CLIMATE CHANGE MITIGATION THROUGH PUBLIC FINANCE AT THE NAIROBI COFFEE EXCHANGE

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A Research Project Submitted to the Strathmore University Business School in Partial Fulfilment for the Degree of Bachelor of Commerce of Strathmore University

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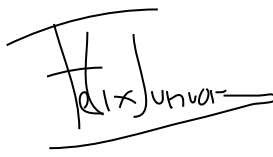
Strathmore University

Nairobi, Kenya

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other university. To the best of my knowledge and belief, the research project contains no material previously published or written by another person except where due reference is made in the research project itself.

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Approval

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ABSTRACT

The famous "coffee belt" or coffee-growing area exists only between the Tropic of Cancer and the Tropic of Capricorn. Due to the rising effects of climate change, its production suitability is projected to decline by half in 2050. In Kenya, coffee-growing zones such as Kiambu and Murang'a are no longer appropriate for the crop. As a result, coffee traders at the Nairobi Coffee Exchange (N.C.E) are experiencing a rise in prices and low quantity supply for trading. This research study aims to propose effective public finance policies to support N.C.E traders in mitigating the effects of climate change. The research methodology is qualitative and the population are N.C.E traders. The sample is composed of coffee marketers (the five coffee brokers approved by the Capital Market Authority of Kenya) and coffee buyers (the top eight coffee exporters in Kenya according to the Kenya Trade Network Agency). Data collection shows that 72% of respondents prefer subsidies as the most suitable public finance policies to help them face the effects of climate change. The study is only focused on the Nairobi Coffee Exchange, which limits the research in giving an overall conclusion that accommodates all coffee players in Kenya. Hence, further studies to be undertaken at a national level are encouraged. The study helps readers understand the effect that global warming will have on their morning coffee cups and aids the Government of Kenya to restructure the coffee industry as part of the country's poverty-reduction strategy. The rising consequences of climate change on the agriculture sector have led to the publication of many studies which provide solutions based on farmers' capabilities such as climate farming techniques, little work has been done to study how the government can use public finance as a tool to tackle the problem. As a result, this research study is unique and needed.

Keywords: Public finance, climate change, coffee.

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ACKNOWLEDGMENTS

DEDICATION

I dedicate this research paper to my wonderful nephew and niece, Ruhamanyi Dieudonné Michael and Ruhamanyi Agisha Eliora, and my beautiful grandmother, Ntiriserurwa Félicité. I thank the Lord for their presence in my life.

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CHAPTER ONE: INTRODUCTION

1.1.   Background of the study

The agricultural industry is the backbone of the Kenyan economy, accounting for about 33% of the GDP, employing more than 40% of the total population and 70% of the country's rural territory (United States Agency for International Development (USAID), 2021). The country is renowned for its coffee production since the Kenyan Arabica ranks among the world's five best coffees in the world due to its rich body, delightful aroma, and flavour (Intercontinental Coffee Trading (ICT), 2020). However, the crop is in jeopardy since rising temperatures will reduce by half the amount of land suitable for coffee production by 2050 (Ovalle-Rivera, Läderach, Bunn, Michael, & Schroth, 2015, pp. 1-2). For instance, due to global warming, coffee-growing zones such as Kiambu and Murang'a have become less appropriate for the crop (The East African, 2017). Short rainy and long dry seasons have a significant impact on the coffee harvesting period as they obstruct the maturation of coffee berries. Climatic change comes with a reduction in coffee yields which in the end affects coffee traders at the Nairobi Coffee Exchange (N.C.E). Research suggests that climate change is an externality because most of its consequences are not borne by those who pollute (Gruber, 2005, p. 219). Thus, public finance is one of the most critical aspects of economics in resolving externalities since it allows the government to intervene in the economy through taxation and/or subsidies (Gruber, 2005, p. 56). In this study, public finance policies are dependent variables, and climate change effects are independent variables.

1.2.   Background of the Kenyan Coffee Sector

In Kenya, Arabica coffee is grown on an estimated area of 115,570 acres across 32 counties. (International Coffee Organization (ICO), 2019). Temperatures of 18°C to 21°C are required for the famous crop to thrive; thus, they are grown in high-potential environments with temperatures ranging between 15 to 24 °C. Coffee accounted for 5.5% of total exports and 0.22% of GDP in 2017 (ICO, 2019). Coffee cooperatives number between 500 and 651 and their main goal is to safeguard the rights of farmers (Karuri, 2021, p. 11).

The coffee value chain starts with planting. Depending on the variety, it takes 3 to 4 years for newly planted coffee trees to give fruits. After harvesting, coffee farmers can deposit their crops at cooperative factories where they will be washed and delivered to millers who will grade them according to their quality. They result in green or clean coffee with different characteristics. Marketers are companies contracted by farmers to present their coffee for sale at the Nairobi Coffee Exchange. Every Tuesday, buyers bid on the most favourable beans depending on their financial capacity and the desired quality. After the auction sale and purchase confirmation, marketers store the coffee at their premises. Upon the receipt of funds; they release warrants to buyers as proof of ownership and pay farmers for their yields less a fee for the marketing services offered. Buyers will then initiate a coffee collection process at the marketers' premises. Buyers will choose between roasting the coffee (usually for local sales) or exporting it to international customers. Kenya exported $224 million worth of coffee in 2019, making it the world's 25th largest exporter with Belgium ($33.4 million), the United States ($31.9 million), Germany ($31.4 million), South Korea ($18.8 million), and Switzerland ($15.4 million) as the top destinations for the crop (The Observatory of Economic Complexity (OEC), 2019). Production, on the other hand, was 41,400 million tons (Kenya National Bureau of Statistics (KNBS), 2019).

1.3. Background of the climate policies in Kenya

Climate change means a change of climate, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable periods (United Nations (UN), 1992). Kenya is one of the few African nations that recognize the importance of climate change. The National Climate Change Response Strategy of 2019, the National Policy on Climate Finance (2015), the Climate Change Act (2016), and the National Climate Change Action Plan 2018-2022 (NCCAP) are examples of policies and legislations that the Government has implemented as yet. The Climate change Act mainstreams climate change responses throughout all sectors of the economy and gives the state and local governments the power to control climate action. The private sector, on the other hand, contributes by reducing carbon emissions and investing in various climate projects. The World Bank supported these initiatives by establishing the Kenya Climate Innovation Centre, an incubation centre that finances SMEs addressing climate change (Kenya Climate Innovation Center (KCIC), 2018). Kenya has also established a climate-smart plan, which

enables the NCCAP to include sustainable forest management, increase renewable energy, climate research, and green practices. The Act mandates the Cabinet Secretary for Environment to oversee climate change issues and establish a Climate Change Council chaired by the President of the Republic of Kenya. While these regulations serve to address the climate change effects, they did not benefit stakeholders in the economy since Kenya does not have a climate finance-reporting framework.

1.4. Problem Statement

The main problem is that climate change causes a reduction in coffee production. As a result, coffee traders at the N.C.E are affected in two ways: rising prices (on coffee buyers) and low availability quantity for trading purposes (on coffee marketers).

Despite being the most economically developed country in East Africa, the Kenyan Coffee yields were the lowest in the 2019/2020 crop year with a reduction of 8.2 % compared to East African counterparts (International Coffee Organization (ICO), 2020). Furthermore, the Kenyan coffee value chain funnels through several cooperative unions, millers, and marketing agents, where a lack of good corporate governance, as well as an apparent failure to fully exploit the potential of Kenya's relatively well-developed savings and loans cooperatives (SACCOs) in terms of channelling payments and providing financial services to farmers, contributes to low smallholder productivity.

1.5. Research objectives

1.5.1. General research objective

The research objective of this study is to determine the suitable public finance policy needed to support Nairobi Coffee Exchange traders in facing the effects of climate change.

1.5.2. Specific research objectives

1. To establish the public finance policies present at the N.C.E that protect traders from climate effects.
2. To assess the suitability of these public finance policies according to traders' perspectives.
3. To propose a more suitable public finance policy relative to traders' choices.

1.6. Research Questions

1. What are the public finance policies present at the Nairobi Coffee Exchange that support traders to mitigate the effects of climate change?
2. How suitable are these public finance policies according to traders' views?
3. What is the most suitable public finance policy to help coffee traders mitigate climate change?

1.7. Scope of the Study

The scope of the study focused on studying the public finance policies implemented at the N.C.E to help traders deal with climate change. The study covered both buyers and marketers who trade at the Nairobi Coffee Exchange every Tuesday. The sample size is composed of the five coffee marketers approved by the Capital Market Authority of Kenya (CMA) and the top eight coffee buyers/exporters in Kenya according to the Kenya Trade Network Agency (Kentrade).

1.8. Significance of the Research

This study is beneficial for all avid learners and coffee lovers. Moreover, since African scholars aspire to provide solutions to the increasing consequences of climate change in Africa, this study provides a unique answer that puts the responsibility on the shoulders of the government rather than the farmers and traders.

1.8.1. To the Government of Kenya

The study aids the government and public finance experts to comprehend the impact of climate change on the agriculture sector as a whole and the coffee sector in particular. Kenya, the world's 16th largest coffee producer (World Economic Forum (WEF), 2021) will be severely impacted if appropriate actions are not taken in advance. Climate change is having an increasingly negative influence on the Kenyan coffee sector which employs roughly 250,000 people according to the Coffee Research Institute of Kenya. As a result, the study helps the government to restructure the coffee industry as part of the country's poverty-reduction strategy.

1.8.2. To coffee traders

Since coffee traders are the players behind our morning coffee cups, the government must ensure they are protected while they face climate effects. The effect of climate change on trade has been discussed in many research studies around the world, yet few African countries have taken adequate actions. Hence, this research study advises the Government of Kenya to build strong systems to protect traders at the Nairobi Coffee Exchange

1.8.3. To readers

Many people associate coffee with the belief that it alters sleep patterns only. However, the crop has many health benefits: Heart disease reduction, fat reduction and increasing life expectancy (Link, 2022). Hence, by placing the crop at risk, climate change is threatening one of the gifts of humanity. The reader benefits from the study by understanding the unemployment impact that climate change will bring to the coffee industry. For students, this research shows the importance of the agricultural sector in Kenya, which needs intellectual minds to embrace it and build its future.

CHAPTER TWO:
LITERATURE REVIEW

2.1. Introduction

This chapter covers the study's theoretical and empirical reviews. The chapter's goal is to analyze existing literature by identifying research gaps that necessitate further studies. Works published by other authors and organizations are examined. The Chapter begins with section 2.2 theoretical review, which outlines the various discussions of externality in public finance and previous studies on the same. The empirical evidence is discussed in section 2.3, followed by sections 2.4 and 2.5 on research gaps and literature summary respectively. Section 2.6 presents the conceptual framework and lastly, section 2.7 summarizes the chapter.

2.2. Theoretical Review

Climate externalities have been discussed for a long time, yet the topic remains controversial. Externalities' frame of view has historically been separated into two major nodes. First with Pigou (1920). In his book, Economics of welfare, he argues that externality is the discrepancy between marginal private cost and marginal social cost and marginal private income and marginal social income. Coase's (1960) later discussion of externality was not the same as Pigou's. In his book, Problem of Social Cost, he claimed that externality is the direct impact of an actor's economic activities on other economic entities. Thus, the negative externalities presented in this research study i.e., climate change, is closer to Coase's research in terms of conceptualization. Besides, the law of supply and demand (1890), which dictates how prices are set and production distributed, helps the study to have a clear understanding of the economics behind coffee trading at the Nairobi Coffee Exchange.

2.2.1 Pigouvian tax theory

Pigouvian Tax by Pigou (1920) is a tax implemented against private individuals or businesses for engaging in activities that are harmful to society. Those side effects are not included in the product's price; instead, they are external, such as pollution and disease from tobacco products. When the firm produces, greenhouse gases are released to

contribute to global warming and harm our world in several ways. The Pigouvian tax theory aims to reflect the true cost of the product borne by society. The tax's goal is to ensure that carbon producers bear this external cost. For forty years, Pigou's externality theories dominated mainstream economics, but they fell out of favour once Nobel Laureate Ronald Coase presented his ideas. Coase used Pigou's analytical framework to show that Pigou's examination and solution were often incorrect.

2.2.2 Coase Theory

Coase's theory (1960) is used in circumstances when one party's economic activities cause a cost or damage to another party's property. Funds may be offered to compensate one party for the activities of the other or to pay the party whose activity causes the damages to stop that activity based on the bargaining that occurs during the process. The theory differs from the Pigouvian tax theory on property rights. For example, if a steel corporation owns the property affected by the emissions, then there is no point to tax it. Although if coffee farmers are the owners, then Coase gives two possible ways to settle the problem. First, the firm can decide to compensate financially the farmers in exchange for their permission to continue the harmful activities, or the firm can choose to refrain from its activities if the farmers can be persuaded to pay the business a fee to do so as a compensation for the lost revenue associated with stopping the production. Although, there are problems associated with the application of the internalization of externality. First, the assignment problem, which simply states that it is difficult to calculate the damage since climate change can come from many sources not only from polluting firms. Second, the free-rider problem can still occur even after the assignment problem is solved. The free-rider problem is when an investment has a personal cost but a common benefit, individuals will underinvest (Gruber, 2005, pp. 258-259) .

2.2.3 Supply and demand theory

The law of supply and demand was discovered by various scholars. It states that a product's availability and attractiveness influence its price. the concept is one of the most well-known in economics and was seen in the marketplace long before it was described in a published book or even given its name. Smith (1776) known as the "Father of Economics," defined supply and demand as an "invisible hand" that automatically directs the economy's pricing

and distribution processes. In his book, The Wealth of Nations, he described an economy with butchers and bakers who meet the demand of their society. Marshall (1890) was the first to develop the supply-and-demand curve that we know today, his contributions to microeconomics indicate that when resources are scarce, the price tends to rise but when production is high and goods are available to a large number of people, prices are low. In general, as prices rise, individuals are inclined to supply more and demand less, and vice versa when prices fall.

2.3 Empirical Review

When facing externalities such as climate change in the private market, research suggests that the government has two options to intervene in the economy: Taxation and subsidies (Gruber, 2005, p. 56).

2.3.1 Taxation

A study conducted by Goulder (1993), a professor in Environmental & Ressources economics at Stanford University, used computer simulation models to assess the economic impacts of both distortionary and corrective taxation. Distortionary taxes are those charged on employment income. The research reveals that corrective taxes are less costly to collect than income taxes since they are easily enforceable and paid directly to the tax authority using digital finance means. Unlike most climate policy instruments, using taxes raise considerable revenues to finance climate mitigation activities.

Knight (2008) argues that pricing carbon is the most preferred method by economists when dealing with climate change. According to his studies, a public finance policy taxing carbon emissions can reduce pollution and encourage polluting companies to expand production using innovative low emission technologies. The government can achieve this by taxing polluting firms an amount of marginal damage (MD) for each unit of good produced.

In Kenya, Wanyonyi (2019) conducted a study to determine if carbon taxation can be incorporated into Kenya's law. She reached out to 53 financial experts, 33 practitioners in Natural Resource Management (NRM) and 64 climate experts. Her findings reveal that 49 percent of financial experts, 63 percent of NRM officials and 53 percent of climate experts

agree with the notion that an increase in fossil fuel taxes will decrease demand for fossil fuels and related commodities. Moreover, 95 percent of financial experts suggest that they would expect clean energy technologies to expand if the Government of Kenya implements a carbon tax on local polluting firms. Even though corrective taxes are extolled to be an effective way to curb emissions and ease the burden of vulnerable households, 70% of energy-related CO_2 emissions from developed and emerging countries are entirely untaxed (OECD, 2019).

2.3.2 Subsidies

Hoffmann and Jones (2021) examined the impact that subsidies have in helping farmers use climate technology techniques and increase their production. From a sample of 236 Kenyan farmers, they noticed that subsidies increase technology adoption by almost 50 percent.

Although, Kurukulasuriya (2021) estimated that governments around the world spend on average US$453 Billion to subsidize fossil fuel consumption instead of climate-smart agriculture. In other words, for every dollar pledged to tackle climate change, four dollars are spent to keep the crisis alive. Besides, a research analysis conducted by the UNDP's Don't Choose Extinction team in October 2021 highlights that the total amount spent on fossil fuels could eradicate extreme poverty three times over in the world. UNDP study suggests the following alternative methods of public fund usage: Phasing out fossil fuel subsidies, implementing a carbon tax and redirecting funds toward people (United Nations Development Programme, 2021).

2.4 Research gaps

The metrics proposed by Pigou (1920) and Coase (1960) are used all over the world as a threshold for public finance, however, they are somehow narrow to tackle large challenges such as climate change due to the assignment and free-rider problem. The research conducted by Wanyoyi pictured the view of financial experts on the implementation of a carbon tax, but a more diverse group would have enabled a deeper discussion on the various arguments in favour of or against the implementation of explicit carbon taxes. Research studies on subsidies covered a large number of coffee farmers and showed that they were

effective in enhancing farmers' activities, although, since the impact of climate change is not the same in each county, adding the location characteristics of respondents would have benefited the study in assessing the type of subsidies each farmer needs.

2.5 Summary of literature review

Previous theories on externality have been divided into two major nodes: Pigouvian tax and Coase theorem. These theories have guided public finance officials in setting policies against climate change. Coase theory forestalls others by setting property rights to determine who is liable for the climate change burden. Although, the research gap noted here is that climate change is a global issue, and it is difficult to determine whom to blame due to the assignment problem. On the other hand, the supply and demand theory argued that when resources are scarce, the price tends to rise but when production is high and goods are available to a large number of people, prices are low. The empirical literature has shown that corrective taxation is an effective measure to deal with the daily pollution in cities. Moreover, subsidies against climate change are important to revive the coffee industry in Kenya. The size of respondents and location characteristics are gaps noted in previous studies.

2.6 Conceptual framework

The conceptual framework is a model that shows the relationship between the dependent and independent variables (Scribber, 2015).

The Climate change effects **(Independent Variables)**:

1. Low coffee availability

2. Rising coffee prices

→

Public finance measures **(Dependent Variables).**

1. Taxation
2. Subsidies

Figure one – Conceptual framework: Relationship of climate change effects faced by N.C.E traders and public finance measures.

2.7   Summary of the chapter

The chapter analyses the previous literature on externalities presented throughout history. In the theoretical part, we have noticed that externalities are concepts that appeared in economics when market failures were observed. Pigou (1920) and Coase (1960) both agree that externalities cause social inefficiency, but they differ in the solutions to be undertaken as they propose taxation and property rights allocation respectively. Smith (1776) argued that supply and demand concepts automatically direct the economy's pricing and distribution processes and Marshall (1890) followed by indicating that when resources are scarce, the price tends to rise but when production is high and goods are available to a large number of people, prices are low. On the other hand, empirical research has proved public finance measures to be efficient in tackling climate change and helping farmers increase their yield. Tax studies have shown the relevance of corrective taxation in cities and its popularity among financial experts in Kenya. Subsidizing coffee farmers lead to increase mitigation techniques that use technology. However, since climate change is global, research studies that test international public finance measures are encouraged, and gaps relating to respondents' characteristics and location encourage further study to cover national coffee players. The conceptual framework of our study classifies climate effects into two: Rising prices (coffee buyers) and low quantity (coffee farmers). Public finance measures available are taxation and subsidies.

CHAPTER THREE:
RESEARCH METHODOLOGY

3.1. Introduction

A research methodology is a method for systematically solving a research problem and can be regarded as a science that studies how the research is carried out (University of Kashmir, 2021). This chapter looks at the steps that the researcher took to investigate his research problem as well as the logic behind them. Section 3.2 outlines the design used in the study, followed by section 3.3 on population and sampling. Data analysis of the research is presented in section 3.4, followed by section 3.5 on data collection and section 3.6 on research quality. Section 3.7 presents the construction of questionnaires. Ethical issues in research are addressed in section 3.8.

3.2. Research Design

The research design is the overall method you adopt to combine the various components of the study logically and cohesively, ensuring that the researcher effectively addresses the research problem; it is the blueprint for data collecting, measurement, and analysis (Vaus, 2001). The research study uses a qualitative approach. The research process involves emerging questions and procedures, data typically collected in the participant's setting, and the researcher making interpretations of the meaning of the data.

3.3. Population and sampling

A population is a group of people from which a statistical sample for a study is drawn (Investopedia, 2021). The study population focuses only on Nairobi Coffee Exchange traders. The sample is divided into two groups: buyers and marketers. The sample of buyers is composed of the eight top coffee exporters in Kenya according to the Kenya Trade Network Agency (KenTrade). The sample of marketers is composed of the current five approved coffee brokers in Kenya by the Capital Market Authority (CMA).

3.4. Data collection methods

The study used primary data. Data were collected by administering questionnaires to the targeted respondents at the N.C.E. In total thirteen questionnaires were dispatched. Each respondent is a representative of the targeted entity, preferably the auction managers. Demographic characteristics of respondents such as gender, age, and occupation were also collected.

3.5. Construction of questionnaires

A questionnaire is defined as a document containing questions and other types of items designed to solicit information appropriate to analyze (Acharya, 2010). In the case of our research, each question has been designed to respond to the specific research objectives.

The researcher asks question number one to establish the current public finance policies present at the N.C.E that support traders in facing the effects of climate change. Question number two aims to assess the suitability of these public finance policies in helping coffee traders. Question number three aims to propose a suitable public finance policy according to the respondents' needs. Respondents shared relevant information only, duplication or unnecessary information was not of relevance.

3.6. Data analysis

To answer research questions and fulfil the objectives of the study, the researcher needed to design relevant research instruments. The data analysis adopted to respond to each research objective sought to come up with similar research questions destined to collect data from respondents. For example, to address research objective 1 the researcher designed question five on the online questionnaires (Appendix 1, question 5) destined to collect information about any public finance policy implemented by the government to protect traders. Research objective number 2 was addressed through question 6 (Appendix 1) which sought to collect data on how the implemented public finance policies were suitable to meet respondents' problems. Research objective 3 was addressed through question 7 (see appendix 1) which sought to collect data on which is the most preferred public finance policy of coffee traders

3.7.   Research quality

Research quality is the extent to which a research instrument measures what was intended to be measured (Robinson, 2011).

Creswell and Poth (2013) consider "validation" in qualitative research as trying to assess the "accuracy" of the results, as best described by the researcher, the participants, and the readers. Whittemore, Chase, and Mandle (2001) give a guideline on qualitative research validity. They classified the criteria into Credibility, Authenticity, Criticality, and integrity. These guidelines have been implemented in this research as follows:

Credibility: The result should be an accurate interpretation of the participant's meaning. The questions to N.C.E traders are clear to allow the respondents to understand what is requested from them. After receiving the questionnaire responses, the researcher sought feedback from respondents to ensure that the intended answers are similar to the ones collected. Authenticity: This research seeks to hear different voices to draw a relevant conclusion. For instance, the samples seek to understand and hear parties involved in the coffee value chain: buyers (representing consumers) and marketers (representing farmers). Criticality: The researcher submitted the draft of the instruments to the supervisor to assess their validity. After the study, the researcher contacted coffee industry practitioners to receive feedback and assess if the instruments were effective in sourcing the relevant information needed from N.C.E traders. Integrity: It refers to the researcher's degree of self-criticism. The researcher sought to achieve the objective of the study only and ensure that his intentions and work deliver the same.

3.8. Ethical issues in research

The researcher sought a letter of introduction from the University before actual data collection. Before the administration of the questionnaire, the researcher called every respondent to explain to them the study being conducted and request their business email. The respondents were reminded that this research is purely for academic purpose and their data will not be used for other purposes. The respondent's confidentiality was maintained by ensuring that the name, email and data of the person filling the questionnaires is not visible to the researcher. The researcher ensured that the study is free of plagiarism or research misconduct by sending formal emails to every respondent requesting them to fill out the questionnaires. Close communication was maintained to ensure that all respondents were able to fill in their data into the google forms and avoid duplication. The researcher used the responses to accurately represent the results.

CHAPTER FOUR:
PRESENTATION OF RESEARCH FINDINGS

4.1. Introduction

This chapter analyzes the findings of primary data collected through the questionnaires delivered to targeted respondents in the coffee sector. Section 4.2 describes the frequency of respondents and their answers to the main questions of the study. Section 4.3 gives the representation of the data collected i.e. demographic characteristics, occupation, age and gender of the respondents. The analysis findings were presented in tables. Descriptive statistics such as frequencies and percentages were used to analyze responses to various variables in the questionnaires.

4.2. Descriptive Statistics

Descriptive statistics entails discussing the research variables in terms of the frequency of respondents to comprehend the diverse replies to the questionnaire questions in connection to each study variable (Ali, 2018). 13 companies (8 coffee buyers and 5 coffee brokers) were issued questionnaires and 11 (7 coffee buyers and 4 coffee brokers) respondents returned the questionnaire. A response rate of 84.6% was obtained in the study. This is a good response rate according to Mugenda and Mugenda (1999).

Table 1 displays the public finance policies that the government can use to intervene in the coffee sector. Roughly, 82% of the respondents state that the government did not intervene to help their organizations face climate change effects.

Table 1: (Question 5) What are the public finance policies present at the Nairobi Coffee Exchange to support traders mitigate climate change.

Options	Frequency (Buyers)	Frequency (Marketers)	Total	Percentage	Cumulative Percentage
Subsidies	1	1	2	18.18%	18.18%
Taxation	0	0	0	0%	18.18%
None	6	3	9	81.81%	100%
Total	7	4	11	100%	

Table 2: (Question 6) Suitability of these public finance policies according to traders' views

Table 2 shows the suitability of the implemented public finance policies (if any) to respond to traders' needs. This question is related to question five since respondents chose "strong disagree" if no public policies were implemented. Hence, the same 82% of the respondents state that the government inactivity led to an unsuitable outcome.

Options	Frequency (Buyers)	Frequency (Marketers)	Total	Percentages
Strongly disagree	6	3	9	81.81%
Disagree	0	0	0	0%
Normal	1	0	1	9.1%
Agree	0	1	1	9.1%
Strongly agree	0	0	0	0%
Total	7	4	11	100%

Table 3: (Question 7) What would be the most suitable public finance intervention to help coffee traders mitigate climate change.

According to traders' respective challenges, 72.7% prefer subsidy policies as a way to revamp the coffee sector and prepare for climate change. Such policies include subsidizing coffee production to stabilize coffee prices (benefiting coffee buyers) and at the same time, the policy encourages production to keep coffee marketers in their business as auction brokers.

Options	Frequency (Buyers)	Frequency (Marketers)	Total	Percentages
Subsidies	5	3	8	72.7%
Taxation	1	1	2	18.2%
(Other) Remove VAT	1	-	1	9.1%
Total	7	4	11	100%

4.3. Sample Representation

The sample is composed of coffee marketers (the five coffee brokers approved by the Capital Market Authority of Kenya) and coffee buyers (the top eight coffee exporters in Kenya according to the Kenya Trade Network Agency (Kentrade)) as shown in Appendix 2.

4.4. Demographic representation

4.4.1. Gender representation

Question 1 requested respondents about their gender identity. The study established in Table 4 that 63.6% of those surveyed were males while 36.4% percent were females. Gender was a critical factor in assessing the different views of public finance policies that the government can undertake. The distribution of gender among study respondents is displayed in the table as follows:

Table 4: Respondents' representation by gender

Gender	Frequency (Buyers)	Frequency (Marketers)	Total	Percentages
Male	4	3	7	63.6%
Female	3	1	4	36.4%
Total	7	4	11	100%

4.4.2. Age representation

Question 2 sought to determine the current age of respondents. This was to determine if age has any connection with the different perceptions of public finance techniques to be used to tackle climate change. The results indicate that the age distribution of the respondents comprises 54.5% of the respondents being in the age bracket of 40-50 years of age. The 30-39 age bracket constitutes 45.5%. The age distribution of respondents indicates that the distribution is desirable since older respondents may be more knowledgeable about public finance and climate change because of the experience gained in the coffee sector. The results are shown in Table 5 below.

Table 5: Respondents' representation by age

Age level	Frequency (Buyers)	Frequency (Marketers)	Total	Percentages
Below 30 years	0	0	0	0%
30-39 years old	3	2	5	45.5%
40-49 years old	4	2	6	54.5%
50 years old and above	0	0	0	0
Total	7	4	11	100%

4.4.3. Occupation/Job representation

The target respondents were requested in question 3 to provide the current position they occupy within their companies. The purpose was to determine if respondents are in the capacity to make adequate decisions and suggestions regarding the challenges they are facing due to climate change. 46% of respondents are auction managers while other positions occupy low percentages. It benefits the study since only auctioneers can trade coffee on behalf of their companies every Tuesday at the Nairobi Coffee Exchange. The results are shown in Table 6.

Table 6: Occupation of respondents

Position	Frequency (Buyers)	Frequency (Marketers)	Total	Percentages
CEO	1	0	1	9%
Export Manager	1	0	1	9%
Auction Manager	2	3	5	46%
Finance Manager	1	0	1	9%
Marketing Manager	0	1	1	9%
Warehouse Manager	0	0	0	0%
Office Assistant	1	0	1	9%
Finance Assistant	1	0	1	9%
Total	7	4	11	100%

4.4.4. Participation in the Nairobi Coffee Exchange

Question 4 sought to investigate if respondents are active participants in the Nairobi Coffee Exchange Auction. It is critical for the study since it proves that respondents are aware of any public finance policies implemented by the government. The results shown in Table 7 indicate that all coffee traders participate in the N.C.E auction every Tuesday.

Table 7: Participation in the Nairobi Coffee Auction

Response	Frequency (Buyers)	Frequency (Marketers)	Total	Percentages
Yes	7	4	11	100%
No	0	0	0	0%
Total	7	4	11	100%

4.5. Summary of findings

Coffee traders are affected by climate change since global warming has consequences on the price and quantity available of coffee. In other words, the quantity of available coffee for trading at the Nairobi Coffee Exchange will dramatically reduce over the next years due to climate change, leading to increase prices due to an unchanged demand. The study reached out to the top 8 coffee exporters and the 5 approved coffee brokers in Kenya to understand their situation and how the government can help by using public finance tools.

Demographic characteristics of respondents indicate that 63.6% are male and 36.4% female. All the respondents are between the age of 30 to 49 years old and 40-50 years. 46% of them occupy the position of auction manager in their companies. Besides, they all participate in the N.C.E auction held every Tuesday. In responding to the main questions of the research, 82% of respondents admitted that the government did not implement any public finance measure to help them face the effects of climate. This led them to "strongly disagree" on the effectiveness of the government intervention. Lastly, 72.5% of respondents agree that subsidies (incentives) are the most suitable public finance policy to implement as a way to help them face climate challenges.

CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter summarizes the study and gives a conclusion to the subjects addressed in the study. Section 5.2 summarizes the main findings, followed by section 5.3 which concludes the study and 5.4 on recommendations. Section 5.5 suggests further study be undertaken on the research findings and the study's limitations are presented in section 5.6.

5.2. Summary of findings

The relationship between climate change and public finance to save the coffee sector in Kenya was the main incentive for undertaking the study. It, therefore, unveiled the effect of public finance tools entailing subsidies, and tax in helping coffee traders at the Nairobi Coffee Exchange face the consequences of climate change. Previous studies on taxation highlighted the importance of carbon tax introduction in Kenya, however, the results of this study differ. Respondents' feedback shows that a carbon tax would be more efficient for a developed economy, and Kenyan polluting companies can reduce their carbon footprint as long as the government implement measures for climate change rather than punishing them directly with taxes. Hoffmann and Jones (2021) study on subsidies revealed that the policy helped farmers to thrive. Their studies correspond to our conclusion that if farmers succeed traders also succeed. That is why 72.7% of the 11 coffee traders agree with the notion that subsidies are essential public finance tools to help traders face climate change because subsidies encourage coffee farmers to produce more coffee beans, leading to a high coffee supply which afterwards reduces the price (benefiting coffee buyers) and ensures availability of the commodity for trading (benefiting coffee brokers). Pigou's theory (1920) on public finance taxation affirms that carbon producers should bear the external cost of climate change, Although, our study does not confirm that since it is not always the case, but rather the study suggests other measures suitable to allow coffee traders to benefit without giving the government the need to tax polluting firms. The supply and demand theory, on the other hand, is confirmed by the fact that climate change affects both prices and quantity since the majority of respondents affirmed subsidies as the way to increase the quantity and reduce prices.

5.2.1. Summary of objective 1

The Objective 1 of the study is to establish the public finance policies at N.C.E helping coffee traders face climate change. Data were collected from 11 traders out of the 13 targeted. Research question 1 reflected this objective. 82% of the respondents stated that the government did not intervene to help organizations face the effects of climate change.

5.2.2. Summary of objective 2

Objective 2 of the study intended to measure the suitability of the implemented public finance policies (if any) to respond to traders' challenges. The objective was addressed in research question 2 where 82% of respondents strongly disagree with the presence of any policy suitable to respond to their needs.

5.2.3. Summary of objective 3

Objective 3 of the study sought to ask for traders' views on which public finance policy would be suitable for them to face climate effects. 72.7% of respondents agree that subsidies are of great advantage for them. Subsidizing coffee production to keep coffee prices low for coffee buyers and increasing output to keep coffee marketers in business as auction brokers are benefits of such incentives.

5.3. Conclusions

The study focused on responding to the present need of helping coffee traders face the effects of climate change. The study uses qualitative analysis to determine the current public finance measures to help coffee, then propose more suitable measures according to traders' views and needs. The targeted population are Nairobi Coffee Exchange traders (coffee buyers and marketers). The sampling focused on the top 8 coffee exporters in Kenya (as coffee buyers) and the current 5 approved coffee brokers by the Capital Market Authority of Kenya. Trading of coffee in Kenya happens only at the Nairobi Coffee Exchange; hence it was an adequate place to carry out the study. Online questionnaires that mirror the research objectives were provided to respondents. Out of the 13 traders, 11 returned the questionnaires. Demographic characteristics show that 63.6% of them were male, all respondents' are active participants in the Nairobi Coffee Exchange Auction,

respondents' age varies between 30 to 49 years old, and 46% occupy the position of auction managers. Respondents' views on the public finance policies needed for climate change mitigation indicate that 82% did not benefit from any policy implemented by the government of Kenya, leading the same number to disagree on the presence of any suitable finance measures. 72.7% believe that subsidy is the most suitable measure to help face climate change effects. When getting feedback from respondents about their choices, they indicated that subsidies are more innovative since the government can develop an incentive scheme to promote the planting of specific trees that are friendly to coffee (such as macadamia) to provide shade to the coffee. The method is a win-win for the farmers as they get better quality coffee grown under shade, and earn extra money from the tree (sell of macadamia) while mitigating the adverse effects of global warming. Respondents' arguments against other public finance tools such as taxation advise that: being a young economy, taxing Kenyan polluting firms could bring problems and will involve many politics.

5.4. Recommendations

The study, therefore, undertakes various recommendations that would help in the relationship between climate change and public finance to save the coffee industry. The study recommends that the government should recognize agriculture as a sector at high risk that needs support and investment. On a global scale, coffee is ranked one of the most consumed beverages, employing millions of people and in Kenya, the beans drive economic growth and employment of the rural population. As a result, the study, therefore, recommends the government subsidize activities that will enhance coffee production and grow shade trees to provide extra income for farmers.

5.5. Suggestions for further research

Further study should be undertaken at a national level and in the global context where developed countries are considered in the study. The findings of this study should therefore be compared to whether they hold in such a scenario. A study that involves Kenyan coffee farmers to determine if subsidies are suitable policies for them too is needed. This study would have been more informative if other individual traders at the Nairobi Coffee

Exchange were involved in data collection and many other coffee players who are facing climate change in Kenya.

5.6. Limitations of the research

The study was conducted only at the Nairobi Coffee Exchange, which limits the research in giving an overall conclusion that accommodates all coffee players in Kenya. Although the research is unique as it engaged primary sources of data by utilizing questionnaires. Having less than 50% of respondents occupying auction manager positions within their firms may imply that respondents' knowledge of coffee auction trading is not perfect.

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APPENDICES:

Appendix 1: Research Instruments

QUESTIONNAIRES

1. TO COFFEE BUYERS

I am an undergraduate student at Strathmore University pursuing a Bachelor of Commerce degree. This questionnaire intends to study how the government of Kenya can help Nairobi Coffee Exchange traders (buyers) facing climate change effects (rising coffee prices). Your organization have been selected as part of the sample to provide necessary data for this study. The sampling process is based on the list of the top 8 coffee exporters in Kenya by the Kenyatrade Agency Network. The information obtained from this questionnaire shall be used for academic purposes only and will remain confidential when compiling them for results.

1. What gender do you identify as?
   o Male
   o Female

2. What is your age range?
   o Below 30 years
   o 30-40 years old
   o 40-50 years old
   o 50 years old and above

3. What is your occupation?
   o Export Manager
   o Auction Manager
   o Finance Manager
   o CEO
   o Other (please write below)

4. Do you participate in the Nairobi Coffee Exchange auction held every Tuesday?
   o Yes
   o No

5. When facing the global effects of climate change which affected coffee prices, how did the government support your organization?

   o Subsidies (The government helped by subsidizing coffee production to lower and control coffee prices).
   o Taxation (The government taxed polluting firms in Kenya and used the proceeds to fund and protect our industry).
   o The government was passive (no public finance measures were taken to help coffee buyers face climate change).

o   Other (please specify).

6.   The public finance policies adopted were suitable for supporting my organization to face the rising prices of coffee due to climate change. (On a scale of 1 to 5).

1   2   3   4   5

Strongly disagree o   o   o   o   o   Strongly agree

7. What is the most suitable public finance intervention to help coffee buyers (your organization) mitigate the effects of climate (the rising coffee prices)?

o   Subsidizing coffee production to lower the price.
o   Taxing polluting companies in Kenya and using the proceeds to finance and support the coffee industry and trade.
o   Other:

2.   TO MARKETERS

I am an undergraduate student at Strathmore University pursuing a Bachelor of Commerce degree. This questionnaire intends to study how the government of Kenya can help Nairobi Coffee Exchange traders (marketers) to face climate change effects (low coffee yields). Your organization have been selected as part of the sample to provide necessary data for this study. The sampling process is based on the list of the 5 approved coffee brokers in Kenya by Capital Market Authority. The information obtained from this questionnaire shall be used for academic purposes only and will remain confidential when compiling them for results.

1. What gender do you identify as?

o   Male
o   Female

2. What is your age range?

o   Below 30 years
o   30-40 years old
o   40-50 years old
o   50 years old and above

3. What is your occupation?

- o Marketing Manager
- o Warehouse Manager
- o Auction Manager
- o Finance Manager
- o CEO
- o Other (please write below)

4. Do you participate in the Nairobi Coffee Exchange auction held every Tuesday?

- o Yes
- o No

5. When facing the global effects of climate change that affected coffee yield, how did the government support your organization?

- o Subsidies (The government is subsidizing coffee farmers to augment coffee yield).
- o Taxation (The government is taxing polluting firms in Kenya and using the proceeds to revamp coffee marketing).
- o The government was passive (no public finance measures were taken to help coffee marketers facing climate change).
- o Other (please specify).

6. The public finance policies adopted were suitable for supporting my organization to face the low coffee yields from farmers due to climate change. (On a scale of 1 to 5).

1 2 3 4 5

Strongly disagree o o o o o strongly agree

7. What is the most suitable public finance intervention to help coffee marketers (your organization) mitigate the effects of climate (low coffee yields from farmers)?

- o Subsidizing coffee production to encourage production.
- o Taxing polluting companies in Kenya and using the proceeds to finance and support the coffee industry and marketing.
- o Other:

Appendix 2: Sample list

The Sample list

Buyers	Reason for choice
1. Dormans Limited 2. Kenya Co-operative coffee exporters Limited 3. Rockbern Coffee Group Limited 4. Africoff Trading Limited 5. Diamond Coffee Limited 6. Mwangi Coffee Exporters 7. Sannex Coffee 8. Rashid Modeline & Co.	These companies are listed as the largest coffee exporters by Kenyatrade (2017). References: Kenyatrade Top coffee exporter rank.
Marketers	**Reason for choice**
1. Meru County Coffee Marketing Agency Limited 2. Kipkelion Brokerage Company Limited 3. Murang'a County Coffee Dealers Company Limited 4. United Eastern Kenya Coffee Marketing Company 5. Mt. Elgon Coffee Marketing Agency	These companies are the only approved coffee brokers in Kenya by CMA (2021) References: CMA list of licensees.

Appendix 3: Letter of introduction from the university

Ole Sangale Rd, Madaraka Estate,
P.O Box 59857 00200, Nairobi, Kenya.
Cell: +254 703 414/6/7, Twitter: @SBSKenya
Email: info@sbs.ac.ke or visit www.sbs.strathmore.edu

Strathmore
UNIVERSITY
BUSINESS SCHOOL

08 April 2022

To whom it may concern

Academic Reference for Twayigize, Felix Junior - Student Number 113702

Strathmore University offers the Bachelor in Commerce degree program. In their 4th year of study, each degree student is required to work on a Management Research Project. The project involves reading literature that relates to the research topic; data collection and analysis and finally preparing a written document of the research findings and recommendations.

Felix is requesting to gather information to be used in his research. He is accountable for all information extracted from you and ensure that it will be used for research purpose only and will be kept confidential.

The research is entitled "Influence of Public Finance Policies on Coffee Traders Affected by Climate Change in Kenya."

We are looking forward for your co-operation and assistance to the above named student.

Any assistance accorded to him will be highly appreciated.

Yours faithfully,

Mary Weremba
Manager, Undergraduate Programmes
Strathmore Business School
Email: mweremba@strathmore.edu

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Appendix 4: Similarity report

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Document Information

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Submitter email	felix.twayigize@strathmore.edu
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Analysis address	library.strath@analysis.urkund.com

Sources included in the report

SA	**Strathmore University / 112067 .docx** Document 112067 .docx (D129086791) Submitted by: Stella.Warucu@strathmore.edu Receiver: maminga.strath@analysis.urkund.com	⊞ 2
W	URL: https://www.pd.co.ke/commerce/nairobi-coffee-exchange-debars-brokers-at-auction-sale-91406/ Fetched: 2022-05-16T15:04:48.4000000	⊞ 1