

**AN ASSESSMENT OF THE MARKET ORIENTATION OF UP-COUNTRY PROTECTED
AGRICULTURE VEGETABLE FARMERS**

by

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2024/25

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A REPORT

Submitted in partial fulfillment of the requirements for the degree of
Bachelor of Science in Agricultural Technology and Management
2024/25

Majoring Module: Applied Economics and Business Management

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ABSTRACT

Protected Agriculture Farming (PAF) practices were introduced to Sri Lankan farmers in the late 1990s, with various government institutions subsequently engaging in their promotion and adaptation. This study examines the degree and nature of market orientation among vegetable farmers in the Welimada and Bandarawela areas, specifically comparing fully and partially funded participants under the Smallholder Agribusiness Partnership Program (SAPP). Using stratified and snowball sampling methods, data were collected from 75 farmers (35 fully funded and 40 partially funded) through a structured questionnaire and analyzed using descriptive statistics and Wilcoxon rank-sum tests. Analysis revealed that partially funded farmers demonstrated a significantly higher degree of market orientation than fully funded farmers in both PAF and Open-Field Farming (OFF) contexts ($p < 0.05$). This pattern was particularly evident in decisions related to crop selection, produce quality, and selling methods. These findings underscore the importance of funding structure in enhancing beneficiary commitment to achieving project success, suggesting that cost-sharing arrangements may foster greater market responsiveness. The research offers valuable insights for agricultural policy development and program design, implying that partial funding models may better promote sustainable agricultural development in Sri Lanka by fostering a stronger market orientation among farmers.

Keywords: Market orientation, Production orientation, Protected agriculture, Cost-sharing, Beneficiary Selection

ACKNOWLEDGEMENTS

I want to express my deepest gratitude to all those who have supported me throughout the journey of completing this research report on the market orientation of protected agriculture vegetable farmers in Welimada and Bandarawela.

First and foremost, I am immensely grateful to my supervisor, Prof. K.A.S.S. Kodithuwakku, Senior Professor, Department of Agricultural Economics & Business Management, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka. His invaluable guidance, insightful feedback, and unwavering encouragement were instrumental in shaping this study. I also extend my heartfelt thanks to my co-supervisor, Mr. Nawarathna B. Kandangama, Researcher-Sustainable Value Chain & Landscape Investment, The Center for International Forestry Research & World Agroforestry (CIFOR-ICRAF), ICRAF Sri Lanka Country Office, Sri Jayewardenepura Kotte, Sri Lanka. Mr. Kandangama's practical insights into sustainable agriculture and his constructive suggestions greatly enriched the quality of this study. I also thank Dr. P. Weligamage, Head of the Department of Agricultural Economics and Business Management of the Faculty of Agriculture, University of Peradeniya, for the valuable guidance and support.

Further, I deeply appreciate the assistance provided by the Assistant Director of the Department of Agriculture Office in Bandarawela, whose cooperation facilitated access to the study sites and ensured smooth coordination during data collection. I owe a special debt of gratitude to the farmers in Welimada and Bandarawela who participated in this study, representing both the fully funded and partially funded groups under the SAPP project. Their generosity in sharing their time, experiences, and insights through surveys was the cornerstone of this research. Without their active participation and openness, this study would not have been possible.

Finally, I must express my gratitude to my family, colleagues, and others who were involved directly or indirectly in completing this research. Finally, I must express my gratitude to my family.

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LIST OF ABBREVIATIONS

IQR	Interquartile rang
LRF	Limited Resource Farmers
MO	Market orientation
OFF	Open Filed Farming
PAF	Protected Agriculture Farming
SAPP	Smallholder Agribusiness Partnership Program

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Agriculture plays a major role in the economy of Sri Lanka, contributing significantly to the country's GDP and providing livelihoods for a large portion of the population. With the advancement in agriculture, various types of PAF practices have emerged for specific types of agro-climatic zones. In 1997, PAF practices were introduced to Sri Lankan farmers. It ensures continuous crop production without seasonal variation, guarantees a farmer's income, controls the effects of adverse weather and pest and disease problems, overcomes land and labor scarcity problems in agriculture, and attracts the younger generation towards the utilization of modern technology (Kumara *et al.*, 2015). From the late 90s, PAF was gradually adopted by Sri Lankan farmers for ornamental plant, fruit, and vegetable cultivation. Because of their ideal climate and agricultural potential, areas like Welimada, Bandarawela, and Nuwara Eliya have seen a rise in the use of PAF, which includes techniques like tunnel farming, greenhouses, and rainshelters (Wijerathne *et al.*, 2014).

Department of Agriculture, National Agribusiness Centre, Export Development Board, and various government institutes were engaged in the promotion and adoption of these PAF practices among the farmers. They introduced several state-sponsored programs for community development and livelihood improvement, such as "Divineguma", "Gemidiriya", "Yali Pibidemu", and "Smallholder Agribusiness Partnership Program (SAPP)". These projects provided financial support for farmers to make net houses, poly-tunnels, and rain shelters in many of the districts in the country (Kumara *et al.*, 2015). The SAPP program aims to facilitate rural farmers in building commercial partnerships, providing access to finance, improving technical knowledge and financial literacy, introducing mechanization to agriculture, and promoting sustainable agricultural practices.

Under this program, several projects were implemented. Agro Village Entrepreneur Development Project in Kahaththewela, Bandarawela was one project, which was

commenced in March 2017. In this program, it was likely a community-driven initiative to empower farmers through sustainable agriculture and entrepreneurship by making a cluster village of Agriculture entrepreneurs through combining the Ihala Kahaththewela, Pahala Kahaththewela, and Ambegoda areas. In this project, 64 beneficiaries were selected through the Agriculture Instructor(AI) and “Grama Niladari” at the Kahaththewela, Bandarawela area. The selected beneficiaries received a 100% cash grant to build a poly-tunnel.

The Tomato Cultivation Value Chain Development Project in the Welimada area was another key driver project of the SAPP program. This project, 75 beneficiaries through a calling application from the Welimada area. Farmers received a partially funded cash grant from the SAPP project to build the polytunnels, and half were self-funded by the farmers.

Table 1.1 Investment Plan of Tomato Cultivation Value Chain Development Project

Description	Amount(LKR)	Farmers Own(LKR)	Bank Loan(LKR)	SAPP Grant(LKR)
Land Development	35,000	35,000	-	-
Construction of a poly-tunnel with drip irrigation	345,700	-	202,700	143,000
Farming Equipment	16,000	16,000	-	-
Allocation for working capital	73,000	15,000	58,000	-
Pre-project expenses	6,500	6,500	-	-
Sub total	476,200	72,500	260,700	143,000
contingency	23,900	-	-	23,900
Total project cost for 1 farmer	500,100	72,500	260,700	166,900

Source: <https://sapp.lk/production-of-export-oriented-tomato-in-poly-tunnels-and-related-value-chain-development-to-benefit-smallholder-farmers-in-badulla-district/>

1.2 Justification of the Study

However, the success of PAF depends not only on technological advancements but also on the farmer's ability to adapt to market demand and adopt a market-oriented approach, as well as the success of the projects depends on the involvement of the beneficiaries and commitment to project success. So involvement of the beneficiary throughout the lifecycle of the project is important. It emphasizes the level of involvement, including cost-sharing, which can influence the sense of ownership and project outcomes. Uwanyirigira and Nasirov (2016) emphasize that beneficiaries who invest their resources may exhibit a stronger commitment to the project's success compared to those who receive full funding without any personal investment. According to Dutta (2021), the level of funding can affect how beneficiaries engage with the project, as those contributing financially may feel more invested in outcomes. The degree of MO among beneficiary farmers varies significantly based on their access to resources and commitment to the project. So funding sources influence the degree of MO among PAF farmers. Understanding the differences in the degree of MO between two beneficiary farmer groups is essential for designing targeted interventions to support farmers and promote sustainable agriculture development.

1.3 Research Question and Objective

This research aims to address this gap by comparing the degree of MO of two PAF farmer groups in the Welimada and Bandarawela area towards PAF and OFF. One group has been fully funded, and the other group has been partially funded.

This research aims to address this gap by comparing the degree of MO between fully funded and partially invested protected agriculture and open field vegetable farmers in the Welimada and Bandarawela area. Therefore, research question is "Does the degree and the nature of MO of farmers vary with the type of project funding (i.e., full funding vs partial funding) and the type of farming (PAF vs OFF)" General objective of this research is to analyze the degree and the nature of MO of farmers by the type of funding (i.e., full funding vs partial funding) and the type of farming (PAF vs OFF).

1.4 Structure of the Report

The research project is mainly divided into 5 sections as introduction, literature review, methodology, results and discussion, and finally, the conclusions. In the first chapter of the report, the background of the study and the identified problem were discussed. As well as the research question and research objectives also pointed out in this chapter. The second chapter will state the review of the literature related to the study. Conceptual framework, which was shown by the reviewed literature, will also be presented in this chapter. The research methodology will be discussed under the third chapter of the report. It includes sampling. Data collection and data analysis techniques. Forth chapter will be on the results and discussion. And the final chapter will conclude the findings, discuss the summary of the results and limitations, and implications of the research. It will also suggest the implications regarding the issue studied in the research.

CHAPTER TWO

2. REVIEW OF LITERATURE

2.1 Introduction

The previous chapter explained the overview, identified the research problem, the purpose of the study question, and the objectives of the study. This chapter aims to revive the literature related to the study. It will be discussed under the subtopics of definitions of market orientation, definition of protected agriculture, market orientation in the context of farming and marketing strategies in achieving Market orientation. This chapter ends with the conceptual framework pertinent to this study.

2.2 Definition of market orientation

MO has been defined in different ways. According to Narver and Slater (1990), MO has three components: customer orientation, competitor orientation, and inter-functional coordination. Customer Orientation means that the organization must sufficiently understand the target buyers, create a continuous superior value, and satisfy their needs. Competitor orientation means the organization clearly understands its short-term strengths and weaknesses and the long-term capabilities of its current and potential competitors. Inter-functional coordination implies the integration of all functions of the organization and creates superior customer value. According to Kholi and Jaworski (1990), MO consists of three basic characteristics: market intelligence, intelligence dissemination, and market responsiveness. Organizations seek information on current and future customers' needs and competitor actions to meet them. Then disseminate the intelligence to develop the product to meet the specific needs of the market and choose an appropriate response to the market intelligence, either by modifying the product or by making a new product. MO can differ in different industries.

2.3 Definition of Protected Agriculture

The concept of PAF first emerged in developed countries in the Northern Hemisphere in the winter season to continue crop production at lower temperatures in extremely cold climates (Jensen and Malter, 1995). In the PAF practices, the crop's

microenvironment is modified and controlled. Then plants grow vigorously and perform best to their genetic potential compared to the field-grown plants due to plants receiving optimum growth conditions and minimum environmental stress. Studies therefore show that PAF practices result in higher yields than conventional agriculture practices. (Weerakkody *et al.*, 2000 and Jensen *et al.*,1995). According to Paroda (2013), studies show that 10-100 times higher annual returns per unit area could be achieved by PAF compared to open field crop production. So PAF practices make higher outputs per unit input and enhance water and land use efficiency. There are more advantages of PAF. A study conducted by Amit (2007) showed that leafy vegetables cultivated in protected environments yield more quality and quantity than those cultivated in open fields. Due to producing high-quality fruits and vegetables during the off-seasons, cultivation makes higher market prices for the producer and improves the grower's profit (Singh and Sirohi, 2006).

2.4 Market orientation in the context of farming

Kodithuwakku (1997) provides a significant framework for understanding MO in farming, particularly in the context of developing countries. The model highlights the dynamic interplay between entrepreneurial behavior, resource mobilization, and market conditions. Market-oriented farmers in horticulture sectors are more likely to sustain their businesses due to their ability to align production with market demands (Verhees and Meulenbergh, 2004). Farmers with a strong MO are more likely to invest in long-term strategies such as innovation, quality improvement, and customer relationships (Verhees and Meulenbergh, 2004). Kodithuwakku's (1997) model supports this view by demonstrating how entrepreneurial farmers overcome constraints through innovative approaches, such as diversification and adaptive marketing strategies.

In market-oriented farming, the farm is considered a business, hence, knowledge of farm business management is essential to become successful. To be market-oriented, farmers need to produce what the market wants and what satisfies the consumers (Kahan, 2013). Therefore, to survive in farming, MO is an important resource. It enables one to quickly become aware of the needs of the market and the underlying sources of value (Moore and Hussey, 1965, as cited in Kahan, 2013). According to Kahan (2013), MO in farming starts with the understanding of markets and their

demand. Then followed by the selection of suitable products and marketing channels that can supply these demands, satisfy consumers, and generate profit.

2.5 Marketing strategies in achieving Market orientation

The rural agriculture farming context of Sri Lanka is characterized by limited and fragmented land, temporal labor, inadequate capital, and prevailing highly imperfect agricultural market systems, leading to a highly constrained business environment (Kodithuwakku and Rosa, 2002). The greater majority of them belong to the category of Limited Resource Farmers (LRF). They usually act as “price-takers” (Meulenberg, 1986; Wossink, 1990, as cited in Kodithuwakku,1997). Therefore, they are incapable of influencing the prices they received for their product (Cornelius, 1988; Giles, 1990, as cited in Kodithuwakku,1997). The price-taking nature of the LRF tightly constrains the scope for action in their marketing efforts (Giles, 1990, as cited in Kodithuwakku,1997). This condition has further been aggravated since LRFs have limited capacities for controlling the market mix since they are endowed with scant contact with the final consumer (Meulenberg, 1986, as cited in Kodithuwakku,1997). This makes farmers need to become more market-oriented in their attempt to survive and prosper (Cornelius,1988; Brunaker, 1990, as cited in Hemachandra and Kodithuwakku,2005), which can be achieved by adopting marketing strategies to (a) capture maximum potential incomes that the existing markets are capable of providing (Cornelius, 1988; Dagher and Christy, 1991, as cited in Hemachandra and Kodithuwakku,2005) and to (b) limit the risks the prevailing environment has to provide (Cornelius, 1988, as cited in Hemachandra and Kodithuwakku,2005). These strategies can be viewed as choices about (a) which level of the market the farm should compete on and (b) the tactical dimensions, such as product (what to supply and of what quality, e.g., varieties of crops, breeds of animals, etc. (Ferris, 1988 as cited in Kodithuwakku,1997), price (at what cost), distribution (where, when, what services), promotion (what information) (Dagher and Christy, 1991, as cited in Kodithuwakku,1997).

The majority of rural farmers tend to follow routine, traditional decision-making processes that are well-established (Bryant, 1989, as cited in Kodithuwakku,1997). These practices were put in place primarily due to the greater transparency of the setting of agricultural production (Bryant, 1989, as cited in Kodithuwakku,1997) and have

been described as "production oriented" (Dagher and Christy, 1991; Brunaker, 1990, as cited in Kodithuwakku,1997). They allocate more time, effort, and resources for production than to marketing (Dagher and Christy, 1991, as cited in Kodithuwakku,1997), which ultimately leads to low income and socioeconomic failure. The interdependence of production and marketing decisions, such as what to produce, of what quality, when to produce, at what times, and in which markets the produce should be sold, is thus forcing individual farmers to deal with the situation, which ultimately leads to the need for farmers to adopt integrated production market strategies which have to be implemented well before start of production (Cornelius. 1988, as cited in Kodithuwakku,1997) from them to be regarded as market oriented. Cornelius (1988), as cited in Kodithuwakku (1997), has identified "strategic concept" as an approach to agricultural marketing which involves systematic coordinated decision-making. As pointed out by several authors, in achieving MO, LRFs adopt marketing strategies such as what and when to produce, how much to produce at what quality, in which way, when, where, and who to sell in what form, and how to sell the produce. These decisions are summarized in Table 2.1.

Table 2.1 Strategies Adopted by LRFs to Adapt to the (Market) Environment

Strategic Action (Decision Criteria)	Logic for the Action
What to produce?	<ul style="list-style-type: none"> a) given the soil, climate and the presence of absence of a certain crop, selecting the best combination of products to gain advantage b) focusing a specific niche market (or excluding other markets) to gain a higher margin/reduce risk through crop diversification c) to differentiate the product from traditional ones on price/introducing new crop or product to an area to gain advantage over others d) gain a comparative/competitive advantage by selecting a particular commodity of combination of commodities to suit a farmer's resource status e) produce what can be sold rather than hope to sell what cannot be produced (subject to internal and external environmental conditions)
How should I best produce them?	<ul style="list-style-type: none"> a) adapting a new technology (innovation) to gain cost advantage b) become more efficient by decreasing the input use to increase profit and thus to gain competitive advantage over others c) relatively efficient use of resources in production to gain comparative advantage over others and become competitive by providing products to the market at a lower cost
How much to produce? (it has been argued that increased capacity of	<ul style="list-style-type: none"> a) to reduce the cost of production in order to gain a higher margin (this determine where to sell the products) <p>farm more units or expand the enterprise to gain more and complete use of existing unused resources/ spread fixed cost over more units of output (economies of scale)</p>

earning and accumulation of capital are dependent on steady expansion of the size of farm operation.	
When to produce?	a) to take the advantage of market windows caused by seasonality in production due to variability in climatic conditions, physiology of crops and cultural practices.
Of what quality?	a) target niche markets to increase net margin b) to differentiate the product to gain price advantage c) to gain a price advantage (this determine where to sell too) d) to gain competitive advantage by exploiting quality differences (i.e. to obtain price premium for quality) e) to exploit the quality differences to gain a higher margin
When to sell?	a) store and sell grains to reduce market risk b) to take the advantage of variability in market prices caused by changing environmental factors c) perishable nature of agricultural produce d) to gain the price advantage by focusing specific market windows ³ e) to maximize the average returns by timing the sales (this is aimed at minimizing the risk created due to the volatility of the market) f) store and sell at a higher price to gain a higher profit g) examine the price changes to determine when early marketing or delay is the more profitable alternative

	h) to exploit price variations in order to get a higher price
Who/where to sell?	<p>a) focusing a specific niche market (or exclude other markets) or distribution channel to gain a higher margin/identify new markets/reduce market risk through hedging</p> <p>b) choice of a marketing channel by farmers in order take a higher price (geographical market windows)</p> <p>c) to gain a price advantage by selling a product of different quality</p> <p>d) to exploit the price differences in different marketing alternatives</p>
In what form to sell?	a) expansion of industrial uses of agricultural produce or value enhancement activities using agricultural produce to gain a higher margin
How to sell?	<p>a) e.g. access the market quickly due to the perishable nature of agricultural produce (e.g.) pooling arrangements, contract production, co) operative marketing, direct selling to final consumer)</p> <p>b) focusing a specific niche market (or exclude other market) to gain a higher margin/ vertical integration) obtain more profits by moving higher or lower into the marketing and distribution channels (e.g. direct marketing⁴).</p> <p>c) focusing a unique niche market (by its location, income class, age, race or buying habits) to gain price advantage</p> <p>d) cash sales, forward contracting to reduce risk</p> <p>e) how much marketing functions should farmer perform in order to gain a higher price?</p> <p>how much to sell in each selling option</p>
Source: Kodithuwakku, 1997	

2.6 Conceptual Framework and Hypotheses

The conceptual framework provides a theoretical lens to analyze how the type of funding and type of farming shape market orientation, addressing the research objectives of assessing the degree and nature of market orientation among vegetable farmers.

2.6.1 Conceptual Framework

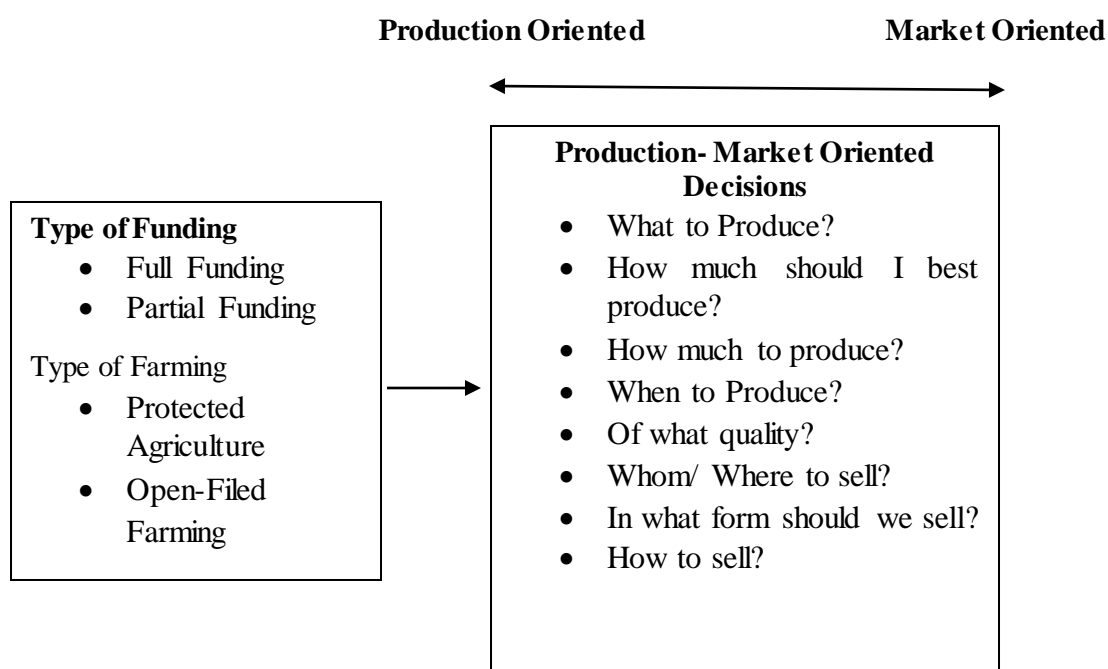


Figure 2.1: Conceptual Framework

H₁: There is a significant difference in the degree & nature of MO between the protected agriculture vegetable farmers who belong to the two projects. (fully funded vs partially funded)

H₂: There is a significant difference in the degree & nature of MO between the open field vegetable farmers who belong to the two projects. (fully funded vs partially funded)

2.7 Chapter Summary

This chapter presented the previous literature on market orientation, protected agriculture, market orientation in the context of farming, and marketing strategies in

achieving market orientation. This review was concluded with the introduction of the conceptual framework and hypotheses of this study. The next chapter presents the research methodology used during the study to achieve the objectives of the study.

CHAPTER THREE

3. METHODOLOGY

3.1 Introduction

The previous chapter presented the previous literature. This review was concluded with the introduction of the conceptual framework and hypotheses of this study. This chapter discusses the research method adopted in sampling, data collection, and analysis. The sampling method will be further discussed under the subtopics of selection of sampling site and sampling population. Under the data collection process, the research approach, source of data, and instrument used in data collection will be described. Finally, the method used in data analysis will be discussed for each objective.

3.2 Method of Sampling

3.2.1 Study Site

Welimada and Bandarawela areas, which were located in the Badulla district, were selected as the study site. Badulla district was selected due to the climate in this area being suitable for PAF (Kumara, Weerakkody and Epasinghe, 2015), and many SAPP projects were implemented there.

3.2.2 Study population

The study population consisted of one hundred and thirty-nine farmers (139) which were belonging to two farmer groups. Farmers who received full funding from the program have belonged to one group. There were sixty-four (64) beneficiary farmers, and a list of them was obtained from the Assistant Director's office of the Department of Agriculture at Bandarawela. Among them, thirty-five (35) farmers were selected through a stratified sampling technique, which ensured proportional representation based on tunnel size. Farmers who received partial funding from the program belonged to another group. There were seventy-five (75) beneficiary farmers, and among them, forty (40) farmers were selected through the snow poll sampling technique through referrals from the farmer organization. Therefore, the sample size was seventy-five (75) farmers.

3.3 Method of Data Collection

Data was collected mainly through a questionnaire survey. The questionnaire was a structured questionnaire that was developed using the revised literature (see Appendix). It consisted of two sections. Section one of the questionnaire intends to obtain the data related to the background information of farmers, such as age, level of education, gender, hometown, poly-tunnel size, farming experience, and type of farmer involvement (full-time/ part-time)

Section two consisted of statements related to production-market oriented decisions taken by the farmers, such as Crop selection, timing of planting, method of production, time of selling, amount of produce, form of selling, quality of produce, and method of selling. These questions were asked to measure whether they are market-oriented or production-oriented. These were measured by using a 1-5 Likert scale. Only the primary data was used in the study.

3.4 Method of Data Analysis

Various descriptive analysis techniques and non-parametric methods were used in analyzing the data. The MO score showed the extent to which a particular farmer was market-oriented. MO score was measured using production-market oriented decisions, each assessed with multiple Likert scale questions. Each response was converted to a numerical value (1-Strongly disagree, 2- Disagree, 3- Neither Agree nor Disagree, 4- Agree, and 5- Strongly Agree). Using these assigned values average sub-score for each decision was calculated for each farmer. Finally, the MO score for each farmer was calculated by averaging all sub-scores of all decisions. The mean MO score for each farmer group (fully vs. partially) was calculated for both types of farming (PAF vs. OFF). The mean and standard deviation were calculated for descriptive statistics. Farmers were categorized into 3 clusters on their MO scores using a manual clustering method. If the MO score was higher than 3.5 ($MO > 3.5$), they were categorized as highly market-oriented farmers who focus on market demand. When the MO scores between 2.5 and 3.5 ($2.5 \leq MO \leq 3.5$), they were categorized as moderate market-oriented farmers, and if the MO score was lower than 2.5 ($MO < 2.5$), they were categorized as highly production-oriented farmers who focus on yield over market demand. To ensure the reliability of the questionnaire used to measure market orientation, Cronbach's Alpha was computed to test the internal consistency of the scale. The Cronbach's Alpha

for the overall MO is 0.8532, indicating good internal consistency. Additionally, the alpha values if each item were deleted range from 0.8108 to 0.8716, indicating that no single item significantly undermined the scale's reliability. Normality test (Shapiro-Wilk test) was done to find whether the data is normally distributed or not. According to the result data were not normally distributed. Therefore, non-parametric methods were used. The Wilcoxon rank-sum test was carried out to compare two farmer groups with their type of farming, allowing for comparison of medians between groups to determine if there were statistically significant differences.

3.5 Chapter Summary

This chapter presented the method followed in performing research. First, the chapter presented the details of the study site and the sample, followed by the research design and the procedure followed during the study. Data collection and the method used for data analysis were discussed in the latter part of this chapter. The next chapter will present the results and the discussion of the study.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1 Introduction

The previous chapter presented the method followed in performing research. Details of the study site and the sample, procedure followed during the study, data collection, and data analysis were discussed in the last chapter. This chapter presents the findings of the study. The results will be discussed under the topics of profile of the respondents, descriptive analysis of MO scores, comparative analysis of MO by type of funding in Protected Agriculture, comparative analysis of MO by type of funding in open field farming, nature of MO across kind of funding and type of agriculture and clustering of farmers based on degree of MO.

4.2 Profile of the Respondents

4.2.1 Gender of the Respondents

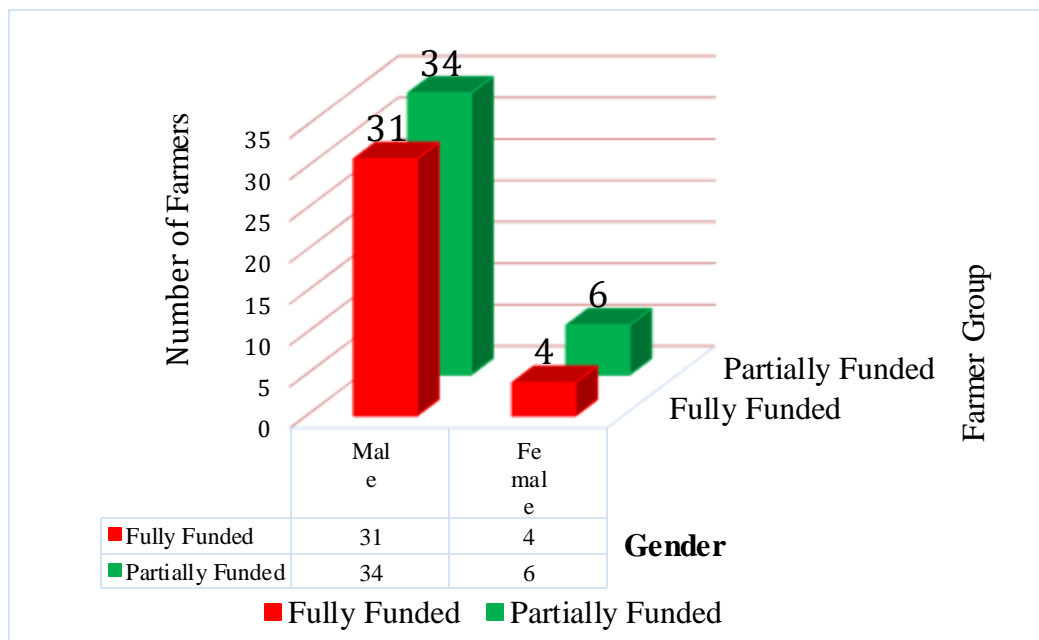


Figure 4.1: Age distribution of respondents

Out of the 75 farmers interviewed, 10 farmers (13.3%) were female farmers, while 65 farmers were male farmers (86.7%). Among them, 6 female farmers were partially

funded group and 4 female farmers were fully funded group. According to the results, the number of male farmers was higher than that of female farmers. However, according to the information received from the informal discussion with the farmers, most of them are running family cultivation. Therefore, both male and female members of the families are involved in farming. Some female farmers were engaged in poly-tunnel cultivation as an extra income source as a part-time involvement.

4.2.2 Age Distribution of Respondents

Out of 75 farmers interviewed, most of the farmers were between the 40-50 age group (figure 4.2). The young generation of farmers (ages between 20-30) is significantly low. There were only 4 farmers. Out of these 4 farmers, 3 farmers were partially funded group. Most young farmers could not be selected for the fully funded project. However, according to the informal discussion, most of the younger generation population was engaged in the tourism industry in the “Ella” area instead of farming.

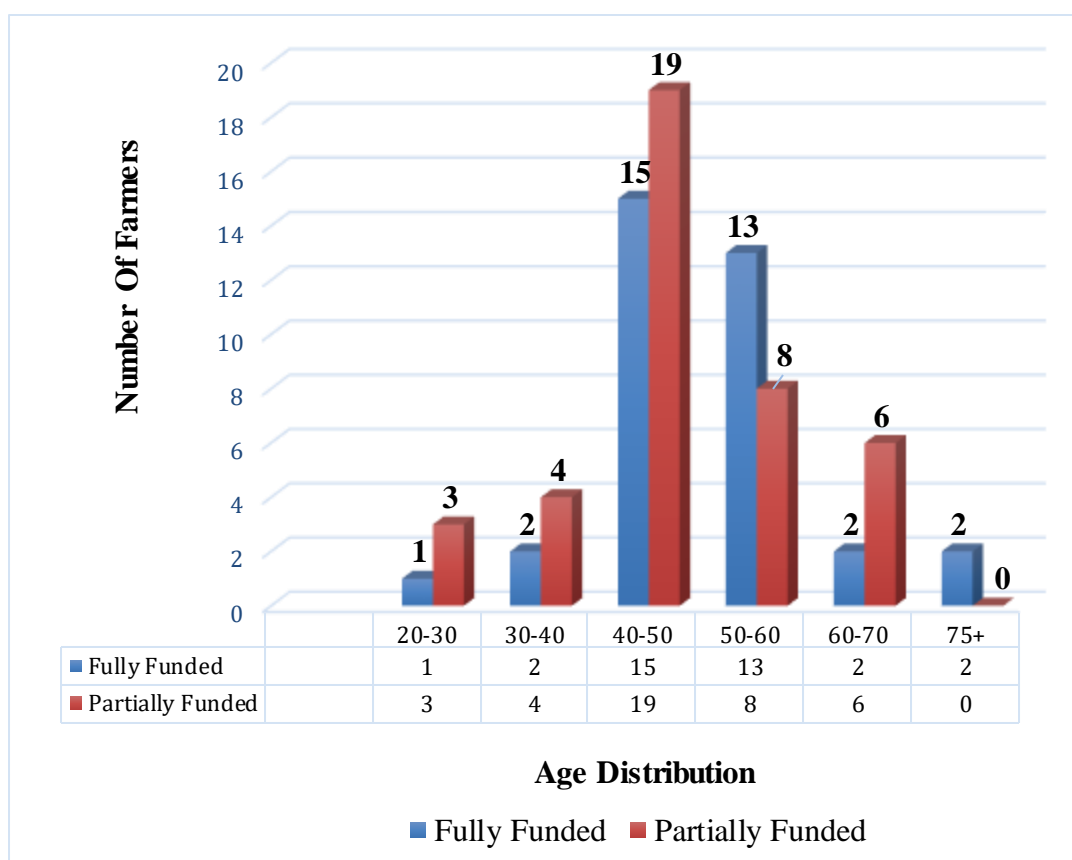


Figure 4.2: Age distribution of respondents

4.2.3 Education Level of the Respondents

A significant portion of the respondents (32 farmers) have completed up to the Ordinary level(O/L), which is a common secondary education qualification. 21 farmers have completed up to the Advanced level (A/L), which is a higher secondary qualification. A very small percentage of respondents (3 farmers) have a degree-level education, indicating a relatively low level of formal education among the surveyed population. 2 farmers (2.67%) of respondents hold a diploma, which is a post-secondary qualification.

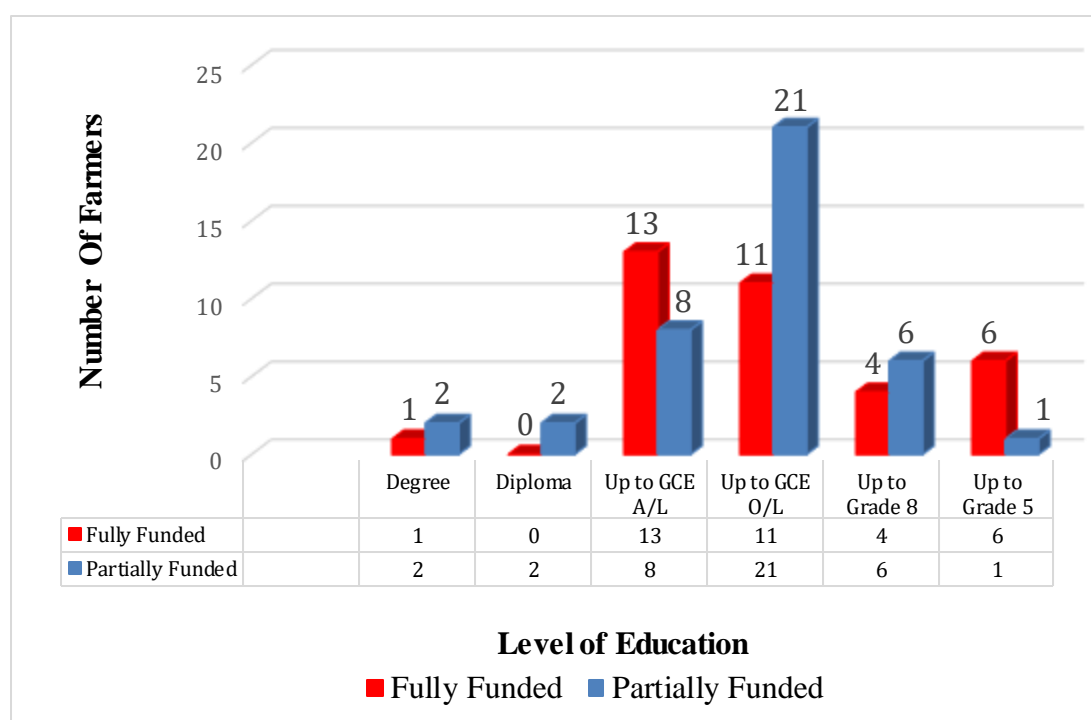


Figure 4.3: Education level of respondents

4.2.4 Farming Experience of the Respondents

According to the result, most farmers have more than 20 years of open-field farming experience. Due to their occupation being traditional farming, their open-field farming experience is significantly higher than protected agriculture farming. The two respondents had no experience in open-field farming, but they engage in protected agriculture. Due to projects commenced 5-7 years ago, most farmers had less experience in protected agriculture farming. They started poly-tunnel farming with those projects. Only one farmer had more than 10 years of experience in tunnel farming.

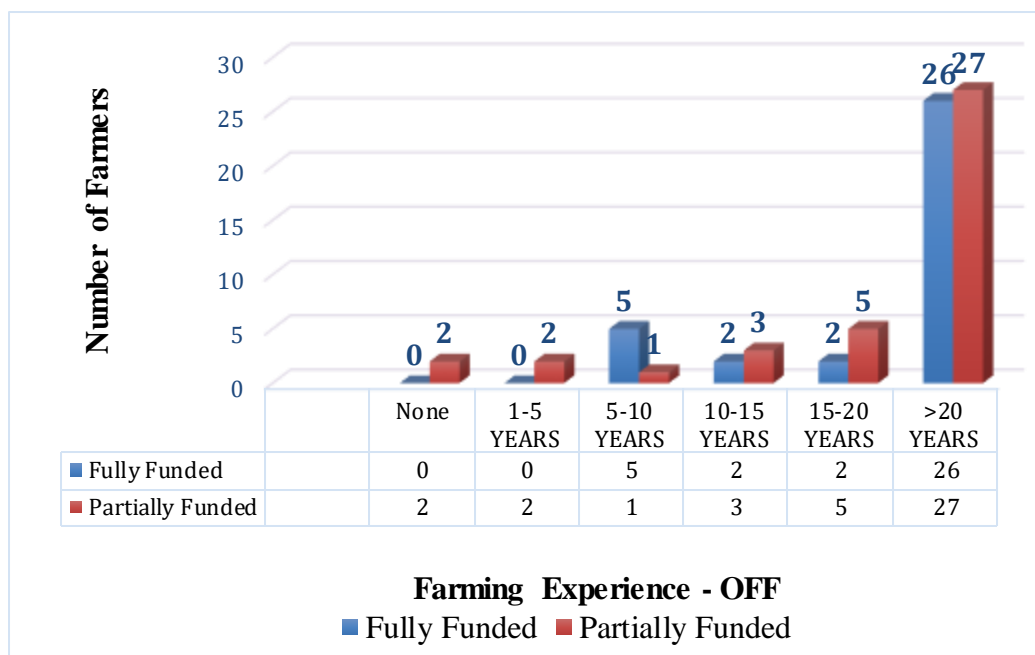


Figure 4.4: Open-field farming experience

4.2.5 Type of Farmer Involvement

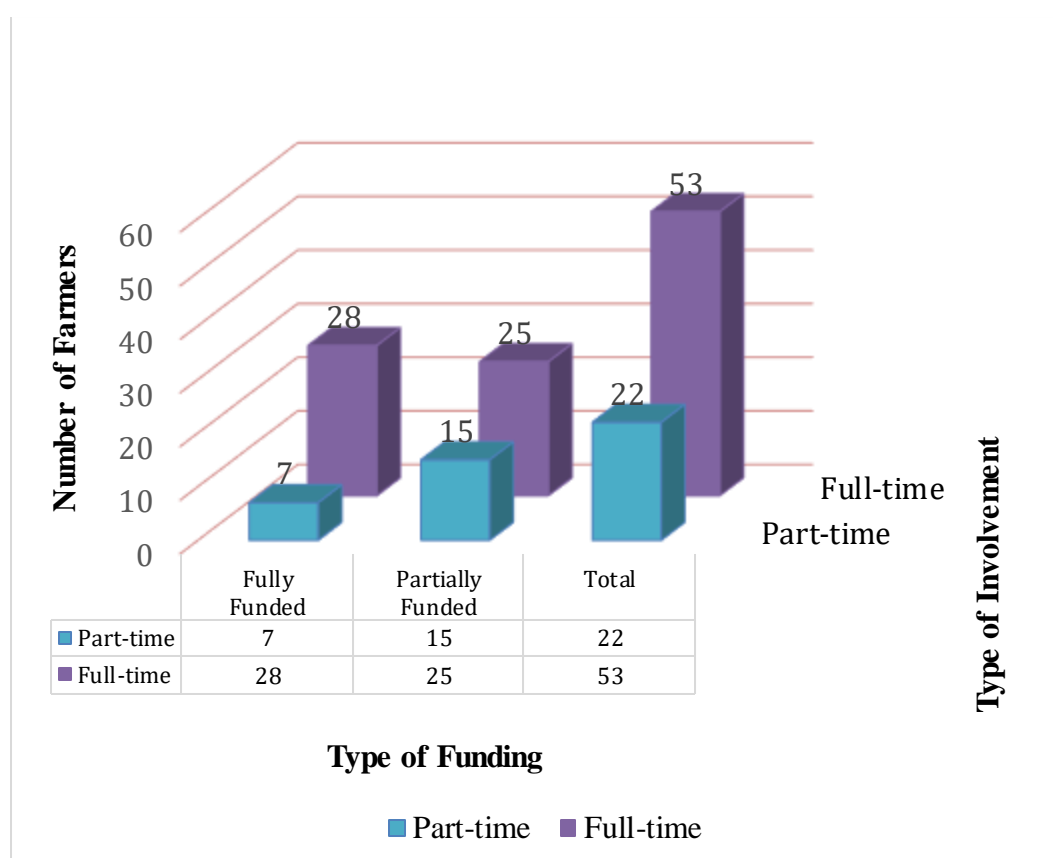


Figure 4.5 Type of farmer involvement

Out of the 75 farmers interviewed, 22 farmers were engaged in part-time farming while 53 farmers were full-time farmers (Figure 4.1.7). Among the part-time farmers, 15 farmers were partially funded group and 7 farmers were fully funded group. Most female farmers are engaged in part-time farming to earn extra income.

4.3 Descriptive Analysis of Market Orientation Scores

The initial analysis of MO scores provides a foundational understanding of the differences between fully funded and partially funded farmers across PAF and OFF systems. Table 4.1 presents the mean values of MO scores and standard deviations for each group.

Table 0.1: Descriptive statistics of MO scores by type of farming and type of farming

Type of farming	Type of funding	Mean Score	Std. Dev.	N
Protected Agriculture	Fully Funded	2.27	0.35	35
	Partially Funded	3.43	0.31	40
Open-field Farming	Fully Funded	2.63	0.21	35
	Partially Funded	2.84	0.32	40

In PAF, partially funded farmers achieved a higher mean score ($M = 3.43$, $SD = 0.31$) compared to fully funded farmers ($M = 2.27$, $SD = 0.35$), indicating a stronger MO. In OFF, the mean MO scores were closer, with fully funded farmers averaging 2.63($SD=0.21$) and partially funded farmers averaging 2.84 ($SD=0.32$), but partially funded farmers scoring slightly higher than fully funded farmers. These descriptive statistics suggest a large difference in MO in the PAF, where partially funded farmers appear to be more responsive to market conditions. This is different from the lower difference in OFF, which suggests greater consistency of orientation and perhaps less sensitivity of traditional farming systems to the funding type. The standard deviations indicate moderate group variability, suggesting consistency of response despite the small sample.

4.4 Comparative Analysis of Market Orientation by Type of Funding in PAF

A Wilcoxon rank-sum test was conducted to compare market orientation between fully funded and partially funded farmers in PA. Table 4.2 shows the results of the test.

Table 0.2: Two-Sample Wilcoxon Rank-Sum test results for Market Orientation in PAF

Type of Funding	Observation	Rank Sum	Expected Rank Sum
Fully Funded	35	646.5	1330
Partially Funded	40	2203.5	1520
Combined	75	2850	2850
Adjusted variance 8859.10			
Z= -7.262			
Prob> Z = 0.0000			

The results indicate a significant difference ($z = -7.262$, $p < 0.0000$), which partially funded farmers exhibiting a higher rank sum (2203.5) compared to fully funded farmers (646.5). The negative z-score (-7.262) indicates that the Fully Funded farmers have lower MO scores than the Partially Funded farmers. Partially Funded farmers have higher MO scores compared to Fully Funded farmers. This indicates a statistically significant difference in the degree of MO between the PAF vegetable farmers who belong to the two projects. (fully funded vs partially funded). Figure 4.6 presents a box plot comparing the overall MO scores of fully funded and partially funded farmers in PAF.

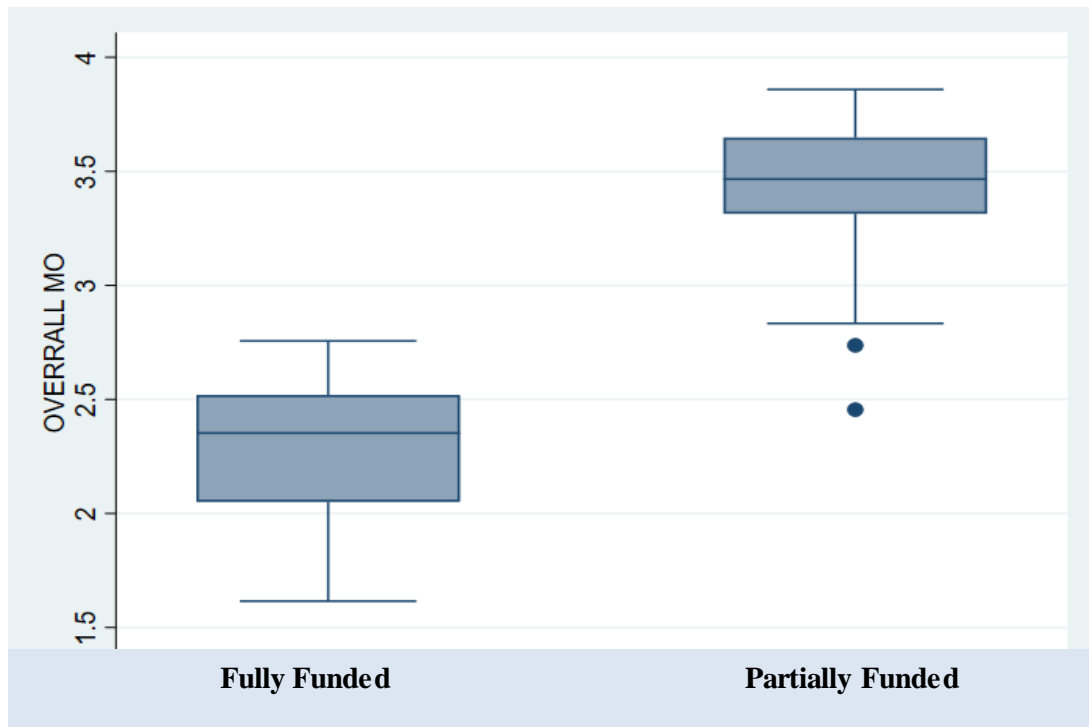


Figure 4.6: Box plot of MO Scores in PAF

The median score for fully funded farmers is approximately 2.3, with an interquartile range (IQR) spanning from 2.0 to 2.5, indicating that 50% of these farmers scored within this range. In contrast, partially funded farmers exhibit a higher median of 3.4, with an IQR of 3.2 to 3.5, reflecting a stronger market orientation. The whiskers for fully funded farmers extend from 1.8 to 2.8, while those for partially funded farmers range from 3.0 to 3.8. The partially funded group includes two outliers around 2.5, suggesting a small subset of farmers with unexpectedly low scores. This visual representation corroborates the significant difference identified in the Wilcoxon rank-sum test ($z = -7.262, p < 0.0000$), emphasizing the significant difference in the degree of MO between the PAF farmers who belong to the two projects. (fully funded vs partially funded).

4.5 Comparative Analysis of Market Orientation by Type of Funding in OFF

A Wilcoxon rank-sum test was conducted to compare MO between fully and partially funded farmers in OFF. Table 4.3 shows the results of the test.

Table 0.3: Two-sample Wilcoxon Rank-Sum test results for market orientation in open field farming

Type of Funding	Observation	Rank Sum	Expected Rank Sum
Fully Funded	35	946	1155
Partially Funded	30	1199	990
Combined	65	2145	2145
Adjusted variance 5763.77			
Z= - 2.753			
Prob> Z = 0.0059			

The results indicate a significant difference ($z = -2.753$, $p < 0.0059$), which partially funded farmers exhibiting a higher rank sum (1199) compared to fully funded farmers (946) across 65 observations. The negative z-score (-2.753) indicates that the Fully Funded farmers have lower MO scores than the Partially Funded farmers. Partially Funded farmers have higher MO scores compared to Fully Funded farmers. This indicates a statistically significant difference in the degree of MO between the OFF vegetable farmers who belong to the two projects. (fully funded vs partially funded). Figure 4.7 presents a box plot comparing the overall MO scores of fully funded and partially funded farmers in protected agriculture.

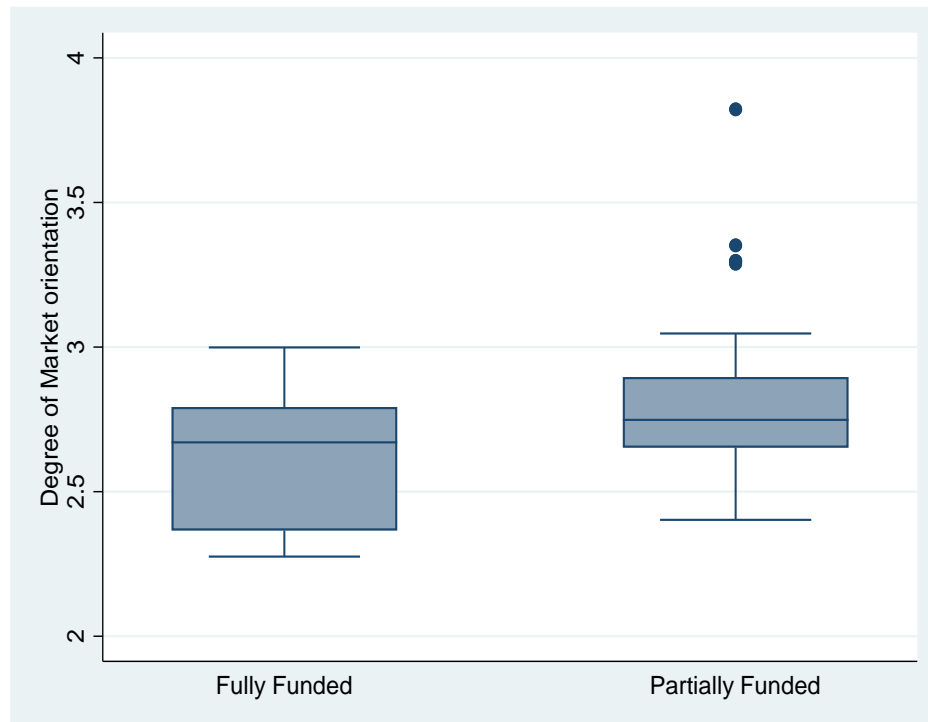


Figure 4.7: Box plot of MO scores in OFF

The median score for fully funded farmers is approximately 2.6, with an IQR spanning from 2.5 to 2.8, indicating that 50% of these farmers scored within this range. In contrast, partially funded farmers exhibit a slightly higher median of 2.8, with an IQR of 2.7 to 3.0, reflecting a modest increase in market orientation. The whiskers for fully funded farmers extend from 2.3 to 3.0, while those for partially funded farmers range from 2.5 to 3.2, showing some overlap in the typical range of scores. Notably, the partially funded group includes three outliers at 3.5 and 4.0, suggesting a small subset of farmers with exceptionally high market orientation, possibly due to entrepreneurial behaviors or better market access. This visual representation aligns with the Wilcoxon rank-sum test results ($z = -2.753$, $p = 0.0059$), confirming a statistically significant but smaller difference in market orientation compared to PAF.

4.6 Nature of Market Orientation Across Funding and Farming Types

Beyond the degree of MO, the study explored its nature by analyzing specific production-market oriented decision aspects derived from Likert scale responses. Table 4.4 illustrates the nature of MO in PAF, comparing mean scores across key production-market oriented decisions.

Table 0.4: Comparison of Production-Market Oriented decisions in PAF

Production-Market Oriented Decisions	Fully Funded	Partially Funded
What to Produce?	2.21	3.10
When to Produce?	2.93	3.65
How should I best produce?	3.16	3.44
Time of Selling?	2.04	3.58
Quantity of Produce?	1.90	3.06
Form of Selling?	1.03	1.38
Quality of Produce?	1.91	4.65
Method of Selling?	2.26	3.75

Partially funded farmers consistently outperformed their fully funded counterparts, with higher means in “What to produce?”, “Method of selling?”, “Quality of produce?”, “Quantity of produce?” and “Time of selling?” among others. This suggests that partial funding fosters a broader market-oriented focus, possibly driven by the need to maximize return on personal investment. Partially funded farmers performed the “Time of selling?” well due to they had a storage facility. No one added value to their product to meet the diverse needs of different customers and buyer groups. Therefore, the “Form of selling?” decision was given a lower score by both farmers. Partially funded farmers sorted and graded their product before selling to their farmer organization, and they had higher bargaining power due to their collective action of the farmer organization. Therefore, their “Method of selling?” and “quality of selling?” decision scores were higher than fully funded farmers. Figure 4.8 is a radar chart that compares the MO of two groups of farmers in the context of PAF. The radar charts visually confirm that partially funded farmers in PAF are more market-oriented across all production-market-oriented decisions.

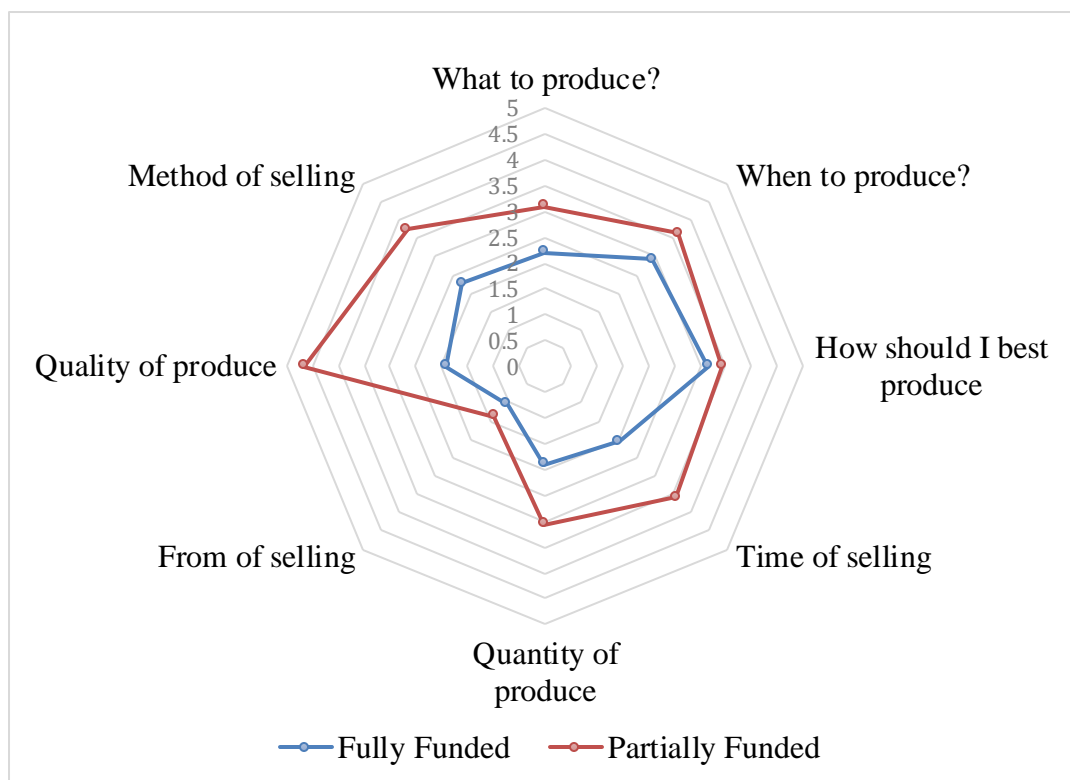


Figure 4.8: Comparison of the nature of MO: PAF farmers

Table 4.4 illustrates the nature of MO in OFF, comparing mean scores across key production-market oriented decisions.

Table 0.5: Comparison of market orientation decisions in OFF

Production-Market Oriented Decisions	Fully Funded	Partially Funded
What to Produce?	2.47	2.61
When to Produce?	3.59	4.01
How should I best produce?	3.33	3.87
Time of Selling?	2.53	2.2
Quantity of Produce?	2.52	2.07
From of Selling?	1.69	1.13
Quality of Produce?	1.49	2.43
Method of Selling?	2.4	2.93

In the OFF, partially funded farmers excelled in “Method of selling?”, “Quality of

produce?”, “How should I best produce?”, “When to produce?” and “What to produce?” while fully funded farmers were more market oriented towards “time of selling?”, “form of selling?” and “quantity of produce?” These differences suggest that partially funding encourages a broader, proactive engagement with market demands, possibly reflecting a need to optimize limited resources. Figure 4.9 is a radar chart that compares the MO of two groups of farmers in the context of OFF.

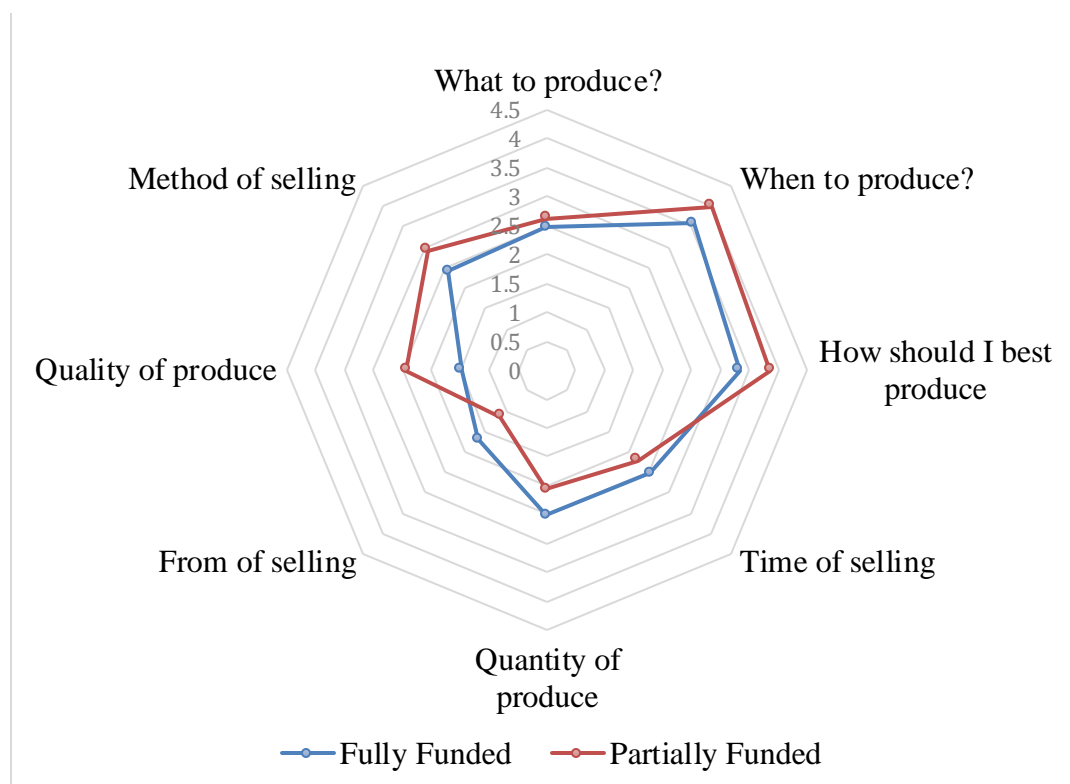


Figure 4.9: Comparison of the nature of MO: OFF

4.7 Clustering of Farmers Based on Degree of Market Orientation

To further explore the heterogeneity in MO among the farmers, a manual clustering approach was employed to categorize farmers into three groups based on their overall MO scores: Low (< 2.5), Moderate ($2.5-3.5$), and High (> 3.5). The clustering was performed separately for PAF and OFF to account for differences in farming systems. Table 4.6 presents the distribution of PAF across the three clusters.

Table 0.6: Clustering of farmers in PAF by degree of MO

For PAF:

MO Cluster	Fully Funded	Partially Funded	Total
High	0	19	19
Moderate	11	20	31
Low	24	1	25
Total	35	40	75

Among fully funded farmers, 24 out of 35 were classified as having low MO, with scores below 2.5. They were focused on production instead of market demand. It means they were production-oriented farmers. In contrast, 19 out of 40 partially funded farmers were classified as having high MO, with scores above 3.5, and only one partially funded farmer was low market oriented (highly production oriented). There were none of highly market-oriented farmers in the fully funded farmer group. The remaining farmers in both groups fell into the moderate category, with scores between 2.5 and 3.5. There were 11 farmers from the fully funded group and 20 farmers from the partially funded group. The clustering highlights that partially funded farmers are predominantly market-driven. Figure 4.10 shows the distribution of PAF farmers among the clusters.

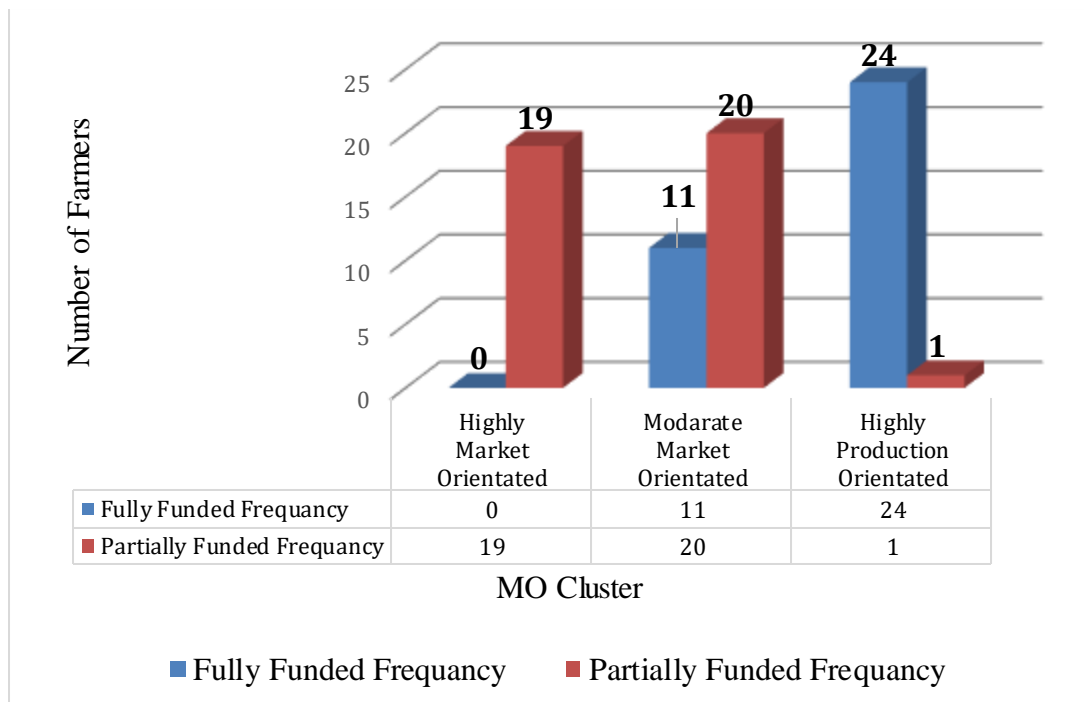


Figure 4.10: Distribution of PAF farmers among the clusters.

Figure 4.10: Distribution of PAF farmers among the clusters.

Table 4.7 presents the distribution of open field farmers across the three clusters.

Table 4.7: Clustering of farmers in OFF by degree of MO

For OFF:

MO Cluster	Fully Funded	Partially Funded	Total
High	0	1	1
Moderate	26	25	51
Low	9	4	13
Total	35	30	65

Among fully funded farmers, 9 out of 35 were classified as having low MO, with scores below 2.5. They were focused on production instead of market demand. It means they were production-oriented farmers. In contrast, only one farmer out of 30 partially funded farmers was classified as having a high MO, with scores above 3.5, and 4 partially funded farmers were low market oriented (highly production oriented). The remaining farmers in both groups fell into the moderate category, with scores between 2.5 and 3.5. There were 26 farmers from the fully funded group and 25 farmers from the partially funded group. Figure 4.11 shows the distribution of open field farmers among the clusters.

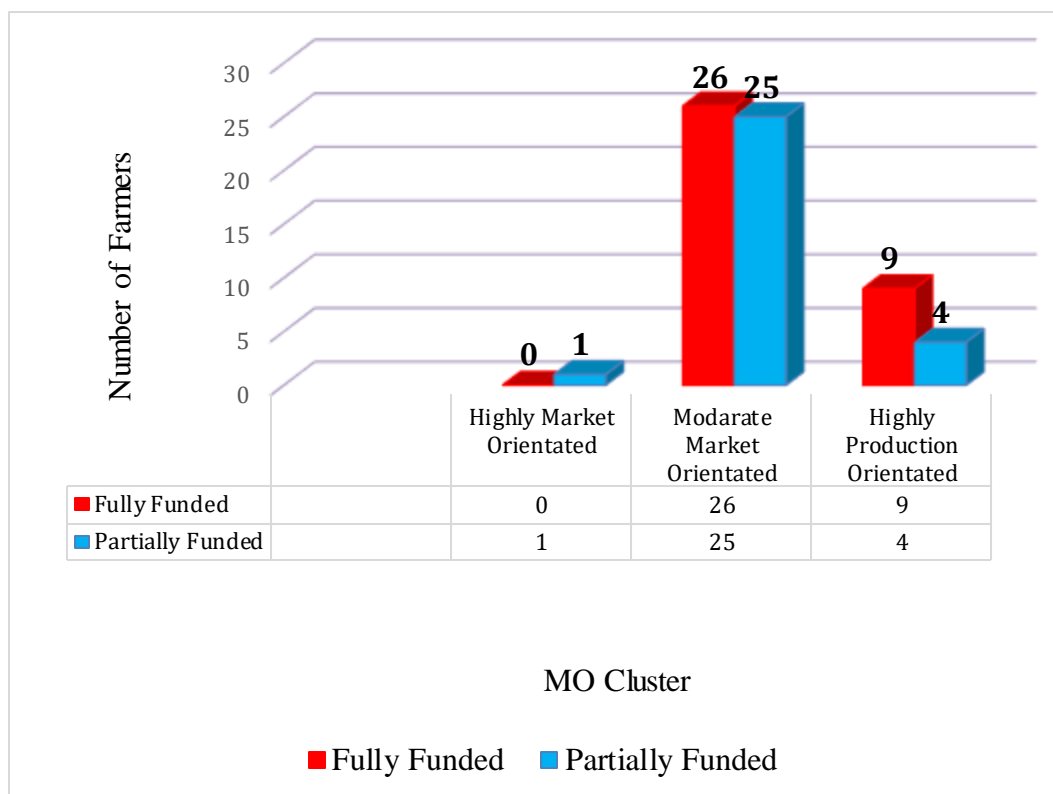


Figure 4.11: Distribution of OFF farmers among the clusters

4.8 Chapter Summary

The overall analysis indicates that fully funded PAD and OFF farmers were not much more market-oriented than partially funded PAF and OFF vegetable farmers. However, the statistical analysis shows a significant difference between the farmer groups in the degree and nature of MO. The next chapter will conclude the research report with recommendations and suggestions for future research.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The primary aim of this research was to investigate whether the degree and nature of MO among vegetable farmers in the Welimada and Bandarawela areas of Sri Lanka vary with the type of project funding (fully funded vs. partially funded) and the type of farming (PAF vs. OFF). This study addressed this question by comparing two farmer groups (i.e., fully and partially funded) under the SAPP, analyzing their MO through quantitative data collected via questionnaires and supported. This chapter summarizes the results obtained during the study and presents conclusions and recommendations that can be derived from the results. Suggestions for further research will be discussed as the final section of the chapter.

5.2 Summary of the study

The research revealed significant differences in the degree and nature of MO between fully funded and partially funded farmers across both PAF and OFF types. In PAF, partially funded farmers exhibited a higher mean MO score compared to fully funded farmers, with a statistically significant difference. Similarly, in OFF, partially funded farmers scored higher than fully funded farmers. Clustering of farmers further highlighted that partially funded PAF farmers were predominantly highly market-oriented, while fully funded PAF farmers were mostly production-oriented. In OFF, both groups were moderately market-oriented, with only one partially funded farmer classified as highly market-oriented.

Regarding the nature of MO, partially funded PAF farmers outperformed fully funded farmers across all production-market-oriented decisions, particularly in "Quality of Produce" and "Time of Selling". In OF farming, partially funded farmers excelled in "When to Produce" and "Method of Selling", while fully funded farmers showed slight advantages in "Time of Selling" and "Quantity of Produce." These findings suggest that partial funding fosters greater market orientation, likely due to increased personal investment, commitment and ownership.

5.3 Conclusions

The study confirms that the degree and nature of MO indeed vary with the type of funding and the type of farming. Partially funded farmers, who contribute financially to their projects, demonstrate a higher MO, particularly in PAF, where they align production-market oriented decisions with market demands and consumer preferences more effectively than their fully funded counterparts. This aligns with the previous finding of the literature (Uwanyirigira and Nasirov, 2016, and Dutta, 2021), who argue that personal investment enhances commitment and engagement with a project throughout the project life cycle. In contrast, fully funded farmers, especially in PAF, tend to prioritize production over market needs and consumer preferences, which reduces their incentive to adapt to market dynamics. In OFF, the smaller gap in MO scores suggests that traditional farming practices are more production-oriented, regardless of funding type. These findings underscore the importance of cost-sharing models in fostering entrepreneurial behavior and sustainable agricultural development in Sri Lanka.

5.4 Recommendations

The findings of the study suggest that a shift from fully funded models to partially funded schemes, as cost-sharing appears to enhance market orientation and project ownership. For instance, future SAPP initiatives could adopt a 50-50 funding model, similar to the Tomato Cultivation Value Chain Development Project, to attract more committed farmers as project beneficiaries to enhance the sustainability of project outcomes. As well as providing targeted training on MO, quality management, and timing of sales, especially for fully funded farmers, to bridge the gap in MO. Workshops could focus on practical skills like grading produce and negotiating with buyers. Partially funded farmers should exercise their collective bargaining power (e.g., through farmer organizations) to further enhance market access and profitability. Fully funded farmers should seek opportunities to diversify crops and explore niche markets to shift from a production-oriented mindset.

5.5 Limitations of the Study

The above finding of the study needs to be interpreted in the light of its limitations. This study focuses on only two areas (Welimada and Bandarawela). It limits the

generalizability of findings to other regions or farming contexts in Sri Lanka as well as this study did not explore external factors such as market access, infrastructure.

5.6 Future Research Direction

Further research is recommended to expand the sample size and geographic scope to include other agro-climatic zones in Sri Lanka, providing a more comprehensive study of MO trends and investigating the role of external factors.

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APPENDIX

No:

Date:

Questionnaire

I am a final-year student at the Faculty of Agriculture at the University of Peradeniya. I am conducting research here regarding assessing the market orientation of protected agriculture vegetable farmers. I kindly request your cooperation to ensure the success of my research. I assure you that your response will remain anonymous. And I beg your pardon for the inconvenience I have caused you.

Please answer the following question by crossing the relevant box or writing down your answer in the space provided.

Section A- Background information

1. Age:

2. Level of Education: Up to Grade 5 ☐ Up to Grade 8 ☐

Up to GCE O/L ☐ Up to GCE A/L ☐

Diploma ☐ Degree ☐

3. Gender: Male ☐ Female ☐

4. Home town:

5. Poly-tunnel Size:

- Poly-tunnel only ☐
- Poly-tunnel and open-field cultivation ☐
- Open field cultivation only(Present) ☐

6. Farming Experience: None ☐ 1-5 YEARS ☐ 5-10 YEARS ☐

10-15 YEARS ☐ 15-20 YEARS ☐

>20 YEARS ☐

7. Type of farmer involvement: Full-time ☐ ☐
Part-time

8. Funds for constructing the poly-tunnel:

By Own Investment ☐ By Grant ☐

9. Crops cultivated
 Open field:
 Poly-tunnel:
10. Selling Market:

Section B- Marketing Strategies

Put the appropriate number for your response.

1. Strongly Disagree
 2. Disagree
 3. Neither agree nor disagree
 4. Agree
 5. Strongly agree
- (PT: Poly-tunnel, OF: Open field)

Major Marketing Strategy	No	Sub Marketing Strategy	Level of agreement	
			PT	OF
1. Crops Selection (what crops)	1.1	I only cultivate crops that fetch high market prices in a given season.		
	1.2	I cultivate high-value crops that fetch high market prices .		
	1.3	I always try to produce crops not grown by most farmers in the area to sell them at a higher market price .		
	1.4	I select and cultivate crops based on market demand and consumer preferences instead of relying on my skills and knowledge.		
	1.5	When deciding which crops to grow, I prioritize market trends and consumer preferences over pre-arranged buyback agreements.		
	1.6	I focus on cultivating crops distinct from traditional open-field varieties to meet market demand better and gain a competitive advantage .		
	1.7	I select specific crop varieties that align with market demand while also considering the efficient and effective allocation of time and labor among other activities.		
2. Timing of planting	2.1	I adjust the planting time of crops to ensure they are ready for harvest during periods of high market demand, allowing me to sell them at higher prices.		
	2.2	I adjust the planting time of crops to balance market demand with the need to minimize		

		costs caused by unfavorable weather conditions.		
	2.3	I adjust the planting time to align with market demand while also avoiding periods of peak demand for inputs.		
3. Method of production	3.1	I focus on reducing production costs by collaborating with fellow farmers for labor to gain higher profit.		
	3.2	I collaborate with fellow farmers to share inputs, aiming to reduce production costs while ensuring my crops meet market demand.		
	3.3	I utilize farm machinery to reduce labor costs while ensuring efficient production to meet market demand.		
	3.4	I adopt new technologies to reduce production costs while enhancing the quality and appeal of produce to meet higher market demand.		
4. Time of selling	4.1	I store my harvest to sell at a time when market prices are favorable , ensuring better returns.		
	4.2	I adjust the planting time of crops to harvest earlier than other farmers, allowing me to sell at higher prices.		
5. Quantity of produce	5.1	I determine the amount of crops to cultivate based on market demand instead of relying on available resources.		
	5.2	I expand cultivation to maximize the use of existing unused resources while considering market demand.		
	5.3	I decide the extent of crops/quantity to cultivate crops based on market demand.		
6. Form of selling	6.1	I add value to my products to meet the diverse needs of different customer and buyer groups.		
7. Quality of produce	7.1	I sort and grade my produce into different quality categories to cater to buyers at varying prices.		
8. Method of selling	8.1	I use my outlet to directly sell my produce to final consumers.		
	8.2	I sell my products through farmer organization markets to ensure higher prices through collective bargaining and market support.		
	8.3	I get together with a group of farmers to bargain for higher prices from our buyers.		
	8.4	I get together with a group of farmers and transport the products together to reduce		

		transport costs while maintaining quality for market demand.		
	8.5	I utilize multiple marketing channels/options to diversify risk while ensuring steady market access .		
	8.6	I gain higher prices by taking advantage of specific geographical market windows.		

Thank you very much. I highly appreciate your cooperation in completing this questionnaire.