, resulting in panic, stress, and mental health issues. To develop protective motivation, the coping and threat evaluation processes were combined. According to the research, PMT can properly predict whether or not protective behaviors will be adopted. This theory has been applied in many studies. The study a variety of behaviors, including influenza vaccine administration, H1N1 pandemic prevention, cancer prevention and sun protection, SARS prevention, and infectious disease and skin cancer prevention. However, this theory was reprimanded for employing fear tactics in its implementation. Fear was used excessively, and in some cases, illegitimately. This includes showcasing graphic photographs of casualties and exaggerating the effects in some cases. The theory also ignores a range of environmental and behavioral characteristics, such as the impact on social customs.

## 2.3 Empirical Review of Literature

In this section, we will review our research variables and each variable will be accompanied by a review of the existing literature. The research variables will also be summarized in this section. This section will compare and contrast the results of numerous research publications, emphasizing the need of measuring each variable.

### 2.3.1 The effect of COVID-19 on the production of flowers

Flower production increased by a particular proportion, indicating that substantial production by the end of 2019 was expected [26]. The COVID-19 pandemic had a detrimental effect on productivity in the first phase of 2020 than expected, and the recuperation was expected to

be slower than expected [27]. The spread of COVID-19 led to total closure of many business operations, leading to an unprecedented disruption of commerce in most industry sectors [28].

To contain the spread of the COVID-19 pandemic, most countries were placed on total lockdown as immediately as the first case was confirmed. Lockdown was seen to be a good way to stop the coronavirus from spreading over the world [29,30].

All foreign flights and cargo freights were cancelled. As a precaution against the fatal COVID-19 epidemic, the Kenyan government temporarily halted all foreign flights, which was effective from March 25, 2020. As a result, Kenya Airways (KQ) filed for a government rescue to prevent going bankrupt because its planes were grounded and its income streams were cut off [20]. The few remaining operators faced significant demand for cargo capacity, resulting in an increase of cargo space costs [7]. Considering floriculture depends mainly on exports and imports, all wholesaling markets were close down, leading to substantial losses for both farmers and dealers, negatively impacting production and sales in the floriculture industry. Since production and sales were dropping, many countries were obliged to temporarily suspend operations in that sector.

The flower industry was losing over 250 million Kenya Shillings every day, and it was expected to lose half of its worth by end of 2020. Kenya's flower exports had dropped by more than half, with predictions suggesting low production of less than 10% and that the sector was at the verge of collapsing [20].

As a result of the lockdown, both export market and the domestic market were closed. The major domestic markets, including Delhi, Bengaluru, Hyderabad, Indore and Mumbai, lost up to Rs. 60 lakh every day. The government had imposed a lockdown on March 25, 2020, due to the outbreak. As a result of the decreased demand for flowers in the market, some farms were closed.

In 2020, the flower industry was expected to produce 400 million US dollars. However, the Ethiopia's export fell and the sector expected to lose 110 million US dollars in the first quarter of 2020, putting over 50,000 jobs at danger. Ethiopia's agriculture sector was predicted to contract in 2020 by 1.6 percent due to a loss of agricultural output owing to a drop in exports mainly due to the COVID-19 pandemic and other factors. Border closures and other international travel bans altered the economy globally through increasing transactions done in order to be allowed to travel [31].

The authors looked at farmers' and dealers' opinions on shutdown losses in the floriculture business, based on a previous study. Jasmine blooms which are primarily picked in mid-March, were affected as this was when the pandemic started. Farmers, on the other hand, suffered huge losses at this time because it was impossible to sell flowers in the market due to the lockdown [31,32].

#### 2.3.2 Effects of the health protocols on the performance of floriculture sector in Kenya

Some of the health protocols that were introduced were social distancing and the dusk-dawn curfews. Social distance is keeping a distance of at least one meter from each other and avoiding spending time in crowded places or groups [33].

Social distance was a crucial strategy for preventing the transmission of COVID-19, as it reduced the likelihood of infected people coming into touch with uninfected people [34]. The pandemic of COVID-19 resulted in substantial changes in social distance and curfew. Social distance was one of the tactics employed to control the transmission of the COVID-19 outbreak. This measure had a strong influence on the floriculture sector's performance because it included the restriction of celebrations and gatherings during the COVID-19 outbreak. Weddings, going to church and hence celebrating baptisms, burials, birthdays, anniversaries, baby showers, and Valentine's Day were examples of such events. In the Kingdom of Saudi Arabia, severe social distancing measures were difficult to enforce, due to the high urbanization level in the Kingdom, social and religious conventions and annual hosting of high-profile international religious mass congregations Before the first case of COVID-19 was confirmed in the Kingdom, Kingdom of Saudi Arabia (KSA) started implementing strong social distancing measures which included everything from the revocation of religions, sporting, entertainment events, occasions like the Umrah, to the break from

educational activities and the introduction of curfew. In the interest of public and global health, these actions were done despite of their socioeconomic, political, and religious obstacles [35]. Burial rites are considered frequently complex and multiday affairs involving thousands of people and lasting for many days. [36]. The societal nature of funerary practices qualifies them as wailing, dancing, and other activities, all of which necessitate and attract the participation of hundreds, if not thousands, of people. Despite the tension between good public health practices and proper burial and events, which was subjected to new guidelines, the tension between good public health practices and proper burial and events was evident. COVID-19 pandemic led to their inability to properly bury their dead; regardless of the objective of the rites. Since COVID-19 virus transfer in aerosolized form even when people are asymptomatic, Kenya adopted some of the new guidelines which included prohibiting the transport of bodies across the country, particularly in COVID high-risk counties, prohibiting burial processions, and restricting practices such as leaving the hours of death among conditions, opposition to these prohibitions had resulted in clashes between police and the violators. Kenya's acting Director of Health said that he wanted the body in the house overnight before being buried and that they were working with the law to limit the number of persons allowed to attend burials to a maximum of 15 [37].

The shutdown of most cut flower retail establishments, including florists and open-air markets, as well as the postponement of social occasions like weddings, resulted in enormous market losses [38]. People stopped buying flowers, which resulted in a decrease in both domestic and international flower trade. Flowers were considered the most important gifts and enhancement of beautification in such events, so people stopped buying them. This had an impact on the floriculture industry's financial performance because demand fell dramatically and supply increased. The government made a number of measures to mitigate the consequences of the COVID-19 outbreak on the economy and labor market. The most fundamental flaw, on the other hand, the lack of specialized protection for the informal economy. The curfew hampered economic activity for informal laborers, who were largely daily wage earners, in various regions.

On March 25, 2020, the Kenyan government issued a national curfew from 7 p.m. to 5 a.m., which came into place on March 27, 2020 [39]. The dusk-dawn curfew was a serious mitigation measure to an extent that people who violated the rule were punished. Over 56,000 curfew violators had been jailed since the curfew was implemented on March 20th 2020, according to various media publications citing police reports [37,40]. The government announced new home care-based isolation guidelines in June 2020, a new program in which people with COVID-19 symptoms could self-isolate at home and, if practicable, be cared for there [40].

The introduction of curfew led to a waste of 10 hours a day in the floriculture industry, because prior to the COVID-19 pandemic, most flower farms were open 24 hours a day. According to the recent prediction model, worldwide working hours decreased by 4.5% in the early 2020 which millions of full-time jobs which was a two-day work per week as compared to levels before the pandemic. Since farms were now working in less time than previously, this resulted in a reduction in workers, which resulted in a decrease in sales and profits. The finance sector of flower farms was also impacted by fewer sales as a result of lower flower yield and since flowers are perishable, there was a lot of waste and thus losses in the flower industry.

#### 2.3.3 Measures implemented to cope up with the COVID-19 pandemic

Most floricultural farms had to adopt measures and plans to deal with the financial crisis caused by the COVID-19. These included firing employees, cutting their monthly wages and others were forced to go on a mandatory leave. Men had lower unemployment rates than women, maintaining a lengthy trend of high female jobless rates [41]. Even though several performers claimed to have asked their in-house operations personnel at upper levels of management to take all of their paid holidays, most field laborers on casual contracts, who were primarily women, were sent home without any compensation [42].

Some of the flower farms such as Equator Farm was unable to pay its employees' salaries, and they were obliged to implement layoffs and pay-cuts in order to lower operating costs and retain its workforce. The epidemic had a huge impact on the financial sector that are critical to the normal operation of international trade. Another policy was that most farms provided protective equipment for their farmers’ safety. In the

greenhouses, grading, packaging, chilling, and processing facilities, the majority of flower farms provided enough protective equipment to restore worker safety and motivation. In the event of a COVID-19 detection, they developed safety procedures and mitigating measures [32]. Workers were also vaccinated so as to reduce infection rate although not all of vaccines worked. Vaccination, according to a recent study, could help, but there were still many risks, and the influence on all aspects of the economy was negative [43,44].

In order to promote the advantages of floriculture during the pandemic, several virtual initiatives on social media applications were sprouting in tandem with the ads which helped in the promotion. With the floriculture industry in a state of crisis, representatives from a variety of public and private sectors worked on a report aimed at educating the public, producers, and technicians about the issue [45]. The use of technology was also applied to recover from the pandemic. Floriculture, for example, was impacted by lower sales. After a crisis state, the floriculture sector, which had been hit hard at the start of the crisis, was already displaying positive trend, thanks to technological advancements and floral e-commerce, which helped reach buyers [46].

According to a recent study, low-wage workers were substantially more likely than higher-wage workers to have their hours decreased, be dismissed, or lose their employment [47]. Those workers who had temporary jobs in the companies were at a higher risk of being laid-off. People in lower-paid jobs who lose their jobs during the COVID-19, according to a recent study, were more likely to be unemployed. After the lockdown pandemic, they were likely to encounter more competition in the labor market and may have found it more difficult to re-enter the workforce than those in higher-paying positions. As constraints loosen, they were at a greater risk of long-term unemployment and a resulting scarring. A certain percentage of the global workforce, including businesses and self-employed individuals, lived in nations where workplace shutdown were compulsory [32,47].

#### 2.3.4 Summary the empirical review

The COVID-19 epidemic had a slew of negative economic consequences, with the floricultural industry taking the brunt of it. One of the negative consequences was the country's complete lockdown, which caused flight cancellations and disrupted air freight and cargo. As a result, many importers, such as Europe, went into complete lock down, resulting in the loss of a significant amount of flower. Flower farm workers were also impacted in the following ways: some were laid off, some were forced to take mandatory leave as a result of social distancing measures, and those who stayed in the sector saw their pay lowered. The national dusk-to-dawn curfew resulted in a decline in production due to fewer working hours.

## 3. METHODOLOGY

### 3.1 Introduction

The following topics are discussed in this section: research design, target population, sample size, sampling design, and data collection technique and data analysis.

### 3.2 Research Design

A research design is a plan or framework for responding to a research problem [48]. The research design used for this study is descriptive research design since the study's goal was to gather information from respondents on how the COVID-19 affected floriculture performance in Karen roses. Descriptive design is a systematic empirical investigation in which the researcher has no direct influence on the independent variable because it has already expressed itself [49]. Descriptive design was also used since it relies on facts in a natural setting rather than altering it. It required gathering data on the population's perspectives and attitudes [50]. This was very useful in extracting data from a sample of management and marketing directors from their normal work environment and presenting it descriptively in order to make predictions about the complete population in the research area [51].

### 3.3 Target Population and Site Description

#### 3.3.1 Target population

A population is a collection of individuals, events or things that share a common observation whereas a target population is the complete composition of elements from which the sample is selected; it is the stated population about which information is sought. The target demographic for this study consisted of 220 flower farms in Kenya. Karen Roses being the

study's population. A total of 1300 individuals work at the flower farm. We focused mainly on three departments; the marketing and sales department, the managing department and Human Resource department.

#### 3.3.2 Site descriptions for experiment

The study was carried out in Sawmill village in Eldama-Ravine, Koibatek Ward, Baringo County in Kenya.

### 3.4 Sampling Procedure and Sample Size

#### 3.4.1 Procedure sampling

The convenience sampling method was employed, which is a type of non-probability sampling methodology. It has the advantages of being quick, easy, and cost-effective.

#### 3.4.2 Sample size

The sample size was determined by the marketing, management, and human resource departments' ranks.

### 3.5 Validity and Reliability of the Instruments

The degree to which the results of data analysis accurately reflect the issue under research is referred to as validity [49]. It refers to the extent to which the findings can be applied to other scenarios involving different persons. To ensure validity, all questionnaires were closely scrutinized by the flower company's management, marketing and human resource departments, with suggestions and opinions incorporated to improve the quality of the research instruments, if necessary, with the goal of ensuring the study's results and inferences were accurate and meaningful. Reliability is the degree to which an instrument will generate similar data at different times. Pilot study was conducted to ensure the reliability of the study.

### 3.6 Data Collection Instruments and Procedures

The data collection method in this study was questionnaire where closed and open-ended questionnaires was applied. These types of questionnaires are preferred because they allow the researcher to collect as much information as possible about the research project study. In addition, secondary data from Karen Roses production metrics from the year 2016 to 2021 was used too.

### 3.7 Data Analysis

Data entry was done and analyzed using Microsoft Excel and Statistical Packages for Social Sciences (SPSS). The results were presented using descriptive statistics such as percentages, means, pie charts, and bar graphs and inferential statistics.

### 3.8 Limitation and Delimitation

Collecting primary data in Eldama-Ravine took time and resources, the constraints were limited time and inadequate resources. To address the issue of time and expense, we scheduled an early visit to the farm which prevented not being able to find our respondents, who were the management and marketing directors and respondents from the human resource department, and also to collect at least all of the data we required. We saved money because we did not have to go to the farm multiple times.

**Table 1. Sample composition**

| Department | Respondents | Sample size |
|---|---|---|
| Managing | 2 | 2 |
| Sales and Marketing | 4 | 4 |
| Human Resource | 6 | 6 |
| **Total** | **12** | **12** |

## 4. RESULTS AND DISCUSSION

The presentation was done based on the research questions and the objectives. The study was to determine the impact of COVID-19 pandemic on the performance of floriculture sector in Kenya: a case study of Karen Roses, Ravine branch (2016-2021). Data were gathered from managing, human resource and marketing and sales directors. The data covered the effect of COVID-19 on the production of the flowers, the effects of health protocols on the performance of floriculture sector and the measures implemented to cope up with COVID-19 pandemic.

## 4.1 The Effects of COVID-19 on the Production of Flowers

### 4.1.1 Demographic information of the respondents

The study analyzed the gender and work experience of the respondents. Findings of the demographic of the respondents are shown In Table 2.

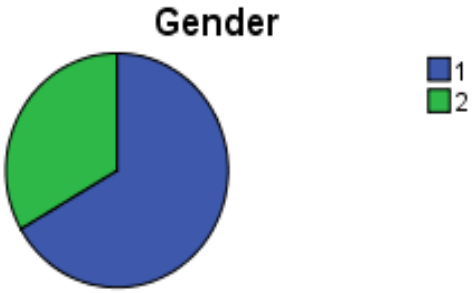


**Fig. 1. Respondents' Gender**

According to Fig. 1, the majority of respondents were male, represented by 1 as coded into SPSS, accounting for 66.7% of the respondents, as stated in Table 2. The remaining fraction of respondents were female, represented by 2, accounting for 33.3% of the respondents. Table 3. Demographic information on work experience

According to Table 3 and Fig. 2, the majority of respondents (66.7%) had work experience of five years or more, as is illustrated in Fig. 2.

The frequencies in terms of counts, percentages, mean, median, and standard deviation were among the descriptive statistics used. A five-point Likert scale was used in the study, with the options being: 1- Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, and 5- Strongly Agree.

Fig. 3 shows that there was a variation in flower output from 2016 to 2019 in terms of total stems received, but sales of total stems increased but decreased in 2019 to 70610103 from 74342841 in 2018. Both the total stems received and sold fell dramatically by the year 2020, to 82573265 from 102959378 in 2019 and 63633718 from 70610103 in 2019, respectively as indicated in Table 4. Both the number of stems received and those sold increased in 2021.

**Table 2. Demographic information on gender**

| Gender | | | | | |
|---|---|---|---|---|---|
| | | **Frequency** | **Percent** | **Valid Percent** | **Cumulative Percent** |
| **Valid** | 1 | 8 | 66.7 | 66.7 | 66.7 |
| | 2 | 4 | 33.3 | 33.3 | 100.0 |
| | **Total** | 12 | 100.0 | 100.0 | |

**Table 3. Demographic information on work experience**

| | | **Frequency** | **Percent** | **Valid Percent** | **Cumulative Percent** |
|---|---|---|---|---|---|
| **Valid** | 0-2 Years | 1 | 8.3 | 8.3 | 8.3 |
| | 3-5 Years | 3 | 25.0 | 25.0 | 33.3 |
| | 5 Years and Above | 8 | 66.7 | 66.7 | 100.0 |
| | Total | 12 | 100.0 | 100.0 | |


**Fig. 2. Respondents' work experience**

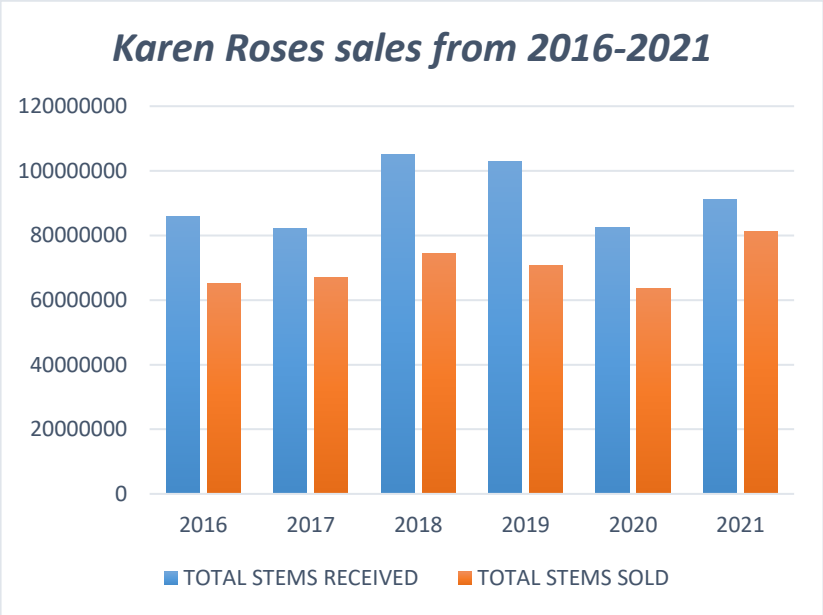


**Fig. 3. Production of the cut flower stems in terms of those received and sold (2016-2021)**

**Table 4. Production of the cut flower stems in terms of those received and sold (2016-2017)**

| Year | Total stems RECEIVED | Total stems sold |
|---|---|---|
| 2016 | 85945660 | 65007576 |
| 2017 | 82192908 | 67026521 |
| 2018 | 104962394 | 74342841 |
| 2019 | 102959378 | 70610103 |
| 2020 | 82573265 | 63633718 |
| 2021 | 91245488 | 81163970 |

*Source: Karen roses sales department*

**Table 5. Descriptive statistics on production**

| | | Count |
|---|---|---|
| The COVID19 pandemic affected production of flowers | Strongly Disagree | 0 |
| | Disagree | 0 |
| | Neutral | 2 |
| | Agree | 4 |
| | Strongly Agree | 6 |
| COVID19 had a huge impact on the floriculture sector in Kenya | strongly disagree | 0 |
| | Disagree | 0 |
| | Neutral | 1 |
| | Agree | 10 |
| | strongly agree | 1 |
| Production of flowers were hugely affected due to the pandemic | strongly disagree | 0 |
| | Disagree | 1 |
| | Neutral | 1 |
| | Agree | 4 |
| | strongly agree | 6 |

From Table 5, it is evident that most respondents strongly agreed that COVID-19 pandemic affected the production of flowers. Moreover, majority of the respondents agreed that COVID-19 had a huge impact on floriculture sector in Kenya and also most respondents strongly agreed that the productions of flowers were hugely affected due to the pandemic.

Table 6 mean and standard deviation of production indicate that most respondents strongly agreed because the mean is near to 5 and the standard deviation is 0.18749. These results concur with those of Deloitte (2020) [20], who discovered that most flower farms in Kenya saw a decline in flower production.

Tables 7, and 8 give the findings of linear regression for effects of production of flowers on the performance of the floriculture industry. The results were used to test the null hypothesis$\boldsymbol{H_0}$: production changes had no significant difference on the performance of the floriculture sector.

According to Table 7 above, with R square value of 0.448, it implied that production accounted for 66.9% of the variation in performance of the floriculture industry in Kenya, according to Karen Roses' case study. Given that the model's standard error of estimate was 0.7791which was less than 1, it implied that the model forecast was accurate and hence the Likert scale was sufficiently utilized.

Since we used linear regression, ANOVA was performed to determine the model's statistical significance. The significant (Sig.) column value of 0.017 in Table 8 results is less than alpha=0.05. This suggested that production and performance have a statistically significant relationship.

According to Table 9, 50% of respondents indicated that they generally agreed that the curfew decreased their working hours. According to Fig. 4, the respondents who agreed that curfew lowered working hours made up a larger percentage of the pie chart.

According to data from Table 10, 66.7 percent of respondents agreed that social distance had an impact on production.

According to Fig. 5, the respondents who felt that social distance had an impact on production made up the greater area of the pie chart that is shaded green.

**Table 6. Descriptive statistics on production in terms of mean and standard deviation**

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | **N** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| Performance | 12 | 4.20 | 4.80 | 4.5667 | .18749 |
| Valid N (listwise) | 12 | | | | |

**Table 7. The model summary of production**

| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** |
|---|---|---|---|---|
| 1 | .669[a] | .448 | .393 | .77912146 |
| a. Predictors: (Constant), Z score(production) | | | | |

**Table 8. ANOVA table of production**

| **ANOVA** | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 4.930 | 1 | 4.930 | 8.121 | .017[b] |
| | Residual | 6.070 | 10 | .607 | | |
| | **Total** | 11.000 | 11 | | | |
| a. Dependent Variable: Z score(performance) | | | | | | |
| b. Predictors: (Constant), Z score(production) | | | | | | |

**Table 9. How helth protocols affected the performance of floriculture sector in terms of curfew**

| Curfew reduced the working hours | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | strongly disagree | 1 | 8.3 | 8.3 | 8.3 |
| | Disagree | 1 | 8.3 | 8.3 | 16.7 |
| | Neutral | 1 | 8.3 | 8.3 | 25.0 |
| | Agree | 6 | 50.0 | 50.0 | 75.0 |
| | strongly agree | 3 | 25.0 | 25.0 | 100.0 |
| | Total | 12 | 100.0 | 100.0 | |

**Table 10. How helth protocols affected the performance of floeiculture sector in terms of social distancing**

| Social distancing affected production | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| **Valid** | Disagree | 2 | 16.7 | 16.7 | 16.7 |
| | Agree | 8 | 66.7 | 66.7 | 83.3 |
| | strongly agree | 2 | 16.7 | 16.7 | 100.0 |
| | Total | 12 | 100.0 | 100.0 | |

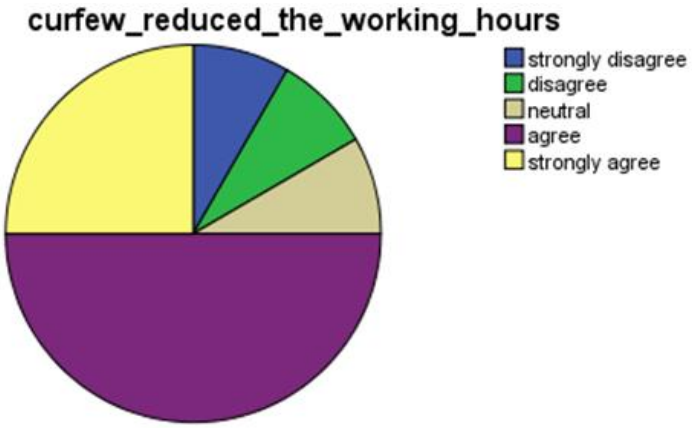


**Fig. 4. How curfew reduced woeking hours**

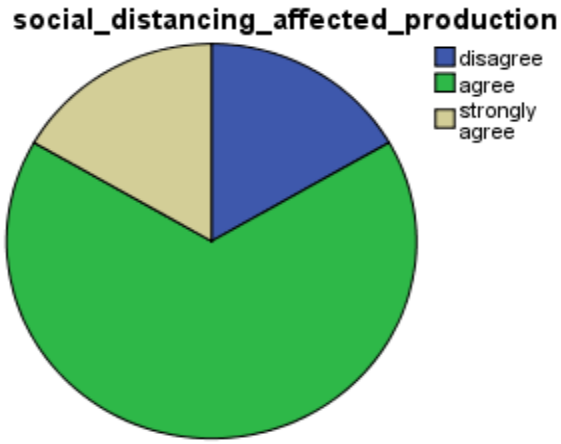


**Fig. 5. How social distancing affected production**

**Table 11. Descriptive statistics on helth protocols in terms of mean and standard deviation**

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | **N** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| Production | 12 | 1.67 | 3.33 | 2.8611 | .52143 |
| Valid N (listwise) | 12 | | | | |

## 4.2 The Effect of Health Protocols on the Performance of Floriculture Sector

From Table 11, the mean of the health protocols was 2.8611 and the standard deviation was 0.52143, this suggested that most respondents were neutral because the mean was close to 3. These results concur with those of [20, 35] who discovered that health protocols had an impact on the floriculture sector's performance.

Tables 12, 13, and 14 exhibit the findings of linear regression for the effect of health protocols on the performance of the floriculture industry. The results were used to test the null hypothesis$H_O$: health protocols had no significant difference on the performance of the floriculture sector.

According to Table 12, with R square value of 0.281, health protocols accounted for 53% of the difference in performance of the floriculture in Karen Roses. Given that the estimated standard error was 0.8891 which is less than 1, this implied that the forecast was accurate hence sufficient utilization of Likert scale.

Since we used linear regression, ANOVA was performed to determine the model's statistical significance. In Table 13 data, the significant (Sig.) column value of 0.076 is higher than alpha=0.05. This suggested that there is no meaningful connection between health protocols implemented and performance of floriculture.

**Table 12. Model summary of helth protocols**

| Model Summary | | | | |
|---|---|---|---|---|
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** |
| 1 | .530[a] | .281 | .210 | .88907685 |
| a. Predictors: (Constant), Zscore(healthprotocols) | | | | |

**Table 13. ANOVA table of helth protocols**

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 3.095 | 1 | 3.095 | 3.916 | .076[b] |
| | Residual | 7.905 | 10 | .790 | | |
| | Total | 11.000 | 11 | | | |
| a. Dependent Variable: Zscore(performance) | | | | | | |
| b. Predictors: (Constant), Zscore(healthprotocols) | | | | | | |

**Table 14. Linear regression anatysis of helth protocols**

| Coefficient table | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Unstandardized Coefficients** | | **Standardized Coefficients** | **T** | **Sig.** |
| | | **B** | **Std. Error** | **Beta** | | |
| 1 | (Constant) | 7.202E-016 | .257 | | .000 | 1.000 |
| | Zscore(healthprotocols) | -.530 | .268 | -.530 | -1.979 | .076 |
| a. Dependent Variable: Zscore(performance) | | | | | | |

**Table 15. How descriptive statistics on the measures implemented to cope up with COVID-19 pandemic**

| | | Count |
|---|---|---|
| Lockdown affected the performance of the flowers | strongly disagree | 0 |
| | Disagree | 3 |
| | Neutral | 3 |
| | Agree | 3 |
| | strongly agree | 3 |
| Flights cancellation affected production of flowers | strongly disagree | 0 |
| | Disagree | 0 |
| | Neutral | 1 |
| | Agree | 8 |
| | strongly agree | 3 |
| Increase of the cargo freights prices incurred costs | strongly disagree | 0 |
| | Disagree | 0 |
| | Neutral | 0 |
| | Agree | 7 |
| | strongly agree | 5 |
| Safety measures incurred costs | strongly disagree | 0 |
| | Disagree | 1 |
| | Neutral | 2 |
| | Agree | 6 |
| | strongly agree | 3 |
| Laying off of workers affected production | strongly disagree | 0 |
| | Disagree | 3 |
| | Neutral | 3 |
| | Agree | 5 |
| | strongly agree | 1 |
| The government funding helped in the recovery | strongly disagree | 5 |
| | Disagree | 4 |
| | Neutral | 2 |
| | Agree | 0 |
| | strongly agree | 1 |
| Measures adopted helped | strongly disagree | 0 |
| | Disagree | 0 |
| | Neutral | 1 |
| | Agree | 7 |
| | strongly agree | 4 |
| Pay cuts affected your monthly income | strongly disagree | 0 |
| | Disagree | 0 |
| | Neutral | 0 |
| | Agree | 9 |
| | strongly agree | 3 |
| Laying off workers affected standard of living | strongly disagree | 1 |
| | Disagree | 0 |
| | Neutral | 1 |
| | Agree | 4 |
| | strongly agree | 6 |
| Curfew affected your working hour | strongly disagree | 0 |
| | Disagree | 0 |
| | Neutral | 5 |
| | Agree | 5 |
| | strongly agree | 2 |
| Mandatory leave without salary affected consumption | strongly disagree | 0 |
| | Disagree | 2 |

| | | Count |
|---|---|---|
| | Neutral | 1 |
| | Agree | 5 |
| | strongly agree | 4 |
| COVID19 affected their health status | strongly disagree | 0 |
| | Disagree | 1 |
| | Neutral | 2 |
| | Agree | 6 |
| | strongly agree | 3 |
| Social isolated workers were lonely and depressed | strongly disagree | 0 |
| | Disagree | 3 |
| | Neutral | 5 |
| | Agree | 4 |
| | strongly agree | 0 |
| Safety measures prevented spread of COVID-19 | strongly disagree | 0 |
| | Disagree | 0 |
| | Neutral | 0 |
| | Agree | 3 |
| | strongly agree | 9 |

**Table 16. Showing how descriptive statistics on the measures implemented to cope up with COVID- 19 Pandemic in terms of mean and standard deviation**

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | **N** | **Minimum** | **Maximum** | **Mean** | **Std. Deviation** |
| **Measures** | 12 | 3.43 | 4.43 | 3.8155 | .24453 |
| **Valid N (listwise)** | 12 | | | | |

The ANOVA table above presents a linear regression model as shown below;

$$Y_h = 7.202 - 0.53X_h + \varepsilon$$

Where

$Y_h$= performance of the floriculture sector
$X_h$= health protocols
$\varepsilon$ = error term

The coefficients table provided us with information to show performance of floriculture sector in produce of flowers. This implied that 1 unit increase in health protocols resulted to 0.53 decrease in performance.

## 4.3 The measures implemented to cope up with the COVID-19 pandemic helped

From Table 15, most of the respondents disagreed, agreed, strongly disagreed and others were neutral that the lockdown affected the performance of flowers. Moreover, many of the respondents agreed that flights cancellation affected the production of flowers, increase of cargo freights prices incurred cost, safety measures incurred costs, laying off of workers affected production, pay cuts affected their monthly income, mandatory leave without salary affected their consumption, COVID-19 affected their health status and measures adopted helped. It is also evident that most respondents were neutral that social isolated workers were lonely and depressed while other agreed and were neutral that curfew reduced their working hours. Other respondents strongly agreed that safety measures prevented spread of COVID-19.

According to Table 16, the measures' respective means and standard deviations were 3.8155 and 0.24453, which suggested that the majority of respondents agreed because the mean was near to 4. These results were not in agreement with those of [32], who found that measures implemented helped cope up with the COVID-19 pandemic.

The results were put to use in a test of the null hypothesis $H_0$ : *measures implemented had no significant difference on the performance of the floriculture sector.*

**Table 17. Model summary on measures implemented**

| Model Summary | | | | |
|---|---|---|---|---|
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** |
| **1** | .678[a] | .460 | .406 | .77092896 |
| a. Predictors: (Constant), Z score(Measures) | | | | |

**Table 18. ANOVA table of helth protocols**

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 5.057 | 1 | 5.057 | 8.508 | .015[b] |
| | Residual | 5.943 | 10 | .594 | | |
| | Total | 11.000 | 11 | | | |
| a. Dependent Variable: Zscore(performance), b. Predictors: (Constant), Zscore(Measures | | | | | | |

**Table 19. Linear regression analysis of measures implemented**

| Coefficient table | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Unstandardized Coefficients** | | **Standardized Coefficients** | **t** | **Sig.** |
| | | **B** | **Std. Error** | **Beta** | | |
| 1 | (Constant) | 2.982E-016 | .223 | | .000 | 1.000 |
| | Zscore(Measures) | -.678 | .232 | -.678 | -2.917 | .015 |
| a. Dependent Variable: Zscore(performance), b. Predictors: (Constant), Zscore(Measures) | | | | | | |

Since we used linear regression, ANOVA was performed to determine the model's statistical significance. Table 18 results show that 0.015 is less than the apha value of 0.05 in the significant (Sig.) column. This suggested that there was a statistically significant relationship between the performance of floriculture and the measure that was adopted.

According to Table 17, with R square value of 0.46, it implied that measures implemented accounted for 67.8% of the variation in performance of the floriculture sector in Kenya, a case study Karen Roses. Given that the standard error estimate was 0.7709 which was less than 1, it implied that its results were accurate.

The ANOVA Table 19 presents a linear regression model as shown below;

$$Y_m = 2.982 - 0.678X_m + \varepsilon$$

Where;

$Y_m$ = performance of the floriculture sector
$X_m$= measures implemented
$\varepsilon$ = error term

The coefficients table provides us with information to show the performance of floriculture sector. This implied that 1 unit increase in measures implemented would result to 0.678 decrease in performance.

## 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Introduction

This section focuses on three main areas namely; summary, conclusions and recommendations. The mains areas are discussed in details in the following sub-headings.

### 5.2 Summary of the Study Findings

This study examined the impact of the COVID-19 on the floriculture industry's performance in Kenya using Karen Roses Eldama Ravine branch in Baringo as a case study from 2016 to 2021. The analysis was based on the results of three research objectives, which were to determine the effect of COVID-19 on the production of flowers, to determine the effects of health protocols on the performance of

floriculture sector and to find out the measures they implemented to cope up with COVID-19 pandemic. Twelve respondents from the managerial, marketing, and human resource departments provided the information for this research study. Both descriptive and inferential statistics were used in the study's data analysis. Frequency distribution tables were employed in descriptive analysis, while linear regression was used in inferential analysis which were both keyed in and analyzed using SPSS.

From the first objective which sought to determine the effect of COVID-19 on the production of flowers which indicated that the production had increased by the year 2019 from 2016. The majority of respondents strongly agreed that the COVID-19 pandemic's emergence had a significant impact on Kenya's floriculture industry's performance. The results of linear regression showed that a 1 unit increase in production would result in a 0.669 percent decline in the performance of Kenya's floriculture industry, which is contrary to the findings of Deloitte (2020) [20], as we had stated in chapter one. As a result, the inferential statistic based on linear regression was in conflict with the conclusions of descriptive statistics.
The results of the second objective, which was to determine the effect of health protocols on the floriculture sector's performance, showed that these protocols had a detrimental effect. According to 66.7 percent of the respondents, many respondents agreed that social distancing had an impact on production. The conclusions of the descriptive statistics were supported by the inferential statistics based on linear regression, which showed that a 1 unit increase in health protocols would lead to a 0.53 decrease in the performance of Kenya's floriculture industry. This goes hand in hand with the findings of Yezli and Khan (2020) [35] and Deloitte (2020) [20], which we had mentioned in chapter two.

The third objective was to find out the measures they implemented to cope up with COVID-19 pandemic and the results showed that these strategies had a negative effect on performance of floriculture. Because the mean was predicted to be close to 4, as shown in table 11, the majority of respondents agreed that the measures put in place helped them deal with the COVID-19. The results of the linear regression demonstrated that a 1 unit increase in measures implemented will lead to a 0.678 decrease in the performance of the floriculture sector in Kenya, which is consistent with the findings of Floral (2020) [32], as we had mentioned in chapter two. As a result, the inferential statistic was in agreement with the findings of the descriptive statistics.

## 5.3 Conclusion

### 5.3.1 The effects of COVID-19 on the production of flowers

The first research question was to determine the effect of COVID-19 on the production of flowers. We found out that the descriptive statistics showed that production was affected by C0VID-19, however, the inferential statistic implied the opposite that production was not affected by COVID-19.

### 5.3.2 The effect of health protocols on the performance of floriculture sector

The second research question was to determine how the health protocols affected the performance of floriculture sector. We found out that both the descriptive statistics and inferential statistic showed that health protocols affected the performance of floriculture sector, hence we achieved our objective.

### 5.3.3 The measures implemented to cope up with the COVID-19 pandemic helped

The third research question was to find out if the measures that they implemented helped them cope up with COVID-19 pandemic. We found out that both the descriptive statistics and inferential statistic showed that the measures implemented affected the performance of floriculture sector, hence we achieved our objective.

## 5.4 Recommendations

This section of chapter five entails the practical suggestions that will help the situation or solve the problem investigated in the study. In our case we intend to advocate for the policy recommendations and recommendations for further research as illustrated below

## 5.5 Policy Recommendations

I. The implementation of subsidy policy- the government typically implements subsidy policies to counteract externalities and market failures in order to increase economic efficiency. In order

to compensate Kenya's flower farms for the significant losses brought on by the COVID-19 pandemic, the Kenyan government should provide subsidies.

II. Monetary policy: To assist flower farms in remaining afloat in the event of a future pandemic, the central bank should reduce the bank cash reserve ratio, provide borrowers more flexibility in lending terms, and lower interest rates.

III. Fiscal policy: To sustain cash flow for flower purchases in the event of future pandemic, the Kenyan government should propose accelerating payments of existing obligations.

IV. Non-restrictions for the cargo freights policy- the government should implement this policy in order to avoid huge losses because the flowers will be exported even during any other pandemic in the future.

#### 5.5.1 Recommendations for further research

I. Based on a case study that includes the majority of Kenya's flower farms, we advise conducting more research on the overall impact of COVID-19 on the performance of the floriculture sector.

II. Because the inferential statistic was at odds with our descriptive statistic, we also advise building on the conclusions based on our initial research question. They ought to employ logistic linear regression, which we were unable to do because of time constraints.

III. In the event that new ideas are developed as a result of our work, we advise that existing hypotheses be reviewed and expanded during subsequent research.

## ETHICAL APPROVAL

It is critical to follow ethical guidelines while working with human beings, which include informed permission, privacy and confidentiality. High ethical standards were followed throughout our project study in order to include cultural norms, handle any sensitive information with extreme caution, and obtain the agreement of all study participants.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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