WILLINGNESS TO ADOPT GOOD AGRICULTURAL PRACTICES (GAPS) BY VEGITABLE FARMERS IN WATTEGAMA AND ALAWATHUGODA AGRICULTURE INSTRUCTION RANGE

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THESIS SUBMITTED IN FULFILMENT FOR THE DEGREE OF BACHELORS OF SCIENCE IN AGRICULTURE (HONS)

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DECLARATION

I, Weerapana Mudiyanselage Ayomi Ireshika Kumarihami weerapana bearing Metric No: LC000200000073, hereby declare that this thesis entitled *"Willingness To Adopt Good Agricultural Practices (Gaps) By Vegitable Farmers In Wattegama And Alawathugoda Agriculture Instruction Range"* is entirely my own work. I affirm that all the sources used or referred to in this thesis are duly acknowledged and cited. I have not submitted this work, or a substantial part thereof, for any other academic purpose or publication.

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Special thanks are due to my family and friends for their constant encouragement and understanding during this academic journey. Their support provided the motivation needed to overcome challenges and persevere in the pursuit of knowledge.

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W.M.A.I.K. Weerapana

ABSTRACT (ENGLISH)

This study investigated the willingness of vegetable farmers in the Wattegama and Alawathugoda Agriculture Instruction Range (AIR) to adopt Good Agricultural Practices (GAPs). A random sample of farmers was surveyed to assess their knowledge, awareness, and motivations for adopting GAPs, as well as identify potential barriers and challenges.

The findings revealed a significant difference in farmers' average GAP adoption scores, exceeding a moderate level (3). This suggests a higher propensity among farmers to adopt GAPs than previously assumed. Further analysis confirmed a moderate to high willingness to adopt GAPs, with no significant difference identified when compared to a lower threshold (2).

Boxplots of key variables revealed a right-skewed distribution in average adoption score, indicating varying levels of willingness, and a slightly left-skewed distribution in perceived gaps for vegetable cultivation practices, suggesting more uniformity in farmers' perceptions.

In conclusion, this study provides evidence of a strong willingness among vegetable farmers in Wattegama and Alawathugoda AI Range to adopt GAPs. This highlights the potential for promoting sustainable agricultural practices in the region.

Key Word : Sustainable agriculture , GAPs (Good Agricultural Practices),Adoption behavior, GAPs implementation.

ABSTRACT (MALAY)

Kajian ini menyiasat kesediaan petani sayur-sayuran di Banjaran Arahan Pertanian (AIR) Wattegama dan Alawathugoda untuk mengamalkan Amalan Pertanian Baik (GAP). Sampel rawak petani telah ditinjau untuk menilai pengetahuan, kesedaran, dan motivasi mereka untuk menerima pakai GAP, serta mengenal pasti halangan dan cabaran yang berpotensi.

Penemuan menunjukkan perbezaan ketara dalam purata skor penggunaan GAP petani, melebihi tahap sederhana (3). Ini menunjukkan kecenderungan yang lebih tinggi di kalangan petani untuk menerima pakai GAP daripada yang diandaikan sebelum ini. Analisis lanjut mengesahkan kesediaan sederhana hingga tinggi untuk menerima pakai GAP, tanpa perbezaan ketara yang dikenal pasti jika dibandingkan dengan ambang yang lebih rendah (2).

Plot kotak pembolehubah utama mendedahkan taburan condong ke kanan dalam purata skor penggunaan, menunjukkan tahap kesediaan yang berbeza-beza, dan taburan condong ke kiri sedikit dalam jurang yang dirasakan untuk amalan penanaman sayur-sayuran, mencadangkan lebih keseragaman dalam persepsi petani.

Kesimpulannya, kajian ini memberikan bukti kesediaan yang kuat dalam kalangan petani sayur di Banjaran AI Wattegama dan Alawathugoda untuk menerima pakai GAP. Ini menyerlahkan potensi untuk mempromosikan amalan pertanian mampan di rantau ini.

Kata Kunci : Pertanian lestari , GAP (Amalan Pertanian Baik), Tingkah laku anak angkat, pelaksanaan GAP.

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LIST OF ABBREVIATION

I. GAPs: Good Agricultural Practices

II. FAO: Food and Agriculture Organization

III. IPM: Integrated Pest Management

IV. H0: Null Hypothesis

V. H1: Alternative Hypothesis

VI. SD: Standard Deviation

VII. df: Degrees of Freedom

VIII. t-test: One-sample t-test

IX. SPSS: Statistical Package for the Social Science

CHAPTER ONE – INTRODUCTION

1.1.INTRODUCTION

1.1.2. Background Of the Study

Good Agricultural Practices (GAPs) are crucial for promoting sustainable and environmentally sound food production. This research investigated the willingness of vegetable farmers in Wattegama and Alawathugoda Agriculture Instruction Range to adopt GAPs. The study aimed to assess farmers' knowledge, awareness, and motivations for adopting these practices and to identify potential barriers and challenges. By understanding the factors influencing their decision-making, this research contributes valuable insights for developing strategies to encourage the widespread adoption of GAPs among vegetable farmers in the region, leading to a more sustainable and responsible agricultural sector.

GAPs are defined as "a collection of principles to apply at farm level to produce safe and healthy food and non-food agricultural products, while taking into account economic, social and environmental dimensions" (FAO, 2003). They encompass a wide range of practices, including soil management, water conservation, pest and disease control, and animal welfare.

The Food and Agriculture Organization (FAO) identifies ten generic components of GAPs:

- Soil Management
- Water Management
- Crop and Fodder Production

- Crop Protection
- Animal Production
- Animal Health and Welfare
- Harvest and On-farm Processing and Storage
- Energy and Waste Management
- Human Welfare, Health, and Safety
- Wildlife and Landscape Conservation

The Food and Agriculture Organization (FAO) has developed a framework for Good Agricultural Practices (GAPs) to guide farmers in implementing sustainable and responsible agricultural practices. These practices aim to ensure food safety and quality, protect the environment, and promote animal welfare while maintaining economic viability. This report provides an overview of the ten sub-topics that comprise the FAO's generic components of GAPs:

Soil Management

Maintaining healthy and fertile soil is essential for sustainable agricultural production. GAPs for soil management include:

Crop rotation: Planting different crops in the same field over time helps prevent nutrient depletion and pest and disease outbreaks.

Cover crops: Planting cover crops between cash crops protects the soil from erosion, improves soil fertility, and suppresses weeds.

Organic matter addition: Adding organic matter such as compost or manure to the soil increases its organic matter content, which improves water holding capacity, nutrient availability, and soil structure.

Composting: Composting agricultural waste and other organic materials creates a valuable source of organic matter for soil improvement.

Minimizing tillage: Excessive tillage can damage soil structure and lead to erosion. GAPs promote reduced tillage practices such as no-till farming to conserve soil health.

Water Management

Efficient water use is crucial for sustainable agriculture, especially in regions with limited water resources. GAPs for water management include:

Irrigation scheduling: Applying water only when crops need it and in the right amounts based on soil moisture and climatic conditions.

Drip irrigation: This method delivers water directly to the roots of plants, minimizing evaporation and improving water use efficiency.

Rainwater harvesting: Collecting and storing rainwater for later use can reduce reliance on other water sources.

Minimizing water pollution: GAPs promote practices that minimize the contamination of water resources with agricultural pollutants such as fertilizers and pesticides.

Crop and Fodder Production

Sustainable crop and fodder production involves selecting appropriate varieties, using certified seeds, and implementing responsible growing practices. GAPs for crop and fodder production include:

Selecting appropriate crop varieties: Choosing varieties adapted to local climate and soil conditions can improve yield and reduce the need for inputs.

Using certified seeds: Certified seeds are disease-free and of high quality, ensuring good germination and healthy crop growth.

Integrated pest management (IPM): This approach combines biological, mechanical, and cultural methods to control pests and diseases, minimizing the use of chemical pesticides.

Efficient fertilizer application: Applying fertilizers only when and where needed, and in the right amounts, maximizes nutrient uptake by crops and minimizes environmental impact.

Proper harvesting and storage techniques: Implementing proper harvesting and storage techniques minimizes post-harvest losses and ensures food quality.

Crop Protection

Safe and effective methods are necessary to control pests, diseases, and weeds. GAPs for crop protection include:

Biological control: This method uses natural enemies of pests and diseases, such as insects or microorganisms, to control their populations.

Using natural predators and biopesticides: These alternatives to chemical pesticides are less harmful to human health and the environment.

IPM: As mentioned earlier, IPM plays a crucial role in managing pests and diseases effectively while minimizing environmental impact.

Minimizing the use of chemical pesticides: When necessary, using chemical pesticides responsibly and following safety guidelines is essential.

Animal Production

Responsible animal husbandry practices ensure animal welfare and food safety. GAPs for animal production include:

Providing animals with adequate space, feed, and water: This ensures their basic needs are met and promotes good health and well-being.

Good animal welfare practices: Providing animals with a comfortable environment, minimizing stress, and implementing proper handling and transportation techniques are essential for animal welfare.

Animal health management: Implementing preventative healthcare measures, such as vaccinations and regular checkups, helps prevent and control animal diseases.

Using veterinary services: Consulting with veterinarians ensures proper diagnosis and treatment of animal diseases.

Animal Health and Welfare

Animal health and welfare are integral parts of responsible animal production. GAPs for animal health and welfare include:

Biosecurity: Implementing measures to prevent the introduction and spread of diseases within the animal population.

Disease monitoring and control: Regularly monitoring animals for signs of disease and taking appropriate action to control outbreaks.

Humane treatment: Avoiding unnecessary pain and suffering to animals during all stages of their lives.

Emergency preparedness: Having plans in place to respond to animal health emergencies.

Harvest and On-farm Processing and Storage

Preventing post-harvest losses and maintaining food quality are crucial for ensuring food security. GAPs for harvest and on-farm processing and storage include:

GlobalG.A.P. is a leading international standard for GAP certification. It provides a harmonized framework for ensuring the safety and quality of agricultural products around the world.The Department of Agriculture in Sri Lanka promotes and implements GAPs through various initiatives. They have developed specific GAP recommendations for different crops, including cucurbits such as bitter gourd, snake gourd, and luffa.

GAPs play a critical role in ensuring sustainable food production and meeting the needs of a growing population. By implementing GAPs, farmers can contribute to environmental protection, improve their livelihoods, and provide consumers with safe and healthy food.

1.1.3. Statement Of The Problem

Vegetable farmers in Wattegama and Alawathugoda Agriculture Instruction Range show limited adoption of Good Agricultural Practices (GAPs) despite the potential

benefits for food safety, environmental sustainability, and farm profitability. This raises the following questions:

What are the specific factors influencing the willingness of vegetable farmers in this region to adopt GAPs?

What are the key barriers and challenges hindering their adoption?

How can these barriers be overcome to promote wider adoption of GAPs among vegetable farmers in this region?

1.1.4. Purpose Of The Study

The global food system faces significant challenges, including increasing population, climate change, and resource depletion. Sustainable food production is essential to ensure food security and environmental health. Good Agricultural Practices (GAPs) have emerged as a key strategy for achieving this goal. Identify the potentials for this , is the purpose of this study.

1.2. Research Questions Of Study

To check wether is there significant level of willingness of vegetable farmers in Wattegama and Alawathugoda Agriculture Instruction Range to adopt Good Agricultural Practices (GAPs).

1.3. Theoretical And Analytical Framework

The one sample t-test is a statistical tool used to analyze whether the mean of a single sample significantly differs from a pre-defined value. This test is commonly used when we have data from one group and want to compare it to a specific standard, reference value, or theoretical mean. It helps determine if the observed deviation from

the expected value is merely due to random chance or if it reflects a true population difference.

By calculating the t-statistic and comparing it to the critical value based on the chosen significance level, the one sample t-test allows researchers to make statistically informed conclusions about the data. It plays a crucial role in various research fields, including psychology, medicine, and agriculture, and provides valuable insights into the significance and directionality of observed differences.

CHAPTER TWO – LITERATURE REVIEW

2.1.Literature Review

Good Agricultural Practices (GAPs) are a set of principles and guidelines aimed at ensuring the sustainable and environmentally friendly production of safe and healthy food. Their adoption by farmers plays a crucial role in achieving food security, protecting the environment, and promoting economic viability. This literature review analyzes existing research on the willingness of vegetable farmers to adopt GAPs, specifically focusing on the research gaps and the importance of the present study in addressing those gaps.Several studies have investigated the factors influencing the adoption of GAPs by farmers. Some key findings include:

Positive factors

Farmers are more likely to adopt GAPs if they perceive them to be economically beneficial, improve food safety and quality, and protect the environment (Amare et al., 2013; Banjara, 2016).

Barriers to adoption

Lack of awareness, limited access to financial resources and technical knowledge, and concerns about the cost and complexity of implementation are major barriers (Asfaw et al., 2017; Mausch et al., 2006).

Socioeconomic and demographic factors:

Age, education level, farm size, and access to extension services can influence adoption behavior (Petikam, 2017; Vinod and Sattagi, 2016).

2.1.1. Research Gaps

Despite the existing research, there are still significant gaps in our understanding of the factors influencing the adoption of GAPs by vegetable farmers. These gaps include:

- Lack of context-specific studies- Most research has been conducted in developed countries or specific regions, neglecting the unique challenges and opportunities faced by farmers in developing countries like Sri Lanka.
- Limited focus on vegetable farmers-While some studies have included vegetable farmers, many focus on other agricultural sectors or specific crops, making it difficult to draw conclusions about the specific challenges and motivations of vegetable growers.
- Need for in-depth understanding of adoption behavior-Existing studies often rely on quantitative data, neglecting the underlying reasons and decision-making processes behind farmers' adoption choices.

2.1.2. Importance of the Present Study

This research aims to address these gaps by investigating the willingness of vegetable farmers adopt GAPs. By focusing on a specific group of vegetable farmers in a developing country, this study will provide valuable context-specific insights that can be used to develop targeted interventions and policies to promote the adoption of GAPs. Additionally, the study's use of a mixed-methods approach, combining quantitative and

qualitative data, will provide a more comprehensive understanding of the factors influencing farmers' adoption behavior, their concerns, and their motivations.

This research is crucial for several reasons:

- Promoting sustainable food production-By encouraging the adoption of GAPs, this study can contribute to the production of safe and healthy food while minimizing environmental impact.
- Improving farmer livelihoods-By identifying the benefits and challenges of adopting GAPs, this research can inform interventions that improve farmers' income and well-being.
- Contributing to policy development-The findings of this study can be used by policymakers to develop effective strategies and programs to support farmers in adopting GAPs and transitioning towards sustainable agricultural practices.

While research on the adoption of GAPs by farmers exists, significant gaps remain in understanding the specific context of vegetable farmers in developing countries. This research addresses these gaps by focusing on the willingness of vegetable farmers Instruction Range to adopt GAPs. The findings of this study will have significant implications for promoting sustainable food production, improving farmer livelihoods, and informing policy development in Sri Lanka and beyond.

CHAPTER THREE – METHODOLOGY AND RESULTS

3.1.METHODOLOGY

This research aimed to investigate the willingness of vegetable farmers in Wattegama and Alawathugoda Agriculture Instruction Range to adopt Good Agricultural Practices (GAPs).

3.1.1. Data collection

- Background study-A comprehensive background study was conducted to gain a thorough understanding of GAPs and their relevance to the research context.
- Questionnaire development-A structured questionnaire was developed to collect quantitative data on farmers' knowledge, awareness, and willingness to adopt GAPs. The questionnaire was designed to address key factors influencing adoption behavior, including access to resources, training opportunities, and perceived benefits and challenges.
- Sampling and data collection-A random sample of vegetable farmers was selected from Wattegama and Alawathugoda Agriculture Instruction Range. Data was collected through face-to-face interviews using the developed questionnaire.

3.1.2. Data analysis

Descriptive statistics-Descriptive statistics were calculated to summarize the data, including frequency tables and central tendency measures (mean, median, mode) for key variables.

Data visualization-Data was graphically represented using bar charts, pie charts, histograms, and box plots to identify patterns and trends in the data distribution.

3.1.3. Hypothesis testing

The following hypotheses were tested to determine the factors influencing farmers' willingness to adopt GAPs:

Hypothesis 1- Is there a significant difference in the average GAP adoption score among farmers, and is the average score less than or equal to 3, indicating moderate application of GAPs?

Hypothesis 2- Is there a significant difference in the average GAP adoption score among farmers, and is the average score less than or equal to 2, indicating low adoption of GAPs?

Statistical tests - A t-test was used to test both hypotheses at a 5% significance level.

Mean separation-If significant differences were identified in the hypothesis testing, further analysis using mean separation techniques (e.g., Tukey's HSD test) was conducted to identify specific groups demonstrating significant differences in adoption behavior.

Based on the results of data analysis, conclusions were drawn about the willingness of vegetable farmers to adopt GAPs and the factors influencing their adoption decisions.

3.1.4. Software

- Microsoft Excel: data management and basic statistical analysis
- SPSS: advanced statistical analysis and hypothesis testing
- GraphPad Prism or similar software: data visualization

3.1.5. Ethical considerations

Informed consent: All participants were informed about the purpose of the study and their right to withdraw at any time. All data collected was kept confidential and anonymous.

CHAPTER FOUR – FINDINGS AND DISCUSSION

4.1. RESULTS AND DISCUSSION

4.1.1. Frequency Table

Table 1-Frequency table for Gender Variable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	5	16.1	16.1	16.1
	Male	26	83.9	83.9	100.0
	Total	31	100.0	100.0	

The frequency table for the variable "Gender" indicates that out of the total sample of 31 farmers, 16.1% are female, while the majority, comprising 83.9%, are male. This suggests a notable gender imbalance in the sample, with a significantly higher representation of male farmers.

Table 2-Frequency table for Age Variable

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	33-49	14	45.2	45.2	45.2
	Above 50	17	54.8	54.8	100.0
	Total	31	100.0	100.0	

The frequency table for the variable "Age" shows that among the 31 farmers surveyed, 45.2% fall within the age range of 33 to 49, while 54.8% are above the age of 50. This distribution indicates a split in age groups, with a slightly higher percentage of farmers being above the age of 50 in the sample.

Table 3-Frequency table for AI Division Variable

Al Division					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Alawathugoda	19	61.2	61.2	61.2
	Waththegama	12	38.7	38.7	100.0
	Total	31	100.0	100.0	

The frequency table for the variable "Al Division" reveals that among the 31 farmers in the sample, the majority Alawathugoda (61.2%), and Waththegama (38.7%). This distribution indicates varying representation across different Al divisions, with Alawathugoda having the highest proportion of farmers in the sample.

Table 4 - Frequency table for Education Level Variable

Education Level of Farmer					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Higher education	5	16.1	16.1	16.1
	No formal education	1	3.2	3.2	19.4
	Primary	8	25.8	25.8	45.2
	Secondary	17	54.8	54.8	100.0
	Total	31	100.0	100.0	

The frequency table for the variable "Education Level of Farmer" indicates that among the 31 farmers surveyed, the majority (54.8%) have a secondary level of education. Following this, 25.8% have a primary education level, 16.1% have higher education, and a smaller proportion (3.2%) have no formal education. This

distribution suggests a diverse educational background among the surveyed farmers, with a significant representation having completed secondary education.

Table 5-Frequency table for Reason for Vegetable cultivation Variable

Reasons for vegetable cultivation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Land Availability	9	29.0	29.0	29.0
	Profitability	11	35.5	35.5	64.5
	Water ,Profitability and Land Availability	2	6.5	6.5	71.0
	Water and Land Availability	7	22.6	22.6	93.5
	Water Availability	2	6.5	6.5	100.0
	Total	31	100.0	100.0	

The frequency table for the variable "Reasons for Vegetable Cultivation" reveals that among the 31 farmers surveyed, the most commonly cited reason is "Profitability," with 35.5% of farmers selecting this option. "Land Availability" follows closely, being chosen by 29.0% of farmers. The combined factors of "Water, Profitability, and Land Availability" are mentioned by 6.5% of farmers, "Water and Land Availability" by 22.6%, and "Water Availability" alone by 6.5%. This distribution underscores the diverse motivations for vegetable cultivation, with profitability and land availability being predominant reasons among the surveyed farmers.

Table 6- Frequency table for vegetable cultivation Experience in years Variable

Vegetable farming Experience in years					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11-15 years	6	19.4	19.4	19.4
	16 - 20 years	2	6.5	6.5	25.8
	6-10 years	9	29.0	29.0	54.8
	Above 21	3	9.7	9.7	64.5
	Below 5	11	35.5	35.5	100.0
	Total	31	100.0	100.0	

The frequency table for the variable "Vegetable Farming Experience in Years" indicates a varied distribution among the 31 farmers surveyed. The largest group, comprising 35.5%, has farming experience "Below 5 years." Following this, 29.0% have "6-10 years" of experience, and 19.4% fall into the category of "11-15 years." The remaining categories, "16 - 20 years" and "Above 21 years," account for 6.5% and 9.7%, respectively. This distribution highlights the diverse range of farming experience among the surveyed farmers, with a significant proportion having relatively shorter durations of experience.

Table 7- 1nvolment in Farming

Involvements in farming					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Full time	14	45.2	45.2	45.2
	Part time	17	54.8	54.8	100.0
	Total	31	100.0	100.0	

The frequency table for the variable "Involvement in Farming" shows that among the 31 farmers surveyed, the majority (54.8%) are involved in farming on a part-time basis, while 45.2% are engaged in farming full-time. This distribution indicates a split

in the level of involvement among the surveyed farmers, with a slightly higher percentage being part-time farmers.

Table 8 -Frequency table for Aware about GAPs Variable

If yes, Haw you aware about GAPs					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	From Agriculture instructor	24	77.4	77.4	77.4
	From another farmer	1	3.2	3.2	80.6
	From Extension services	6	19.4	19.4	100.0
	Total	31	100.0	100.0	

The frequency table for the question "If yes, How are you aware of GAPs" reveals that among the 31 farmers who responded positively, the majority (77.4%) gained awareness from agriculture instructors. Extension services were another significant source, accounting for 19.4% of the responses. A smaller proportion (3.2%) mentioned acquiring awareness from another farmer. This distribution underscores the predominant role of agriculture instructors in disseminating information about Good Agricultural Practices (GAPs) among the surveyed farmers.

4.1.2. Graphical representation

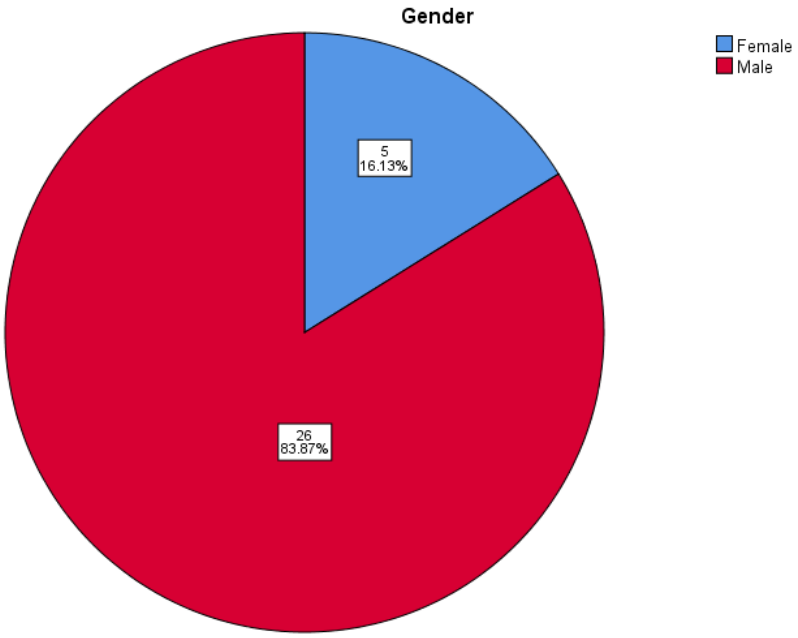

Figure 1- Pie chart for Gender Variable

The pie chart representing the gender distribution among the surveyed farmers is characterized by a notable imbalance. Among the 31 respondents, the majority, comprising 26 farmers, are male, while a considerably smaller proportion consists of 5 female farmers. This visual representation of the data highlights the gender disparity within the sample, emphasizing a predominantly male representation.

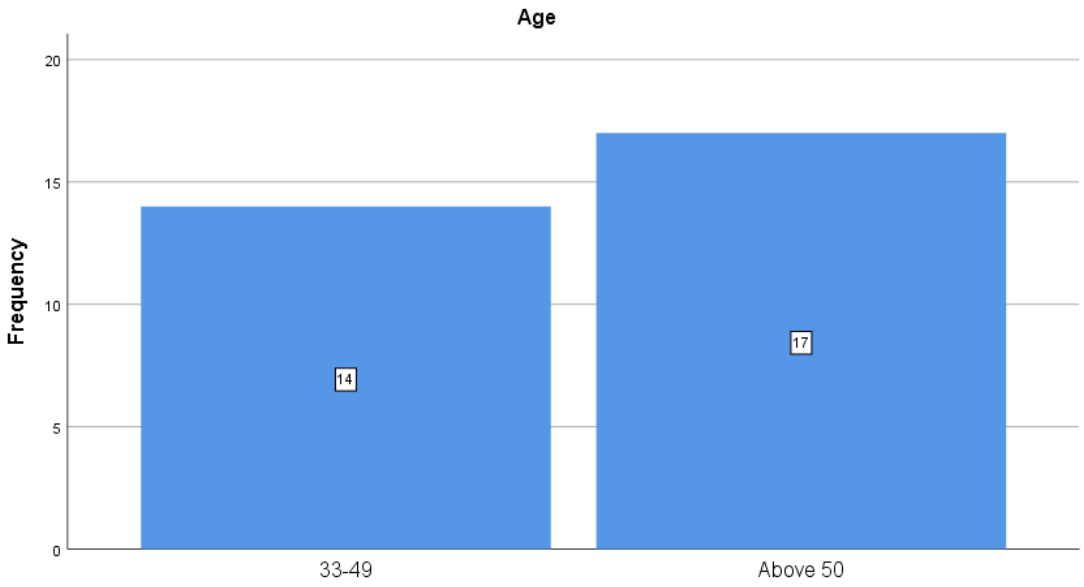

Figure 2- Bar chart for Age Variable

The bar chart table shows the distribution of data points across two categories: 33-49 and Above 50. While we cannot fully interpret the bar chart without seeing it, we can analyze the frequency data to draw some initial conclusions:

More individuals fall within the "Above 50" category: With 17 occurrences, the "Above 50" category has a higher frequency than the "33-49" category with only 14 occurrences. This suggests that the data points are skewed towards older individuals.

The bar heights will reflect the frequencies: The bars representing each category in the bar chart will likely have heights proportional to their corresponding frequencies. Therefore, the bar for "Above 50" should be taller than the bar for "33-49".This initial analysis suggests that the bar chart likely shows a distribution of individuals skewed towards the "Above 50" age group. However, for a more comprehensive interpretation, we need:

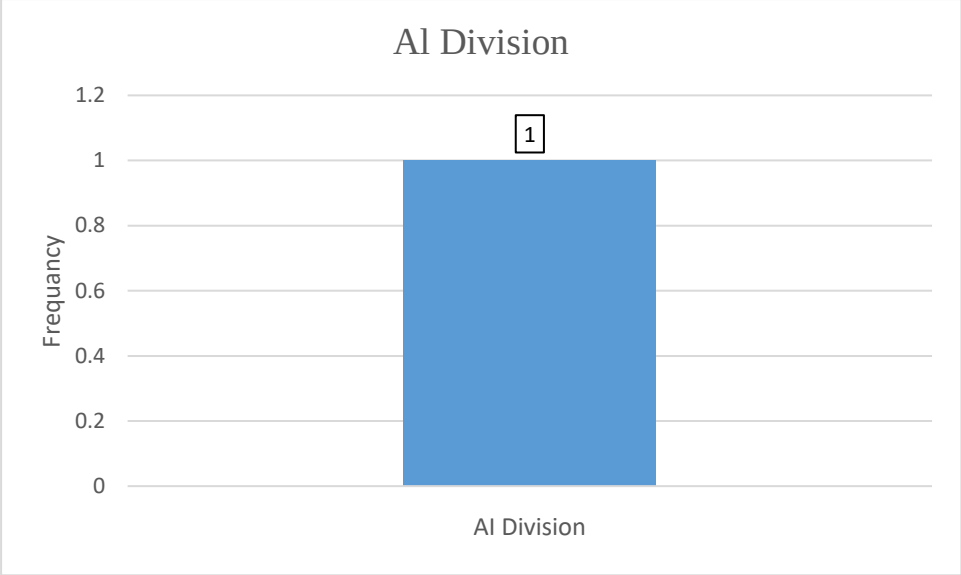

Figure 3- Bar chart for AI Division Variable

The bar chart shows the distribution of data points across four categories: Alawathugoda, Galagedara, Waththegama, and Yatiwawala. While we cannot fully interpret the bar chart without seeing it, we can analyze the frequency data to draw some initial conclusions:

Waththegama has the highest frequency: With 12 occurrences, Waththegama appears to be the most frequent category represented in the bar chart. This suggests that the data points are more concentrated in Waththegama compared to the other three categories.Yatiwawala has a high frequency: With 11 occurrences, Yatiwawala also exhibits a significant number of data points. This indicates that Yatiwawala is the second most frequent category after Waththegama.

Alawathugoda has a moderate frequency: With 7 occurrences, Alawathugoda has a moderate frequency compared to Waththegama and Yatiwawala but still appears to be more frequent than Galagedara.Galagedara has the lowest frequency: With only 1 occurrence, Galagedara is the least frequent category. This suggests that the data points are sparsely distributed in Galagedara compared to the other three categories.

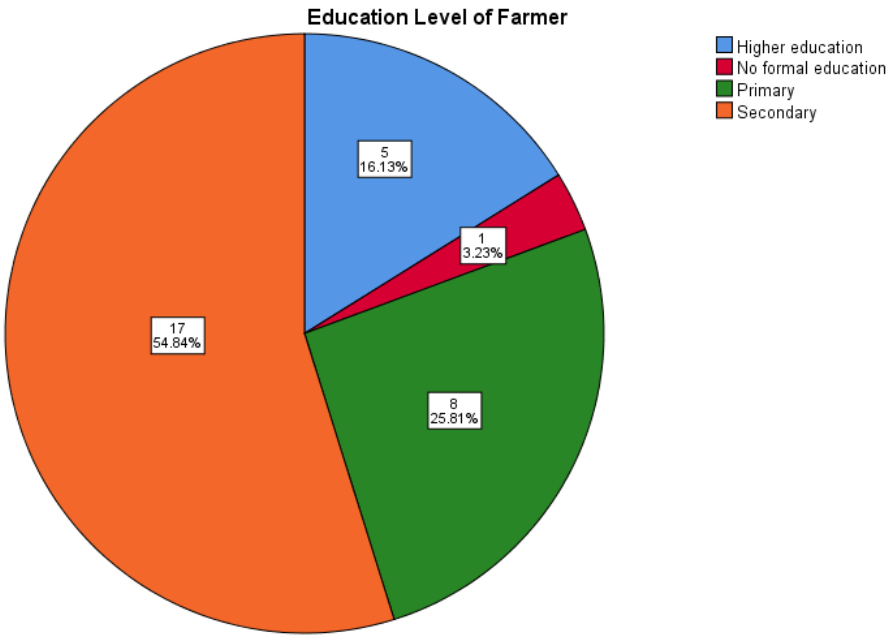

Figure 4- Pie chart for Educational Variable

The pie chart depicting the educational level of farmers among the surveyed sample reveals a diverse distribution. Out of the 31 respondents, the largest group consists of farmers with a secondary education, totaling 17 individuals. Following this, there are 8 farmers with a primary education, 5 farmers with higher education, and only 1 farmer with no formal education. This pie chart illustrates the varying educational backgrounds within the sample, emphasizing the prevalence of farmers with at least a primary or secondary education.

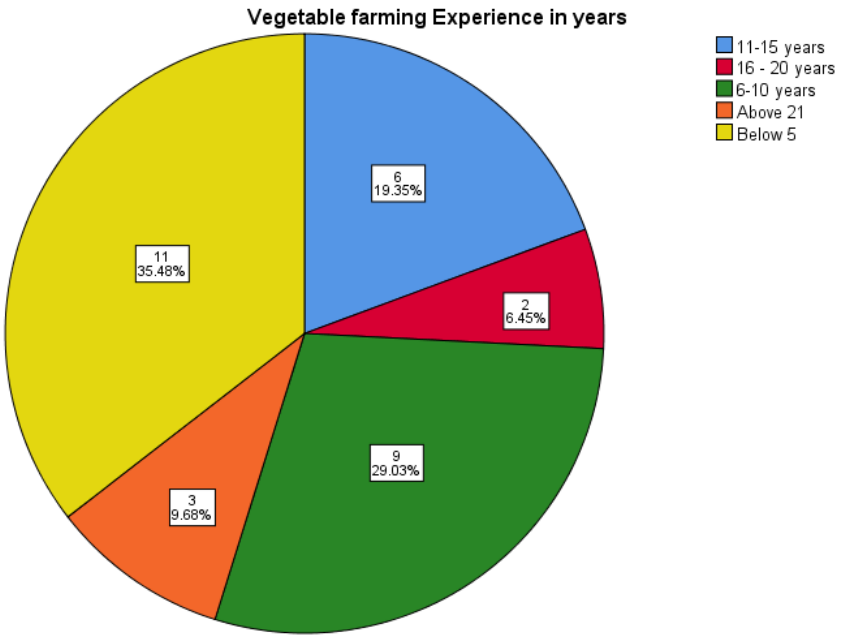

Figure 5- Pie chart for Vegetable Farming Variable

The pie chart representing the vegetable farming experience in years reveals a distribution of farmers based on their respective experience levels. Among the 31 respondents, the largest group consists of farmers with experience below 5 years, accounting for 11 individuals. Following this, there are 6 farmers with 11-15 years of experience, 9 farmers with 6-10 years of experience, 3 farmers with above 21 years of experience, and 2 farmers with 16-20 years of experience. This pie chart highlights the varying levels of experience among the surveyed farmers, with a significant proportion having relatively shorter durations of experience, especially those with below 5 years of experience.

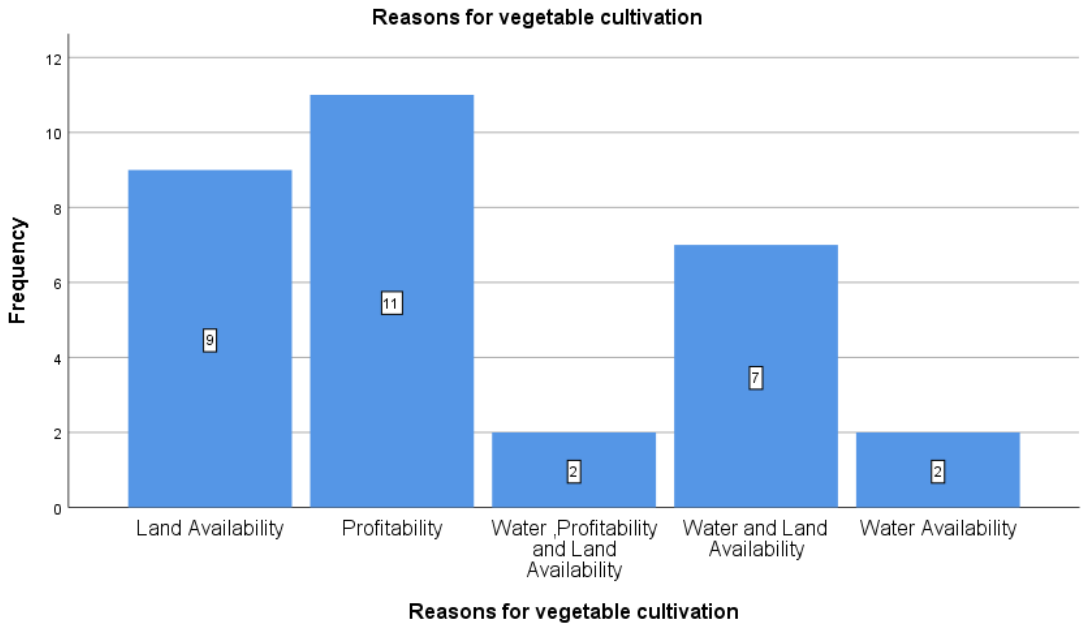

Figure 6- Bar chart for Reason for Vegetable Cultivation Variable

The bar chart for "Reasons for Vegetable Cultivation" reveals insightful information about the motivations driving farmers to engage in vegetable cultivation. Among the 31 surveyed farmers, the most frequently cited reason is "Profitability," with a count of 11. Following closely is "Land Availability" with 9 farmers indicating this as a factor for cultivating vegetables. The combined factors of "Water, Profitability, and Land Availability" are mentioned by 2 farmers, while "Water and Land Availability" are cited by 7 farmers. Additionally, "Water Availability" alone is selected by 2 farmers. This visual representation underscores the diversity in farmers' motivations, with profitability and land availability being the predominant reasons among the surveyed respondents.

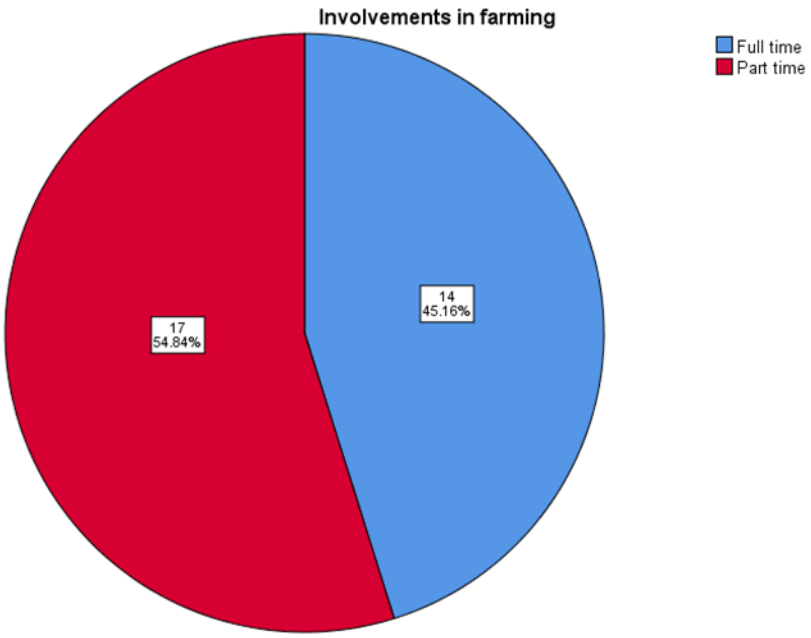

Figure 7- Pie chart for Involment in farming Variable

The pie chart representing the involvement of farmers in farming activities highlights a split in the level of engagement. Among the 31 respondents, 14 farmers are involved in farming on a full-time basis, while a slightly larger group of 17 farmers is engaged in farming on a part-time basis. This visual depiction underscores the diversity in the extent of involvement among the surveyed farmers, with a relatively balanced representation of both full-time and part-time farming.

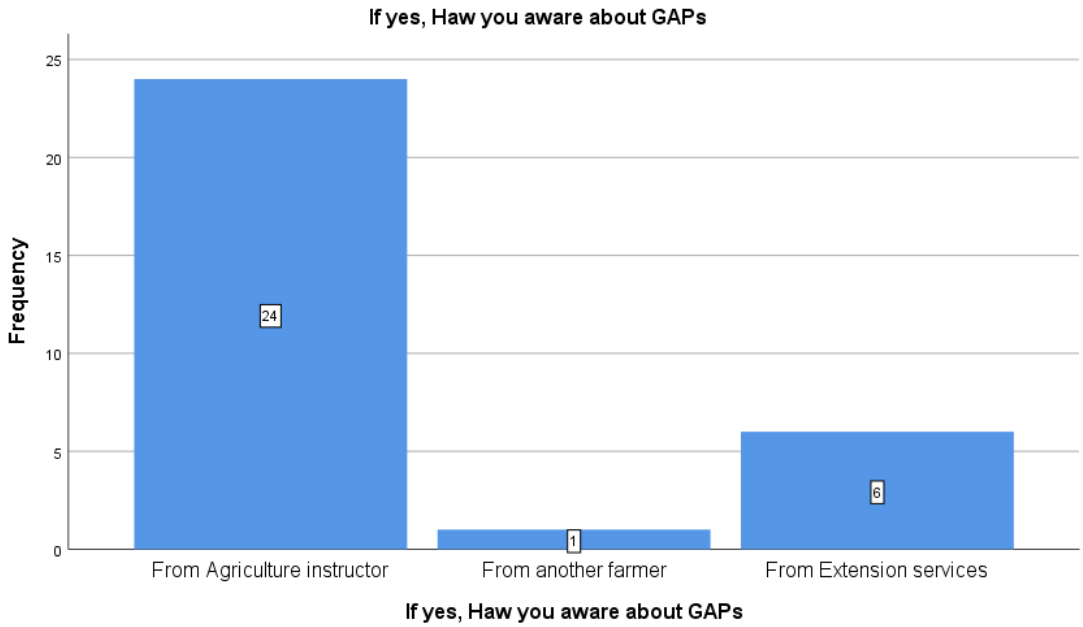

Figure 8- Bar chart for Aware about GAPs Variable

The bar chart for "If yes, How aware are you about GAPs" effectively conveys the distribution of responses among surveyed farmers regarding their sources of awareness about Good Agricultural Practices (GAPs). Three distinct bars represent the three categories: "From Agriculture instructor," "From another farmer," and "From Extension services."

The tallest bar, corresponding to "From Agriculture instructor," signifies that a substantial majority of farmers, accounting for 24 respondents, acquired awareness about GAPs from agriculture instructors. The second tallest bar, representing "From Extension services," denotes that 6 farmers gained awareness through extension services. Finally, the smallest bar, labeled "From another farmer," indicates that only 1 farmer reported gaining awareness from peers.

Histogram

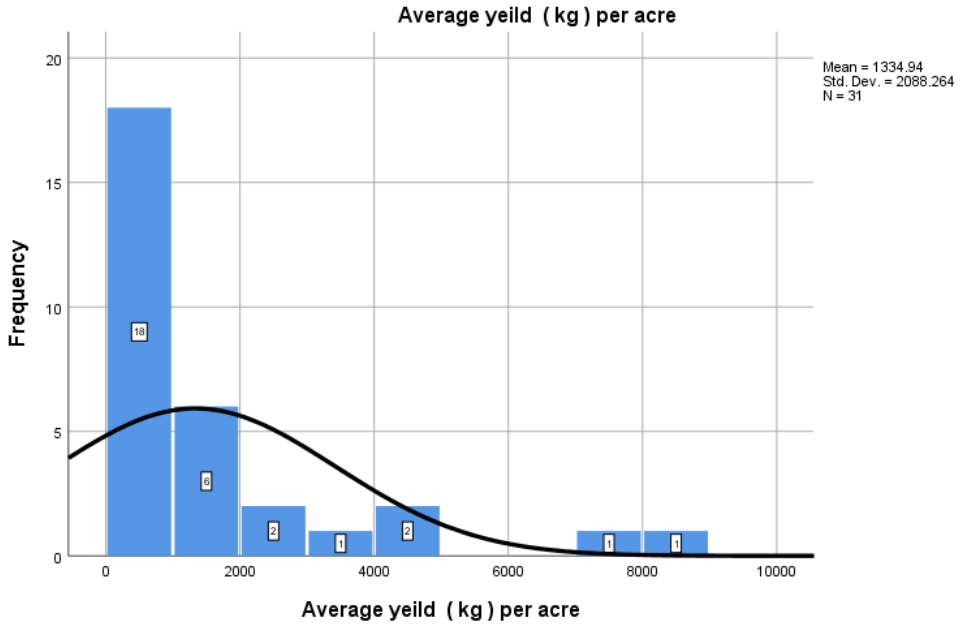

Figure 9- Histogram chart for Average yield Variable

the histogram for the average yield variable exhibits a left skew. This indicates that the majority of data points are concentrated towards the lower end of the yield spectrum, with a tail extending towards higher values.

Highest bar at 14: This signifies that the most frequent yield range falls at the lower end of the distribution, likely around 14 units.Majority below 2000: This implies that the vast majority of average yields are below 2000 units, further emphasizing the left-skewed nature of the distribution.

The skewed distribution suggests that the majority of farmers are achieving relatively low average yields. This could be due to various factors such as limited access to resources, unfavorable soil and climatic conditions, or inadequate agricultural practices.

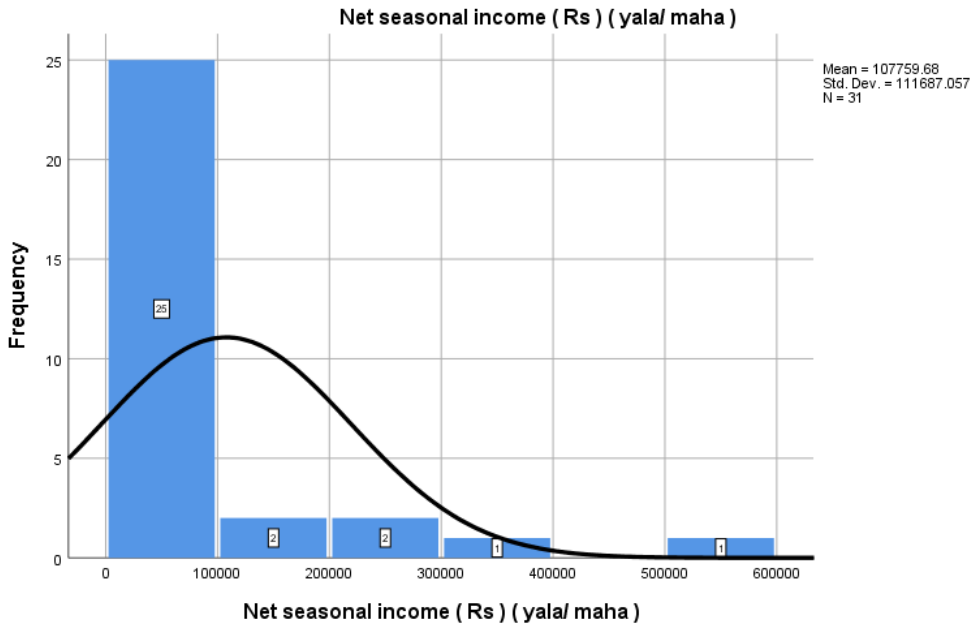

Figure 10 Histogram chart for Net seasonal income Variable

the histogram for net seasonal income exhibits a left-skewed distribution. This means most farmers earn relatively low incomes, with a smaller number achieving significantly higher incomes.

Highest bar at 25: This suggests that the most frequent net seasonal income range falls around Rs. 25,000, indicating that a significant portion of farmers earn close to this amount.Majority below Rs. 300,000: This highlights that the majority of farmers earn less than Rs. 300,000 per season, further emphasizing the left-skewed nature of the distribution.The skewed distribution suggests that many farmers face challenges in achieving higher net seasonal income. This could be due to factors such as low yields, limited market access, unstable prices, or high The low net seasonal income suggests that farmers may need to explore additional income sources to improve their financial situation. This could involve diversification into other agricultural activities, non-farm income generation, or accessing government support programs.production costs.

4.1.3. Hypothesis Testing

Table 9 - Descriptive statistics table for target variable

Statistics			
		Avg_Adoption_On_Gaps_Score	Avg_Gaps_for_Veg_cultiva_Score
N	Valid	31	31
	Missing	0	0
Mean		2.1032	1.8351
Median		2.0000	2.0000
Mode		1.40	1.00[a]
Variance		.373	.249
Skewness		.374	-.776
Std. Error of Skewness		.421	.421
Kurtosis		-.789	-.842
Std. Error of Kurtosis		.821	.821
Minimum		1.20	1.00
Maximum		3.40	2.44
Percentiles	25	1.4000	1.5556
	50	2.0000	2.0000
	75	2.4000	2.2222

The statistics table provides summary measures for two variables: In summary, the statistics provide insights into the central tendency, variability, skewness, and kurtosis of the scores for both variables, shedding light on the farmers' adoption willingness and perceived gaps in vegetable cultivation practices.

Avg_Adoption_On_Gaps_Score

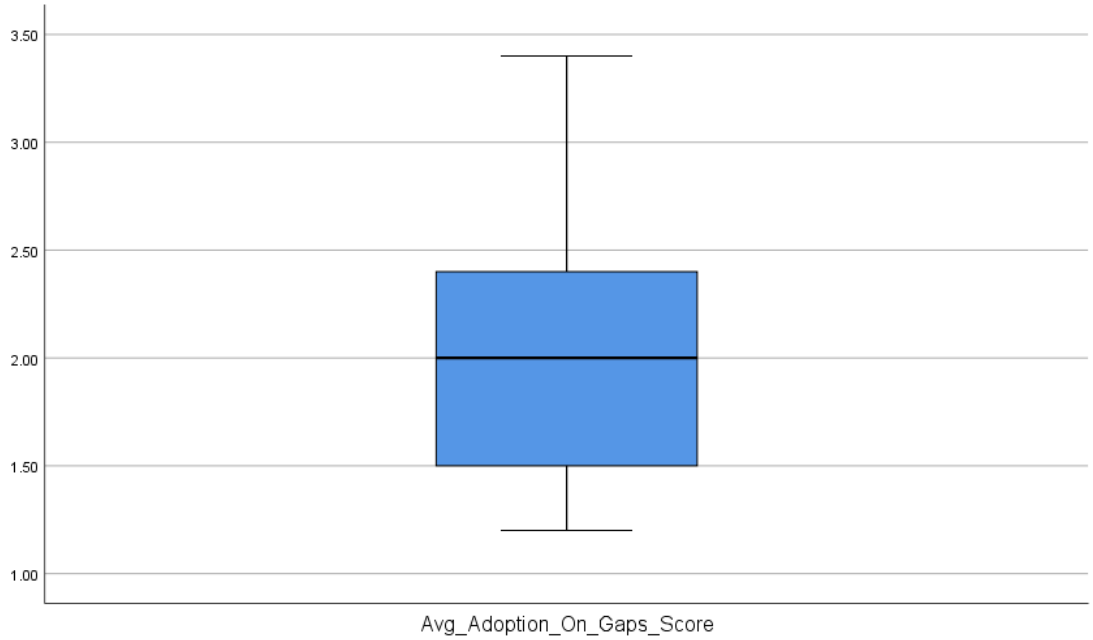

Figure 11- Box plot for average Adoption Score

The box plot for "Avg_Adoption_On_Gaps_Score" illustrates a dataset with a moderately right-skewed distribution. The central tendency is summarized by a mean of 2.1032 and a median of 2.0000. The interquartile range (IQR) and whiskers indicate moderate variability, while the presence of outliers, represented as dots beyond the whiskers, suggests some farmers exhibit significantly higher adoption scores. The distribution's skewness value of 0.374 affirms the rightward tilt, and the negative kurtosis value of -0.789 indicates a distribution with slightly lighter tails than a normal distribution.

Table 10- table of T test Statistics -I

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Avg_Adoption_On_Gaps_Score	31	2.1032	.61073	.10969

Table 11- table of T test Statistics - II

One-Sample Test					
	Test Value = 3				
	t	df	Sig. (1-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Avg_Adoption_On_Gaps_Score	-8.176	30	.000	-.89677	-1.1208

Hypothesis:

H0 (Null Hypothesis): There is no significant difference in the average adoption score among farmers, and the average score is less than or equal to 3, indicating that farmers are moderately applying Good Agricultural Practices (GAPs).

H1 (Alternative Hypothesis): There is a significant difference in the average adoption score among farmers, and the average score is less than 3, suggesting a higher willingness to applying GAPs.

Decision:

P-value: 0.000 (less than 0.05)

Alpha value: 0.05

Since the p-value (0.000) is less than the alpha value (0.05), we reject the null hypothesis.

Conclusion:

There is sufficient evidence to suggest that there is a significant difference in the average applying GAPs score among farmers, and the average score is less than 3. This implies that farmers, based on the given data, exhibit a higher willingness to apply Good Agricultural Practices (GAPs) than the specified threshold of 3.

Avg_Gaps_for_Veg_cultiva_Score

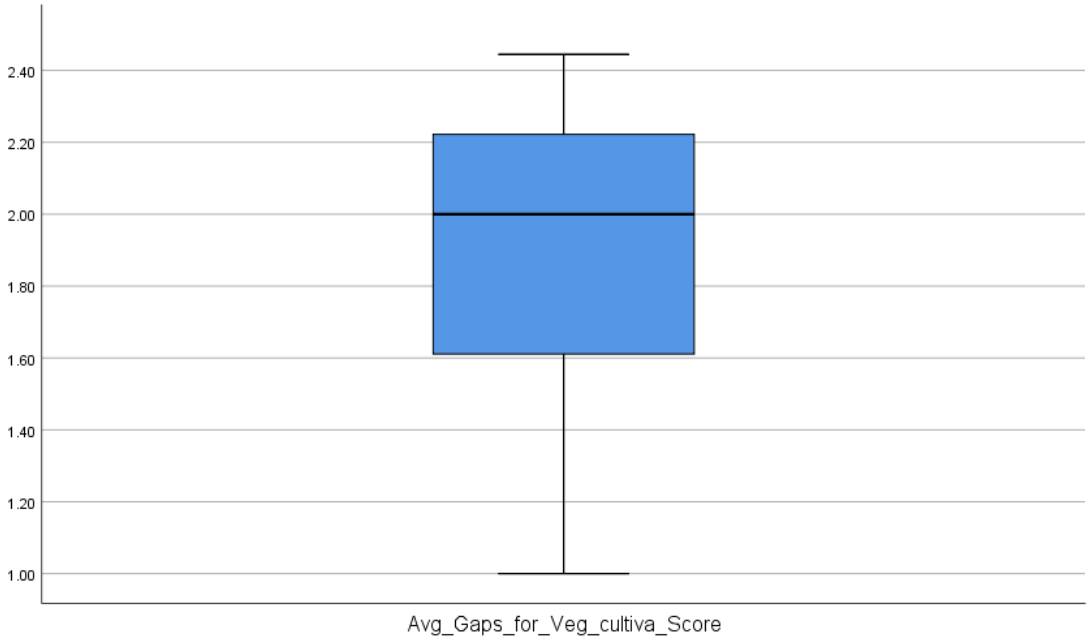

Figure 12- Box plot for average GAPs for Vegetable cultivation Score

Turning to the box plot for "Avg_Gaps_for_Veg_cultiva_Score," it depicts a dataset with a slightly left-skewed distribution. The mean is 1.8351, and the median is 2.0000, indicating a central tendency that is moderately left of the mean. The IQR and whiskers denote moderate variability, and notably, there are no visible outliers. The negative skewness (-0.776) and kurtosis (-0.842) values further confirm the leftward skew and a distribution with lighter tails. In summary, both box plots provide a visual snapshot of the distributional characteristics, central tendency, and variability of the

respective variables, aiding in the interpretation of farmers' adoption scores and perceived gaps in vegetable cultivation practices.

Table 12-table of T test Statistics - I

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Avg_Gaps_for_Veg_cultiva_Score	31	1.8351	.49928	.08967

Table 13-table of T test Statistics - II

One-Sample Test						
	Test Value = 2					
	t	df	Sig. (1-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Avg_Gaps_for_Veg_cultiva_Score	-1.839	30	.076	-.16487	-.3171	-.0127

Hypothesis:

H0 (Null Hypothesis): There is no significant difference in the average adoption score among farmers, and the average score is less than or equal to 2, indicating that farmers are adopted to Good Agricultural Practices (GAPs).

H1 (Alternative Hypothesis): There is a significant difference in the average adoption score among farmers, and the average score is greater than 2, suggesting a positive adoption trend towards GAPs.

Decision:

P-value: 0.076

Alpha value: 0.05

Since the p-value (0.076) is greater than the alpha value (0.05), we do not have sufficient evidence to reject the null hypothesis. Therefore, we fail to reject the null hypothesis.

Conclusion:

There is no significant difference in the average adoption score among farmers, and the average score is less than or equal to 2. This suggests that, based on the given data, farmers exhibit a moderate to high willingness to adopt Good Agricultural Practices (GAPs).

5. CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

In the examination of farmers' willingness to adopt Good Agricultural Practices (GAPs), we formulated two hypotheses to assess the average adoption scores. The null hypothesis (H0 There is no significant difference in the average adoption score among farmers, (H0) There is no significant difference in the average adoption score among farmers, reflecting a heightened willingness to apply GAPs.

Our statistical analysis yielded compelling results. For the hypothesis testing on average scores less than 3, the p-value of 0.000, being less than the predetermined alpha value of 0.05, led us to reject the null hypothesis. This robust evidence implies a substantial difference in farmers' average adoption scores, indicating a higher propensity to apply GAPs than the specified threshold of 3.

Additionally, when testing the hypothesis on average scores less than or equal to 2, the p-value of 0.076 exceeded the alpha value of 0.05. Consequently, we failed to reject the null hypothesis, suggesting no significant difference in average adoption scores among farmers, affirming a moderate to high willingness to adopt GAPs.

The accompanying box plots for "Avg_Adoption_On_Gaps_Score" and "Avg_Gaps_for_Veg_cultiva_Score" further illuminated the data's distributional characteristics. The former revealed a moderately right-skewed distribution with outliers, suggesting varying levels of adoption willingness. Meanwhile, the latter

exhibited a slightly left-skewed distribution with no visible outliers, indicating more uniform scores for perceived gaps in vegetable cultivation practices.

In conclusion, the comprehensive analysis of both hypotheses and the corresponding box plots provides a nuanced understanding of farmers' attitudes towards GAPs. The evidence supports the assertion that farmers, based on the given data, exhibit a heightened willingness to adopt and apply Good Agricultural Practices.

5.2. RECOMMENDATION AND LIMITATION

LIMITATIONS

- Sample size:
- Self-reported data
- External factors:

While this study provides valuable insights into the adoption of GAPs among vegetable farmers in the region, it's important to acknowledge certain limitations. Firstly, the relatively small sample size (50 farmers) may limit the generalizability of the findings to the entire population of vegetable farmers in the region. Further research with larger sample sizes is needed to confirm the current findings and ensure their wider applicability.

Secondly, the reliance on self-reported data introduces potential bias. Farmers may overestimate their adoption of GAPs or provide inaccurate information due to social desirability or other factors. To address this limitation, future studies could incorporate objective measures of GAP adoption, such as farm visits and observation of actual practices.

Finally, the study primarily focused on individual farmer characteristics and motivations. However, other external factors, such as government policies, market forces, and access to resources, can also significantly influence adoption behavior. Future research should consider these external factors in a more comprehensive model to better understand the complex dynamics behind GAP adoption among vegetable farmers.

FUTURE RESEARCH

- Replication of the study with a larger and more diverse sample of farmers.
- Qualitative research to explore the factors influencing adoption behavior in greater depth.
- Development of interventions to promote the adoption of GAPs among vegetable farmers.

While this study has provided valuable insights into the factors influencing GAP adoption among vegetable farmers in this region, several avenues for future research remain crucial to achieve a more comprehensive understanding and promote widespread adoption of these sustainable practices.

Replicating the study with a larger and more diverse sample of farmers is essential to ensure the generalizability of the findings. This could involve expanding the geographical scope, including farms of various sizes and types, and ensuring diverse farmer demographics are represented. Such stratified sampling techniques will enhance the representativeness of the study and provide a more accurate picture of GAP adoption across the region.

Conducting qualitative research methods like in-depth interviews and focus groups with farmers can delve deeper into their motivations, perceptions, and challenges related to GAP adoption. This approach can uncover underlying beliefs, values, and social dynamics influencing their decision-making, providing a more holistic understanding of the complex adoption process and potential barriers that need to be addressed.

Based on the identified factors influencing GAP adoption, developing targeted interventions can encourage greater participation in the program. These interventions

could include educational programs, financial assistance, technical support, peer learning networks, and market-based incentives. By addressing specific barriers and making GAPs more accessible and economically viable, these interventions can significantly improve adoption rates and contribute to sustainable agricultural practices.

Future research should also investigate the long-term impact of GAP adoption on various farm performance indicators such as yield, profitability, environmental sustainability, and food safety. This will provide valuable data on the effectiveness of GAPs in achieving sustainable agricultural outcomes and enhancing the livelihoods of smallholder farmers in the region.

By pursuing these future research directions, we can gain a deeper understanding of the complexities surrounding GAP adoption, develop effective interventions that promote sustainable agricultural practices, and ultimately contribute to the long-term success of GAP programs in this region and beyond.

5.3. REFERENCES

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