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**RELATIONSHIP BETWEEN SOCIAL AND ECONOMIC FACTORS AND INCOME
FROM CONTRACT FARMING OF HORTICULTURAL CROPS IN MACHAKOS
COUNTY**

BY



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REG No. 53190

**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF MANAGEMENT IN
AGRIBUSINESS AT STRATHMORE UNIVERSITY**

APRIL 2026

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 dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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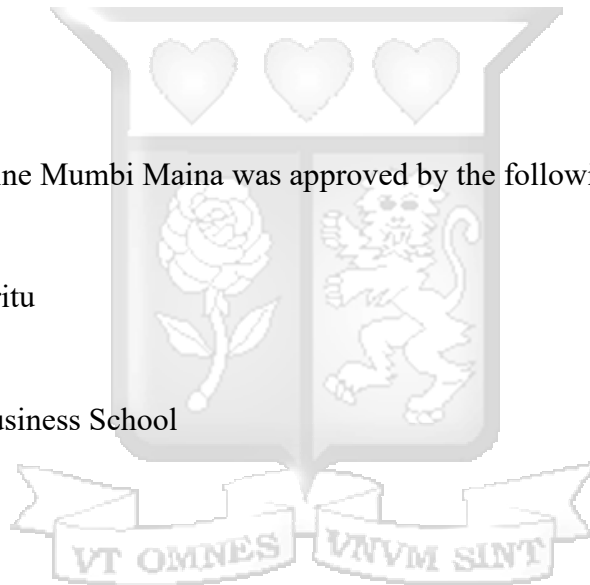
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ABSTRACT

Contract farming is widely regarded as an institutional arrangement capable of enhancing agricultural productivity, stabilizing markets, and improving rural livelihoods. However, income outcomes for smallholder farmers remain inconsistent across contexts. This study examined the relationship between social and economic factors on income from horticultural contract farming in Machakos County, Kenya, focusing on how selected socio-economic characteristics affect annual income per acre under contractual arrangements. The study was guided by Transaction Cost Theory (TCT) and Resource Dependence Theory (RDT) to frame the role of efficiency, resource access, and interdependence in shaping income outcomes. A census approach was adopted, covering 350 horticultural farmers contracted by VegPro Kenya Limited. Primary data were analyzed using descriptive statistics, correlation analysis, and multiple regression techniques. The regression model was statistically significant and had moderate explanatory power, indicating that the selected variables explain a meaningful proportion of the variation in income per acre. Findings show that while farmers exhibit relatively homogeneous demographic characteristics—middle age, moderate education, and substantial farming experience—these social factors do not consistently influence income outcomes. Household size was the only social variable with a statistically significant positive effect, suggesting the importance of household labor availability. Economic factors showed stronger effects: production cost had a significant positive relationship with income per acre, implying that higher input investment enhances productivity, while farm size had a significant negative effect, indicating declining efficiency at larger scales. Household earnings showed a positive but statistically insignificant relationship, and output prices remained constant due to contractual pricing arrangements. The study concludes that income outcomes in horticultural contract farming are primarily driven by labor availability, production intensity, and land-use efficiency. While the findings provide partial empirical support for Transaction Cost Theory and Resource Dependence Theory—particularly regarding resource optimization and structured market access—these relationships are context-specific and not universally generalizable. The study is limited by its cross-sectional design, focus on a single contracting firm, and reliance on self-reported income and cost data, which may affect external validity and measurement accuracy. Future research should incorporate longitudinal data and comparative contract models to strengthen causal inference. Policy recommendations include strengthening contract design, enhancing farmer capacity in cost management, and improving access to productive inputs to maximize income benefits.

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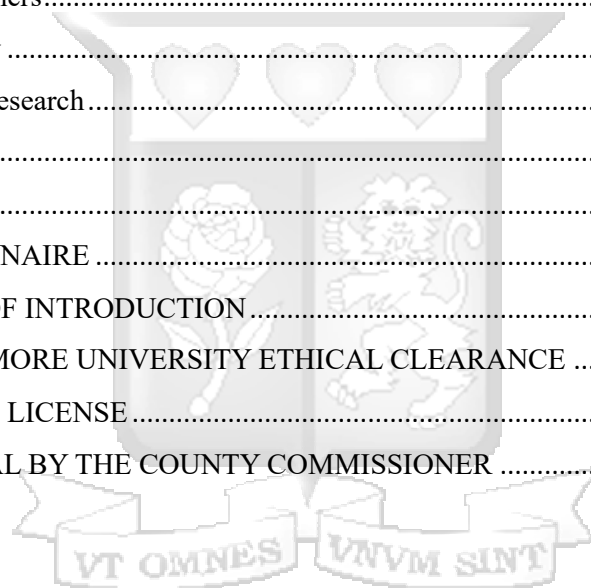


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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Agriculture remains a central driver of economic development in Sub-Saharan Africa (SSA), with horticulture emerging as a key component due to its high value, labor intensity, and links to vital markets (Murigi et al., 2024). In Kenya, contract farming in horticulture offers a potential solution to persistent challenges such as weak market organization, price volatility, and unreliable buyers by linking smallholder farmers to structured markets and stabilizing their incomes (Murigi et al., 2024).

Contract farming, or production contracting, has existed globally for over a century. Documented early in Japan, the United States, and Malaysia (Runsten & Key, 1996), it began in 1885 when Japan used it to secure sugar production in Taiwan. U.S. firms expanded it in Central America in the early twentieth century. Adoption accelerated in Europe and North America from the 1930s to the 1950s, driven by commercial fruit and vegetable markets. The practice later spread to South and Southeast Asia, often with government support for agricultural commercialization, as seen in Malaysia since the mid-1950s (Ncube, 2020).

In developing countries, particularly in Africa, contract farming has expanded since the late 1980s, but farmer participation rates remain low. While the World Bank estimates that up to one-quarter of Kenyan farmers may be involved in such arrangements, rates in most developing countries are substantially lower, with less than 5% participation in countries like Ghana, Uganda, and Vietnam (Minot et al., 2024). This context emphasizes the importance of understanding what drives farmer income from contract farming, as explored in this study.

The prevalence of contract farming varies significantly across commodities, with the practice especially widespread in export-oriented horticulture in Kenya, Madagascar, and Senegal (Minot et al., 2024). In Kenya, proximity to Nairobi and increasing commercialization, particularly in Machakos County, have promoted export-linked horticultural contract farming and involvement with firms such as VegPro Kenya Limited. While studies highlight noteworthy income gains for participating farmers, the mechanisms and conditions under which these gains occur remain unclear, underscoring the need for research focused on social and economic determinants.

To better understand the significance of contract farming, it is useful to define the concept. Contract farming is an agreement between farmers or organizations and buyers that specifies production, quality, delivery, and price (Eaton & Shepherd, 2001). Farmers supply agreed-upon produce, and buyers purchase it—often supported by inputs or technical advice (Sadawarte, 2024). Although farmers keep some autonomy, buyers often set terms, reflecting vertical supply chain coordination (Strohm & Hoeffler, 2006a; Schrobback et al., 2023).

This definition sets the stage for examining the practical benefits and shortcomings of contract farming. Contract farming can reduce market risks, lower costs, and improve incomes and access to inputs (Schrobback et al., 2023). However, it may limit autonomy, raise production risks, or create unequal power dynamics (FAO, 2018). Weak contracts can lead to payment issues, exclusion, environmental harm, or gender disparities (Grow Asia, 2018). Outcomes depend on contracts and farmers' specific circumstances.

In light of these varied outcomes, understanding which factors most strongly influence income is vital. This study focused on social and economic factors as key household-level determinants of income, since they are directly observable at the farm level. Social factors such as age, education, experience, and household size affect the management and adoption of practices. Economic factors such as farm size, costs, income, and resources affect productivity and profits.

The variables chosen for this analysis were guided by the study's theoretical foundations. Transaction Cost Theory emphasizes efficiency in resource allocation and the costs of production, while Resource Dependence Theory highlights reliance on land, labor, capital, and market-linked resources through contracts. Social and economic factors, therefore, offer a practical lens to empirically examine these theories. Past studies on contract farming consistently find that socio-economic characteristics predict farm income, participation, and welfare gains. Focusing on these factors enables the study to generate context-specific evidence using variables that farmers influence and that policymakers can target through extension, training, financing, and contract design.

While these frameworks are central, other factors, such as climate variability, institutional quality, and market dynamics, also matter. However, the study narrowed its scope to social and economic factors for analytical focus and feasibility within Machakos County. The literature reveals mixed findings on the income effects of contract farming: some report positive impacts on productivity

and household income (Murigi et al., 2024), while others report negligible or negative outcomes (Mwambi et al., 2016; Olounlade et al., 2020). These results underscore the need to examine the social and economic conditions of contract farming. Household labor, education, experience, production costs, farm size, and alternative income may all shape income outcomes under contractual arrangements.

Against this backdrop, this study investigated how social and economic factors shape income outcomes for horticultural contract farmers in Machakos County, Kenya. By analyzing growers contracted by VegPro Kenya Limited, the research directly addresses the central question: how do farmers' social characteristics and economic factors determine their income under contractual arrangements?

1.1.1 Overview of the Horticultural Sector in Kenya

In Kenya, agriculture drives economic growth, directly contributing about 33 percent to Gross Domestic Product (GDP) and indirectly adding another 27 percent through trade, transport, and agro-processing (FAO, 2024). Within this sector, horticulture stands out as a dynamic sub-sector, strongly contributing to foreign exchange, jobs, food security, and poverty reduction. The sub-sector is regulated by the Horticultural Crops Directorate, which promotes growth, standards, and competitiveness across horticultural value chains (AFA, 2024).

Horticulture has created opportunities for smallholder commercialization through contract farming, particularly for export-oriented crops such as French beans, snow peas, chilies, and baby corn. Through contractual arrangements, farmers access reliable markets, technical assistance, and production inputs, which can potentially improve farm productivity and household income (Cheruiyot et al., 2024). The extent of these benefits, however, depends on social and economic factors specific to each farmer, including education, labor availability, farming experience, farm size, and production costs. Therefore, horticulture is an important sector for examining the determinants of income under contract farming.

In Machakos County, agriculture is the main economic activity and the main source of livelihood. The county suits this study due to its active, irrigated, and market-driven horticultural economy despite semi-arid conditions. Major crops are French beans, mangetout, baby corn, chilies, and mangoes (Machakos County Government, 2023). Many farmers here participate in export

horticulture through production contracts, making the county an ideal setting for analyzing the incomes of contracted farmers.

The study focused on VegPro Kenya Limited's network of contracted smallholder farmers in Machakos County, specifically assessing how selected social and economic factors influence annual income per acre under uniform contract terms for French bean production.

This study focuses on Machakos County to examine how social and economic characteristics explain income variations among horticultural contract farmers, highlighting the role of Kenya's horticultural sector both in economic terms and as a platform for smallholders to access structured markets.

1.2 Statement of the problem

Horticultural contract farming has expanded in Machakos County as a strategy to integrate smallholder farmers into export markets, facilitated by firms such as VegPro Kenya Limited. These arrangements are expected to improve farmer incomes through assured markets, technical support, and access to production inputs. However, despite the growth of contract farming in the county, many farmers continue to report uneven income outcomes, with some realizing higher returns while others experience low profitability. This raises concern about whether participation in contract farming alone is sufficient to improve farmer welfare.

Existing studies on contract farming in Kenya and other developing countries have largely focused on participation decisions, productivity, and household welfare, with limited attention to income per acre as a direct measure of farm-level economic performance. Income per acre is particularly important in Machakos County, where land is relatively scarce, and smallholder farmers depend on maximizing returns from limited cultivated land. Understanding what drives income efficiency per unit of land is therefore critical for both farmers and policymakers.

Although contract farming provides a common market framework, farmers differ in their ability to benefit from it because of variations in social and economic characteristics. Social factors such as education, farming experience, household size, and age may influence managerial ability, labor availability, and adoption of recommended practices. Economic factors such as farm size, production costs, and alternative household earnings may determine investment levels, scale

efficiency, and profitability. These factors may explain why farmers operating under similar contracts realize different income outcomes.

However, limited empirical evidence exists on how these social and economic factors jointly influence income per acre among horticultural contract farmers in Machakos County. Without such evidence, interventions by county governments, agribusiness firms, and development partners may fail to address the real constraints affecting farmer returns. This study, therefore, sought to examine the relationship between selected social and economic factors and income per acre among farmers engaged in horticultural contract farming in Machakos County, focusing on those contracted by VegPro Kenya Limited.

1.3 Objectives of the Study

The main objective of this study was to examine the relationship between social and economic factors and income among farmers engaged in contract production of horticultural crops in Machakos County.

1.3.1 Specific Objectives

- i. To examine the relationship between social factors and income among farmers engaged in contract production of horticultural crops in Machakos County.
- ii. To assess the relationship between economic factors and income among farmers engaged in contract production of horticultural crops in Machakos County.

1.4 Research Questions

- i. What is the relationship between social factors and income among farmers engaged in contract production of horticultural crops in Machakos County?
- ii. What is the relationship between economic factors and income among farmers engaged in contract production of horticultural crops in Machakos County?

1.5 Scope of the study

This study examined the relationship between social and economic factors and income from contract farming of horticultural crops in Machakos County. The county was chosen as it is an important horticultural zone in Kenya. Machakos benefits from its proximity to Nairobi and from good transport infrastructure, which connects producers to domestic and export markets. The county also has a growing number of smallholder farmers engaged in commercial horticulture under contract. This made it a suitable setting for analyzing income outcomes in contract farming. Also, agriculture is devolved in Kenya, so the county level is appropriate for policy and institutional analysis.

The target population was 350 horticultural farmers under contract with VegPro Kenya Limited. This company was selected purposively because it is the largest horticultural contracting firm in Machakos County. VegPro has an established network of smallholder out-growers. It has sustained involvement in export horticulture, provides inputs and technical support, and ensures reliable market access. These reasons made VegPro an appropriate case for studying income outcomes under contract farming. Focusing on a single dominant contractor improved uniformity in contract terms, pricing, and procedures. This minimized variations that could arise when comparing multiple firms.

A census approach was used because the 350 contracted farmers were a manageable group. The farmers were accessible through the company's out-grower register. Using a census helped capture the views and income experiences of the whole population. This reduced sampling error and improved accuracy and representativeness. The approach was also suitable because farmers may differ in farm size, production costs, household labor, and income outcomes. Surveying all farmers increased the likelihood of capturing this variability. In addition, a census strengthened statistical reliability by providing full population evidence to inform decision-making by policymakers, agribusiness firms, and development practitioners.

Geographically, the study was limited to Machakos County, while institutionally it was confined to farmers contracted by VegPro Kenya Limited. Conceptually, the dependent variable was annual income per acre, measured in Kenyan shillings, while selected social and economic factors served as independent variables.

1.6 Significance of the study

The study outcome offers valuable insights to horticultural farmers, policymakers, scholars, and researchers.

The study is premised on examining the relationship between social and economic factors on income from engaging in farming under contract of horticultural crops in Machakos County. Therefore, the study findings are significant to horticultural farmers and enable them to make informed decisions about horticultural farming under contractual terms.

The study provides baseline data and information to inform policymakers, including national and County governments, on the policies, strategies, and development approaches they should invest in to provide a favorable environment for horticultural farming under contract.

The study outcome provides recommendations to scholars and researchers for further research on issues related to horticultural contract farming.

1.7 Chapter Summary

Chapter One introduced the study by presenting the global, regional, and Kenyan context of contract farming, with particular emphasis on the role of horticulture in improving smallholder market access, productivity, and rural livelihoods. The chapter highlighted the growth of horticultural contract farming in Machakos County through firms such as VegPro Kenya Limited and noted that, despite its expansion, income outcomes among contracted farmers remain uneven.

The chapter further identified a knowledge gap in existing literature, which has given limited attention to how social and economic factors jointly influence income per acre among horticultural contract farmers. In response, the study problem, objectives, research questions, scope, and significance were outlined. The study focused on 350 farmers contracted by VegPro Kenya Limited using a census approach to generate comprehensive evidence.

In nutshell, Chapter One established the rationale for examining the relationship between selected social and economic factors and farmers' income in contract production of horticultural crops in

Machakos County. The next chapter reviews theoretical and empirical literature relevant to the study variables and conceptual framework.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter critically reviews the theoretical and empirical literature on the social and economic factors influencing income from horticultural contract farming. The review establishes a conceptual foundation for understanding contract farming arrangements, examines empirical evidence from previous studies, and identifies existing gaps that justify the current research. The chapter contains four main sections: a theoretical review, an empirical review, a summary of the literature, and an identification of research gaps.

2.2 Theoretical Review

This study was anchored on two complementary theories: Transaction Cost Theory and Resource Dependence Theory. These theories provide analytical lenses for examining how contractual arrangements, resource access, and interdependencies between farmers and buyers influence income outcomes under horticultural contract farming systems.

2.2.1 Transaction Cost Theory

The Transaction Cost Theory (TCT), first articulated by Ronald Coase in *The Nature of the Firm* (1937), explains that firms exist to organize economic activity efficiently. Later, Williamson (1979, 1986, 1991) expanded the theory, arguing that economic actors choose governance structures that best minimize transaction costs. Such costs, incurred whenever goods or services are exchanged, include searching for information, negotiating contracts, monitoring compliance, and enforcing agreements.

According to Williamson (1986), a transaction occurs when a good or service is transferred across a technologically separable interface. Transaction costs are commonly categorized into three types: search and information costs, bargaining and decision costs, and monitoring and enforcement costs. In agricultural markets, these transaction costs include identifying reliable buyers, negotiating prices, ensuring compliance with quality standards, and resolving contract disputes. Whether farmers benefit from such arrangements depends on their social and economic characteristics, which determine their ability to manage these costs, access contracts, and increase gross annual income.

Social factors may influence income in several ways. Age affects adaptability, negotiation ability, and the use of experience. Education improves understanding of contracts, record keeping, adoption of extension advice, and compliance with quality standards. Farming experience enhances crop management, labor use, and handling of buyer requirements. Household size can provide family labor, lowering costs and improving the timeliness of farm operations. However, it may also increase household consumption needs. Economic factors may influence income through household earnings that ease cash constraints, production costs that affect yields and profitability, produce prices that determine revenue and bargaining outcomes, and farm size that can improve scale efficiency. Poor cost control or oversized farms may reduce income per acre. Gross annual income from contract farming in Machakos County depends not only on contract participation but also on farmers' ability to manage costs, access resources, mobilize labor, and exercise bargaining power. This study's conceptual model treats social and economic variables as key determinants of efficiency and management capacity. These factors explain income differences among farmers contracted by VegPro Kenya Limited.

Transaction Cost Theory posits that the choice of governance structure depends on transaction costs (Williamson, 1981). Firms choose among three main options: market exchange, hierarchy, or hybrids such as contract farming. High transaction costs prompt internalization; low costs favor market exchange. Contract farming blends market and hierarchical features to coordinate production while preserving farmer autonomy.

In horticultural contract farming, Transaction Cost Theory is relevant because these contracts reduce market uncertainty, stabilize prices, and lower transaction costs for farmers and buyers. Predefined prices, input support, and guaranteed markets shield farmers from price volatility and reduce search costs. Yet transaction costs may persist due to information gaps, enforcement issues, and opportunistic behavior, such as side-selling.

Despite its analytical usefulness, Transaction Cost Theory has several limitations. Critics argue that the theory lacks a clear, widely agreed-upon definition of transaction costs, which may lead to ex post rationalization (Hennart, 2010). The theory focuses on information-related costs while often overlooking social, institutional, and power-related dynamics within contracts. Nonetheless, the theory remains a valuable framework for assessing how social and economic factors influence income in contract farming arrangements.

This study finds that social and economic factors influence how transaction cost theory explains contract farming of horticultural crops in Machakos County.

2.2.2 Resource-Dependence Theory

Resource Dependence Theory (RDT), developed by Pfeffer and Salancik (1978), examines how organizations manage reliance on external resources. The theory asserts that no organization is self-sufficient and that survival depends on access to critical resources controlled by others. Consequently, organizations pursue strategic relationships to reduce uncertainty and secure essential inputs. In horticultural contract farming, smallholder farmers in Machakos County often depend on contractors like VegPro Kenya Limited for inputs, extension support, market access, pricing information, and assured output markets. This dependence offers certain advantages, such as reduced uncertainty and lower transaction costs, but also brings disadvantages: it can weaken bargaining power, heighten vulnerability to delayed payments, and limit income. Thus, gross annual income reflects not only production but also how effectively farmers manage or reduce dependence within the contractual relationship, weighing both the benefits and drawbacks of these dependencies.

According to RDT, inter-organizational relationships are shaped by power dynamics; actors controlling scarce resources influence those who depend on them (Hillman et al., 2009). In agricultural contract farming, farmers rely on contractors for inputs, technical assistance, credit, and market access, while contractors depend on farmers for a consistent supply and adherence to quality standards. This mutual dependence fosters collaboration but can also create imbalances in bargaining power, shaped by social and economic factors.

According to Resource Dependence Theory (RDT), farmers' gross annual income from contract farming in Machakos County depends on the resources they control versus their dependence on contractors such as VegPro Kenya Limited. Social factors—such as age, education, experience, and household size—shape knowledge, labor, and management capacity; in contrast, economic factors—household earnings, production costs, produce price, and farm size—influence liquidity, asset control, and bargaining power. Farmers with stronger internal resources can capitalize on contract opportunities and earn higher income, whereas those who are highly dependent on contractors may receive lower returns.

Resource Dependence Theory applies to contract farming systems by showing how access to resources like capital, labor, land, and knowledge shapes farmers' performance and income. Farmers with more internal resources—such as household labor or financial capacity—are less dependent on external actors and may do better under contract arrangements. By contrast, farmers with fewer resources are more dependent on external actors, making them more vulnerable and weakening their bargaining positions. This highlights the contrast between resource-rich and resource-poor farmers within contract farming systems.

However, RDT is criticized for emphasizing external constraints and underplaying internal dynamics and adaptability, especially in fast-changing markets (Hillman et al., 2009). Despite this, the theory remains useful for explaining how social and economic resources influence income in horticultural contract farming.

2.3 Empirical Review

2.3.1 Social factors in horticulture contract farming

Several empirical studies have examined how social and demographic factors affect participation and performance in contract farming. However, evidence remains mixed, mainly due to differences in crops, institutions, and methods studied.

In Kenya, Kanana and Mbugua (2019) analyzed 291 contracted sorghum smallholders in Meru County using multiple regression analysis. Education, farming experience, and household income significantly impacted contract farming performance, while age and land size were less influential. The study indicates that human capital and resources strengthen farmers' compliance with contract requirements and their ability to benefit from market arrangements. However, it examined only contracted sorghum farmers and measured "performance" mainly through perceptions and output indicators. This narrow focus limits generalization to high-value horticultural systems, where perishability, quality standards, and buyer oversight are stricter.

Similarly, Taslim *et al.* (2024) investigated participation in contract farming among bean farmers in Bangladesh. They used binary logistic regression on 200 farmers—75 contract and 125 non-contract. The study found that education significantly increased the likelihood of participation, while farming experience was not significant. Other significant factors included family size, labor availability, training, savings, fertilizer use, and income. This implies that participation decisions

may depend more on household capacity and access to resources than on years of farming alone. However, the study combined many explanatory variables in a small sample, raising concerns about overfitting and coefficient stability. Furthermore, bean production in Bangladesh is influenced by domestic market orientation and local land tenure arrangements, which differ from Kenya's export-oriented horticulture and distinct land tenure systems, thereby limiting the transferability of results.

Shyhrete *et al.* (2024) examined determinants of contract farming participation in Kosovo using binary logistic regression with 249 farm households. The study found that while farmer cooperation greatly increased participation, age, gender, education, trust, and farm size were not statistically significant. In addition, vegetable producers participated more than cereal producers, and contract farmers reported higher incomes. This contrast between cooperation and demographic traits, as well as between crop types, underscores that collective action, market organization, and crop characteristics may matter more than demographic traits in transitional economies. However, since the study measured participation rather than income performance, comparisons with profitability or welfare-focused studies remain conceptually inconsistent.

Across studies, education links to higher participation and better contract-farming performance, as literacy and management skills help farmers understand contract terms, quality standards, and production requirements. In contrast, farming experience shows mixed effects. Social capital, such as cooperation and trust, is also important, as it strengthens bargaining power, reduces transaction costs, and improves market access. A major limitation is that many studies focus on non-horticultural crops, such as sorghum, beans, and cereals. However, horticultural contract farming has unique features, such as perishability, strict quality standards, frequent harvesting, and cold-chain requirements. Thus, findings from those crops may not fully explain outcomes in vegetables, fruits, or floriculture.

Methodologically, most studies used cross-sectional surveys and regression models, which show associations but not causality. Few used panel data, propensity score matching, or experiments to address selection bias and endogeneity. Conceptually, some studies examined participation, others performance—distinct outcomes. Participation does not guarantee profitability, and higher income does not always imply sustainable contracts.

Overall, the empirical evidence is mixed, showing that social factors affect contract farming differently across crop types, institutional arrangements, and market structures. Given this inconsistency, there is a need for a context-specific study in Machakos County, Kenya, to determine how social factors—age, education, experience, and household size—influence farmers' incomes in demanding value chains.

2.3.2 Economic factors in horticulture contract farming

Economic factors are widely studied as determinants of income in contract farming, but evidence remains mixed across countries, crops, and contract types.

In West Africa, Olounlade *et al.* (2020) assessed the effects of contract farming on rice farmers' income and food security in northern Benin. Using Propensity Score Matching and Local Average Treatment Effects on 400 households, they found that, contrary to assumed benefits, contract farming significantly reduced farm income and food consumption. Participation in rice contract farming correlated with lower incomes. Poorly functioning markets, weak infrastructure, and limited diversification undermined expected gains. The authors concluded that contract farming may fail in marginal production areas lacking complementary resources.

By contrast, Murigi *et al.* (2024) used a Difference-in-Differences (DID) panel-data regression to study smallholder banana farmers in Kenya. Participation in banana contract farming significantly increased both farm productivity and household income. These gains stemmed from extension support, reliable markets, better prices, and improved institutional coordination. The authors also note that DID yields stronger causal inference than many cross-sectional matching studies by controlling for time-invariant unobserved heterogeneity.

Mwambi *et al.* (2016) investigated avocado contract farming in Kenya using an instrumental variable Probit-2SLS model to address endogeneity in participation. However, their findings showed no statistically significant improvement in farm, avocado, or household income among participating farmers. The authors partly attributed this outcome to the contract's loose, intermediary-based structure. In this type of structure, farmers were weakly bound, prices were not predetermined, and services like credit and inputs were limited. Therefore, this study shows that participation alone does not guarantee welfare gains unless contracts are efficiently structured and enforced.

In the Middle East, Khaledi *et al.* (2024) analyzed tomato farmers in Iran using a two-level multinomial logit model with 380 farmers. The study found that income, higher product prices, reduced production risk, education, and proximity to processing facilities positively influenced the adoption of contract farming. Conversely, land scarcity significantly pushed households toward non-contract farming alternatives. These findings suggest that land endowment and market access are central economic factors shaping participation decisions and likely income outcomes.

Across studies, income outcomes under contract farming depend on stable prices, support services, adequate land, and strong institutions for transparency, trust, and contract enforcement. Many studies focus on crops such as rice, bananas, avocados, and tomatoes. Because production and marketing for these differ from those of horticultural crops, their findings may not fully explain the income determinants of horticultural contract farming. Methodological weaknesses also cause conflicting findings. Many used cross-sectional data, which may not control for selection bias, while stronger methods like DID and instrumental variables rely on unverifiable assumptions. Studies also measure varied outcomes, such as participation, income, productivity, or food security. Notably, higher productivity does not always mean higher income when prices are low or transaction costs are high.

Overall, the empirical evidence suggests that economic factors affect contract farming income outcomes through a combination of prices, costs, market access, farm resources, and institutional arrangements rather than through contract participation alone. The mixed findings across crops and regions justify a context-specific study of horticultural contract farming, where perishability, quality premiums, and input-market imperfections may shape farmer income differently from those in contracts for staple or industrial crops.

2.4 Summary of Literature Review

The reviewed literature shows that contract farming income outcomes are shaped by social factors, including education, experience, household labor, and farmer cooperation. Economic factors such as prices, production costs, farm size, access to credit, and market support also play a role. Findings remain inconsistent. Some studies report positive income effects, others find no significant gains, and some show negative outcomes. These differences are largely linked to variations in crop type, contractual design, institutional support, and research methods across studies.

Methodologically, many previous studies relied on cross-sectional surveys and regression models. These identify associations but do not fully address causality, self-selection bias, or unobserved farmer characteristics. A few studies applied stronger approaches, such as Difference-in-Differences or instrumental variables, but these were mostly conducted outside horticultural export systems and in contexts different from Machakos County. This study addresses that gap by focusing directly on income variation among contracted horticultural farmers. It examines income rather than only participation decisions or productivity outcomes.

Theoretically, earlier studies often examined isolated demographic or market variables. They did not integrate transaction costs, farmers' dependence on contractors, and bargaining power into a single framework. This study combines Transaction Cost Theory and Resource Dependence Theory to offer a more comprehensive explanation of how farmer resources, contract relationships, and market coordination jointly influence gross annual income.

Much of the reviewed evidence relates to crops—such as rice, sorghum, bananas, beans, avocados, and tomatoes—whose production and marketing systems differ from those of export-focused horticulture. Distinctive features of horticultural contract farming in Machakos County, including perishability, strict quality standards, frequent harvesting, buyer oversight, and cold-chain requirements, may influence the factors that determine farmers' incomes. This study's key contribution is to address this contextual gap by analyzing how social (age, education, experience, household size) and economic factors (household earnings, costs, prices, farm size) shape gross annual income among farmers contracted by VegPro Kenya Limited in Machakos County, Kenya.

2.5 Gaps in Literature Review

The literature clearly demonstrates critical gaps that justify this study. Most existing research centers on staple or tree crops, largely overlooking horticultural crops within export-oriented contract farming systems. There is a clear lack of empirical evidence assessing income per acre as an outcome variable, especially in Kenyan horticultural value chains. Moreover, inconsistent methodologies in previous studies have generated contradictory findings regarding the influence of social and economic factors. Notably, very few studies comprehensively integrate both Transaction Cost Theory and Resource Dependence Theory to explain income outcomes under contract farming arrangements.

Table 2.1 Summary of Gaps in the Literature Review

SOCIAL FACTORS				
Author and Year	Title	Study Findings	Research Methodology	Research Gap
Kanana, M. C. <i>et al.</i> (2019).	Study among smallholder sorghum farmers in Meru County to determine the factors that influence the performance of contract farming.	The study found that the education of the farmer, experience, and income influenced the performance of contract farming.	Regression	The findings for smallholder sorghum contract farming in Meru County may not apply to other crops or counties, creating gaps for further studies.
Shyhrete <i>et al.</i> , (2024)	Factors influencing farmers' participation in farming under contract in Kosovo	Results reveal that cooperation among farmers significantly influences farming under contract. The size of farms, trust, education, age, and gender were found to be non-significant ($p > 0.05$) in influencing contract farming.	Binary logistic regression analysis	• These findings may not be applicable in other geographic orientations. • Methodological gaps
Taslim <i>et al.</i> , (2024)	Determinants of farmers' engagement in farming under contract in the Narsingdi District of Bangladesh	The study found that a farmer's education was a significant factor, while the farmer's experience was a non-significant factor in influencing farmers' decision to participate in farming under contract.	Binary logistic regression was used to analyze the data.	
ECONOMIC FACTORS				
Author and Year	Title	Study Findings	Research Methodology	Research Gap
Olounlade <i>et al</i> (2020)	Effect of engaging in farming under contract on smallholder farmers' income and food security in rice crop	The more rice farmers engage in farming under contract, the lower the farm income.	Propensity score matching Local average	• The study results are rice-specific and may not apply to horticultural crops, creating

	production in Northern Benin.		treatment effect	gaps for further studies. Methodological gap
Murigi <i>et al.</i> , (2024)	Effect of smallholder banana farming under contract on income and farm productivity in Kenya.	The outcome indicated positive effects, highlighting the potential of farming under contract on invigorating rural economies, increasing incomes for smallholder farmers, and enhancing productivity.	The research utilized Difference in Difference (DID) regression analysis.	- These studies have methodological gaps; while Murigi <i>et al.</i> (2024) utilized Difference in Difference (DID) regression analysis, Mwambi <i>et al.</i> (2016) employed Probit-2SLS - The results of Mwambi <i>et al.</i> (2016) indicate that engaging in contract farming is not sufficient to improve avocado, farm and household income. This finding contradicts Murigi <i>et al.</i> (2024), who found that contract farming increases incomes for smallholder farmers, creating gaps for further studies.
Mwambi <i>et al.</i> (2016)	Does farming under contract improve smallholder income? The case of avocado farmers in Kenya	The study outcome showed that engaging in farming under contract is not sufficient to improve avocado, farm, and household income.	Probit	
Schrobbach <i>et al.</i> (2023)	Willingness of producers of horticultural crops to engage in export-focused contract-based marketing agreements in Queensland, Australia	Produce prices and the potential higher cost of production are factors identified as significant for decision-making about changes to the supply chain.	Mixed logit and a latent class model	A methodological gap exists in the studies, creating gaps for further studies.
Ndiritu (2024)	Determinants of farmers' discontent with market-oriented contracts for finger millet crop in Kenya	Farmers' content is driven by reasonable prices offered by the spot market traders and ease of access to the market.	Probit model and descriptive analysis approach	

Khaledi et al., (2024)	Determinants of evolution of farming under contract in Iran: Case study: Tomatoes in Kermanshah Province	The results revealed that land scarcity significantly influences noncontract farming engagement.	Multinomial logit model	• This finding may not apply to other geographical locations. • Methodological gap
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2.6 Conceptual Framework

The study conceptualizes that farmers' income from horticultural contract farming, measured as annual income per acre, is influenced by both social and economic factors. Social factors include age, education, farming experience, and household size, while economic factors include household earnings, production cost, output price, and farm size. These variables interact within the contract farming system to shape income outcomes.

Independent Variables

SOCIAL FACTORS

- Age
- Education
- Experience
- Household size

ECONOMIC FACTORS

- Household earnings
- Production Cost
- Price of produce
- Farm Size

Dependent Variables

CONTRACT FARMING

- Gross annual income in Kenya shillings per acres

Fig 2.1 Conceptual framework (Source Researcher)

2.7 Operationalization of the Variables

The variables in this study were operationalized to enable empirical analysis of the relationship between social and economic factors and income from horticultural contract farming. Independent variables included selected social and economic characteristics, while the dependent variable was annual income per acre, measured in Kenya shillings. Statistical techniques such as descriptive analysis, ANOVA, and multiple regression were employed to assess these relationships.

Table 2.2: Operationalization of the variables

Objective	Variable	Indicators	Correct Measurement Scale	Tools of Analysis	Type of Data Analysis
To examine the relationship between social factors and income among farmers engaged in contract production of horticultural crops in Machakos County.	Independent Variable: Social factors	Age	Ratio	Mean, Correlation, Regression,	Descriptive, Inferential
		Education level	Ordinal	Mean rank, Frequencies, Regression	Descriptive, Inferential
		Farming experience	Ratio	Mean, Correlation, Regression	Descriptive, Inferential
		Household size	Ratio	Mean, Correlation, Regression	Descriptive, Inferential
To assess the relationship between economic factors and income among farmers engaged in contract production of horticultural crops in Machakos County.	Independent Variable: Economic factors	Household earnings	Ratio	Mean, Correlation, Regression	Descriptive, Inferential
		Production cost	Ratio	Mean, Correlation, Regression	Descriptive, Inferential
		Price of produce	Ratio	Mean, Correlation, Regression	Descriptive, Inferential
		Farm size	Ratio	Mean, Correlation, Regression	Descriptive, Inferential
	Dependent Variable: Income from farming under contract	Gross Annual income per acre from contract farming (KES)	Ratio	Mean, Correlation, Regression	Descriptive, Inferential

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology used in the study. It outlines the research philosophy, design, and rationale for adopting each. It then mentions the study area, population, and sample calculation. Further, the chapter explains the data collection procedure and analysis techniques.

3.2 Research Philosophy

Research philosophy refers to the assumptions that guide how knowledge is generated and how research should be conducted. Common philosophies include positivism, interpretivism, pragmatism, and realism (Žukauskas *et al.*, 2018). This study was guided by a positivist research philosophy because it examined measurable relationships between social and economic factors and income among farmers engaged in contract horticulture in Machakos County. Positivism is appropriate where data can be quantified and analyzed objectively using statistical methods. The study used structured questionnaires and analyzed data through descriptive statistics and regression analysis to determine the effect of independent variables on income. Since the study aimed to test relationships and explain outcomes, it is best aligned with a quantitative correlational/explanatory design rather than a purely descriptive case study.

3.3 Research Design

Research design is a framework that provides a roadmap for the entire research process, showing how research questions will be answered and how data will be collected, analyzed, and interpreted. This study adopted a descriptive correlational case study research design to examine the effects of social and economic factors on income from contract horticultural farming in Machakos County. The design was appropriate because it enabled the researcher to describe the characteristics of the study population and assess relationships between the independent variables and income outcomes within a specific context (Kathori, 2004). The design supported the collection of primary data using questionnaires and enabled the application of various analytical techniques, including descriptive statistics, correlation, and regression analysis. Findings were presented using tables for clarity. Since the researcher did not manipulate variables or control the study environment, the design was suitable for analyzing associations and predictive relationships, but not for making

definitive causal conclusions. Therefore, the study findings should be interpreted as indicating relationships between variables rather than direct cause-and-effect outcomes.

3.4 Study Population

The study was conducted in Machakos County, Kenya. The target population selected for this study was horticultural farmers contracted by Veg Pro in Machakos County. Veg Pro is a leading horticultural contractor serving farmers in Machakos County. A list of the contracted farmers was obtained. The company contracts up to 350 farmers per year from Machakos County. (Source: Veg Pro).

3.5 Sampling design

The study used a census approach to collect data from all farmers who had been contracted in the past year. This approach was appropriate because the target population was relatively small and manageable, consisting of approximately 350 contracted farmers (Source: Veg Pro). Using a census ensured comprehensive population coverage, minimized sampling error, and improved the reliability of the study's findings.

3.6 Data Collection Procedure and Instruments

3.6.1 Data collection instrument

Data were collected using structured questionnaires administered through face-to-face interviews. The questionnaire was developed in English because it is Kenya's official language of instruction and is widely used in formal education, government communication, and agribusiness transactions. In addition, many contracted farmers regularly interact with extension officers and buyers, and they are often required to sign contract documents prepared in English. To minimize language barriers and response bias, the researcher used trained interviewers who provided clarification or translated questions into the respondents' preferred local language where necessary. This helped ensure that all respondents clearly understood the questions and could provide accurate responses. The questionnaire was designed to collect quantitative data on the extent to which social and economic factors influence income from engaging in contract horticultural farming in Machakos County. Questions were arranged thematically, beginning with contract farming practices and then moving to social and economic factors.

3.6.2 Data collection procedure

Before data collection, the researcher trained the research assistants in research etiquette, time management, and essential communication skills. The researcher also contacted Veg Pro's management and scheduled a meeting to discuss the study. In the meeting, the researcher asked management to notify all contracted horticulture farmers about the study and the interview dates. Calls were made to the notified farmers before the visits, and availability and the time of the visit were confirmed. Ten (10) enumerators were engaged in the data collection exercise, and an official from Veg Pro assisted in transporting them to the farms. Each enumerator visited five (5) farmers daily and accomplished the task within five (5) working days.

The questionnaire was administered using personal interviews. Each interview lasted 30 minutes, during which the research assistants introduced themselves to the respondents, explained the purpose of the study, provided information necessary for respondents to complete the survey, and collected the data as per the questionnaire.

The questionnaire entries were then coded and entered into the Statistical Package for the Social Sciences (SPSS), where they were cleaned and analyzed.

3.7 Data Analysis

The study used quantitative methods of data analysis. Statistical Package for Social Sciences (SPSS) software version 29 analyzed the data. Multiple regression methods were used to model the relationship between independent variables and the dependent variable, using regression coefficient estimates to examine interactions among the variables. ANOVA output was used to ascertain the existence of a significant relationship between the outcome and predictor variables and to determine the fitness of the regression model for data analysis, as depicted by the values of the F distribution (F value). The model is given in the form below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon \dots \dots \dots 3.3$$

Where:

- Y - the dependent variable – Income from participation in contract farming/acre in Ksh
- β_0 - constants
- β_s - regression coefficients (β_1 -Age, β_2 -Education, β_3 -Experience, β_4 – Household Size, β_5 - Household earnings, β_6 – Production cost, β_7 –Price of produce, β_8 – Farm Size)

- X - column vectors for the independent variables (X_1 - Age, X_2 - Education
 X_3 - Experience, X_4 - Household Size, X_5 - Household earnings, X_6 - Production
cost, X_7 - Price of produce, X_8 - Farm Size)
- ε - vector of errors of prediction

3.8 Research Quality

Validity and reliability are the two most fundamental features of any research measurement instrument. They are concerned about the trustworthiness of the data used to make good decisions. Validity refers to the ability of a research instrument to capture and measure what it was purposed to measure, while reliability is the confidence a researcher has in data obtained from the instrument and its ability to control random errors (Mohajan, 2017). It is crucial to conduct validity and reliability tests to guarantee robustness and confidence in the collected data (Kothari, 2004).

3.8.1 Validity

A content validity approach was used to ascertain validity. This approach assessed the constructs of the variables and whether the test was totally representative of what it purports to measure. The study questionnaire was based on contract farming and sub-variables commonly used in the empirical literature. The questionnaire was pre-tested before administration to determine whether the study's objective could be achieved using the questionnaire and interviews. Content validity was established through the appraisal of relevant literature to form the questionnaire's questions; in addition, the questionnaire was reviewed with the supervisor's assistance. Construct validity was conducted through a pilot study, where the responses from respondents were analyzed and clarifications made with the research assistants before full data collection

3.8.2 Reliability

Mahajan (2017) defines reliability as the ability of data collection tools to be replicated in the future. It measures a research tool's consistency, trustworthiness, repeatability, and precision. The reliability coefficient lies between 0 (no reliability) and 1 (perfect reliability). Values above 0.7 signify acceptable reliability. Cronbach's (1951) alpha (α) will be used to measure consistency. A pilot study was conducted among 30 farmers who were not part of the study. Data from different research assistants were analyzed for 'inter-rater reliability' to determine the coefficient of

agreement among the independent research assistants. Cronbach's (1951) alpha (α) was used as a measure of consistency.

Table 3.1: Reliability tests

Variable	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of items
Age in years	.790	.800	6
Education in years	.703	.773	3
Experience in years	.716	.706	5
Household size	.721	.755	6
Household income	.807	.721	4
Production cost	.691	.812	5
Price of produce	.734	.789	7

Source: Research Data 2025

Table 3.2: Overall reliability test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
.761	.788	36

Source: Researcher Data 2025

3.8.3 Diagnostic test

3.8.3.1 Multicollinearity tests

Multicollinearity occurs when two or more independent variables in a regression model are highly correlated, which may distort coefficient estimates and weaken the interpretation of relationships between independent and dependent variables (Daoud, 2017). To assess multicollinearity, the study used the Variance Inflation Factor (VIF), which measures the extent to which the variance of a regression coefficient is inflated by correlations among predictors. A VIF value of 1 indicates no correlation with other independent variables; values between 1 and 5 indicate low to moderate

correlation, which is generally acceptable, while values above 5 suggest high multicollinearity concerns. The unit price of French beans per kilogram was constant and therefore excluded from the VIF analysis. Results showed that most predictors had VIF values above 1 but below the acceptable threshold of 5, indicating low to moderate correlations among some independent variables, not at levels severe enough to affect the regression model. Therefore, multicollinearity was not considered a significant problem in this study.

Table 3.3 Multicollinearity test results

Model	Coefficients			t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-182980.090	578920.840		-.316	.752		
Age Years	-1574.951	1844.365	-.052	-.854	.394	.557	1.797
Education Years	2592.883	6759.568	.020	.384	.702	.747	1.339
Experience Years	26066.197	16824.124	.076	1.549	.122	.842	1.187
Household Size	24348.350	9169.450	.167	2.655	.008	.518	1.930
Annual Household Income	181231.739	190397.239	.043	.952	.342	.991	1.009
Production Cost	.619	.081	.423	7.642	.000	.668	1.496
Household Farm Size (Acreage)	-98521.317	7552.946	-.700	-13.044	.000	.711	1.406

Source: Researcher Data 2025



3.11 Ethical Consideration

The study emphasized ethical concerns in research and ensured that they are not violated. Firstly, during the drafting of the proposal, the researcher ensured that the study was original and had not been presented to any university or institution for the award of a degree. The contents are not products of plagiarism. Secondly, before data collection, the researcher obtained a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI) and clearance from Strathmore University's ethics board. Finally, during data collection, informed consent was obtained from the study participants, and they were duly informed to ensure that no one was coerced into giving responses. In addition, the respondents were adequately informed about the purpose of the research, and confidentiality of their information was guaranteed.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1. Introduction

This chapter analyzes the data collected using the methodology proposed in the previous chapter. The chapter is divided into five main sections. The introduction, the response rate, demographic information, descriptive statistics, and inferential statistics as shown in the conceptual framework.

4.2. Response rate

The questionnaire response rate was 85.7% as shown in table 4.1 below.

Table 4. 1: Response rate

Sample size	Responded	Response rate (%)
350	300	85.7%

Source: Researcher Data 2025

The response rate was adequate, as it exceeded the average rate of 30% for ‘delivery and collection’ questionnaires (Saunders et al., 2009). This implied that the questionnaire's quality was acceptable. The main reasons for non-response were a lack of authorization from owners when farms were managed by farmhands, taxation paranoia, and fear among respondents who had previously breached the contractual agreement by side-selling their produce to middlemen.

4.3 Descriptive Statistics

The purpose of this section is to present descriptive statistics relating to both the dependent and independent variables. The independent variables (social and economic factors) are presented first, followed by the dependent variable (Annual gross income per acre from contract farming in Kenya shillings).

4.3.1 Social and Economic Factors in Horticulture Contract Farming

The descriptive study's outcome on the effects of social and economic factors on income from contract farming of horticultural crops in Machakos County varied, as evidenced by the means and standard deviations.

4.3.1.1. Social Factors

The descriptive statistics of the key social variables were age, education, farming experience, and household size, which may influence farmers’ participation in contract horticulture farming in

Machakos County. The average age of respondents was 42.69 years (SD = 7.95), showing that most farmers were middle-aged and economically active. The mean education level was 12.05 years (SD = 1.87), suggesting that most had secondary education, which may support understanding of contracts and adoption of new practices. Farmers had an average of 4.59 years (SD = 0.71) of experience in contract farming with Veg Pro, indicating familiarity with the production and marketing system. The average household size was 3.72 persons (SD = 1.66), which may provide family labor while also increasing household needs. Overall, the results indicate that respondents were relatively mature, educated, and experienced farmers, factors likely to support successful participation in contract farming.

Table 4.2 Social factors

	Mean	Std. Deviation	N
Age years	42.6933	7.95426	300
Education Years	12.0467	1.87337	300
Experience Years	4.5867	.70887	300
Household Size	3.7233	1.65810	300

N = 300

Source: Researcher Data 2025

4.3.1.2. Economic factors

The key economic variables were annual household income, production costs, the unit price of produce, and household farm size, which reflect the economic capacity of farmers in contract horticulture in Machakos County. Respondents had an average annual household income of KES 986,153 (SD = 629,609) and production cost of KES 303,810.67 (SD = 165,356.22), showing wide variation across households due to differences in farm size, productivity, input use, and off-farm income sources. French beans were sold at a fixed contract price of KES 70 per kg, implying that income differences were mainly influenced by output levels and efficiency rather than price. The average farm size was 2.14 acres (SD = 1.72), suggesting that land size also contributed to variations in income and costs.

Table 4.3 Economic factors

	Mean	Std. Deviation	N
Household Income	986,153	629,609	300
Production Cost	303,810.6667	165,356.21512	300
Unit Price of Produce KES	70.0000	.00000	300
Household Farm Size (Acreage)	2.1442	1.71856	300

N = 300

Source: Researcher Data 2025

4.3.2 Annual Income Per Acre from Contract Farming

Annual income per acre from contract farming in Kenya, in shillings, was the outcome variable in the study. The results showed that farmers earned an average of KES 511,077.92 per acre per annum (SD = 241,773.10), indicating that contract farming can generate substantial returns. However, the relatively high standard deviation suggests considerable variation in earnings among farmers, which may be due to differences in productivity, production costs, management practices, and compliance with quality standards. This implies that while contract farming has strong income potential, farmer performance and resource capacity significantly influence actual returns.

Table 4.4 Annual income per acre in Kenya shillings

	Mean	Std. Deviation	N
Unit Acre Annual Income KES	511,077.9221	241,773.10103	300

N = 300

Source: Researcher Data 2025

4.4 Inferential Statistics

The study was conducted to establish the effects of the social and economic factors on income from contract farming of horticultural crops in Machakos County. The study used inferential, correlation, and regression analyses to examine the relationships between predictor and outcome variables.

4.4.2 Correlation Analysis

The results showed that farm size had a strong negative association with income per acre ($r = -0.577$, $p = 0.000$), while farming experience ($r = 0.143$, $p = 0.013$) and production costs ($r = 0.176$, $p = 0.002$) were positively associated with income per acre. This suggests that more experience and higher investment can boost returns, while bigger farms might lower efficiency per acre. Age, education, household size, and annual household income weren't statistically significant. For instance, education may matter less here, as most respondents had similar levels of schooling, while hands-on experience and resource use seem to play a larger role in contract farming.

Table 4.5: Correlation Matrix

Dependent Variable		Independent Variable								
		Social Factors				Economic Factors				
		Age Years	Education Years	Experience Years	Household Size	Annual Household Income Total KES	Production Cost	Unit Price KES	Farm Size (Acre)	Unit Acre Annual Income KES
Unit Acre Annual Income KES	Correlation Coefficient	-.007	.050	.143*	.055	.078	.176**	.	-.577**	1.000
	Sig. (2- tailed)	.909	.384	.013	.344	.178	.002	.	.000	.
	N	300	300	300	300	300	300	300	300	300
** Correlation is significant at the 0.01 level (2-tailed).										

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Researcher Data 2025

4.4.3. Regression Analysis

The regression analysis aimed to see how well the dependent variable could be explained by the independent variables in exploring the link between social and economic factors and income from contract farming of horticultural crops in Machakos County. Multiple regression was used to describe the relationship between the dependent variable and the independent variables, namely social and economic factors.

4.4.3.1 Regression Analysis for the Social and Economic factors

The model summary in Table 4.6 presents the regression results between the dependent variable (Unit Acre Annual Income in KES) and the predictors— Farm size (Acres), Household earnings,

Household Size, Experience (Years), Education (Years), Production Cost, Age (Years). The regression results show that the model has an R value of 0.639, indicating a moderately strong correlation between the observed and predicted values. The R Square value of 0.409 suggests that 40.9% of the variation in the dependent variable is explained by the independent variables included in the model. After adjusting for the number of predictors, the Adjusted R Square decreases slightly to 0.395, confirming that the model explains 39.5% of the variance. The standard error of the estimate is 188,129.080, reflecting the average deviation of the predicted values from the observed values.

Table 4.6 Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.639 ^a	.409	.395	188129.080

Predictors: (Constant), Farm size (Acres), Household earnings, Household Size, Experience (Years), Education (Years), Production Cost, Age (Years)

Source: Researcher Data 2025

The ANOVA table below shows results in the regression model assessing the influence of social factors - age, education, experience, and household size and economic factors - Production Cost, Annual Household earnings (KES), and Farm Size (Acreage) on unit acre annual income revealed a statistically significant relationship ($F = 28.833$, $p = 0.000$). This indicated that a significant relationship existed between the dependent variable and the independent variable and that the regression model was a good fit for the data.

Table 4.7 Analysis of Variance (ANOVA)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7143190638234.592	7	1020455805462.085	28.833	.000 ^b
	Residual	10334624843491.316	292	35392550833.874		
	Total	17477815481725.908	299			

a. Dependent Variable: Unit Acre Annual Income KES

b. Predictors: (Constant), Farm size (Acres), Household earnings, Household Size, Experience (Years), Education (Years), Production Cost, Age (Years)

Source: Researcher Data 2024

Linear regression results; $t = (-0.225)$, $\beta = (-129423.888)$ (standardized coefficient), $p < 0.822$. The model was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon \dots \dots \dots 3.3$$

Where:

- Y - the dependent variable – Income from participation in contract farming/acre in Ksh
- β_0 - constants
- β_s - regression coefficients (β_1 -Age, β_2 -Education, β_3 -Experience, β_4 – Household Size, β_5 - Household earnings, β_6 – Production cost, β_7 – Price of produce, β_8 – Farm Size)
- X - column vectors for the independent variables (X_1 - Age, X_2 – Education, X_3 – Experience, X_4 – Household Size, X_5 – Household earnings, X_6 – Production cost, X_7 – Price of produce, X_8 – Farm Size)
- ε - vector of errors of prediction

The linear regression model using the standardized coefficient was;

$$\text{Unit acre annual income} = (-129423.888) + (-0.31) \text{ Age} + 0.037(\text{Education in Years}) + 0.075(\text{Experience in Years}) + 0.152(\text{Household size}) + 0.036(\text{Household earnings}) + 0.472(\text{Production Cost}) + (-0.737) \text{ Farm size} + 575575.936 \text{ (Standard error)}$$

Age had a negative but insignificant effect (-947.56; $p = 0.607$), implying that differences in farmers' age did not meaningfully affect income per acre. Education had a positive but insignificant effect (4,723.73; $p = 0.483$), suggesting that formal schooling alone did not translate into higher earnings, possibly because practical skills were more important.

Experience had a positive but insignificant effect (25,481.82; $p = 0.129$), indicating that more experienced farmers tended to earn higher income, although the effect was not strong enough statistically. Household size had a significant positive effect (22,197.05; $p = 0.016$), meaning that an additional household member could increase income per acre, likely through provision of family labour and reduced hired labour costs.

Household earnings showed a positive but insignificant effect (150,874.06; $p = 0.426$), suggesting that off-farm income did not strongly influence contract farming returns. Production cost had a

strong significant positive effect (0.691; $p < 0.001$), implying that greater spending on inputs, labour, and farm operations increased productivity and income. Farm size had a significant negative effect (-118,613.98; $p < 0.001$), meaning that increasing acreage reduced income per acre. This may be due to managerial inefficiency, since horticultural crops require close supervision, timely input application, and strict quality control, which become harder to maintain on larger farms. It may also reflect labour and resource constraints, where farmers spread limited capital, labour, and inputs over more land, reducing productivity per acre. In contrast, smaller farms are often managed more intensively, with closer monitoring and higher input use per acre. The finding suggests that increasing land size alone does not guarantee higher profitability, as efficient management, adequate resources, and intensive production practices are more important than farm expansion.

Overall, household size, production cost, and farm size were the most practically important factors influencing annual income per acre.

Table 4.8 Regression Coefficient Model

Coefficients ^a						
Model		Coefficients			t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-129423.888	575575.936		-.225	.822
	Age (Years)	-.947.562	1840.594	-.031	-.515	.607
	Education (Years)	4723.733	6725.484	.037	.702	.483
	Experience (Years)	25481.819	16723.064	.075	1.524	.129
	Household Size	22197.052	9128.072	.152	2.432	.016
	Household earnings	150874.058	189362.502	.036	.797	.426
	Production Cost	.691	.083	.472	8.319	.000
	Farm size	-118613.976	8947.855	-.737	-13.256	.000

a. Dependent Variable: Unit Acre Annual Income KES

Source: Researcher Data 2025

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents findings from data analysis examining the relationship between social and economic factors and income from contract farming of horticultural crops in Machakos County. The chapter contains an introduction, summary, discussion, conclusion, recommendations, limitations of the study, and suggestions for further research.

5.2 Summary

The general objective was to examine the relationship between social and economic factors and farmers' income in contract production of horticultural crops in Machakos County. The findings show that average annual income per acre was about KES 511,078, but income varied widely among farmers. This indicates that while contract farming can be profitable, benefits are not shared equally among participants.

The variation in income suggests that contract farming alone does not guarantee equal returns. Farmers differ in their ability to turn resources into productivity and profit. Management skills, labor organization, compliance with quality standards, timing, and access to capital help explain why some farmers earn much more than others under the same conditions.

The descriptive results further show that most respondents were relatively mature, educated, and experienced farmers operating under a fixed contract price system. Since output prices were standardized, income differences were mainly driven by internal farm efficiency rather than by market price variation. This implies that productivity, cost control, and operational discipline are more important determinants of success than price bargaining.

Correlation and regression results revealed that household size, production cost, and farm size were the strongest predictors of income per acre. Larger households earned more, suggesting family labor is valuable for smallholders in labor-intensive horticulture. Higher production costs also led to more income, meaning well-managed investments in inputs, irrigation, crop care, and labor yield better returns.

The study found that as farm size increases, income per acre tends to decrease. This is because expanding land without also increasing management, labor, capital, and supervision can lower productivity. Small farms have a comparative advantage because their size allows for more intensive, efficient management.

The study demonstrates that farmer income under contract horticulture is shaped less by contract participation itself and more by the farmer's capacity to organize labor, invest productively, and manage land efficiently. The findings support Transaction Cost Theory, which holds that coordination efficiency affects outcomes, and Resource Dependence Theory, which holds that access to labor, capital, and knowledge determines performance. Therefore, successful contract farming should be viewed not only as a market arrangement but also as a management and resource optimization system.

5.3 Discussion of findings

5.3.1 Extent to which social factors influence income from contract farming of horticultural crops.

The first research objective in this study was to examine the relationship between social factors and income among farmers engaged in contract production of horticultural crops in Machakos County.

The findings reveal that farmers average about 43 years old ($SD = 7.95$). Most respondents belong to a relatively homogeneous, middle-aged group. Farmers typically complete 12 years of education, so most have at least secondary education. Such education enables them to understand contractual obligations and adopt improved horticultural practices.

Farmers averaged 4.6 years of contract farming experience, with little variation ($SD = 0.71$). This reflects a moderately experienced group. The average household size was 3.7 members, so most households were small to medium. This may affect labor availability and household decisions in contract farming.

The results show that while age, education, and farming experience shape farmers' decision-making, they do not strongly influence annual income per acre in this setting. In contrast, household size has a more immediate, practical effect on farm productivity by affecting labor

availability. These findings stress the importance of labor dynamics over individual demographic traits for smallholder production efficiency.

5.3.1.1 Discussion on the Social Factors in Relation to the Theories

This study examined how social factors shape unit-acre annual income within contract farming arrangements, drawing on Transaction Cost Theory (TCT) and Resource Dependence Theory (RDT). The results indicated that household size significantly increased income, while age, education, and farming experience did not have statistically significant effects.

From the perspective of Transaction Cost Theory (TCT), household size matters. Larger households can provide family labor for labor-intensive tasks such as planting, weeding, harvesting, sorting, and grading. This reduces reliance on hired labor and lowers transaction costs, such as searching for workers, supervising, negotiating wages, and ensuring tasks are completed on time. As a result, households with more available labor are better positioned to achieve higher productivity and income per acre.

From the Resource Dependence Theory (RDT) perspective, household labor is an internal resource that reduces dependence on external labor markets, where labor may be costly, scarce, or unreliable. Farmers with adequate household labor can respond more quickly to production demands and meet buyer quality and delivery schedules, thereby improving contract performance and income outcomes.

Theory often suggests that education and experience should boost income by improving management, technology use, and contract understanding. Their insignificance partly contradicts TCT and RDT. A likely reason is the structured contract-farming environment, where firms like VegPro provide standardized advice, schedules, requirements, and market access. Such support may remove much of the advantage higher education or experience would provide, as all farmers work with similar guidance.

Similarly, age was not significant, although older farmers are often assumed to possess more knowledge or social networks. This may indicate that productivity in contract horticulture depends more on labor efficiency, compliance with technical standards, and timely decision-making than on age alone.

In a nutshell, the findings refine both theories by demonstrating that, in this context, practical household labor capacity outweighs individual demographic traits. Income differences among farmers depend less on age, education, or experience, and more on their access to reliable labor and their ability to efficiently fulfill contractual production requirements.

5.3.1.2 Comparison of the social factors in the study with Empirical Studies

The findings of this study showed that age, education, and farming experience did not significantly affect unit-acre income, whereas household size had a significant positive effect. These results both align with and differ from previous empirical studies, suggesting that the influence of social factors depends on production context, crop type, and contract structure.

Kanana and Mbugua (2019) found that education and experience improved performance among contract sorghum farmers in Meru County, whereas in this study, they were found to be insignificant. Sorghum may depend more on management skills, while contract horticulture often involves close buyer guidance, standardized schedules, and technical support from firms like VegPro. These systems may reduce the benefit of education and experience.

Taslim et al. (2024) found education significant in Bangladesh, but experience was not. Education mattered more because participation required literacy and access to information. By contrast, this study examined only contract farmers who were already participating, so education mattered less after joining the scheme.

The findings more closely align with those of Shyhrete et al. (2024), who found that age and education were insignificant in Kosovo. This supports the view that demographic traits do not always determine success in contract farming. However, unlike their study, household size was significant in the current study. This may be because labor-intensive horticultural crops require frequent planting, weeding, harvesting, sorting, and grading, making family labor more valuable than in less labor-demanding systems.

The contradictions across studies indicate that social factors do not operate uniformly. Their effects depend on whether the study measures participation or income, the labor intensity of the crop, the level of contractor support, and local market conditions. In horticultural farming in Machakos, household labor capacity appears more important than education, age, or experience in influencing income.

5.3.2 Extent to which economic factors influence income from contract farming of horticultural crops.

The second research objective examined in this study was to assess the relationship between economic factors and farmers' income from contract production of horticultural crops in Machakos County.

According to the analysis, the average annual household income among horticultural contract farmers was approximately KES 986,153, with a relatively high standard deviation of 629,609, indicating variation in income levels across households. This suggests that while some farmers earned substantial returns from horticultural production, others achieved modest gains, possibly due to differences in production efficiency, farm size, or market linkages.

The mean production cost was KES 303,810.67, with a standard deviation of 165,356.22, reflecting variability in expenditure levels across farmers. These costs likely include input purchases, such as seeds, fertilizers, and pesticides, as well as labor costs associated with contract farming. Higher production costs can be associated with greater investment in quality inputs, which may in turn enhance productivity and income.

The unit price of produce averaged KES 70 per kilogram, which was constant across respondents due to standardized contractual pricing between farmers and the contracting firm (VegPro). This uniformity underscores the structured nature of contract farming arrangements.

Finally, the mean household farm size was 2.14 acres, with a standard deviation of 1.72, suggesting that most farmers operated on small to medium-sized plots. The variation in land size indicates differences in production capacity, which can influence total output and income per acre.

The regression findings reveal that production cost and farm size are the most influential economic factors affecting per-acre income. While increased investment in production significantly boosts income, expanding the farm size reduces per-acre efficiency. Household income and unit price appear to play more indirect or constrained roles, likely shaped by uniform market conditions and structural limitations within the farming system.

5.3.2.1 Discussion on the Economic Factors in Relation to the Theories

The regression results showed that production cost had a strong positive effect on unit-acre annual income, while farm size had a significant negative effect. Household earnings were positive but not significant.

Under the Transaction Cost Theory (TCT), greater investment in production inputs, labor, and crop management helps farmers meet quality standards and delivery schedules, reducing rejection risks and coordination problems. This explains why higher production costs were associated with higher income. The theory also explains the negative effect of farm size: larger farms may face higher supervision, labor coordination, and monitoring costs, thereby reducing efficiency per acre.

Under Resource Dependence Theory (RDT), farmers with access to capital and productive inputs are less constrained and can achieve better yields and returns. This supports the positive effect of production costs, since investment reflects access to resources and productive capacity. However, the theory would also suggest that households with higher earnings should perform better, yet household earnings were not significant. This may be because off-farm income is often used for household consumption, school fees, or debt repayment rather than being reinvested in farming. Similarly, a larger farm size would normally be expected to increase output, but the negative result suggests that land expansion without sufficient labor, capital, and management can reduce per-acre productivity.

The findings show that efficient use of resources matters more than the quantity of resources owned, especially in labor-intensive contract horticulture.

5.3.2.2 Comparison of the Economic Factors in the Study with Empirical Studies

The findings of this study showed that production costs positively and significantly influenced unit-acre income; farm size had a significant negative effect; and household earnings were positive but not significant. These results are consistent with the broader literature, which shows that income under contract farming depends on productive investment, efficiency, and institutional conditions rather than on participation alone.

Olounlade et al. (2020) found negative income effects among rice farmers in Benin. This contrasts with the current study, where higher production investment increased income. The contradiction may be explained by differences in context: weak infrastructure, poor market access, and limited

support services in Benin may have reduced returns to investment, whereas VegPro's structured horticultural contracts may better reward input use through assured markets and quality-based purchasing.

Murigi et al. (2024) found positive income effects among banana farmers in Kenya, which generally supports the current findings. In both cases, access to reliable markets, extension support, and organized value chains likely improved farmer returns. This suggests that contract farming performs better where institutions and buyer coordination are stronger.

Mwambi et al. (2016) found no significant income gains among avocado farmers in Kenya. This differs from the positive role of production cost found in this study. A likely explanation is contract design: avocado contracts were loosely structured, with weak price commitment and limited services, while the VegPro model appears more formalized, with clearer pricing and production coordination.

The current study's negative relationship between farm size and income per acre also adds an important insight. While larger farms are often expected to generate higher income, this result suggests diseconomies of scale in labor-intensive horticulture. Unlike staple crops, horticultural production requires close supervision, frequent harvesting, grading, and quality control, making smaller farms potentially more efficient per acre.

The insignificant effect of household earnings contrasts with expectations that wealthier households should perform better. This may indicate that non-farm income is not always reinvested into farming, but instead used for consumption, school fees, or other household needs. The mixed empirical evidence and current results indicate that economic factors influence contract farming outcomes through resource use, the crop involved, and the quality of institutional arrangements, rather than through contract participation alone.

5.4 Conclusion

This study examined the relationship between social and economic factors and income among smallholder farmers engaged in horticultural contract farming in Machakos County. The findings show that contract farming can be an important pathway for improving farmer income, but its benefits are not automatic or equally distributed across participants. Income differences were

shaped less by participation in the contract itself and more by farmers' ability to organize labor, invest productively, and manage production efficiently.

A key insight from the study is that in labor-intensive horticultural systems, internal household capacity matters greatly. Household size positively influenced income, indicating that family labor remains a strategic asset for timely planting, weeding, harvesting, sorting, and grading. This suggests that smallholder households with stronger labor capacity are better positioned to benefit from demanding contract arrangements.

The study also shows that resource use is more important than resource ownership. Higher production costs were associated with higher income, implying that farmers who invest effectively in inputs, irrigation, labor, and crop care can achieve better returns. However, larger farm size reduced income per acre, showing that expanding land area without corresponding management capacity, labor, and capital may lower efficiency. In this context, intensification and good management are more valuable than simple expansion.

These findings provide broader insights into contract farming systems. First, contract farming should not be viewed merely as a market access arrangement, but as a productivity system that rewards discipline, coordination, and quality compliance. Second, farmer heterogeneity matters: households differ in labor availability, capital access, and managerial ability, which affects how much they benefit from the same contract. Third, well-structured contracts with reliable buyers, technical support, and clear standards can enhance returns, but farmer capacity remains central.

Therefore, successful horticultural contract farming depends on the interaction between institutional support from contractors and internal farmer capabilities. Policies and business models that strengthen farmer labor organization, access to working capital, technical skills, and efficient land use are therefore likely to generate more inclusive and sustainable income outcomes.

5.5 Recommendations of the Research Study

The following recommendations are based on the theoretical literature, empirical findings, and the study's conclusions. They are directed to horticultural farmers, policymakers, agribusiness firms, scholars, and researchers.

5.5.1 Horticultural Farmers

Based on the findings, several practical recommendations can help improve farmer income and performance under contract farming arrangements in Machakos County and similar contexts.

Farmers should prioritize the efficient and timely use of high-quality inputs, such as certified seeds, fertilizers, and crop protection products, within their financial means. Since production cost had a positive relationship with income, well-planned investment in productive inputs can improve yields and returns. However, farmers should avoid unnecessary expenditure and seek extension advice on cost-effective use of inputs.

Farmers should maintain simple production and financial records to track costs, output, and profits. Good record-keeping can support better decision-making, improve access to credit, and strengthen negotiations with contractors.

Experienced farmers should share knowledge through farmer groups, cooperatives, and peer-learning forums. This can reduce information gaps, improve production practices, and enhance collective bargaining power.

Farmers with smaller landholdings should focus on intensive but affordable practices, such as proper spacing, timely weeding, irrigation management, and soil fertility improvement, rather than costly technologies. Farmers with larger farms should improve supervision, labor management, and phased production planning to reduce inefficiencies.

Farmers should also diversify income sources through complementary farm or off-farm activities to reduce dependence on a single contract buyer.

5.5.2 Policy Makers and Agribusiness Firms

Policymakers should establish clear legal and institutional frameworks for contract farming to protect farmers from unfair contract terms, delayed payments, and disputes. Standard contract templates and transparent pricing mechanisms should be promoted.

County and national governments should improve farmers' access to affordable credit, irrigation infrastructure, extension services, and subsidized quality inputs, especially for smallholders with limited capital.

Governments, NGOs, and private firms should support farmer aggregation models such as cooperatives, farmer-producer groups, and clusters. Collective action can lower transaction costs, improve access to markets, and increase bargaining power.

Instead of expensive precision farming technologies, extension services should promote low-cost climate-smart practices such as water harvesting, drip irrigation, mulching, integrated pest management, and improved crop husbandry.

5.5.3 Scholars and Researchers

Future studies should use longitudinal designs to assess the long-term effects of contract farming on income and livelihoods. Comparative studies across counties, crops, and contracting firms are also recommended.

Researchers should further examine factors such as gender roles, climate risks, market shocks, farmer satisfaction, and contract enforcement to understand how they influence contract farming outcomes.

Mixed-method studies combining quantitative and qualitative approaches would provide deeper insights into farmer experiences and institutional dynamics.

5.6 Limitations of the study

Despite achieving its objectives, this study had several limitations that should be considered when interpreting the findings. First, the study was limited to horticultural contract farmers in Machakos County who were contracted by VegPro. Therefore, the findings may not be generalizable to farmers producing other crops, operating under different contractual models, or located in counties with different agro-ecological and market conditions.

Second, the study used a cross-sectional design, which collected data at a single point in time. As a result, it could identify associations between variables but could not establish causal relationships or measure long-term effects of contract farming on income and livelihoods. Future studies may adopt longitudinal designs to assess changes in income over time.

Third, the study relied on self-reported data collected through questionnaires, which may have introduced social desirability bias, where respondents overstate positive outcomes or underreport challenges. Enumerator influence may also have affected responses through question interpretation.

or interaction with respondents. In addition, measurement errors may have occurred due to recall difficulties, especially on income, costs, and production records.

Finally, some important factors such as market shocks, weather variability, access to credit, and household decision-making were not fully captured, yet they may influence farmer income. Future research should incorporate mixed methods and broader variables to provide deeper insights into contract farming performance and livelihoods.

5.7 Suggestion for further research

Building on the limitations of this study, future research should address specific gaps identified in the findings and methodology.

First, since this study focused only on VegPro-contracted horticultural farmers in Machakos County, future studies should conduct comparative analysis between different contracting firms (e.g., exporters, processors, local buyers) to determine how contract terms, pricing systems, input support, and payment timelines affect farmer income.

Second, because the study used a cross-sectional design, future researchers should apply longitudinal panel studies that track the same farmers across multiple seasons to assess how contract farming influences income stability, asset growth, productivity, and household welfare over time.

Third, given the significant negative relationship between farm size and income per acre, future studies should investigate why larger farms are less efficient, focusing on labor management, supervision challenges, input allocation, mechanization, and economies or diseconomies of scale.

Fourth, since education was not statistically significant, future research should examine whether practical skills, extension training, and financial literacy are more important than formal schooling in determining success under contract farming.

Fifth, because the study relied on self-reported income and cost data, future studies should use farm records, buyer records, and digital production data to reduce recall bias and improve measurement accuracy.

Sixth, future research should assess the role of gender, youth participation, and household decision-making in access to contracts, control of income, and benefit distribution within farming households.

Finally, researchers should explore how climate variability, water access, and market shocks affect contract farming profitability and farmers' resilience, especially in semi-arid counties such as Machakos.

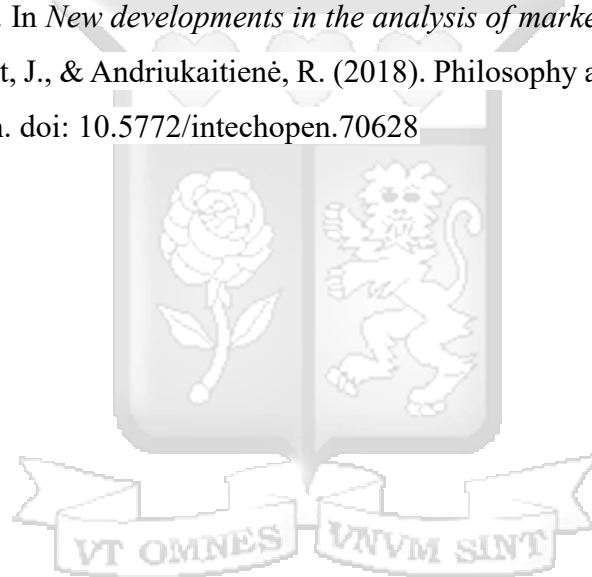


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APPENDICES

APPENDIX I: QUESTIONNAIRE

Interview No: Date Enumerator.....

Introduction: My name is And or on Behalf of /I am a Master Student at Strathmore University Business School. In partial fulfilment of the requirement for the Degree of Master of Management in Agribusiness, we are conducting a research in Machakos County on **Effect of Social and Economic Factors on Income from Contract Farming of Horticultural Crops in Machakos County**. We would like to get your permission to ask you some questions about your participation in the contract farming. All information will be analysed anonymously and treated with utmost confidentiality. Thank you.

SECTION A: INCOME FROM CONTRACT FARMING

This section is to be answered by every farmer.

Which crop (s) have you produced in your farm over the last one year?

How many acres have you had in production over the last one year?.....

If you have produced more than one horticultural crop, list acreage per crop

Crop 1..... Acreage

Crop 2..... Acreage

Crop 3..... Acreage.....

How much income did you get from contract farming per acre over the last one year in Kenya shillings?

SECTION B: SOCIAL FACTORS

The following questions relate to social factors in horticulture contract farming.

<i>Attribute</i>	<i>Question</i>	<i>Response</i>	<i>Comment</i>
Age	What is your age of household head in years?		
Gender	What is your gender? (Male/Female/Others)		
Education	You schooled for how many years?		
Experience	How many years of experience do you have in contract farming?		
Household size	Your household consists of how many members?		

Group Membership Do you belong to any farmer's group? YES/NO

SECTION D: ECONOMIC FACTORS

The following questions relate to economic factors in contract farming.

<i>Attribute</i>	<i>Question</i>	<i>Response</i>	<i>comment</i>
Household income	How much income did you get from farming over the last one year?		
	How much income did you get from contract farming over the last one year?		
	How much off-farm income did you get over the last one year? (If any)		
	How much was your total household income per annum in Kenya shillings over the last one year? (Tick Appropriately)		
	0 – 50,000	[]	
Production cost	500,001 – 100,000	[]	
	100,001 and above	[]	
	What was your production cost in Kenya shillings/acre for the last season?		
Price of produce	What price/kg were you offered for the last season?		
Farm size	What is the size of your farm in acres?		
	How many acres were under production last season?		
	Has contract farming improved your income? Yes, No.....explain.		

Thank You

APPENDIX II: LETTER OF INTRODUCTION

Ole Sangale Rd, Madaraka Estate
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25th April 2025

To Whom It May Concern,

RE: FACILITATION OF RESEARCH – MAINA CAROLINE MUMBI

This is to introduce Maina Caroline Mumbi who is a Master of Management in Agribusiness Student at Strathmore University Business School, admission number MMA/53190. As part of our MMA Program, Caroline is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MMA course. To this effect, Caroline would like to request appropriate data from your organization.

Caroline is undertaking a research paper on “**EFFECT OF SOCIAL AND ECONOMIC FACTORS ON INCOME FROM CONTRACT FARMING OF HORTICULTURAL CROPS IN MACHAKOS COUNTY.**” The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MMA seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Njoki Kiagiri
Manager – Graduate Programs.
Strathmore University Business School.

Association of African
Business Schools



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APPENDIX III: STRATHMORE UNIVERSITY ETHICAL CLEARANCE



13th June 2025

Ms Maina Caroline,
maina.caroline@strathmore.edu

Dear Ms Maina,

RE: Effect of Social and Economic Factors on Income from Contract Farming of Horticultural Crops in Machakos County

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2943/25**. The approval period is from **13th June 2025 to 12th June 2026**.

This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
- iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
- iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
- v. Clearance for the export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke/> and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

APPENDIX IV: NACOSTI LICENSE

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 469945	Date of Issue: 15/May/2025
RESEARCH LICENSE	
	
This is to Certify that Miss.. Caroline Mumbi Maina of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Machakos on the topic: EFFECT OF SOCIAL AND ECONOMIC FACTORS ON INCOME FROM CONTRACT FARMING OF HORTICULTURAL CROPS IN MACHAKOS COUNTY for the period ending : 15/May/2026.	
License No: NACOSTI/P/25/4173943	
469945	
Applicant Identification Number	Deputy Director NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code	
	
NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.	
See overleaf for conditions	

APPENDIX IV: APPROVAL BY THE COUNTY COMMISSIONER



**OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND NATIONAL ADMINISTRATION
STATE DEPARTMENT FOR INTERNAL SECURITY AND NATIONAL
ADMINISTRATION**

Telephone: 21009 and 21983 – 90100
Email Address: cc.machakos@interior.go.ke
Fax No. 044-21999
When replying please quote:

OFFICE OF THE COUNTY COMMISSIONER
P.O. Box 1 – 90100
MACHAKOS

REF: CC/ST/ADM/5/9 VOL.V/351

DATE: 7th July, 2025

All Deputy County Commissioners,
MACHAKOS COUNTY.

RE: RESEARCH AUTHORIZATION-MS. CAROLINE MUMBI MAINA.

The National Commission for Science, Technology and Innovation has licensed Ms. Caroline Mumbi Maina of Strathmore University to conduct research in Machakos County on **“Effect of Social and Economic factors on income from contract farming of horticultural crops in Machakos County for the period ending 15th May, 2026”**.

License No. **NACOSTI/P/25/4173943**

In case of any queries, the contact person will be Ms. Caroline Mumbi Maina, email gabinaca.mumbi@gmail.com , or maina.caroline@starhmore.edu

Please be notified and accord her the necessary assistance.

Thank you.



**SAMANTHA KEGEHI
FOR: COUNTY COMMISSIONER
MACHAKOS COUNTY.**

Encl.