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Final Thesis on:

**The Role of Entrepreneurial Orientation in Driving Environmental,
Economic, and Social Sustainability: The case of Sebeta and
surroundings smallholder farmers**

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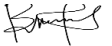
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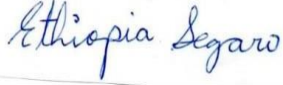
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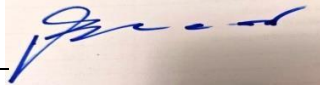
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DECLARATION

I declare that this research thesis entitled “**The Role of Entrepreneurial Orientation in Driving Environmental, Economic, and Social Sustainability: The case of Sebeta and surroundings smallholder farmers**” is my original work and has not been submitted to any other university or institution for the award of any degree or diploma. All sources of information used in this proposal have been properly acknowledged and referenced. This work has been carried out under the guidance and supervision of my advisor.

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List of Abbreviations and acronyms

EO	ENTERPRENURIAL ORIENTATION
H1	HYPOTHESIS ONE
H2	HYPOTHESIS TWO
H3	HYPOTHESIS THREE
P	PROACTIVNESS
R	RISK TAKING
<u>I</u>	INNOVATIVENESS
SPSS	STATISTICAL PACKAGE FOR SOCIAL SCIENCE
VIF	VARIANCE INFLATION FACTOR
STI	STAKEHOLDER INTEGRATION
ES	ECONOMICAL SUSTAINABILITY
MU	MARKET UNCERTAINTY

SI	STRATEGIC INNOVATION
SS	SOCIAL SUSTAINABILITY
EnvS	ENVIROMENTAL SUSTAINABILITY

Abstract

The purpose of this study was to examine the role of entrepreneurial orientation in ensuring the three sustainability dimensions namely, economic, environmental, and social. Moreover, the study is made among smallholder farmers in Sebeta region and its surroundings. Specifically, the research investigated the mediating effects of strategic innovation and stakeholder integration, as well as the moderating roles of market uncertainty and strategic innovation–stakeholder integration interactions. A structured questionnaire was administered to 384 smallholder farmers, yielding a 72.4% response rate. Data were analyzed using SPSS version 25 and Hayes’ PROCESS macro (Models 1 and 4) to test moderation and mediation effects respectively. The findings revealed that entrepreneurial orientation significantly improves economic sustainability, partially mediated by strategic innovation, indicating that innovation serves as a key mechanism for enhancing economic performance. Market uncertainty was found to positively moderate the relationship between EO and environmental sustainability, suggesting that EO becomes more effective in promoting environmentally sustainable practices under uncertain market conditions. Furthermore, stakeholder integration partially mediated the relationship between EO and social sustainability, demonstrating that active stakeholder engagement enhances social outcomes. Based on these findings, the study concludes that strengthening entrepreneurial capabilities, innovation adoption, stakeholder collaboration, and farmers’ capacity to navigate market uncertainty can significantly improve the long-term sustainability of smallholder farming systems. The study contributes to the literature by providing empirical evidence on the mechanisms through which entrepreneurial orientation drives multidimensional sustainability in agriculture, while recommending that future research incorporate additional mediating and moderating variables to further enrich understanding.

Keywords: Entrepreneurial Orientation, Strategic innovation, Stakeholder integration, Market uncertainty, sustainability, Smallholder farmers.

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Most of the literatures related to entrepreneurial orientation in one way or the other talks about sustainability in agriculture. This sustainability is through economic, environmental and social. Early Reported Findings indicated that Entrepreneurial activity has two simultaneous effects that it generates wealth and economic growth but simultaneously produces huge damage to the environment if not seen or implemented properly (Koe, 2015). Thus, such dualism has inspired the emergence of sustainable entrepreneurship, which aims to harmonize economic objectives with environmental protection and social sustainability. Therefore, getting to know how entrepreneurial orientation contributes to agricultural sustainability remains a critical research idea.

Entrepreneurial orientation (EO) from an economics point of view, has established as having a positive impact on performance of farms. It enables farmers to enter new, bigger markets thereby helping them to stay economically fit and enable them to be familiar with market conditions (Nunung Kusnadi, 2018). This shows how entrepreneurial orientation or EO contributes to the success of farmers' economy, while also enhancing the sustainability of agriculture. Moreover, many educators do researches on entrepreneurship and sustainability. This showed that educators are more and more recognizing sustainability as an important element of business education (Wyness, 2015).

Another dimension of the literatures links the fields of EO with environmental sustainability (Amankwah-Amoah, 2019). Entrepreneurially oriented farmers tend to adopt innovative farming techniques, improve resource usage, and respond proactively to environmental and market challenges. Furthermore, different studies made findings emphasizing how incorporating stakeholders can improve the positive impact of entrepreneurial orientation with a special focus on small businesses that face the challenges of limited resources. This study has also found that small business facing resource limitation and regulatory pressures can effectively use stakeholders' engagements to improve their sustainability efforts and thus, their overall performance. However, despite these great insights, there is a significant scientific gap. This gap said that there isn't enough coherent data yet to clearly prove the relationship between a

smallholder farming enterprises sustainability actions and their financial performance (Bartolacci, 2020).

In addition, the techniques through which Entrepreneurial Orientation lead to agricultural sustainability are not yet clear in developing countries. Here developing countries are those especially in sub-Saharan Africa's small scale farmers farming sector (Amankwah-Amoah, 2019). Similarly, in Ethiopia, agriculture is the backbone of the economy, but is affected by various challenges including land degradation, climate-related shocks, limited access to formal market and finance. The Sebeta and surroundings area is particularly important area due to its high levels of agricultural activity, small and fragmented land holdings, and increasing competition for water and labor due to the expansion of urban centers. Farmers in this area need to switch to more entrepreneurial and sustainable systems of farming, if they are to remain economically viable within changing environments. So, it is important to know how their Entrepreneurial Orientation gets converted into real environmental, economic and social outcome in this resource poor area.

Furthermore, the impact of entrepreneurial orientation on sustainability outcomes may differ contextually. It varies on conditions like market uncertainty. Thus, there is still a serious scientific gap in explaining the connection between Entrepreneurial Orientation practices and financial performance of smallholder farmers.

Finally, from the context of Ethiopian agriculture, still there is a lack of evidence that links the individual farmer's entrepreneurial mindset (EO) to a balanced triple bottom line performance (economic, environmental and social). Thus, the proposed study will help fill this theoretical gap systematically by exploring the multifaceted correlations between entrepreneurial orientation and the three pillars of sustainable agriculture, using the Sebeta and surroundings smallholder farmers as a specific case.

1.2 Problem statement

The agricultural sector is the backbone of the Ethiopian economy, contributing significantly to employment, income generation, and food security. However, the sector is increasingly facing serious sustainability challenges that threaten the long-term viability of smallholder farmers. Economically, many smallholder farmers struggle with low productivity, unstable incomes, limited market access, and vulnerability to price fluctuations, which weaken their financial sustainability. Environmentally, unsustainable farming practices, land degradation, soil fertility decline, water scarcity, and climate variability are intensifying, putting pressure on natural resources and reducing the capacity of farms to sustain production over time. Socially, challenges such as weak stakeholder collaboration, limited institutional support, low community engagement, and unequal access to resources continue to hinder inclusive rural development and social well-being.

Although entrepreneurship is widely recognized as a driver of economic development (Schumpeter, 1934; Shane, 2000), and entrepreneurial orientation (EO) has been strongly linked to improved financial performance, the application of these concepts to sustainable agriculture remains insufficiently explored. Theories such as Schumpeter's Creative Destruction and the Resource-Based View have effectively explained how EO enhances economic performance; however, their capacity to explain non-financial outcomes particularly environmental and social sustainability is still underdeveloped. This theoretical limitation is especially evident in under-researched contexts such as smallholder farming systems in developing countries.

Moreover, there is a lack of systematic empirical studies examining how the key dimensions of EO proactiveness, innovativeness, and risk-taking—simultaneously influence the economic, environmental, and social pillars of sustainability. The absence of such integrated analysis limits the development of holistic strategies needed to strengthen resilience, improve livelihoods, and ensure long-term sustainability in Ethiopia's agricultural sector. Therefore, a clearer understanding of how entrepreneurial orientation contributes to multidimensional sustainability among smallholder farmers is critically needed.

1.3 Study objectives

1.3.1 General objective

The major objective is to investigate the relationships between entrepreneurial orientation and the three dimensions of sustainability; economic, environmental, and social among smallholder farmers in Ethiopia, by exploring the mediating role of strategic innovation and the moderating effects of market uncertainty and stakeholder integration.

1.3.1.1 Specific objectives

The specific objectives of this research are:

- To examine the mediation of strategic innovation: To determine if strategic innovation acts as a channel through which entrepreneurial orientation positively influences economic sustainability.
- To examine the moderation effect of market uncertainty between the connection of entrepreneurial orientation and environmental sustainability within smallholder farmers community.
- To examine the Mediation effect of stakeholder integration on relation between entrepreneurial orientation and social sustainability within the farming community.

1.4 Significances of the study

Smallholder farmers in the Sebeta region and surrounding areas are expected to benefit from the findings of this study, as it aims to provide a clear understanding of how entrepreneurial orientation influences the economic, environmental, and social dimensions of sustainability. By recognizing these relationships, farmers can make better decisions to improve productivity, manage resources efficiently, and strengthen collaboration with stakeholders. The study also adds valuable empirical evidence linking entrepreneurial orientation to agricultural sustainability, thereby addressing a contextual gap in the Ethiopian literature and offering useful insights for future researchers in the field of entrepreneurship and agriculture. Furthermore, the findings will assist policymakers and government institutions in designing supportive policies and programs, such as training initiatives that promote innovation, risk management, and proactive market participation. Overall, the research offers practical guidance for enhancing food security, improving rural livelihoods, and advancing sustainable land management at both community and national levels.

1.4.1 Scope of the research

This study was conducted in the Oromia region, specifically in Sebeta and its surrounding areas, focusing on smallholder farmers living in the region. The main objectives of the study are: to examine the link between entrepreneurial orientation and agricultural sustainability, exploring how farmers' entrepreneurial skills and mindset influence the sustainability of their farming practices; to investigate the mediating role of strategic innovation in explaining how entrepreneurial orientation enhances economic sustainability; to assess the moderating effect of market uncertainty in determining whether the relationship between entrepreneurial orientation and environmental sustainability is stronger for farmers facing unpredictable market conditions; and to examine the mediating role of stakeholder integration in the relationship between entrepreneurial orientation and social sustainability, highlighting the importance of strong community ties within the farming community.

In conclusion, the findings of this study will offer a theoretical contribution by clarifying the mechanisms and conditions through which entrepreneurial orientation promotes sustainability in smallholder agriculture within a developing country context.

1.5 Limitation

1.5.1 Limitation of the study

This study has certain limitations that should be acknowledged. The research was conducted only in the Sebeta region and its surrounding areas, which may limit the generalizability of the findings to other regions of the country. Furthermore, the mediating and moderating variables examined in the study were restricted to stakeholder integration, strategic innovation, and market uncertainty, meaning that other potentially important factors influencing the relationship between entrepreneurial orientation and sustainability dimensions were not considered.

1.5.2 Organization of the research

This thesis is organized into five main sections: the first section is the introduction; the second covers the review of related literature; the third presents the methodology; the fourth details the results and discussion; and the fifth and final section provides the conclusion and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

It is an ancient history that agriculture is the main pillar for the development of mankind. The evolution of agriculture starting from survival based practice to more complicated commercialized system shows that broader changes on how human engage with the environment and manage resources. Taking this in mind, Ethiopia has a unique characteristic as a country whose livelihood and economy deeply woven with agriculture (Krall, 2023). Despite the fact that agriculture has a fundamental role in one's economy and livelihood, it faced a lot of challenges. These challenges demand an innovative way of taking them and being strong to achieve resilience and growth (Krall, 2023).

Recently, entrepreneurship has come to be an important mechanism to transform sectors to a higher level. Here, entrepreneurial orientation, shown by its dimensions like innovativeness, proactiveness and risk taking had been a link for the improvement of farming. Moreover, agricultural entrepreneurship is seen beyond profit making. It is now being a tool for food security, and rural development as a whole. Thus, by integrating it with sustainable agricultural principles, smallholder farmers can certainly enhance their crop yield while simultaneously improving environmental and social sustainability (Krall, 2023).

Generally, the concept of agricultural sustainability is woven with the three main pillars of sustainability. These pillars are namely; environmental, economic, and social dimensions. Moreover, different researchers also argued that sustainable farming systems are very critical to ensure good crop productivity and environmental balance in the long run. But, in the context of Ethiopia researches done on these sustainability goals, still remains poor. Additionally, previous studies have often seen entrepreneurship and sustainability as separate areas and also focused on contexts outside Ethiopia, creating a huge study gap (Gebeyanesh Zerssa, 2021).

This literature review therefore tries to examine the intersection of entrepreneurial orientation and sustainability in agriculture, with a specific focus on Ethiopian smallholder farmer groups.

Generally, the literature It focuses on global and regional studies to show how entrepreneurial orientations can enhance farm performance. This is by looking at innovation, and sustainability challenges. Additionally, this is done by creating understandings from entrepreneurship theory, agricultural development studies, and sustainability frameworks. Moreover, the review creates a foundation for understanding how entrepreneurial orientation can serve as a reagent for sustainable agricultural transformation in Ethiopia.

2.2. Theoretical Literature

2.2.1. Schumpeter's Theory of Innovation

Entrepreneurial orientation, EO, goes back into the theory made by Joseph Schumpeter, who was talking about innovation. This scholar argued that economic development is driven by creative destruction theory, a theory through which entrepreneurs introduce innovation that disrupted existing markets and create a new economic opportunities. Thus, putting this context in mind, innovation includes new products, new production methods, new markets and new organizational structures. Therefore entrepreneurs are the central agents of economic transformation (Schumpeter, 1934).

In the agricultural sector, entrepreneurial orientation is characterized by being innovative, proactive and risk taker. These behaviors reflect the dimensions of Schumpeterian entrepreneurship (Lumpkin, 1996). Farmers who are innovative, are certain to respond proactively to market changes, and undertake calculated risks and they are more likely to enhance productivity and their long term viability. However, Schumpeter explains economic performance strongly; he provided limited insights into environmental and social sustainability dimensions. Thus, this limitation initiates the integration of broader sustainability theories.

2.2.2. Resource-Based View (RBV)

Barney, in his book about Resources based view (RBV) provided an additional theoretical foundation for understanding the relation between EO and sustainability outcomes. The RBV theory explains that organizations achieve competitive advantages by effectively utilizing valuable, rare and using resources which are not substitutable (Barney, 1991).

Entrepreneurial orientation was used as a strategic capability embedded in the skills and behaviors of the farmer. From the perspective of the Resource-Based View (RBV), as explained by Jay Barney (1991), EO served as a tool that helped smallholders revisit how they utilized their land and labor more efficiently in order to achieve improved sustainability outcomes. When farmers adopted strategic innovation and stakeholder integration, they created a strong pathway that transformed their business mindset into tangible environmental and social outcomes. Therefore, this demonstrated that a farmer's entrepreneurial orientation was not merely a personal trait, but also a form of strategic wealth that empowered the farmer to attain multidimensional sustainability.

2.2.3. Triple Bottom Line Theory (TBL)

Agricultural sustainability is a system which is widely conceptualized using the triple Bottom Line framework. This approach emphasizes that performance should be evaluated across three dimensions. These dimensions are; economic, environmental and social (Elkington, 1997).

Here in this frame work, economic sustainability refers to profits, productivity and long term financial stability. Secondly, environmental sustainability refers to responsible management of resources, soil conservation, biodiversity protection and adaptation to climate changes. Thirdly, social sustainability contains community development, stakeholder engagement, equity and improved livelihoods of the farmers and their surrounding community (Elkington, 1997).

Therefore, TBL framework gives a multidimensional looks that help for analyzing how entrepreneurial orientation contributes economic growth and to environmental sustainability

as well as social wellbeing of smallholder farmers (Elkington, 1997).

2.2.4. Stakeholder Theory

The stakeholder theory strongly argued that organizations should not focus solely on maximizing shareholders' wealth, but rather create value for all stakeholders, as emphasized by R. Edward Freeman (1984). According to this theory, stakeholders included all relevant parties essential for sustainability, such as customers, suppliers, employees, communities, and regulatory institutions (Freeman, 1984).

In the agricultural context, stakeholder integration simply meant the involvement and collaboration of farmers with cooperatives, local communities, governmental offices, and market actors. The effective engagement of these stakeholders led to enhanced information exchange, the building of trust, and the strengthening of social relationships and legitimacy. Researchers such as Duygu Turker (2009) suggested that stakeholder-oriented practices contributed positively to improved social and environmental sustainability outcomes.

Therefore, stakeholder theory provided a strong theoretical justification for examining stakeholder integration as a mediating mechanism linking entrepreneurial orientation to social sustainability outcomes.

2.3. Conceptual definitions

2.3.1 Backgrounds of Agriculture in Ethiopia

2.3.1.1 Origin of Agriculture

Examining the origins of agriculture revealed a critical period in human history, characterized by significant changes in social structures and interactions with the environment. A scholar, **Lynda Pickbourn Krall**, in her 2023 book, described the Agricultural Revolution as a major economic transformation that fundamentally reshaped relationships among humans and between humans and the non-human material world. Historically, the shift from a hunting-and-gathering lifestyle

to an agricultural society not only altered the conditions of human existence but also introduced a new way of life.

Prior to the emergence of agriculture, humans lived in conditions characterized by relative self-reliance and extensive knowledge of their natural surroundings. They maintained low population densities through dependence on hunting and gathering activities. This lifestyle required a deep understanding of ecological systems, which guided human survival and social organization. The transition to agriculture marked a gradual withdrawal from hunting and gathering, leading to increased population densities and significant restructuring of social systems (Krall, 2023).

Furthermore, the researcher indicated that agriculture was not a phenomenon unique to humans. Other species had also engaged in forms of agricultural activity, demonstrating a broader ecological pattern. A key example was the Leafcutter ant, which cultivated fungus as a food source. This perspective encouraged a reconsideration of the human agricultural experience within the broader framework of evolutionary complexity, highlighting the interconnected relationships between species and their environments in the development of agricultural practices. Thus, the literature emphasized that agriculture had profound implications not only for human societies but also for the ecological systems in which they existed (Krall, 2023).

2.3.1.2 Agriculture in Ethiopia

Agriculture remained the most critical sector of the economy in **Ethiopia**. A large proportion of the population was engaged in agricultural activities, and the sector generated the highest share of national income, particularly through exports and import substitution. However, the sector faced serious challenges, including erratic weather conditions, declining soil fertility, and market-related constraints. Although the government and other stakeholders were working to address these issues and support farmers in increasing productivity, the country urgently needed a more strategic approach to equip smallholder farmers with the tools, skills, and empowerment required to succeed in the sector (Gebeyanesh Zerssa, 2021).

Sustainable agriculture, supported by entrepreneurial orientation, referred to farming practices that aimed to generate profit, promote social fairness, and contribute positively to the country's economic development. This approach could significantly benefit smallholder farmers not only

by increasing their income but also by strengthening their resilience to climate variability and preserving land productivity over the long term. While sustainable agriculture through entrepreneurship demonstrated considerable potential, limited research had examined the key factors influencing Ethiopian farmers' adoption of this approach. In particular, there was insufficient understanding of how farmers' prior knowledge and personal motivation shaped their entrepreneurial activities (Alex Bignotti, 2021).

2.3.2 Entrepreneurship

Entrepreneurship is fundamentally concerned with recognizing opportunities and utilizing them to create value. Traditionally, it has been viewed primarily as a mechanism for profit generation and economic growth. However, more recent research has emphasized a broader, value-based perspective. For example, Maricel Racelis (2014) argued that entrepreneurship carries a moral responsibility toward future generations. This perspective supported a transformative business model aimed at actively addressing societal challenges—such as market failures and environmental degradation—rather than focusing solely on profit maximization.

2.3.2.1 Entrepreneurial orientation Dimensions

In the world of business research, Entrepreneurial Orientation (EO) is a popular idea that describes how a company acts strategically. Entrepreneurial Orientation is about how a company is to behave in ways that are considered entrepreneurial (like being innovative or risk taking) (Lomberg et al., 2017). Entrepreneurial Orientation has three dimensions. These dimensions include innovativeness, proactiveness, and risk taking (Lomberg, 2017).

A) Innovativeness

Innovativeness is a company ability in taking actions to inspire new ideas and creativity. Additionally, it is about doing experiments, and launching new products, services or methods that are very different from usual or what is already common or expected. And simply put is it about thinking outside the box (Lomberg, 2017).

B) Proactiveness

This dimension, proactiveness, is about a company's forecasting ability. This skill is needed in search for new business opportunities. The forecasting ability helps the company predict what the market will want next, and based on the result, it launches products or services before its competitors. Hence, it becomes a leader in the market (Lomborg, 2017).

C) Risk Taking

The dimension, Risk taking, means that a company's ability to go after big ideas or products or methods that have a potential to fail, but also have a great chance of huge profits. This means the farmer is ready to make risky choices even when the outcome is clearly unknown (Lomborg, 2017).

2.3.2.2 Entrepreneurial Orientation dimensions and Farm Performance

The concept of Entrepreneurial Orientation (EO) dimensions and farm performance is highly relevant to the present study because it provides a framework for understanding how farmers' entrepreneurial behaviors specifically proactiveness, innovativeness, and risk-taking influence the overall sustainability of their agricultural activities. By examining EO dimensions, the study can identify how these entrepreneurial traits drive economic, environmental, and social performance on farms. This relevance lies in its ability to explain the pathways through which farmers' mindset and strategic actions contribute to improved productivity, resource management, community engagement, and resilience in smallholder farming systems, particularly in the context of the Sebeta region where small-scale agriculture faces challenges from limited resources, market uncertainty, and environmental pressures.

2.3.3 Agricultural Entrepreneurship

Nowadays, academicians are giving much more and more attention to agricultural entrepreneurship concept because farming has its own unique challenges and opportunities.

Thus, different researches showed that to deal with the complexity of farming, one needs distinct policies, skill-building programs, and custom-made strategies for the sector.

Scholars, Bolzani, Carli, Fini, and Sobrero, in their 2015 study, made a research on the tools and factors that can positively affect entrepreneurships in the food and agriculture industry. The major findings of this study was very crucial to understand what happens after the implementation of government policies that promote entrepreneurship (Bolzani, 2015). Similarly, other study that focuses specifically showed that entrepreneurships skills and knowledge are needed for starting farm business. From this study it was found out that motivation, and planning skills are very much essential for success of farming business. More importantly, a similar research argues that training programs can greatly improve entrepreneurial qualities. On example is that the desire to achieve and self-confidence. This quality is especially is very essential in developing countries where limited resources and poor government support are found. Thus, this work is evident that innovation and creativity are the key for farmers success (Morshedi Estahbanaty, 2016).

2.3.3.1 Importance of Agricultural Entrepreneurship

The study of agricultural entrepreneurship has evolved significantly in recent years, highlighting the critical role entrepreneurship plays in the agricultural sector.

In a 2016 study, Morshedi Estahbanaty demonstrated that education was one of the most important factors in developing entrepreneurial skills in farming. The research indicated that effective training programs could lead to increased employment opportunities and the creation of new farm businesses. It further emphasized that equipping individuals with the ability to identify opportunities, manage resources efficiently, and apply scientific methods to problem-solving would not only benefit farmers but also contribute to overall economic growth (Morshedi Estahbanaty, 2016).

Similarly, Ben Youssef (2018) examined the relationship between entrepreneurship and sustainability. The study argued that entrepreneurial activities were essential for promoting

sustainable farming practices. It suggested that entrepreneurial farmers could play a significant role in addressing environmental and social challenges, including pollution reduction and the adoption of green production methods. The author strongly emphasized the need for governments to establish supportive mechanisms—such as appropriate policies and regulations—to encourage entrepreneurship within the agricultural sector. Such support could ultimately enhance both economic development and sustainability outcomes.

Furthermore, a 2018 study by Etriya identified a positive relationship between farmers' Entrepreneurial Orientation (EO) and farm profitability. This finding was important in demonstrating how modern farming performance could be improved through innovative approaches. The study concluded that farm output and the factors influencing the adoption of innovations were closely interconnected, meaning that productivity and innovation could not be separated. Consequently, the research underscored the importance of an entrepreneurial mindset in shaping the success and sustainability of the agricultural sector (Etriya, 2018).

2.3.4 Sustainability in Agriculture

A study conducted by Mohd Karim, Arumugam, and Bonaventure examined the dairy farming sector in Johor Bahru, located in southern Malaysia. Their research found that for farmers to succeed in the dairy sector, they needed a clear understanding and application of sustainable agricultural practices.

These sustainability practices encompassed three major dimensions: economic viability (profitability), social responsibility (community support), and environmental protection. The authors emphasized that the dairy farming sector required transformation, which could be achieved through targeted training and education programs that enabled farmers to learn about and adopt sustainable farming methods. This recommendation was based on the recognition that farmers possessed varying levels of skills, knowledge, and experience within the industry (Mohd Karim, 2016).

2.3.4.1 Pillars of Sustainability in agriculture

A 2014 study by Draper examined how sustainability in farming could contribute to shaping a country's future. The researcher conducted interviews with numerous farmers and incorporated their insights to develop a comprehensive understanding of sustainable farming practices. The findings demonstrated that farming activities aligned with the triple bottom line framework—people, profit, and planet. Draper systematically categorized the major practices and actions within the farming sector that influenced the broader ecosystem. One of the key contributions of the study was clarifying common misunderstandings regarding the financial and community structures necessary to ensure agricultural sustainability. Additionally, the research provided a detailed analysis of the environmental, financial, and social challenges faced by farmers (Draper, 2014).

Furthermore, Santeramo (2022) explored the relationship between the circular economy and the green (sustainable) economy. The study traced the evolution of the circular economy concept and highlighted its potential to transform the agricultural sector by reducing waste and minimizing environmental harm. Santeramo critically examined traditional linear economic models and argued for the adoption of sustainable models that integrate economic and social benefits with environmental protection. The study also emphasized that farming systems were closely interconnected with both environmental and economic transformations (Santeramo, 2022).

2.3.4.1.1 Environmental Sustainability

Environmental sustainability primarily concerned reducing the negative impacts of farming activities on the natural environment. In both past and present agricultural practices, farmers relied on animals and machinery to increase farm yields. However, while pursuing higher production, farming activities also contributed to environmental degradation, particularly soil erosion and water pollution.

A study conducted by Popović (2012) concluded that protecting the environment required farmers to adopt appropriate mechanisms suited to the specific ecological conditions of their farming areas. Similarly, Rose (2019) highlighted integrated farm management as a practical

solution to address environmental challenges. Nevertheless, the study acknowledged that implementing such methods could be difficult for farmers and supporting institutions.

Furthermore, research by Rosa Puertas (2022) emphasized that farming practices were increasingly scrutinized due to their impact on natural resources, especially in light of urgent global challenges such as climate change and rapid population growth. Overall, these systems were designed to balance the need for adequate food production with the protection and conservation of environmental resources.

2.3.4.1.2 Economic Sustainability

Economic sustainability in agriculture refers to the ability of farmers to generate profits consistently over time. Achieving economic sustainability requires a broader perspective beyond simply maximizing profit. Farmers must balance financial gains with the well-being of the environment and their communities.

A 2024 study by Jackson and Holm examined how financial stress influenced consumer behavior and the overall food system. The scholars argued that a strong and resilient food system could withstand economic pressures and the challenges they create. Their research emphasized that economic sustainability was not merely about generating profit, but also about establishing a farming system capable of enduring financial, environmental, and social pressures while remaining resilient over time (Jackson, 2024).

2.3.4.1.3 Social Sustainability

Social sustainability in the food system referred to actively involving people and recognizing their well-being as a central component of sustainable development. It focused on fairness, public health, and the overall well-being of individuals and communities.

In their 2024 study, Jackson and Holm challenged the narrow interpretation of sustainability that focused solely on environmental concerns. They argued that greater attention should be given to

building a resilient food system capable of supporting public health and respecting consumers' food choices (Jackson, 2024).

Furthermore, Rosa Puertas (2022) emphasized that social dimensions must be incorporated when assessing sustainability performance. Therefore, social sustainability ensured that farming practices were equitable and just, supported community development, and guaranteed access to sufficient and healthy food for the population.

2.4. Empirical Literature

The empirical literature concerning the intersection of EO and agricultural sustainability shows a clear shift from profit driven initiatives to more balanced and fair approach. This section reviews previous studies on how entrepreneurial mindsets affect economic, environmental and social outcomes in various contexts.

2.4.1. Entrepreneurial Orientation and Economic Sustainability

Empirical studies have demonstrated that Entrepreneurial Orientation (EO) positively influences the economic performance of farms. A study conducted on small- and medium-sized businesses in Nigeria found that businesses with strong EO capabilities were better equipped to manage large, high-risk projects, resulting in higher profits. These findings align with Joseph Schumpeter's concepts, which emphasize innovativeness as a key driver of market competitiveness (Owoseni O. O., 2021).

Additionally, research by Kusnadi N. E. on vegetable farming in West Java, Indonesia, highlighted that the dimensions of innovativeness, risk-taking, and self-reliance enabled farmers to adapt effectively to environmental changes. The study indicated that a strong EO was directly associated with higher farm productivity and overall success. Similarly, other research identified a direct relationship between proactiveness and risk-taking behaviors and long-term financial performance in farming enterprises (Kusnadi N. E., 2018).

2.4.2. Entrepreneurial Orientation and Environmental Sustainability

The relationship between Entrepreneurial Orientation (EO) and environmental outcomes has been recognized as an important area of research. Amankwah-Amoah (2019) concluded that a business-oriented attitude was strongly associated with achieving positive environmental sustainability outcomes. The study further showed that farmers with high levels of innovativeness did not view environmental challenges merely as constraints, but rather as opportunities for creative problem-solving.

However, other studies indicated that the effectiveness of EO in promoting environmentally sustainable practices often depends on the external context. An entrepreneurial mindset is crucial for driving sustainability because it enables farmers to identify opportunities for green production even under challenging conditions. In the context of Sub-Saharan Africa, research highlighted that while EO has the potential to enhance environmental sustainability, these concepts remain under-researched among small-scale farmers in developing countries (Park C. S., 2017).

2.4.3. Stakeholder Integration and Social Sustainability

When discussions focus on the well-being of communities and the preservation of resources for future generations, the emphasis is clearly on social sustainability. Empirical evidence has shown that incorporating stakeholders is critical for improving the performance of small businesses, especially those operating under resource constraints. In this context, stakeholder engagement for social sustainability extends beyond a firm's immediate growth objectives to generate broader benefits for the community (Duygu Turker, 2009).

Recent research has further highlighted that social sustainability ensures farming practices are fair and equitable for all stakeholders. While many studies historically concentrated on environmental or economic outcomes, scholars such as Jackson P. and Holm (2024) have challenged this narrow focus, strongly advocating for the inclusion of public health and community-supported food systems as primary indicators of sustainable success.

2.4.4. The mediating Role of Strategic Innovation

Study made by Morgan identified strategic innovation as a critical channel through which EO is converted into economic results. This scholar has argued that market based learning and experimentation also allow farmers to identify the best way of doing things that enhance their overall competitiveness. Empirical data from this scholar study showed that business with higher EO ability achieve significant returns on their assets (Morgan D. W., 2005).

2.5. Research Gaps

Many studies have examined entrepreneurship and its contribution to economic growth, and other research has emphasized the importance of sustainability in agriculture. However, there is still limited understanding of how these two concepts are connected. In particular, there is a significant research gap regarding how entrepreneurship and sustainability relate to each other among smallholder farmers in Ethiopia.

More specifically, there is a shortage of empirical evidence that clearly explains how a farmer's entrepreneurial orientation—such as being proactive, innovative, and willing to take risks—affects the three key dimensions of sustainable farming: environmental sustainability, economic performance, and social sustainability. While the importance of these dimensions is widely recognized, the way entrepreneurial behavior influences them in real-world farming contexts remains underexplored.

Traditional business theories, such as Joseph Schumpeter's concept of creative destruction and the Resource-Based View (RBV), mainly focus on financial performance and competitive advantage. These theories primarily explain how innovation and resource utilization lead to economic success. However, they do not adequately address non-financial outcomes such as environmental protection and social well-being. This limitation becomes more noticeable when applying these theories to small-scale farming in developing countries, where sustainability involves more than just profit generation.

Therefore, this study seeks to address this theoretical and empirical gap by carefully examining the relationship between the specific dimensions of farmers' Entrepreneurial

Orientation (EO)—innovativeness, proactiveness, and risk-taking—and the three pillars of sustainability: environmental, economic, and social sustainability among smallholder farmers.

2.6. Hypothesis

H1: Entrepreneurial orientation positively influences economic sustainability through the mediation of strategic innovation.

Past researches support this hypothesis, showing that various studies have looked at how farmers acting like entrepreneurs (being strategically innovative) affect financial sustainability, specially increasing profit and productivity. Other researches also support this by identifying market based learning as a structured process that enables farmers to identify best practices and enhance their competitiveness. It was also argued that this mechanism was not just about imitation but also enables experimentation and innovation, which led to great changes in a firm's profitability (Morgan, 2005). Research done by Morgan and Douglas showed an empirical results that demonstrated entrepreneurial skills like being proactive, innovative have strong and positive linkage with overall performance of the firm. Specifically, the research found out that firms that have good entrepreneurial orientations capabilities can achieve significantly higher profitability and return on assets (ROA) (Morgan, 2005).

In his 2018 study, Kusnadi N. E. emphasized that possessing an entrepreneurial mindset enabled farmers to effectively manage changes and was associated with improved overall performance, particularly when participating in global supply chains through international sales (Kusnadi, 2018). Similarly, Etriya demonstrated that farmers who exhibited proactiveness and risk-taking behaviors were more likely to develop innovations. This approach not only increased their income but also allowed farmers to establish a distinctive competitive advantage, leading to long-term financial success and sustainable economic performance (Etriya, 2018).

H2: The positive relationship between entrepreneurial orientation and environmental sustainability is stronger when there is high uncertainty in the market.

Entrepreneurial Orientation (EO) has a strong connection with environmental sustainability, particularly in contexts characterized by high levels of uncertainty. Market uncertainties—arising from climate change, fluctuating input prices, and shifting consumer preferences—pose significant challenges for farmers and agribusinesses. Firms with a strong entrepreneurial orientation are better equipped to navigate these uncertainties because they emphasize opportunity recognition, experimentation, and innovation (Slevin D. P., 1989).

One study directly examined the relationship between a farmer's entrepreneurial orientation and environmental sustainability, concluding that the two concepts are mutually reinforcing (Amankwah-Amoah, 2019). Similarly, research conducted in 2017 found that an entrepreneurial mindset—characterized by the ability to identify opportunities and innovate—was crucial for promoting sustainability. These findings indicate that farmers with an EO, driven by innovativeness and proactiveness, focus not only on market success but also on environmental stewardship, viewing problems and uncertainties as opportunities for creative solutions rather than mere constraints (Park C. S., 2017).

H3: Entrepreneurial orientation positively influences social sustainability through stakeholder integration.

Social sustainability in farming exceeds beyond simple economic performance of the firm. It focuses on the holistic wellbeing of the community and preservation of resources for the future. In this context, corporate social responsibility by the farmers is defined as a corporate behaviors aimed at affecting stakeholders positively while going beyond a firm's direct interest of growth (Turker, 2009). Here, the integration of stakeholders is a multi-dimensional process that requires addressing the needs of various groups like the surrounding community including local farmers' cooperatives (Turker, 2009).

Additionally, social sustainability is not only concerned about farm wellbeing but it is also about the health and happiness of the whole community surrounding it. Thus, fair pay, fair working condition, community involvement, equal access to resource, and improving the quality of leaving for everyone are some of the effects of good social sustainability measures. A 2019 study by Amankwah-Amoah and colleagues examined the relationship between Entrepreneurial

Orientation (EO) and social sustainability. The study emphasized that integrating stakeholders is a critical factor for enhancing the overall effectiveness of farming systems. Consequently, the research directly linked entrepreneurial orientation to improved social sustainability outcomes in agriculture (Amankwah – Amoah 2019).

2.7 Conceptual Framework

Using the empirical and theoretical works in the literature the conceptual framework for the study was devised. The conceptual frame work shows the connection between entrepreneurial orientations with the dimensions of sustainability. This model adopts insights from different scholars namely Kusnadi and Etriya , and Amankwah-Amoah, to the Ethiopian context, focusing on smallholder farmers.

In this model the one and only independent variable is Entrepreneurial Orientation (EO). This independent variable is measured through its three main dimensions. The dimensions are; innovativeness, proactiveness, and risk-taking.

Similarly, the independent variable contains dimensions like; Proactiveness, Risk taking and innovativeness are measured as follows;

- Proactiveness: Is measured by how quickly someone takes initiative, anticipates changes, and leads rather than follows.
- Risk-taking: Is measured through the willingness to commit resources to uncertain opportunities.
- Innovativeness: Is measured through showing creativity, experimentation, and tendency to adopt or generate new ideas

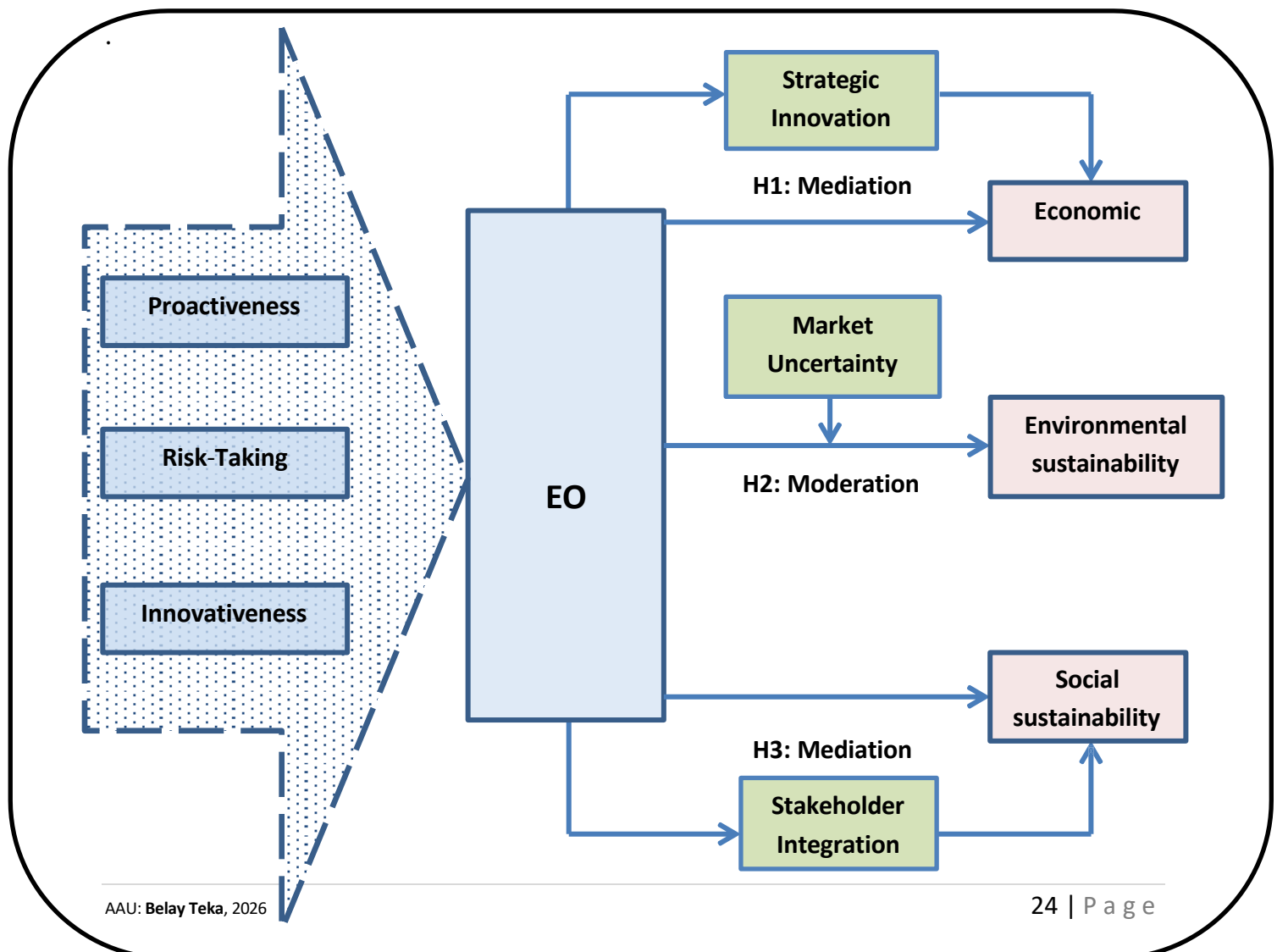
For this study the dependent variables are the three pillars of agricultural sustainability:

- Economic sustainability is influenced by three factors like profitability, yield/productivity, and farm revenues (Kusnadi, 2018); (Etriya, 2018),

- Environmental sustainability is reflected in three practices mainly soil conservation, resource management, and climate adaptation (Amankwah-Amoah, 2019); (Park, 2017),
- Social sustainability is captured through stakeholder integration, (Amankwah-Amoah, 2019).

In the study model, it was expected that Entrepreneurial Orientation (EO) directly and positively influenced each dimension of agricultural sustainability. Additionally, demographic variables such as age, gender, and education served as control variables.

Figure 1 below illustrated the relationships proposed in the framework. These relationships were analyzed using PROCESS macro models 1 and 4. The model shown in Figure 1 allowed for the examination of how Entrepreneurial Orientation (EO) impacted sustainability outcomes. Consequently, the three research hypotheses were tested.



CHAPTER THREE: METHODOLOGY

3.1. Overall process

The main objective of this study was to examine the effect of entrepreneurial orientation, through mediating and moderating variables, on the dimensions of agricultural sustainability. In this study, entrepreneurial orientation was conceptualized in terms of innovativeness, proactiveness, and risk-taking. Agricultural sustainability was measured using three dimensions: economic sustainability, environmental sustainability, and social sustainability. The study focused on smallholder farming communities in Sebeta, located in the Oromia Region of Ethiopia.

Data for the study were collected using structured questionnaires that were directly distributed to smallholder farmers. The questionnaire contained various items designed to address the objectives of the research, including measures of entrepreneurial orientation, sustainability practices, and demographic characteristics. All measurement items were developed using a seven-point Likert scale ranging from —strongly disagree to —strongly agree.

An area-based systematic random sampling technique was employed to select the respondents. The questionnaire was administered in both English and Afan Oromo, as these languages were widely spoken in the study area. Data were collected primarily through face-to-face interviews to ensure clarity and improve response accuracy.

The findings generated from this process provided valuable insights into the role of entrepreneurial orientation in promoting sustainability within Ethiopian agriculture. In doing so, the study contributed to addressing the research gap previously identified in the existing literature.

3.2. Operationalization of variables

To empirically test the proposed relationships discussed in the previous sections, the main constructs of the study—Entrepreneurial Orientation (EO) and Agricultural Sustainability—were translated into measurable indicators. Operationalization was necessary to ensure that the data collected from smallholder farmers accurately reflected the theoretical concepts presented in the literature review.

As shown in the table below, the independent variable, Entrepreneurial Orientation, was divided into three dimensions: proactiveness, risk-taking, and innovativeness. Each of these dimensions was linked to specific strategic mechanisms. In this study, strategic innovation and stakeholder integration were treated as mediating variables, while market uncertainty was considered a moderating variable influencing the relationship between entrepreneurial orientation and agricultural sustainability.

In general, the following table shows how this dimensions are measured.

Independent variables	Variables types	Measures	Indicators	Source	Expected outcomes
Proactiveness (p)	Strategic innovation (Mediating)	Initiative, anticipation of change, leadership.	• Acts before others • Anticipates trends • Responds quickly to problems • Seeks new opportunities	Etriya 2018, morgan 2005.	• Higher productivity and profit • Faster adoption of sustainable practices • Better

			•		stakeholder engagement
Risk-taking (r)	Market uncertainty (Moderating)	Willingness to commit resources to uncertain opportunities	• Willing to invest in uncertainty • Prefers bold actions • Seeks high-risk, high-return opportunities	Park 2017, Slevin 1989.	• Increased financial returns • Greater adoption of eco-innovations • Improved community and worker initiatives
Innovativeness (i)	Stakeholder integration (Mediating)	Creativity, experimentation, and adoption of new ideas or technologies.	• Generates new ideas • Experiments with new methods • Adopts new technologies	Amankwah-Amoah, Turker 2019.	• New products and higher efficiency • Enhanced environmental performance

					nce Improved social and community development
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Table 1: EO Dimension Matrix

In the study model, it was expected that entrepreneurial orientation directly and positively influenced each dimension of agricultural sustainability. Additionally, demographic variables such as age, gender, and education served as control variables.

3.2.1. Hypothesis testing approach:

To test the three hypotheses above, this study has employed Hayes' PROCESS macro models in SPSS 25. The process macro is the best recommend model to test mediation and moderation models. This method is beyond simple correlation and regression to study the complex conditional relationships between these variables.

- For Hypothesis 1 which is mediation: The study proceeded to test whether strategic innovation mediates the positive relationship between entrepreneurial orientation and economic sustainability. This was done using the PROCESS macro (Model 4). Through the process macro output, the study has done the analysis to assess the indirect effect of entrepreneurial orientation on economic sustainability through the mediator, strategic innovation. Thus, a significant indirect effect has made the hypothesis true. The hypothesis is true and valid when entrepreneurial farmers achieve economic success by first engaging in strategic innovation.
.
- For Hypothesis 2 which is moderation: The study proceeded to test whether market uncertainty moderates the positive relationship between entrepreneurial orientation and environmental sustainability. This has been done using the PROCESS macro (Model 1). Through the process macro output, the study has done the analysis to assess the indirect effect of entrepreneurial orientation on environmental sustainability through the moderator, market uncertainty. Thus, a significant interaction effect has showed that the positive effect of an entrepreneurial orientation on environmental sustainability is stronger for farmers operating in more uncertain market conditions.
- For Hypothesis 3 (mediation): similar with the first Hypothesis, the analysis has tested whether the influence of entrepreneurial orientation on social sustainability is positively moderated by stakeholder integration. This has been conducted using the PROCESS macro (Model 4). Then, the researcher analyzed the interaction term between entrepreneurial orientation and stakeholder integration. A significant interaction effect has confirmed that entrepreneurial orientation is more effective at

generating positive social outcomes when farmers are well integrated with their stakeholders.

Prior to hypothesis testing, the quality of the data was verified through reliability and validity assessments. Internal consistency was evaluated using Cronbach's alpha. Furthermore, content and construct validity tests were conducted to ensure that the survey items accurately measured entrepreneurial orientation (EO), sustainability dimensions, and the mediating and moderating variables. Correlation and regression analyses were interpreted and reported only after these measures were confirmed.

3.3. Sampling methods

This research has applied Simple random sampling technique ensures every member of a population has an equal chance of selection, providing high internal/external validity and reducing bias.

3.3.1. Target population

Population is defined as the total number of units for data collection, including individuals, artifacts, events, or organizations (K, 1997).

Due to limited resources, a sample farmers will be taken for the study not all will be included. Additionally, the target populations of this research are —small holder farmers in Sebeta in Oromia region.

3.3.2. Sample size

The population frame for the study was considered on the basis of the number of people served daily. From the communication that the researcher had with the Sebeta region agriculture bureau, the average numbers of smallholder farmers in Sebeta are about 9360. The calculation is shown below. Hence, the sample size that would be taken will be 384 Sebeta. To avoid bias and errors, the researcher by himself collected the data for three/3/ days of a week. The working days have

been chosen as in the first, middle, and last days of a week, namely, Monday, Wednesday, and Saturday.

Sample size calculation using Taro Yemane formula;

$$n = \frac{N}{1 + N(e^2)}$$

n= sample size

N= population size

E= margin of error, 95%=0.05

Sebeta

Population= 9360

Margin of error = 0.05

$$N = \frac{9360}{1 + 9360(0.05^2)} = \mathbf{384}$$

3.3.3. Sources of data

The data sources for the research are both primary and secondary sources.

3.3.3.1. Primary source of data

Primary data is first-hand information obtained by a researcher on variables of interest for a specific study. In this context, sample farmers are selected using a suitable sampling technique. Data was collected using a questionnaire, with the researcher obtaining cooperation and clarification from respondents during distribution.

3.3.3.2. Secondary sources of data

Secondary sources, such as articles, research reports, and books, were reviewed and analyzed to support the study and these sources served only as references for the literature review rather than as sources of empirical data.

3.3.4. Methods of data analysis

The researcher processed raw data before data analysis, checking questionnaires for completeness and providing codes. Data is entered, stored, edited, and cleaned for missing values. Statistical tools, including descriptive and inferential techniques, was used for the analysis.

3.5 Validity of data

Validity refers to the extent to which an instrument measures what it is intended to measure. In this study, validity was ensured by carefully designing the questionnaire to accurately capture the dimensions of entrepreneurial orientation (EO) and agricultural sustainability. The questionnaire was pretested and reviewed against the theoretical constructs from the literature to ensure content and construct validity.

Additionally, a linearity test was conducted to examine whether the data followed the assumptions required for further analysis. The test yielded a p-value of less than 0.001, indicating that the data did not significantly deviate from linearity. This result confirmed that the instrument validly captured the intended constructs and that the data were suitable for subsequent analysis using the Hayes PROCESS macro for mediation and moderation testing

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3.6 Reliability Test

Reliability refers to the consistency and stability of the measurement instrument. To ensure reliability, data were collected from credible sources, namely smallholder farmers in Sebeta and its surrounding areas, and the questionnaires were designed based on established literature. This approach reduced the risk of inaccurate or inconsistent responses and helped ensure that the results were sound. The reliability of the instrument was assessed using Cronbach's alpha, which measures internal consistency. According to standard academic practice, a Cronbach's alpha value above 0.7 is considered acceptable (Nunnally & Bernstein, 1994). In this study, the calculated Cronbach's alpha value was 0.875, which exceeds the threshold and indicates that the

questionnaire was highly reliable and appropriate for use in subsequent regression and mediation/moderation analyses.

3.7 Controlling for common method Bias

To address the potential concern of common method bias, Harman's single-factor test was conducted. The results of the factor analysis showed that the largest single factor accounted for 41.53% of the total variance (see Annex 6). Since this value is well below the commonly accepted threshold of 50%, it indicates that no single factor dominated the variance in the data. Therefore, common method bias was not considered a threat to the validity of the study.

3.8 Construct Validity and data Robustness

To ensure the statistical power and validity of the study, factor analysis was conducted. Initially, the communalities were examined, and the extraction values ranged from 0.32 to 0.983, with the vast majority exceeding 0.70 (see Annex 7). These results indicated that the extracted factors accounted for a substantial proportion of the variance in the survey items, demonstrating that the instrument possessed strong statistical power and construct validity.

CHAPTER FOUR: RESULT AND DISCUSSION

4.1. Response rate

Out of the 384 questionnaires distributed to the farmers in Sebata, 278 were returned and administered to the respondents with close follow-up and guidance in filling them out. When we see the rate of response is 72.4%. Thus, according to (Mugenda, 2003) a response rate of 50 percent is adequate for data analysis and reporting; a rate of 60 percent is good. Thus, a research result with response rate of 72.4% is very good. Thus, the rate of response for this study is acceptable. Here, most of the respondents completed the questionnaires suitably.

The questionnaires were designed to ask several questions related to Entrepreneurial orientation serving as a multi-dimensional driver of organizational sustainability by nurturing growth across social, environmental, and economical pillars. EO, entrepreneurial orientation, enhances social sustainability by better integrating stakeholder's needs, while its impact on environmental sustainability becomes even more significant in uncertain, volatile markets. Moreover, EO strengthens economic sustainability by fueling strategic innovation, which acts as the critical bridge transforming an entrepreneurial mindset into long term financial stability.

Thus, this chapter discusses and analyzes the results of the PROCESS macro (Model 4) and (Model 1) that was proposed as an effective method to study the mediation and moderation relationships between variables. The statistical analysis of this study was performed using SPSS software version 25. The results of the study were presented in two parts: descriptive and inferential statistics (hypothesis testing).

4.2. Descriptive Findings

4.2.1. Demographic Profile

A. Gender distribution

Gender	Frequency	Percentage (%)
Male	179	64.4
Female	99	35.6
Total	278	100.0

Table 2: Demographic profile

The above table shows the gender distribution of the respondents. Out of the responses, the majority of the participants were male, accounting for 64.4% of the sample, while the female respondents constituted 35.6%. This observed gender distribution suggest a higher representation of the male respondents, which is constituent with insuring the inclusion of substantial proportion of female respondent ensures adequate diversity within the sample.

B. Age

Variable	Minimum	Maximum	Description
Age (years)	22	88	Predominantly middle-aged and older respondents

Table 3: Age

This table above shows the age distribution of the respondents. Based on the above response from 278 respondents, the ages of the participant range from 22 to 88 years, indicating a wide variation in the age profile of the sample. From the distribution result, we can clearly see that there is a gradual increase in frequency from the early twenties. Second it showed that there is a huge concentration of respondent in the middle aged group, particularly between 30s and 60s. Thus, we can suggest that the majority of the respondents are farmers with good farming and managerial experiences. Overall, since there is a broad age range of respondents, we can say that this data collected from them would increase the acceptability of the sample and provided a strong demographic base for examining entrepreneurial orientation, innovation behavior, and sustainability outcomes.

C. Educational distribution

Level of Education	Frequency	Percentage (%)
No formal education	111	39.9
Primary education	95	34.2
Secondary education	72	25.9
Total	278	100.0

Table 4: Educational distribution

Educational background of the respondents is shown in the above table 4. Based on the result for the table, we can see that a large proportion of the participants described having no formal education; this is about 39.9% of them from the sample. Here, respondents with primary education accounted to about 34.2% of the sample taken. The final groups of respondents are those who had attained secondary education represented to about 25.9% of the total valid responses. Additionally, the result also indicated that the sample is dominated by individuals with lower to mid-level educational background, which is reflective of the workforce structure commonly observed in the study situation. This educational distribution gives an important background basis for interpreting succeeding analysis related to entrepreneurial orientation, strategic innovation and the sustainability outcomes.

D. Distribution of Farm Size among Respondents

Farm Size (ha)	Frequency	Percentage (%)
0.25- 0.50 ha	119	42.8
0.51 – 1.00 ha	68	24.5
1.01 – 2.00 ha	51	18.4
2.01 – 4.00 ha	40	14.3
Total	278	100.0

Table 5: Distribution of Farm Size among Respondents

The table presents the distribution of farm sizes among the respondents. The majority of smallholder farmers (42.8%) cultivated plots ranging from 0.25 to 0.50 hectares, indicating that most farms in the study area are very small. About 24.5% of the respondents had farm sizes between 0.51 and 1.00 hectares, while 18.4% managed farms of 1.01 to 2.00 hectares. Only 14.3% of the farmers had relatively larger plots, ranging from 2.01 to 4.00 hectares.

Overall, the data show that most farmers in Sebeta and its surroundings operate on small plots of land, with nearly 67.3% of respondents cultivating less than 1 hectare. This highlights the small-scale nature of farming in the area, which may influence the adoption of innovative practices, resource allocation, and the ability to implement sustainable agricultural strategies.

E. Main crop

Main Crop	Frequency	Percentage (%)
Other crops	42	13.1
Teff	278	86.9
Total	320	100.0

Table 6: Main Crop

The table shows the distribution of the main crops cultivated by the respondents. The majority of farmers (86.9%) reported Teff as their primary crop, indicating its dominant role in agricultural

production in the study area. A smaller portion of the respondents (13.1%) cultivated other crops as their main crop. This distribution highlights that Teff is the principal crop among smallholder farmers in the study area, reflecting both its importance for local food security and its economic significance. The relatively small proportion of farmers growing other crops suggests limited diversification in farming activities, which may have implications for both economic and environmental sustainability.

4.3. Reliability and Validity

As discussed in the methodology section of Chapter Three, Cronbach's alpha is the most commonly used measure of internal consistency, or reliability. It is typically applied when a study includes multiple Likert-scale questions that form a composite scale, and the researcher seeks to determine whether the scale is reliable. Since the researcher used a Likert-scale questionnaire, the reliability of the data needed to be tested. Reliability refers to the internal consistency of the constructs in the study, and a construct is considered reliable if its Cronbach's alpha value exceeds 0.7 (Ringle, 2013).

In this study, construct reliability was assessed using Cronbach's alpha. The results revealed that all major variables, along with their corresponding items, were reliable, as their alpha values were greater than 0.7. The reliability of Entrepreneurial Orientation (EO) is summarized in Table 7 below.

Research Variable	Number of Items	Cronbach's Alpha	Verdict
Entrepreneurial Orientation (EO)	9	.757	Reliable
Economic Sustainability	3	.851	Highly Reliable
Environmental Sustainability	4	.909	Excellent
Social Sustainability	2	.972	Excellent

Research Variable	Number of Items	Cronbach's Alpha	Verdict
Overall Instrument	18	.875	Highly Reliable

Table 7: Reliability Statistics

4.4. Regression analysis

In this study, multiple linear regression analysis was employed to assess the extent to which several independent variables influenced a particular dependent variable. Prior to conducting the regression analysis to examine the effect of service quality on customer satisfaction, the assumptions of linearity, normality, and multicollinearity were tested and met. Based on these tests, the following results were obtained.

4.4.1. Regression analysis assumptions

4.4.1.1. Diagnostic test

Before applying the regression analysis and Hayes PROCESS Macro (Model 1 and Model 4), several preliminary tests were conducted to ensure that the data met the assumptions required for regression analysis. The results of these tests are presented as follows

4.4.1.1.1. Linearity Test

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups (Combined)	246.048	6	41.008	20.364	.000
Linearity	238.433	1	238.433	118.402	.000
Deviation from Linearity	7.615	5	1.523	0.756	.582

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Within Groups	545.728	271	2.014		
Total	791.776	277			

Table 8: Linearity Test

From the above table 8 we can see that, the assumption of linearity was assessed ensured the data was suitable for testing the moderation and mediation effects of the proposed hypothesis. Thus the relationship between entrepreneurial orientation and environmental sustainability has demonstrated a statistically significant linear component with p value less than 0.001. Most importantly, the test for deviation from linearity resulted that the relationship does not significantly deviate from a straight line, confirming that linear regression and the process macro model were the appropriate methods for the succeeded analysis.

4.4.1.1.2. Durbin Watson Test or autocorrelation test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.549 ^a	.301	.299	1.41593	2.032
a. Predictors: (Constant), EO					
b. Dependent Variable: EnvS					

Table 9: Durbin Watson Test or autocorrelation test

From Table 9, it is evident that the first assumption of regression analysis was satisfied. This assumption requires that the Durbin-Watson value should be close to 2. Some scholars suggest that a value between 1.5 and 2.5 is acceptable. In this study, the Durbin-Watson value was 2.032, which is very close to 2, indicating that there was no issue of autocorrelation in the data.

4.4.1.1.3. Variance inflation factor (VIF test)

The second test conducted was the Variance Inflation Factor (VIF) test. According to standard guidelines, VIF values should be less than 10. In this study, all VIF values were found to be below 10, which is well within the recommended threshold suggested by Mendenhall and Sincich (1993). Therefore, it was concluded that multicollinearity was not a concern in the data. As shown in Table 10 below.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	6.351	2.455		2.587	.010		
EO	4.078	.374	.549	10.905	.000	1.000	1.000
a. Dependent Variable: EnvS							

Table 10: Variance inflation factor test

Based on the above table Multicollinearity was assessed using Tolerance and variance inflation factor. The VIF value for the primary independent variance EO was 1, which is significantly below 10. This confirms that the data is suitable for multivariate analysis used the process macro.

4.4.1.1.4. Normality Test

The next and the third assumption before regression or process macro analysis a researcher should test was normality. Thus, while trying to check normality the following result was found.

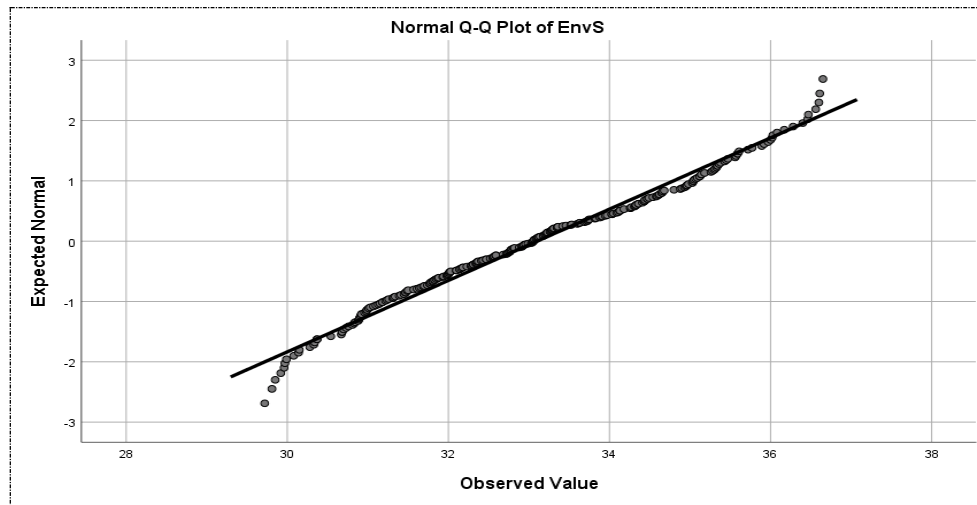


Figure 1: Normality plot

From figure 4 we can see that the normality test is fulfilled because our data follows the diagonal line. Thus, this means the data was normally distributed.

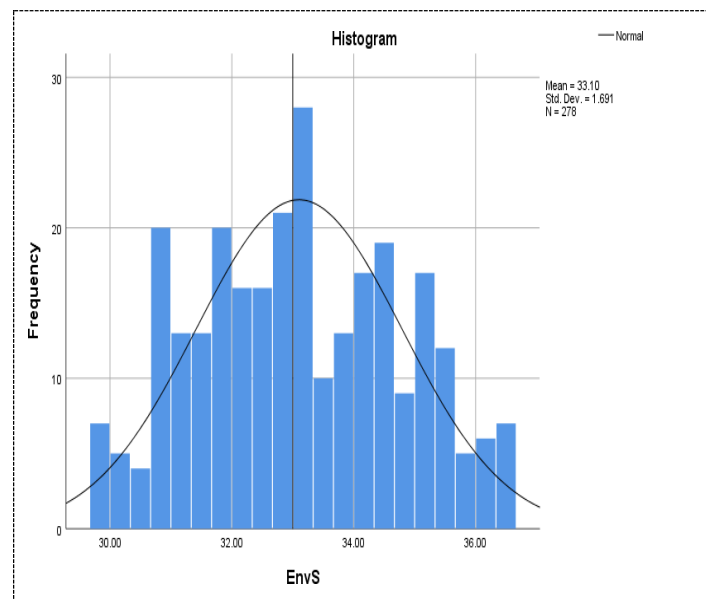


Figure 2: normality test histogram

In addition to the above figure 4, figure 5 also shows the frequency distribution of the standardized residuals compared to a normal distribution. As we can see, the distribution of the study was assessed for normality using graphical. Thus, for the variable EO, the normal Q-Q plot demonstrates that normality is further supported by the distribution of Environmental sustainability (N=278), which yields mean of 33.10 and a standard deviation of 1.691. The

histogram in the above figure 5 reveals a generally symmetrical bell-shaped curve that aligns well with normal distribution overlay. While minor fluctuations in frequency are present across the range, the lack of significant skew-ness or extreme outliers suggest that the data satisfies the normality assumptions required for further analysis.

4.5. Mediation Analysis Result: the role of Strategic innovation

This section of the study presents the result of the mediation analysis examined whether Strategic Innovation (SI) mediates the relationship between entrepreneurial orientation (EO) and economic sustainability (ES). The analysis was conducted using Hayes' Process macro model 4 with 5000 bootstrap samples and 95% confidence interval, based on the sample of 278 farmers.

4.5.1. Effect of Entrepreneurial Orientation on Strategic Innovation

The first stage of the mediation analysis was to examine the effect of entrepreneurial orientation on Strategic innovation. Hence, the regression result indicated that entrepreneurial orientation has a positive and statistically significant effect on strategic innovation.

Predictor	Coefficient (β)	SE	t-value	p-value	LLCI	ULCI
Constant	3.4623	0.4627	7.4835	< .001	2.5515	4.3731
EO	0.4444	0.0716	6.2070	< .001	0.3034	0.5853

Table 11: Effect of Entrepreneurial Orientation on Strategic Innovation (SI)

Model summary: $R = 0.3500$, $R^2 = 0.1225$, $F(1,276) = 38.5267$, $p < 0.001$, please refer ANNEX 1

It is clear to see from the above table that, entrepreneurial orientation explains approximately 12.25% of the variance in strategic innovation. This suggests that small-holder farmers with higher entrepreneurial orientation are more likely to actively integrate Strategic innovation into their operation and decision making process.

4.5.2. Effects of Entrepreneurial Orientation and strategic innovation on Economic sustainability

The second stage examined the joint effects of entrepreneurial orientation and **strategic innovation** on economic sustainability. Both predictors were entered simultaneously into the regression model 4. Then the following table showed the result.

Predictor	Coefficient (β)	SE	t-value	p-value	LLCI	ULCI
Constant	-7.2687	0.5164	-14.0752	< .001	-8.2853	-6.2521
EO	1.6619	0.0778	21.3679	< .001	1.5088	1.8151
SI	0.3105	0.0613	5.0679	< .001	0.1899	0.4310

Table 12: Regression Results: Effects of EO and SI on Economic Sustainability (ES)

Model summary: $R = 0.8355$, $R^2 = 0.6981$, $F(1,276) = 317.9858$, $p < 0.001$, please refer ANNEX2

The result indicated that stakeholder innovation has significant positive effect on economic sustainability. Additionally, even after controlling for entrepreneurial orientation, strategic innovation has significant effect on economic sustainability. Here, it is important to note that entrepreneurial orientation still remains a strong and statistically significant predictor of environmental sustainability. Together, the predictors explain approximately 69.81% of variance in environmental sustainability.

4.5.3. Direct and Indirect effect of entrepreneurial Orientation on economic Sustainability

To test the mediation effect, the direct and indirect effects of entrepreneurial orientation on economical sustainability were examined using bootstrap procedures. Please see the following table 13;

Effect	SE	t-value	p-value	LLCI	ULCI
1.6619	0.0778	21.3679	< .001	1.5088	1.8151

Table 13: Direct Effect of Entrepreneurial Orientation on Economical Sustainability

The direct effect of entrepreneurial orientation on economical sustainability remains positive and statistically significant. This has indicated that EO independently contributes to economical sustainability outcomes.

Mediator	Indirect Effect	BootSE	BootLLCI	BootULCI
SI	0.1380	0.0258	0.0915	0.1928

Table 14: Indirect Effect of Entrepreneurial Orientation on economical Sustainability via strategic innovation

The bootstrap confidence in the above table shows that the interval for indirect effects does not include zero, confirming that the indirect effect is statistically significant.

Thus, the mediation analysis has demonstrated that Strategic innovation partially mediates the relationship between entrepreneurial orientation and economic sustainability. Entrepreneurial orientation positively influences strategic innovation, which in turn enhances economical sustainability performance. At the same time, entrepreneurial orientation continues to exert a significant direct effect on economical sustainability, indicating mediation.

4.6. Moderation Analysis Result: the role of Market Uncertainty on environmental sustainability

This section presented the results of the moderation analysis, which examined whether market uncertainty moderated the relationship between entrepreneurial orientation and environmental sustainability. The analysis was conducted, using Hayes PROCESS Macro (Model 1) with a 95% confidence interval, based on a sample of 278 farmers.

4.6.1. Effects of Entrepreneurial Orientation, Market uncertainty and their interaction on Environmental Sustainability

To test the moderating effect of market uncertainty, entrepreneurial orientation, market uncertainty, and their interaction term (EO x MU) were entered into the regression model. Here environmental sustainability was entered in the model as the dependent variable.

Predictor	Coefficient (β)	SE	t-value	p-value	LLCI	ULCI
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Predictor	Coefficient (β)	SE	t-value	p-value	LLCI	ULCI
Constant	7.2008	3.1314	2.2996	.0222	1.0362	13.3653
EO	0.3054	0.4769	0.6403	.5225	-0.6335	1.2443
MU	0.1408	0.5219	0.2697	.7876	-0.8867	1.1682
EO $\times$ MU	0.5863	0.0795	7.3774	< .001	0.4299	0.7428

Table 15: Regression Results: Moderation of Market Uncertainty on the EO–Environmental Sustainability Relationship

Model summary: $R = 0.9981$, $R^2 = 0.9962$, $F(3,274) = 23895.97$, $p < 0.001$ please refer ANNEX3

In the above table 15 the overall model was statistically significant, explaining nearly 99.62% of the variance in environmental sustainability. While the main effects of entrepreneurial orientation and market uncertainty were not statistically significant when considered independently, the interaction effect (EO $\times$ MU) is positively and highly significant ($\beta = 0.5863$, $p < 0.001$). Thus, this indicated that market uncertainty significantly moderates the relationship between entrepreneurial orientation and environmental sustainability.

4.6.2. Test of the interaction Effect

The significance of the interaction term was further confirmed through the change in explained variance due to the interaction. The following table shows the result of the interaction effect between EO and MU.

Interaction Term	ΔR^2	F	df	p-value
EO $\times$ MU	0.0008	54.4259	(1, 274)	< .001

Table 16: Test of Interaction Effect

Form the above table 16, we can clearly see the significance increase in explained variance confirms the presence of a moderation effect.

4.6.3. Conditional Effects of Entrepreneurial Orientation at different levels of market uncertainty

To better understand the nature of the moderation, conditional effects of entrepreneurial orientation on environmental sustainability were examined. This examination was made at low, medium, and high levels of market uncertainty (16th, 50th, and 84th percentiles).

Market Uncertainty (MU)	Effect of EO	SE	t-value	p-value	LLCI	ULCI
Low (5.5)	3.5302	0.0478	73.7875	< .001	3.4361	3.6244
Medium (6.0)	3.8234	0.0277	137.8582	< .001	3.7688	3.8780
High (6.5)	4.1166	0.0491	83.8937	< .001	4.0200	4.2132

Table 17: Conditional Effects of EO on Environmental Sustainability at Different Levels of MU

In Table 17, the results showed that entrepreneurial orientation had a positive and statistically significant effect on environmental sustainability across all levels of market uncertainty. Notably, the strength of this relationship increased as market uncertainty rose, indicating that entrepreneurial orientation was more effective in promoting environmental sustainability under conditions of higher market uncertainty.

Generally, the moderation analysis demonstrates that market uncertainty strengthens the positive relationship between entrepreneurial orientation and environmental sustainability. When market uncertainty is high, farmers with strong entrepreneurial orientation achieve higher levels of environmental sustainability compared to farmers operating with lower uncertainty conditions.

4.7. Mediation Analysis Result: The role of Stakeholder Integration

This section presented the result of the mediation analysis examining whether stakeholder integration (STI) mediates the relationship between entrepreneurial orientation (EO) and social sustainability (SS). Here, similar to the other sections, the analysis was conducted using Hayes PROCESS macro (model 4) with 95% confidence intervals, based on a sample of 278 farmers.

4.7.1. Effects of Entrepreneurial Orientation and stakeholder integration on social sustainability

To test the mediating effect, EO and STI were entered into the regression model. It is important to note here that social sustainability as the dependent variable. Please see the following table

Predictor	Coefficient (β)	SE	t-value	p-value	LLCI	ULCI
Constant	-0.0112	0.0125	-0.8906	0.3739	-0.0358	0.0135
EO	0.5112	0.0370	13.8146	< .001	0.4383	0.5840
STI	0.5399	0.0251	21.5309	< .001	0.4905	0.5893

Table 18: Regression Results: Effects of EO and STI on Social Sustainability

From the above table 18 we can clearly see that the overall model was statically significant, explaining 98.85% of the variance in social sustainability ($r = 0.9942$, $R^2 = 0.9885$, $F(2,272) = 11699.93$, $p < 0.001$). Both EO and STI were positively and highly related significant predictor of social sustainability.

4.7.2. Direct and Indirect effects of Entrepreneurial Orientation on social sustainability

The direct effect of EO on social sustainability remains significant. Similarly, the indirect effect through stakeholder integration is also significant, as the confidence interval does not include zero. This indicates that stakeholder integration partially mediates the relationship between entrepreneurial orientation and social sustainability. Please see the following table 19;

Effect	BootSE	BootLLCI	BootULCI
Direct effect (EO $\rightarrow$ SS)	0.5112	0.0370	0.4383
Indirect effect (through STI)	0.7754	0.0284	0.7214

Table 19: Direct and Indirect Effects of Entrepreneurial Orientation on Social Sustainability

Generally, it is clear to see that, the result shown in the above tables and interpretation, suggested that EO enhances social sustainability both directly and indirectly through stakeholder integration. In other words, farmers with higher entrepreneurial orientation are more likely to

engage effectively with stakeholders. This engagement in turn promotes greater social sustainability outcomes. Stakeholder integration thus serve as a key mechanism through which entrepreneurial practices translate into improved social sustainability.

4.8. Hypotheses Testing

H1: Entrepreneurial orientation positively influences economic sustainability through the mediation of strategic innovation.

As shown in the table 11 and table 14 above, entrepreneurial orientation has a positive and statistically significant effect on strategic innovation ($\beta = 0.444$, $p < 0.001$). Additionally, strategic innovation also has positive effect on economic sustainability outcomes. The direct effect of EO on economic sustainability through strategic innovation was positive and significant ($\beta = 0.1380$), with the bootstrap confidence interval not including zero. In addition, the direct effect of entrepreneurial orientation remains positive and significant, indicating partial mediation. This result shows that entrepreneurial orientation positively influences economic sustainability by developing strategic innovation. Therefore, H1 is accepted. This finding was consistent with prior studies which argue that EO enhances economic performance and long term viability (SLEVIN, 1989).

H2: The positive relationship between entrepreneurial orientation and environmental sustainability is stronger when there is high uncertainty in the market.

As presented in the table 15 and 17 above, the interaction term between EO and market uncertainty (EO x MU) was positive and statistically significant ($\beta = 0.5863$, $p = 0.0001$ respectively). Although the main effect of entrepreneurial orientation and market uncertainty are not significant when considered independently, their interaction explained a significant increase in the variance of environmental sustainability. Furthermore, from the conditional effects analysis, it is shown that the influence of EO on environmental sustainability increase as market uncertainty roses. This indicates that entrepreneurial orientation becomes more effective in promoting environmental sustainability under conditions of high market uncertainty. Therefore,

H2 is accepted. This finding supports previous studies suggesting that EO Enables farmers to better adapt and respond to uncertain and dynamic market environments (Lumpkin, 2001).

H3: Entrepreneurial orientation positively influences social sustainability through stakeholder integration.

As shown in table 18 and table 19 above, EO, entrepreneurial orientation, has a strong positive and statically significant effect on stakeholder integration ($\beta = 0.5112$, $p < 0.001$ respectively). Additionally, stakeholder integration also positively influences social sustainability ($\beta = 0.5399$, $p < 0.001$). The indirect effect of entrepreneurial orientation on social sustainability through stakeholder integration was positive and significant, with the bootstrap confidence interval excluding 0, while the direct effect remains significant. This indicated partial mediation. Hence, EO enhances social sustainability both directly and indirectly through stakeholder integration. Therefore, H3 was accepted. This result aligned with stakeholder theory, which emphasizes that integrating stakeholder interest into organizational decision making improves social outcomes and long-term acceptability (Freeman, 1984).

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5. Conclusion of the findings

This study examined the role of entrepreneurial orientation as a key driver of sustainability among smallholder farmers, with particular emphasis on the economic, environmental, and social dimensions of sustainability. The findings demonstrate that entrepreneurial orientation significantly contributes to improved sustainability outcomes, confirming that farmers who are proactive, innovative, and willing to take calculated risks are more likely to achieve stronger long-term performance. The results further revealed that strategic innovation serves as an important mechanism through which entrepreneurial orientation enhances economic sustainability, highlighting the critical role of innovation in improving productivity and income stability.

In addition, market uncertainty was found to strengthen the relationship between entrepreneurial orientation and environmental sustainability, suggesting that entrepreneurial farmers are better able to adapt and implement environmentally responsible practices when faced with unpredictable market conditions. Stakeholder integration also played a significant role by mediating the relationship between entrepreneurial orientation and social sustainability, indicating that strong collaboration and engagement within the farming community improve social outcomes and collective well-being.

These findings carry important theoretical and practical implications. Theoretically, the study extends existing entrepreneurship and sustainability literature by demonstrating that entrepreneurial orientation influences not only financial performance but also environmental and social outcomes within smallholder agriculture in a developing country context. Practically, the results suggest that policymakers and development agencies should promote entrepreneurial skills training, innovation adoption, stakeholder collaboration, and capacity-building programs that help farmers navigate market uncertainty. Strengthening these capabilities can enhance resilience, improve rural livelihoods, and support the long-term sustainability of smallholder farming systems.

5.1. Implications of the findings

- **Economic implication:** The finding that strategic innovation mediated the relationship between EO and economic sustainability indicated that hard work alone was no longer sufficient. Farmers needed to not only work but also work intelligently. To avoid financial crises, they had to adopt innovative decision-making processes and modern farming techniques.
- **Environmental implications:** The strong moderating effect of market uncertainty was the most significant among the three relationships. This indicated that in highly volatile markets, farmers with an entrepreneurial mindset consistently maintained environmental protection practices. Proactive farmers viewed environmental stewardship as an essential risk management strategy that safeguarded both their farms and long-term sustainability.
- **Social implication:** The results indicated that stakeholder integration mediated social sustainability. This mediation suggested that farmers could not achieve growth in isolation. Social well-being and community prosperity were interconnected, with community trust and overall social health directly resulting from how effectively a farmer engaged with cooperatives, suppliers, and governmental institutions. Therefore, entrepreneurship promoted social harmony primarily through active collaboration.

5.2. Conclusion on hypothesis test

The study findings indicated that entrepreneurial orientation played a crucial role in enhancing sustainability outcomes.

Firstly, the mediation analysis confirmed that strategic innovation partially mediated the relationship between the independent and dependent variables, namely entrepreneurial orientation and economic sustainability. Entrepreneurial orientation was found to significantly improve strategic innovation, which in turn positively influenced economic sustainability. The analysis revealed that entrepreneurial orientation had a strong and direct effect on economic sustainability. Additionally, there was evidence of a significant indirect effect of entrepreneurial orientation, confirming that strategic innovation served as an important mechanism through

which entrepreneurial behavior translated into improved economic sustainability. These results suggested that economically sustainable practices were strengthened when entrepreneurial farmers adopted innovative strategies and decision-making approaches.

Secondly, the moderation analysis showed that the relationship between entrepreneurial orientation and environmental sustainability was substantially enhanced by market uncertainty. Although the independent effects of entrepreneurial orientation and market uncertainty were not significant, their interaction effect was positive and highly significant. The conditional effect analysis further demonstrated that as market uncertainty increased, the impact of entrepreneurial orientation on environmental sustainability also increased. These results highlighted that under uncertain and volatile market conditions, entrepreneurial orientation became particularly valuable. Therefore, it was important to enable farmers to adopt and implement more effective and environmentally sustainable practices despite these challenges.

Thirdly, the study revealed that the relationship between entrepreneurial orientation and social sustainability was partially mediated by stakeholder integration. Both stakeholder integration and social sustainability were positively influenced by entrepreneurial orientation. Moreover, the direct effect through stakeholder integration was statistically significant, confirming that decision-making processes enhanced social sustainability outcomes when stakeholders were actively engaged and integrated. This also suggested that entrepreneurial farmers were more likely to achieve socially sustainable outcomes, including improved social relationships, trust, and community well-being, if they collaborated effectively with stakeholders such as community members, suppliers, and institutions.

In conclusion, the study demonstrated that entrepreneurial orientation alone was insufficient to achieve sustainability in smallholder farming. Its effectiveness depended on interactions with factors such as strategic innovation, stakeholder integration, and external market conditions. Therefore, by strengthening entrepreneurial orientation and implementing supportive mechanisms that translate it into practical action, policymakers, development agencies, and agricultural institutions could enhance the long-term economic, environmental, and social sustainability of the farming sector.. Table 20 presented the descriptive associations among the variables.

No	Hypothesis	Key Effect (β)	Effect Strength	Decision
1	H1: Entrepreneurial orientation positively influences economic sustainability through the mediation of strategic innovation	Indirect effect $\beta = 0.1380$	mediation effect	Supported
2	H2: The positive relationship between entrepreneurial orientation and environmental sustainability is stronger under high market uncertainty	Interaction $\beta = 0.5863$	Very strong moderating effect	Supported
3	H3: Entrepreneurial orientation positively influences social sustainability through stakeholder integration	Indirect effect $\beta = 0.7754$	Very strong mediation effect	Supported

Table 20: Descriptive Association Strength among Core Constructs

The above Table 20 summarizes the results of the hypothesis testing for the proposed research model. The findings indicated that Entrepreneurial Orientation (EO) positively influenced economic sustainability through the mediation of strategic innovation. This demonstrates that translating entrepreneurial behavior into economic outcomes is facilitated by innovation.

Additionally, the relationship between EO and environmental sustainability was found to be significantly strengthened by market uncertainty. This suggests that EO becomes more effective in enhancing environmental sustainability under conditions of higher uncertainty.

Finally, the relationship between EO and social sustainability was significantly mediated by stakeholder integration, highlighting the critical role of stakeholder engagement in achieving social sustainability. Overall, the study confirmed that EO contributes to sustainability through multiple mechanisms, including both mediation and moderation.

5.3. Recommendations

- **Strengthen entrepreneurial capacity among smallholder farmers**
 - **What to be done:** Enhance farmers' entrepreneurial orientation—specifically proactiveness, innovativeness, and calculated risk-taking—to improve economic, environmental, and social sustainability outcomes.
 - **How to be done:** Develop structured and continuous training programs integrated into agricultural extension services, focusing on opportunity identification, business planning, innovation adoption, financial literacy, and strategic farm management. Practical learning approaches such as field-based coaching, peer learning groups, and farmer business schools should be implemented to ensure behavioral change rather than only theoretical understanding.
 - **Whose responsibility:** The Ministry of Agriculture, Oromia Regional Agricultural Bureau, agricultural extension offices, universities, TVET colleges, and development partners.
- **Promote strategic innovation in farming systems**
 - **What to be done:** Support the adoption of innovative farming practices and technologies that enhance productivity while ensuring environmental protection.
 - **How to be done:** Strengthen agricultural extension programs to prioritize improved seed varieties, climate-smart agriculture, water-saving irrigation methods, soil conservation techniques, and sustainable input management. Establish demonstration farms and innovation hubs where farmers can observe and test new practices. Provide innovation grants, subsidized inputs, and accessible technical advisory services to reduce barriers to adoption.
 - **Whose responsibility:** Government agricultural offices, agricultural research institutes, extension agents, innovation funds, NGOs, and international development organizations.

- **Improve market stability and enhance adaptive capacity**
 - **What to be done:** Reduce excessive market uncertainty while equipping farmers with tools to manage unavoidable risks.
 - **How to be done:** Develop reliable market information systems that provide real-time data on prices, demand trends, and buyer requirements through mobile platforms, radio programs, and cooperative networks. Expand access to crop insurance schemes, flexible credit facilities, warehouse receipt systems, and forward contract arrangements to protect farmers from income shocks. Capacity-building programs on risk management and diversification strategies should also be implemented.
 - **Whose responsibility:** Ministry of Trade and Agriculture, financial institutions, microfinance organizations, insurance companies, cooperatives, and policymakers.
- **Enhance stakeholder integration and collaborative networks**
 - **What to be done:** Strengthen relationships among farmers, suppliers, buyers, financial institutions, community organizations, and public agencies to improve social sustainability.
 - **How to be done:** Encourage farmers' active participation in cooperatives, farmer associations, and multi-stakeholder platforms. Facilitate regular dialogue forums, partnership agreements, and collective marketing initiatives to promote trust, knowledge sharing, and coordinated problem-solving. Support inclusive participation of women and youth to ensure equitable social outcomes.
 - **Whose responsibility:** Local government administrations, cooperative promotion offices, community leaders, NGOs, and agricultural development agencies.
- **Adopt an integrated and coordinated policy approach**
 - **What to be done:** Implement a comprehensive strategy that simultaneously

promotes entrepreneurial orientation, innovation, stakeholder collaboration, and resilience to market uncertainty.

- **How to be done:** Align national and regional agricultural policies to ensure coordinated implementation across institutions. Establish monitoring and evaluation systems to track sustainability performance across economic, environmental, and social indicators. Promote inter-ministerial collaboration to avoid fragmented interventions and ensure long-term impact.
- **Whose responsibility:** Federal and regional governments, policy planners, development partners, and all key stakeholders within the agricultural sector..

Finally, the overall findings of the study indicated that smallholder farmers needed to adopt an integrated approach that simultaneously promoted entrepreneurial orientation skills, strengthened stakeholder integration, and enhanced flexibility in responding to market uncertainty. Such a comprehensive strategy was expected to create mutual benefits for all parties involved, including smallholder farmers, government institutions, and other stakeholders.

5.4. Future Research Direction

Since this study was not able to include all possible factors, future research could expand the model by incorporating additional mediating and moderating variables. These variables might include access to credit, adoption of digital technologies, and climate risk factors. Including such variables would provide deeper insight into how entrepreneurial orientation influenced sustainability outcomes.

Furthermore, conducting similar studies in different regions and across various crop types would enhance understanding of the impact of entrepreneurial orientation on sustainability dimensions. Additionally, comparing smallholder farmers with large-scale farmers could generate valuable insights into how entrepreneurial orientation affected sustainability performance across different farming scales.

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Appendix 1

Run MATRIX procedure:

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This version of PROCESS requires SPSS version 26 or later
Workshop schedule available at haskayne.ucalgary.ca/CCRAM
In SPSS 29 and later, change default output font to Courier New for tidier output. More information about PROCESS at processmacro.org/faq.html.
This beta release has not been completely tested. Use at your own risk.

***** PROCESS Procedure for SPSS Version 5.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model: 4
Y: ES
X: EO
M: SI

Sample
Size: 275

OUTCOME VARIABLE:
SI

Model Summary

R	R-sq	MSE	F	df1	df2	p
.3455	.1194	.0545	37.0084	1.0000	273.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	3.4729	.4700	7.3891	.0000	2.5476	4.3982
EO	.4426	.0728	6.0834	.0000	.2994	.5859

OUTCOME VARIABLE:
ES

Model Summary

R	R-sq	MSE	F	df1	df2	p
.8467	.7168	.0524	344.3056	2.0000	272.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	-7.4978	.5050	-14.8460	.0000	-8.4920	-6.5035

EO	1.6975	.0761	22.3204	.0000	1.5478	1.8473
SI	.3109	.0594	5.2371	.0000	.1940	.4278

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:

ES

Model Summary

R	R-sq	MSE	F	df1	df2	p
.8296	.6883	.0575	602.8288	1.0000	273.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	-6.4180	.4828	-13.2923	.0000	-7.3685	-5.4674
EO	1.8351	.0747	24.5526	.0000	1.6880	1.9823

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI
1.8351	.0747	24.5526	.0000	1.6880	1.9823

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI
1.6975	.0761	22.3204	.0000	1.5478	1.8473

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
SI	.1376	.0251	.0929	.1917

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:

95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

----- END MATRIX -----

Appendix 2

Run MATRIX procedure:

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This version of PROCESS requires SPSS version 26 or later
Workshop schedule available at haskayne.ucalgary.ca/CCRAM
In SPSS 29 and later, change default output font to Courier New for tidier
output. More information about PROCESS at processmacro.org/faq.html.
This beta release has not been completely tested. Use at your own risk.

***** PROCESS Procedure for SPSS Version 5.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model: 1
Y: EnvS
X: EO
W: MU

Sample
Size: 278

OUTCOME VARIABLE:
EnvS

Model Summary

R	R-sq	MSE	F	df1	df2	p
.9981	.9962	.0110	23895.9709	3.0000	274.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	7.2008	3.1314	2.2996	.0222	1.0362	13.3653
EO	.3054	.4769	.6403	.5225	-.6335	1.2443
MU	.1408	.5219	.2697	.7876	-.8867	1.1682
Int_1	.5863	.0795	7.3774	.0000	.4299	.7428

Product terms key:

Int_1 : EO x MU

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0008	54.4259	1.0000	274.0000	.0000

Focal predict: EO (X)
Mod var: MU (W)

Conditional effects of the focal predictor at values of the moderator(s):

MU	Effect	se	t	p	LLCI	ULCI
5.5000	3.5302	.0478	73.7875	.0000	3.4361	3.6244
6.0000	3.8234	.0277	137.8582	.0000	3.7688	3.8780
6.5000	4.1166	.0491	83.8937	.0000	4.0200	4.2132

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95.0000

W values in conditional tables are the 16th, 50th, and 84th percentiles.

----- END MATRIX -----

Appendix 3

Run MATRIX procedure:

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This version of PROCESS requires SPSS version 26 or later
Workshop schedule available at haskayne.ucalgary.ca/CCRAM
In SPSS 29 and later, change default output font to Courier New for tidier output. More information about PROCESS at processmacro.org/faq.html.
This beta release has not been completely tested. Use at your own risk.

***** PROCESS Procedure for SPSS Version 5.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model: 4
Y: SS
X: EO
M: STI

Sample
Size: 275

OUTCOME VARIABLE:
STI

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.9733	.9473	.0001	4906.2611	1.0000	273.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.4167	.0167	-24.9276	.0000	-.4497	-.3838
EO	1.4362	.0205	70.0447	.0000	1.3958	1.4765

OUTCOME VARIABLE:
SS

Model Summary

	R	R-sq	MSE	F	df1	df2	p
	.9942	.9885	.0000	11699.9342	2.0000	272.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.0112	.0125	-.8906	.3739	-.0358	.0135
EO	.5112	.0370	13.8146	.0000	.4383	.5840

```

STI          .5399      .0251      21.5309      .0000      .4905      .5893

***** TOTAL EFFECT MODEL *****

OUTCOME VARIABLE:
SS

Model Summary
      R      R-sq      MSE      F      df1      df2      p
      .9843      .9689      .0000     8512.5005      1.0000     273.0000      .0000

Model
      coeff      se      t      p      LLCI      ULCI
constant    -.2362     .0114    -20.7713     .0000     -.2585     -.2138
EO          1.2865     .0139     92.2632     .0000     1.2591     1.3140

***** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y *****

Total effect of X on Y
      Effect      se      t      p      LLCI      ULCI
      1.2865     .0139     92.2632     .0000     1.2591     1.3140

Direct effect of X on Y
      Effect      se      t      p      LLCI      ULCI
      .5112     .0370     13.8146     .0000     .4383     .5840

Indirect effect(s) of X on Y:
      Effect      BootSE      BootLLCI      BootULCI
STI      .7754      .0286      .7223      .8347

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:
95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
5000

----- END MATRIX -----

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Appendix 4

ADDIS ABABA UNIVERSITY DEPARTMENT OF BUSINESS AND ECONOMICS

Serial No of Participant: _____

CONCSENT OF PARTICIPANT

My name is Belay Teka; I am an MBA student in Addis Ababa University, Addis Ababa, Ethiopia. I am currently working on my MBA research on —*The Role of Entrepreneurial Orientation in Driving Environmental, Economic, and Social Sustainability: The case of Sebata and surroundings smallholder farmers*‖. The aim of this research is to assess Role of Entrepreneurial Orientation in Driving Environmental, Economic, and Social Sustainability among smallholder farmers in Sebata and its surroundings. This research has no risk at all to participate, and yet, your participation in this research is based on your willingness, and you may be able to withdraw any time, if you don't need to do so. Above all, your name and response will be kept undisclosed. The benefit of this research is to the agricultural sector as well as to the country at large. To fill these questionnaires, it would take you at most 15 minutes. Therefore, I would like to respectfully ask for your consent if you may be willing to participate.

Thank You!

SECTION ONE: Demographic and Farm Profile

- 1) Age: _____years
- 2) Gender: ☐ Male ☐ Female
- 3) Level of Education:
☐ No formal education ☐ Primary ☐ Secondary ☐ College or above
- 4) Farm size: _____hectares

- 5) Years of experience in farming: _____ years
- 6) Main crop harvested/cultivated: _____
- 7) Crop type (if known): _____

8) SECTION TWO: Entrepreneurial Orientation

Instruction: Indicate your level of agreement with the following statements (1 = Strongly Disagree, 7 = Strongly Agree).

No	Innovativeness	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Agree
1	I emphasize trying out new types of seeds, livestock, or modern farming technologies on my farm	☐	☐	☐	☐	☐	☐	☐
2	In the last 5 years, I have introduced many new crops or products lines that I did not grow before.	☐	☐	☐	☐	☐	☐	☐
3	When I make changes to my farming methods, they are usually big changes rather than small, minor ones.	☐	☐	☐	☐	☐	☐	☐
	Proactiveness	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Agree
1	I usually initiate new farming actions (like	☐	☐	☐	☐	☐	☐	☐

	planning earlier or trying a new market before my neighbors do						
2	I am often the first farmer in my community to introduce new tools, techniques, or seeds.	☐	☐	☐	☐	☐	☐
3	I take a very competitive approach to farming, trying to perform better than other farmers in my area	☐	☐	☐	☐	☐	☐
	Risk-taking	Strongly Disagree Somewhat Disagree Neutral Somewhat Agree Strongly Agree					
1	I am willing to invest in high- risk farm projects that have a chance for a very high financial returns	☐	☐	☐	☐	☐	☐
2	I believe that bold, wide ranging changes to my farm are necessary to achieve my long term goals	☐	☐	☐	☐	☐	☐
3	When things are uncertain, I prefer to	☐	☐	☐	☐	☐	☐

act boldly to get new opportunities rather than waiting to see what happens						
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9) SECTION THREE: Strategic Innovation

Instruction: Indicate your level of agreement with the following statements (1 = Strongly Disagree, 7 = Strongly Agree).

no	Strategic Innovation	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
1	I have used new types of seeds or plant varieties that were not common in my area before.	☐	☐	☐	☐	☐	☐	☐
2	I have tried a new farming technique, like different irrigation methods, planting patterns, or using different kinds of fertilizer.	☐	☐	☐	☐	☐	☐	☐
3	I have adopted a new way to store my harvest, like using different bags or a new storage building, to keep it fresh for longer.	☐	☐	☐	☐	☐	☐	☐

4	I have used new tools or equipment on my farm, even if they were simple ones, to make my work easier or faster.	☐	☐	☐	☐	☐	☐	☐

10) SECTION FOUR: Stakeholder Integration

Instruction: Indicate your level of agreement with the following statements (1 = Strongly Disagree, 7 = Strongly Agree).

no	Stakeholder Integration questions	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
1	I often talk with other farmers to share farming knowledge and ideas.	☐	☐	☐	☐	☐	☐	☐
2	I am part of a cooperative or a community group that helps farmers.	☐	☐	☐	☐	☐	☐	☐
3	When there is a problem, my neighbors are usually willing to help me	☐	☐	☐	☐	☐	☐	☐

11) SECTION FIVE: Sustainability; Economic, Environmental and Social

Instruction: Indicate your level of agreement with the following statements (1 = Strongly Disagree, 7 = Strongly Agree).

no	Economic Sustainability	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
1	My income from farming is stable and allows me to support my family.	☐	☐	☐	☐	☐	☐	☐
2	I feel I have enough money to handle unexpected problems, like a poor harvest or a sick family member.	☐	☐	☐	☐	☐	☐	☐
3	I am able to save money from my farm income	☐	☐	☐	☐	☐	☐	☐
no	Environmental Sustainability	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
1	I take steps to protect the soil on my farm from being washed away by rain or wind.	☐	☐	☐	☐	☐	☐	☐
2	I try to manage water on my farm so it is not wasted.	☐	☐	☐	☐	☐	☐	☐
3	I use farming methods that protect the land for	☐	☐	☐	☐	☐	☐	☐

no	Economic Sustainability	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
	a long time, so my children and grandchildren can also farm on it							
no	Social Sustainability	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
1	My farm provides enough food to feed my family throughout the year	☐	☐	☐	☐	☐	☐	☐
2	My family's quality of life has improved because of my farming activities.	☐	☐	☐	☐	☐	☐	☐

12) SECTION SIX: Market Uncertainty

Instruction: Indicate your level of agreement with the following statements (1 = Strongly Disagree, 5 = Strongly Agree).

no	Market Uncertainty Price questions	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
1	The prices I get for my crops at the market change a lot and are unpredictable.	☐	☐	☐	☐	☐	☐	☐
2	Competition from other farmers or	☐	☐	☐	☐	☐	☐	☐

no	Market Uncertainty Price questions	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat agree	Agree	Strongly Disagree
	suppliers makes it hard to sell my crops.							
3	Extreme weather, like too much rain or not enough rain, has a big impact on my harvest.	☐	☐	☐	☐	☐	☐	☐
4	It is hard to predict what buyers will want to buy from me from one season to the next.	☐	☐	☐	☐	☐	☐	☐

Appendix 5

Miltoo 1

Yuunivarsiitii Finfinnee Dippartimentii Bizinasii Fi Faayinaasii

Lakkoofsa Addaa Hirmaataa: _____

Heeyyamummaa Hirmaataa

Maqaan kiyya Balaay Takkaa yoo ta’u, Yuunivarsiitii Finfinnee, magaalaa Finfinnee, Itoophiyaa keessatti argamutti Digirii Lammaffaa Bulchiinsa Daldalaa (MBA) kiyya hojjechaan jira. Yeroo ammaa qorannoo MBA mata duree —***Ilaalchi Hojii Uumuu Itti fufiinsa Naannoo, Diinagdee fi Hawaasummaa keessatti qabu: Qonnaan bultoota Sabbataa fi naannoo ishee irratti xiyyeeffate*** jedhuun qorachaan jira. Kaayyoon qorannoo kanaa Ilaalchi Hojii Uumuu Itti fufiinsa Naannoo, Diinagdee fi Hawaasummaa keessatti qabu keessattuu Qonnaan bultoota Sabbataa fi naannoo ishee irratti xiyyeeffatee adda baasanii beekuudha. Qorannoon kana irratti qooda fudhaachuun keessan rakkoo isin irratti hin qaqqabsiisu. Akkasumas immoo qorannoo kana irratti qooda fudhachuun fedha keessan kan bu’uureffatee fi qooda fudhachuuf fedha yoo qabaachuu baattanis yeroo kamittuu addaan kutuu ni dandeessu. Hunda caalaa maqaa fi deebiin keessan icitii ta’ee kan isiniif eegamu ta’a. Qorannoon kun bu’aa inni argamsiisu dame qonnaaf yoo ta’u akka waliigalaatti biyya keenya ni fayyada. Barruu qorannoo kana guutuuf turtii daqiiqaa 15 isin gaafata. Kanaafuu qorannoo kana irratti qooda akka fudhattaniifan kabajaan isin gaafadha.

Galatoomaa!

KUTAA TOKKO: RAGAA DHUUNFAA FIODEEFFANNOO LAFA QONNAA

- 1) Umurii: Waggaa _____
- 2) Koorniyaa: ☐ Dhiira ☐ Dhalaa
- 3) Sadarkaa Barnootaa:

☐ Barnoota idilee hin qabu ☐ Sadarkaa Tokkooffaa ☐ Sadarkaa Lammaffaa ☐ Kolleejii ykn isaan oli

- 4) Ballina Lafa qonnaa: Heekitaara _____
- 5) Muuxannoo qonnaa Waggoonii: _____
- 6) Gosa midhaanii ijoo qotattan: _____
- 7) Gosa midhaanii (yoo beekameef): _____

KUTAA LAMA: Ilaalcha Hojii Uumuu

Qajeelfama: Himoota armaan gadii hangam akka deeggartan ibsaa (1= Bayyeen morma, 7= bayyeen deeggara).

La kk.	Kalaqa Sammuu	Baayye en morma	Nan mor ma	Xiqqo on morm a	Hin murteeffan ne	Xiqqoo n deegga ra	Nan deegga ra	Bayyee n deegga ra
1	Gosa midhaanii, beeyilada ykn teekinooolojii qonnaa haaraa yaaluu irrattin xiyyeeffadha.	☐	☐	☐	☐	☐	☐	☐
2	Waggoota 5 darban keessa gosoota midhaanii ykn mala qonnaa haaraa isaan dura fayyadamee hin beekne	☐	☐	☐	☐	☐	☐	☐

	jalqabeen jira.							
3	Maloota qonnaa kiyya yeroon jijjiirutti yeroo hedduu jijjiirama gurguddoo hordofsiisu.	☐	☐	☐	☐	☐	☐	☐
	Of-eeggannoo	Baayyeen morma	Nan morma	Xiqqoon morma	Hin murteeffanne	Xiqqoon deeggara	Nan deeggara	Bayyeen deeggara
1	Yeroo hedduu hojimaata qonnaa haaraa olloota kiyya durseen eegala (kan akka dursanii karoorsuu ykn gabaa haaraa yaaluu faa)	☐	☐	☐	☐	☐	☐	☐
2	Hawaasa kiyya keessatti meeshaalee haaraa, maloota ykn sanyii haaraa kan fayyadamuu jalqabu anadha.	☐	☐	☐	☐	☐	☐	☐

3	Hojii qonnaa yeroon dalagutti qonnaan bulootaa naannoo kiyyaa waliin dorgomee isaaniin caaluudhaaf carraaqqii olaanaan taasisa.	☐	☐	☐	☐	☐	☐	☐
	Jaginummaa	Baayyee n morma	Nan morma	Xiqqoo n morma	Hin murteeffann e	Xiqqoon deeggar a	Nan deeggar a	Bayyeen deeggar a
1	Ani hojiilee qonnaa bu'aa olaanaa argamsiisanii fi gama biraatiin kasaaraa fiduu danda'ani irratti qooda fudhachuuf heeyyamamaadha.	☐	☐	☐	☐	☐	☐	☐
2	Ani kaayyoo yeroo dheeraa kiyya dhugoomsuudhaaf lafa qonnaa kiyya irratti	☐	☐	☐	☐	☐	☐	☐

	jijjiiramoota						
	olaanoo fi						
	ballina qaban						
	taasisuun						
	barbaachisaadha						
	jedheen amana.						
3	Waa’ee	□	□	□	□	□	□
	wantootaa						
	sirriitti beekuun						
	yeroo hin						
	danda’amnetti						
	fuula duraaf						
	maal akka ta’u						
	eeguu manna						
	carraa						
	uumamutti						
	fayyadamuun						
	filadha.						

KUTAA SADII: KALAQA TARSIIMOO

Qajeelfama: Himoota armaan gadii hangam akka deeggartan ibsaa (1= Bayyeen morma, 7= bayyeen deeggara).

Lak k.	KALAQA TARSIIM OO	Baayyee n morma	Nan morm a	Xiqqoo n morma	Hin murteeffan ne	Xiqqoo n deegga ra	Nan deegga ra	Bayyee n deegga ra
1	Kanaan dura gosoota sannyii ykn biqiltoota haaraa naannoo keeniyatti hin beekamne fayyadamee ra.	☐	☐	☐	☐	☐	☐	☐
2	Maloota qonnaa kanneen akka jallisii, mala sanyii facaasuu ykn xaa'oo	☐	☐	☐	☐	☐	☐	☐

	addaa fayyadamuu yaalee beeka.						
3	Omisha qonnaa kiyya qalqalloo ykn gamoo man-kuusaa haaraa keessatti kuusuudhaa n akka hin mancaaneef taasiseera.	☐	☐	☐	☐	☐	☐
4	Hojiin kiyya akka saffisuuf ykn dadhabbii kiyya xiqqeessuuf meeshaalee ykn mi'oota haaraatti fayyadamee n jira.	☐	☐	☐	☐	☐	☐

KUTAA AFUR: Qindoomina Qoda fudhattootaa

Qajeelfama: Himoota armaan gadii hangam akka deeggartan ibsaa (1= Bayyeen morma, 7= bayyeen deeggara).

Lakk	Gaaffii Qindoomina Qoda fudhattootaa	Baayyee n morma	Nan morma	Xiqqoon morma	Hin murteeffanne	Xiqqoon deeggar a	Nan deeggar a	Bayyeen deeggar a
1	Beekumsaa fi ilaalcha qonnaa waliif qooduuf jecha yeroo baayyee qonnaan bultoota wajjiin nan mari'adha.	☐	☐	☐	☐	☐	☐	☐
2	Ani miseensa Waldaa Hojii Galmtaa ykn Garee isa qonnaan bultoota deeggaruuti.	☐	☐	☐	☐	☐	☐	☐
3	Yeroo rakkoon uumamutti olloottan kiyya	☐	☐	☐	☐	☐	☐	☐

ana deeggaruudhaa f yeroo mara 'qophiidha.				
---	--	--	--	--

KUTAA SHAN: Ittifufiinsa; Diinagdee, Naannoo fi Hawaasumma

Qajeelfama: Himoota armaan gadii hangam akka deeggartan ibsaa (1= Bayyeen morma, 7= bayyeen deeggara).

Lakk.	Ittifufiinsa Diinagdee	Baayyeen morma	Nan morma	Xiqqoon morma	Hin murteeffanne	Xiqqoon deeggara	Nan deeggara	Baayyeen deeggara
1	Galiin qonnaa kiyya ittifufiinsa kan qabuu fi maatii kiyya deeggaruuf gahaadha.	☐	☐	☐	☐	☐	☐	☐
2	Rakoolee tasaa kunneen akka hongee ykn dhibee fayyaa miseensa maatii mudatuuf qarshii ani qabu gahaadha jedheen	☐	☐	☐	☐	☐	☐	☐

	amana.							
3	Galii ani hojii qonnaa irraa argadhu qusachuu nan danda'a.	☐	☐	☐	☐	☐	☐	☐
Lakk.	Ittifufiinsa Naannoo	Baayyeen morma	Nan morma	Xiqqoon morma	Hin murteeffanne	Xiqqoon deeggara	Nan deeggara	Bayyeen deeggara
1	Biyyeen lafa qonnaa kiyya irratti argamu rooba ykn bubbeedhaan akka hin dhiqamneef nan ittisa.	☐	☐	☐	☐	☐	☐	☐
2	Bishaan lafa qonnaa kiyya irratti argamu akka hin mancoofneef nan kunuunsa.	☐	☐	☐	☐	☐	☐	☐
3	Ijoolleen kiyyaa fi dhaloonni egeree lafa	☐	☐	☐	☐	☐	☐	☐

	qonnaa kiyya akka fayyadamaniif jecha maloota qonnaa kunuunsa lafaatiif tajaajilaniin fayyadama.							
Lakk.	Ittifufiinsa Hawaasummaa	Baayyeen morma	Nan morma	Xiqqoon morma	Hin murteeffanne	Xiqqoon deeggara	Nan deeggara	Bayyeen deeggara
1	Omishini qonnaa kiyya fedhii nyaataa maatii kiyya waggaa guutuutiif gahaa dha.	☐	☐	☐	☐	☐	☐	☐
2	Hojii qonnaa kiyya irraa kan ka'e sadarkaa jireenyaa maatii kiyyaa foyya'iinsa argamsiiseera.	☐	☐	☐	☐	☐	☐	☐

KUTAA JA'A: Jijjiirama Gabaa

Qajeelfama: Himoota armaan gadii hangam akka deeggartan ibsaa (1= Bayyeen morma, 7= bayyeen deeggara).

Lakk .	Jijjiirama Gabaa: Gaaffilee Gatii	Baayyee n morma	Nan morma	Xiqqoon morma	Hin murteeffanne	Xiqqoon deeggar a	Nan deeggar a	Bayyeen deeggar a
1	Gatii gabaa ani oomisha kiyyaaf argadhu hedduu kan jijjiiramuu fi kan hin tilmaamamnedha .	☐	☐	☐	☐	☐	☐	☐
2	Dorgommiin qonaan bultoota ykn dhiyeessitoota biroo irraa ana mudatu irraa kan ka'e oomisha kiyya gurgurachuun natti cima.	☐	☐	☐	☐	☐	☐	☐
3	Haalli qilleensaa hamaa kan akka rooba garmalee	☐	☐	☐	☐	☐	☐	☐

	baayyee ykn rakkoo hongee hojii qonnaa irratti dhiibbaa olaanaa qaqqabsiisa.							
4	Waggaa tokkoo gara waggaa itti aanutti feedhi bitattootni maal ana irraa bitachuu fedhu jedhu tilmaamuun natti cima.	☐	☐	☐	☐	☐	☐	☐

Appendix 6

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.215	41.538	41.538	11.215	41.538	41.538
2	3.320	12.295	53.833			
3	1.714	6.347	60.179			
4	1.355	5.017	65.197			
5	1.322	4.897	70.094			
6	1.135	4.202	74.296			
7	1.079	3.998	78.294			
8	1.062	3.932	82.227			
9	.956	3.539	85.766			
10	.913	3.380	89.146			
11	.780	2.887	92.033			
12	.572	2.117	94.150			
13	.427	1.580	95.730			
14	.298	1.103	96.833			
15	.212	.784	97.617			
16	.154	.572	98.189			
17	.131	.485	98.674			
18	.107	.396	99.070			
19	.071	.263	99.333			
20	.053	.196	99.529			
21	.042	.155	99.683			
22	.028	.105	99.788			
23	.023	.083	99.871			
24	.017	.064	99.936			
25	.009	.033	99.968			
26	.007	.024	99.992			
27	.002	.008	100.000			

Extraction Method: Principal Component Analysis.

Appendix 7

Communalities		
	Initial	Extraction
Trying new seeds/livestock/technology	1.000	.879
Makes big changes in farming methods	1.000	.975
Initiates new farming actions early	1.000	.956
First to introduce tools/techniques	1.000	.944
Competitive approach to farming	1.000	.729
Willing to invest in high-risk projects	1.000	.772
Bold changes needed for long-term goals	1.000	.830
Acts boldly under uncertainty	1.000	.663
Used new seed/plant varieties	1.000	.725
Tried new farming techniques	1.000	.856
Adopted new storage methods	1.000	.889
Used new tools or equipment	1.000	.831
Shares knowledge with other farmers	1.000	.513
Member of cooperative/community group	1.000	.321
Neighbors help during problems	1.000	.618
Stable income supports family	1.000	.898
Can handle unexpected problems	1.000	.875
Able to save from farm income	1.000	.819
Protects soil from erosion	1.000	.815
Manages water efficiently	1.000	.934
Uses long-term land protection methods	1.000	.951
Farm feeds family year-round	1.000	.937
Quality of life improved	1.000	.971
Crop prices unpredictable	1.000	.888
Competition affects selling	1.000	.898
Extreme weather impacts harvest	1.000	.983
Buyer demand unpredictable	1.000	.734
Extraction Method: Principal Component Analysis.		

Rotated Component Matrix ^a								
	Component							
	1	2	3	4	5	6	7	8
Initiates new farming actions early	.920							
First to introduce tools/techniques	.915							
Competition affects selling	.907							
Stable income supports family	.899							
Crop prices unpredictable	.853		.334					
Can handle unexpected problems	.811		.375					
Competitive approach to farming	.726							
Protects soil from erosion	.724	.459						
Manages water efficiently	.683	.612						
Adopted new storage methods	.650	.521			.427			
Able to save from farm income	.564	.424			.523			
Extreme weather impacts harvest		.943						
Quality of life improved		.942						
Makes big changes in farming methods		.940						
Uses long-term land protection methods		.921						
Farm feeds family year-round		.918						
Tried new farming techniques		.623	.581					
Bold changes needed for long-term goals	.323		.708			.313		
Buyer demand unpredictable	.404		.684					
Used new seed/plant varieties				.811				
Acts boldly under uncertainty				.745				

Used new tools or equipment	.858	
Willing to invest in high-risk projects	.865	
Member of cooperative/community group	-.446	
Trying new seeds/livestock/technology		.931
Neighbors help during problems		.747
Shares knowledge with other farmers		.578
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 7 iterations.		