Bindura University of Science Education

Faculty of Agriculture and Environmental Science

Department of Agricultural Economics, Education and Extension

An analysis of the profitability in blueberry production. A case study of Palmlife Driptech, Goromonzi District.

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT OF THE BACHELOR OF AGRICULTURAL SCIENCE HONOURS DEGREE IN AGRICULTURAL ECONOMICS AND MANAGEMENT.

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RELEASE FORM

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An analysis of the profitability in blueberry production. A case study of Palmlife Driptech, Goromonzi District

Submitted in partial fulfilment of the Bachelor of Agricultural Science Honours Degree in Agricultural Economics and Management

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DEDICATION

This dissertation is dedicated to James Nudiya, Constance Bhasikoro, my father, my mother, and my entire family. Furthermore, I gladly commit this effort to the Lord because I have seen his faithfulness to meet my needs and guide me into experiences far better than I could have imagined. I appreciate all of your help.

DECLARATION

I at this moment declare that the research project entitled "*An analysis of the profitability in blueberry production. A case study of Palmlife Driptech, Goromonzi District"* submitted to the Bindura University of Science Education, Department of Agricultural Economics, Education and Extension is a record of original work done by Anywhere mudiya and this submitted in partial fulfilment of the requirement for the award of the Bachelor of Agricultural Science Honours Degree in Agricultural Economics and Management. The results presented in this dissertation have not been submitted to any University for the award of any degree of diploma.

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ABSTRACT

The study was conducted on the analysis of the profitability in blueberry production. A case study of Palmlife Driptech, Goromonzi District. The specific objective of the study were to identify the factors affecting the profitability of blueberry, to analyse the factors influencing choice in marketing channel in blueberry and to analyse the profitability of blueberry production at Palmlife Driptech. The study employ both quantitative and qualitative research methods. A structured questionnaire will be used to collect primary data from 135 blueberry participants at Palmlife Driptech. Secondary data will also be obtained from relevant from relevant government agencies and organizations. The main analysis tools were multiple linear regression, gross margin, and descriptive statistics. A multiple linear regression analysis was conducted to ascertain the correlation between the predictor variable, which comprises input costs (labor, energy, pesticides, nursery, drip irrigation, tractors, mowers, fertilizer, and air blast boom sprayer), and the dependent variable, gross profit, in the context of blueberry profitability. , yield in kg and bees with beehives cost had a statistical significant effect on gross profit at 99.9% level of r squared. The input cost found with an inverse relationship gross profit, when the coefficient of -103.631 by a unit is estimated to decrease gross profit by $103.631, whilst other factor having a positive relationship when an increase in cost of bee and beehives by a unit would increase gross profit by 298.619. In addition, if there increase of yield in kilograms by single unit, the gross profit is estimates to raise by 22.534. Furthermore the significant level of predictors (input cost, yield in kilograms and bees with beehives cost indicate there are below predetermined threshold (often 0.05) which is 5%, suggest that the predictors are statistically significant on the effect in the dependent variable (gross profit). The descriptive statistics were used to analyses factor influencing choice of marketing channel in blueberry and the market demand and price have main effect of mean score of 25.77 compared to other variable which includes logistics and transportation capacity, limited access to finance and credit, limited market information and quality and consistency. In addition gross margin was used was found $506380 year 2019 It is encouraging and shows that blueberry farmers at Palmlife Driptech were able to pay variable costs prior to fixed costs.The finding of the study will provide valuable insights for police markers, extension officers and blueberry farmers to enhance profitability of blueberry in Zimbabwe.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Blueberries are becoming a very popular soft-skinned fruit across the world. High bush blueberry cultivation and breeding program began in 1900s. Blueberries belonging to the Actinium genus, which is widely distributed and has more than 200 woody plant species. The European blueberry (Vaccinium myrtillus), also referred to as bilberry in North America, is highly sought after by the processing industry because of its mouthwatering flavor and excellent nutritional value (Nestby et al., 2011). The world's largest producer of blueberries is the United States. In addition, Chile, Argentina, Colombia, and British Columbia grow them. 38 states allow the commercial cultivation of blueberries, with Michigan producing the most of all states in the union. To name a few, other top producing states are Florida, Georgia, and New York (Nestby et al., 2011).

The production of blueberries is one of the agricultural sectors in South Africa that is expanding the fastest, generating employment and economic prospects. The Western Cape has the greatest share of blueberry hectares at 60%, followed by Limpopo at 15%, North West at 10%, and Gauteng at 8%. In 2018, the industry had about 2000 established hectares throughout several provinces, which produced an estimated crop of 11 306 tons. ("The South African Blueberry Industry's Economic Contribution," 2019). In Zimbabwe the blueberry information is limited, but the cultivation has found favourable in Zimbabwe. At the moment, about 600 hectares of blueberry cultivated, of which 450 in full production, and 150 in breeding for a total production of about 9000 tons, of which 6500 tons are exported (wathome, 2024).

In addition to favour, blueberry have a number of health benefits, such as low level of calories, sodium and cholesterol along with high vitamin C and Fibre. They also contain highest level of antioxidants, including flavonoids and phenolic compounds of any fruit (Kalt *et al.*, 2019). The blueberry business in Zimbabwe has grown quite quickly. Blueberry agriculture grew from almost nonexistent in 2016 to 570 hectares in 2021, producing between 6,500 and 7,000 tons of blueberries annually. Due to this growth, Zimbabwe's blueberry industry is now the one with the quickest rate of growth in the world in terms of both cultivated area and exports. Blueberry exports from Zimbabwe have increased by 63% annually during the last five years. Furthermore, the nation's blueberry exports surged by 2.3 tons, propelling it into the top 15 rankings in the world (agronometrics, 24).

1.2 Research problem statement

Blueberry production in Africa has a significant development and growth. Aiming for exporting quality fresh blueberries to Europe during winter. The blueberry production and profitability in Zimbabwe is influenced by multitude of internal and external factors. Blueberry farmers face challenges on the export logistics and power outages. Exporting blueberries to international markets requires efficient logistics including cold storage facilities and reliable transportation networks (agronometrics, 24)

In addition limited access to long term financing and high interest rates can pose challenges for blueberry farmers in Zimbabwe. This hinder the ability to invest in necessary infrastructure, equipment and technology that affect productivity and profitability in blueberry. More so, limited agricultural training and knowledge sharing opportunities for blueberry farmers in Zimbabwe. Lack of proper training can affect negatively the adoption of best practices and innovative techniques, affecting productivity and profitability.

The demand for blueberries in the market and prevailing pricing dynamics significantly impact the profitability of blueberry production. Changes in consumer preference and market price can directly affect the revenue generated form blueberry sales (Brazelton *et al.*, 2021).

Many blueberry farmer's choice of marketing channel in blueberry is influenced with various factors, as in Zimbabwe rely on informal and fragmented marketing channel, which includes selling to local middlemen, small scale processor and roadside venders. These channels often offer lower prices, limited access to higher value markets and including lucrative export opportunities. The lack of collective bargaining power and limited negotiation skills among individual farmers further exacerbate their vulnerability to unfavourable pricing. The quality and consistency of blueberry supplies from smallholder and emerging commercial famers often fail to meet the strict requirements of formal markets, large scale retailers, super, markets and export partners (Gondo et al., 2010).

Several blueberry farmer face challenge on factors that includes post harvesting handling, storage and logistics have significant effect in the quality and shelf life of blueberry so that it end up influence choice of marketing blueberries locally and abroad. The limited access to market information which consist of up to date pricing, demand trends, buyer's preferences and this hampers the ability of blueberry famers to make informed decisions about their marketing strategies (Chipatiso et al.,2020).

1.3 **Aim of the study**

The main objective of this study is to analysis of the profitability of blueberry production. A case study of Palmlife Driptech, Goromonzi District.

1.4 Research Objectives

1. To identify factor affecting profitability of blueberry production at Palmlife Driptech.
2. To examine factors influencing the choice of marketing channel blueberry at Palmlife Driptech.
3. To analyze the profitability of blueberry production at Palmlife Driptech.

1.5 Research Questions

1. What are the factors affecting the profitability of blueberry at Palmlife driptech?
2. What are factor influencing choice of marketing channel blueberry at Palmlife Driptech?
3. What are profits obtained by blueberry farmers?

1.6 Hypothesis

1. Inputs cost, beehives with bees cost and yield significantly affect the profitability at Palmlife Driptech.
2. Blueberry production in Goromonzi are more profitable.

1.7 Justification

The study can provide insights into the economic impact of existing blueberry production and profitability body of knowledge that can be used by other researchers, students and policy maker in Zimbabwe.

Unpacking the profitability of the blueberry production, the study can shed light on the profitability of this agricultural sector. This bring about employment creation, improvements in living standards and health benefits. By understanding the economic viability of blueberry production can help inform decision making process for farmers and generation of income for blueberry farmers. It also contribute to the agricultural diversification to blueberry production instead of reliance on a single crop and enhance the resilience of agriculture sector against market dynamics and environmental challenges (Swart, 2019).

Understanding the factors affecting profitability of blueberry production helps blueberry famers to understand the competitive landscape, market dynamics and challenges which is affecting return from blueberry cultivation. This drive in sustainability in blueberry production by making effective management on irrigation, fertilization strategies, harvesting practices pest and soil fertility. By identifying efficient practices, farmer can optimizes production and increase profitability.

Blueberry production has the potential to contribute to the agricultural market in Zimbabwe, by the profitability provides insights into the market potentials of this crop and this information can be valuable for farmers considering diversifying their crops. Market information also attract investment in blueberry production, leading to economic growth and job creation. Furthermore this study can assess the sustainability of blueberry production by evaluating the environmental impacts such as water usage, soil health and pesticides use. The understanding of then sustainability aspects can help to adopt practices that minimize the negative environmental impacts and promote long term viability.

The choice of marketing blueberry is main influence by quality and consistency, this involves the quality in terms of size, colour, sweetness and freshness, and this is crucial factor when making decisions. Blueberry prices can be highly volatile, cause by factors such as global supply and demand, exchange rate fluctuations and seasonal variations. The ability to access market that offers stable and remunerative price is the main consideration for Zimbabwean blueberry producers and distributors.

1.8 Limitations of the study

There are several limitations associated with the study on the profitability of blueberry production at Palmlife Dritech which include:

The study may have limited sample size which could affect the conclusion of the findings, if the sample size is small, the results may not be accurately represent the entire blueberry production in Zimbabwe.

Data collection methods that rely on self-reported data such as survey can introduce biased and inaccuracies.

External factors that can influence the blueberry production and profitability in Zimbabwe such as weather condition, market fluctuation, government policies and infrastructure limitation could impact the results.

Limited timeframe could restrict the analysis of long term trends and variations in berries production profitability.

1.9 Organisation of the research project

This research project consist of five chapters. Chapter one is the introductory consist of background, research problem statement, aims of the study, research objectives research questions, justification, limitations of the study and the organisation of the research project.

The second chapter presents the literature review related to blueberry production, this chapter gives detailed background of blueberry production in Zimbabwe. Explanation of the methodology used during the study is

presented in chapter three, as this chapter covers the research design for a suitable topic and sampling procedure, data collection methods, research instruments, data analysis and analytical tools used.

The results and discussion of the study are in chapter four. The conclusion from the study and recommendations are presented in chapter five

CHAPTER TWO

LITERATURE REVIEW

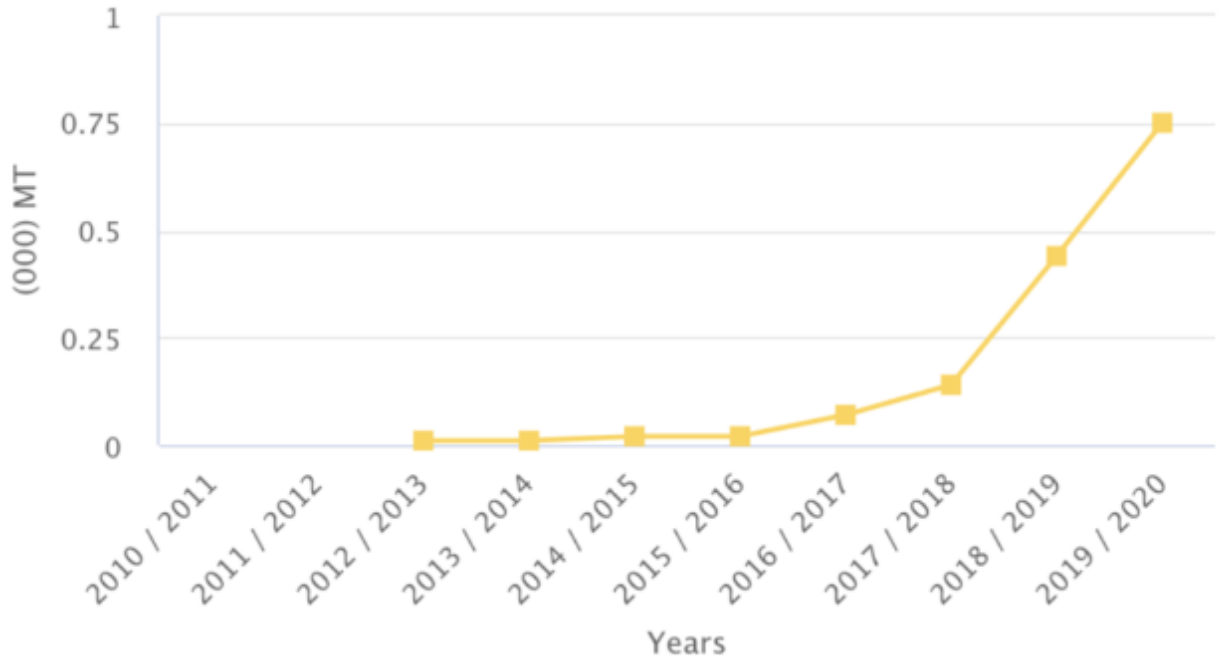
2.1 Introduction

A literature review is a surveys scholarly articles, books and other sources to a particular area of research and providing a description summary and critical evaluation of these work. This chapter offers a literature related to the profitability in blueberry production (Ramdhani, Ramdhani and Amin, 2014**).** Many issues are going to be discussed which includes the production profitability in blueberries. A literature review is a critical, analytical summary and synthesis of the current knowledge of a topic.(Harvey, 2010)

Blueberries are a soft-skinned fruit that is gaining popularity all over the world. The cultivation and breeding of high-bush blueberries started in the 1900s. Within the genus Vaccinium, which is widely distributed and comprises over 200 woody plant species, are blueberries. The European, commonly known as the bilberry, grows across northern Europe. The processing sector has a significant demand for European blueberries (Vaccinium myrtillus) because of its excellent taste and great dietary value (Nestby et al., 2011).
The world's largest producer of blueberries is the United States. In addition, Chile, Argentina, Colombia, and British Columbia grow them. 38 states allow the commercial cultivation of blueberries, with Michigan producing the most of all states in the union. Other states that produce well are Georgia, Florida, and New York. merely listing a select selection (Nestby et al., 2011)

The blueberry business in Zimbabwe has grown in yielding between 6,500 and 7,000 tons. This expansion has positioned Zimbabwe as the fastest-growing blueberry sector globally in terms of exports and cultivated area. For the past five years, Zimbabwe has been experiencing an annual increase of 63% in blueberry exports. In addition, the country’s exports increased by 2.3 tons and dive it into the ranks of the top 15 countries in the blueberry sector (agronometrics, 24). This is shown in diagram figure 2.2 below.

Figure 2.1: Zimbabwe blueberry yield from year 2013 to 2020



Source: Charting challenges in Zimbabwe's blueberry sector March 29, 2024.

2.2 Definition of terms

Multiple linear regression is an extreme extension of simple linear regression in that we use several quantitative (metric) or dichotomous variables in combination rather than one such variable to predict or explain the value of quantitative measured criterion (outcome/dependent) variable (Analysis, 2017).

Profit simply means a positive gain generated from business operations or investment after

subtracting all expenses or cost MA'AM (2019).

Profitability is the measure of business ability to generate income relative to its expense.

The ratio or balance between the company's gross profit and the amount of sales attained over the same period is known as the gross profit margin, or GPM.

A marketing channel is a system of wholesalers, retailers, agents, and dealers inside an organization, unit, or corporation that is used to market a commodity product or service (Qadri, 2018).

Knowledge and future research focusing on the analysis of the profitability in blueberry production in Zimbabwe may be limited, existing research on the related topic provides valuable insights. Future research

could explore the unique challenges and opportunities blueberry producers in Zimbabwe, considering the local agricultural landscape, market dynamics and policy environment.

2.3 Profitability of blueberry production farmers

Over the past five years, blueberries exports have increased by 63% annually, or 1200 tons due to the boom in blueberry agriculture investment in Zimbabwe. The nation's blueberry is now expanding at the quickest rate in the world. In terms of exported goods and cultivated area (oluwole, 2024)

Due to cost-effective labour and favourable climates, blueberries produced in Zimbabwe has been favoured by south Africa farms relocating production Zimbabwe's blueberry sector has been favoured by South African farms relocating production to the country due to better climatic conditions and cost-effective labour (plaza, 2024).

The shelf life and quality of blueberries are directly impacted by efficient supply chain management, which also affects profitability. This supply chain used field consumption to identify important processes. Poor temperature control results in deteriorating quality and increases waste or loss across the supply chain. The supply chain for producing blueberries was shown to depend on the following crucial steps: shipping distribution center (DC) (75 hours at 5°C), retail display (48 hours to 15°C), and consumer (48 hours to 20°C). The model demonstrated the interplay between supply chain circumstances and weight loss, boosted the regression tree model to predict weight loss, and explained 84% of the variance on the test (Ktenioudaki et al., 2021).

2.4 Factors affecting profitability in blueberries

The main cost that affect profitability in blueberry is the initial investment and establishment cost. The blueberries are perennial crops that requires cost for establishment and production year, during which a farmer receives no income, followed by several years of production when cost exceed returns. Finally from the fifth year onwards they return a profit each. This initial investment includes an irrigation well or reservoir, pumps, tractors, air blasting sprayer, mower, pick buckets and pruning (usda, 2024).

In addition crop yield is a crucial determinant of profitability. Blueberry plans cab produce a bountiful harvest for up to 20 years if well maintained, but the yield varies depending on the several variables including the plant variety, age, pruning technique and weather just mentioning few. Higher yields means more revenue. More so market prices also affect profitability in blueberries, this is when the price fluctuate based in different factors which consist of competition, seasonal variation and supply and demand dynamics.

The geographical location also affect profitability in blueberries. This includes factors such as climate, soil quality and this impact profitability positively, marketability of blueberries. Furthermore variety selection affect profitability in blueberries. This is when some variety maybe more suit in certain climates and have a better market demand. Farmers need to consider the varieties resistance to diseases, harvest timing, fruit size and taste. The varieties that ripens early helps to capture market at premium prices before completion.

Pest and diseases management is also importance to achieve profitability as pest like blueberry maggot, mites and blueberry diseases such as mummy berry or beery stem blight can significantly reduce yields and impact on fruit quality. The implementation of integration management and proper timing helps to control the pest and diseases. Operation efficiency and cost management are vital factor affect profitability. Optimising water and fertilizers usage helps to reduce cost by minimise wastages and stream line harvesting (sheykin, 2024)

2.5 Factors influencing choice of marketing channels in blueberries

There are various factors influence marketing channel in blueberry production which include the fruits quality and consistency, which means the ability to meet the specific standards and specifications of different market channels. The investments in post harvesting handling, cold chain logistics and quality control as blueberries need to maintain temperature between the 0 and 0.5 degrees Celsius normal using refrigerated trucks.

In addition market demand and pricing also influence marketing channel in blueberries when understanding the consumer preference and willingness to pay in different markets depending of varieties. The comparative price level and price stability in domestic, regional and international markets favoured by the ability to negotiate favourable prices and payment terms with both buyers. The access to market information is another challenge faced by blueberry farmers in order to obtain timely and reliable data on market trends, also ability to identify and assess new markets opportunities in both domestically and international. Blueberry farmer face challenges on logistics and transportation capacity. This involves availability and reliable of refrigerated transportation and cold chain infrastructure connectivity to domestic and international markets.

Furthermore there is limited access to finance and credit, meaning availability of affordable financial options for blueberry production, inventory and marketing activities and ability to manage the cash flows and working capital requirements throughout the marketing process. Government policies and regulations also influence marketing choice of blueberries, this involves exporting procedures and product registration. Tax and tariffs structure that affect the relative attractiveness of different marketing channels and government support programs such as infrastructure, market information and export promotion positively affect the blueberry marketing.

2.6 Types of marketing channels in Zimbabwe

A marketing channel is a system of wholesalers, retailers, agents, and dealers inside an organization, unit, or corporation that is used to market a commodity product or service (Qadri, 2018). In Zimbabwe marketing channels encompass both domestic and international. Domestic market channels consist of various channels which includes the traditional channels such as direct sales to consumer, retail outlets, online platforms, and wholesale markets and exports markets.

Direct sales to consumer by farmers' markets, pick-your-own farms, farm stands, and on-farm stores are some of the ways that blueberry growers can offer their goods directly to consumers. As a result, producers are able to contact directly with customers and increase their margin.

I addition retail channels, such as supermarkets, grocery stores, health food stores, and specialty food stores are just a few examples of the retail channels where blueberries can be purchased. To assist in facilitating sales to these locations, producers can collaborate with brokers or distributors.

Online Platforms used by blueberry growers have the chance to reach a larger audience outside of their local market by using e-commerce platforms and online marketplaces. Creating an online store or collaborating with e-commerce platforms can help boost sales and awareness. Furthermore wholesale market used by producers of blueberries can sell their goods in large quantities to food service distributors or wholesalers who cater to institutions, hotels, cafes, and restaurants. Producers who want to reach a higher amount of clients might use this channel (Johnson, 2019).

Export Markets for Zimbabwean blueberry growers should look into exporting their product to other markets where there is a market for fresh blueberries. Gaining access to international markets can be made easier by collaborating with export agencies, trading firms, or taking part in trade exhibitions. Much of Zimbabwe's blueberry crop is shipped to South Africa, possibly for further exports. Additionally, the nation directly provides Russia, the Middle East, the UK, and the EU with fresh blueberries (oluwole, 2024).

CHAPTER THREE

RESEARCH METHODOLODY

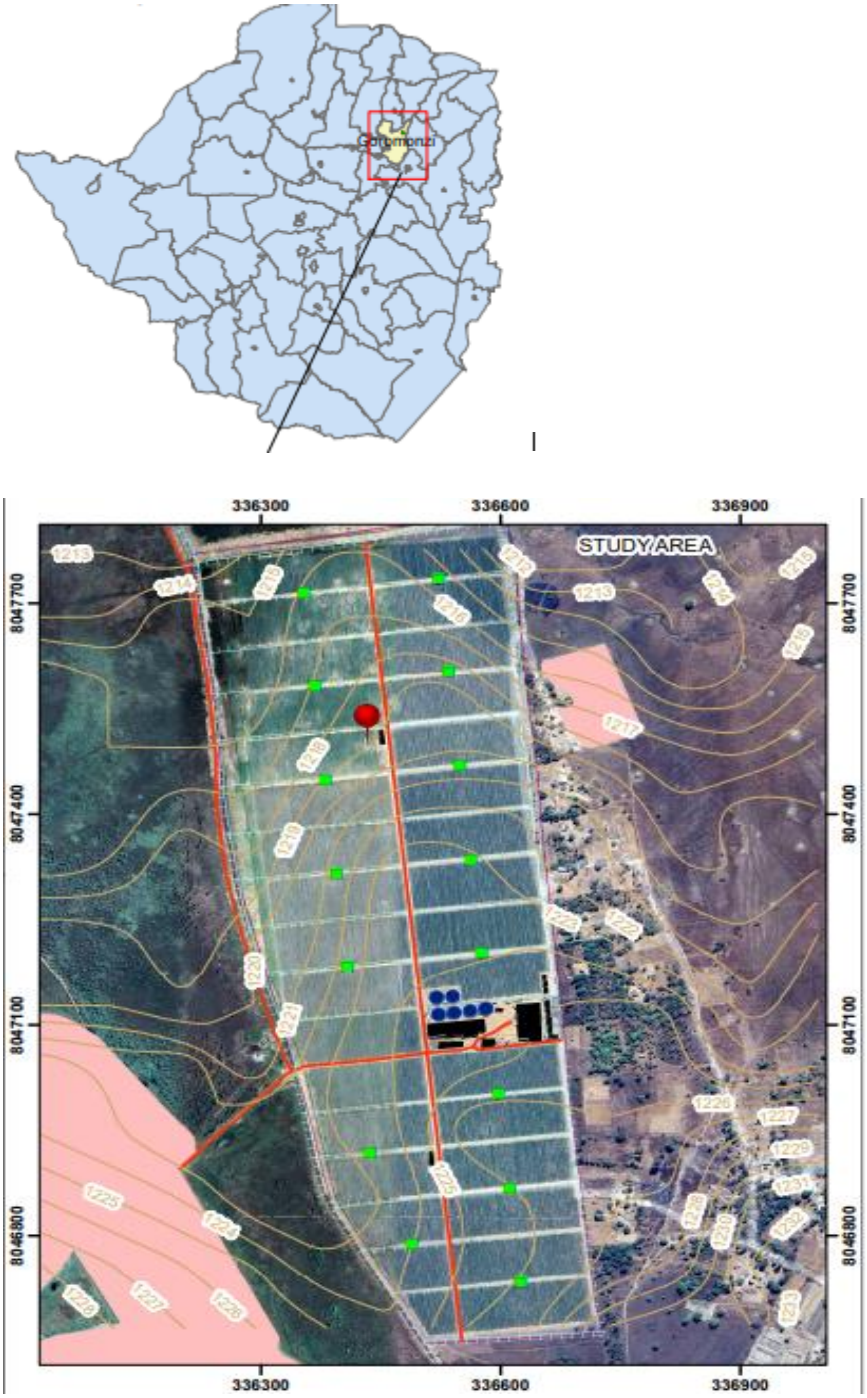
3.1 INTRODUCTION

This chapter outline the procedures which were followed to conduct this study consisting of the description of the study area. This chapter specifies the data collection, analysis, and presentation methods including the analytical framework.

3.2 Description of the study area

This study was carried out in Goromonzi district in Mashonaland East Province. The area is in the agro-ecological region two, a zone with an average rainfall of 800- 1000mm and rainfall occurs between Octobers to April with the rest of the year being dry. Temperature ranges from 12.9℃ to 26.14℃ (climate, 2024). The main economic activity is farming mostly maize and wheat. Horticulture is practiced at both small scale and large scale. The distance from Harare to Palmlife Driptech is 53 kilometres.

Figure 3.1: The map of the study area



3.3Sampling technique

Random sampling was employed in selection of respondents for questionnaires at blueberry Palmlife driptech Farm. The sample size was 135 households. The sampling was done according to department on the farm which include the financial management, fertigation and operation management.

3.4 Data collection

Both secondary and secondary data collection techniques were used in the study. Primary data is unique information that is initially gathered by researchers for a particular study. The data is fresh, collected directly and investigation methods are flexible to suit questions whilst secondary data is the use of data collected by someone for other purpose. It is easy to find as data is available from previous studies. The researcher collected the secondary data as the review of the literature helps to set the context for the study and supported by evidence on the other models used for data analysis in other areas and results were obtained. The main sources of secondary data used involves articles, reports of blueberry production and text books.

In collecting primary data and survey questionnaire was used. The questionnaire was used to collect both quantitative and qualitative data from the profitability of the blueberry farm in terms of all operational cost, the factors that influence choice marketing channel in blueberry production at Palmlife Driptech and in addition the factor that are affecting profitability in blueberry production. Open ended question helped to describe the factors affecting the profitability. Survey allowed participatory from the researcher and the respondents giving response. The participatory approach used such that the research will be helpful to the farmers than just the researcher and the end users of this report. The survey questionnaire was written in English and Shona was used to interpret to help on understanding.

The questionnaire was used to collect data attributes of operational cost and revenue. The operational cost includes the cost of such as cost of labour, blueberry seeds, fertilizers, pesticides and herbicides, cost of energy, cost of equipment such as tractor, mowers, air blasting sprayer, transport cost and water pumps. In addition questionnaire was used to collect data on the factors influencing choice of marketing channel in blueberry production which include the market information, quality and consistency, market demand and price, logistics and transportation capacity and access to finance and credit.

3.5 Data analysis

Data processing and analysis for this study was done using the statistical package for social sciences (SPSS) version 20 and Microsoft excel packages. The advantages of SPSS in analysis of data is many complex statistical test are available as a built feature and interpretation of results is relatively easy.

3.6 Analytical framework

The analytical framework states the analysis procedures used per each objective as following below.

3.7 Factors affecting the profitability of blueberry production at Palmlife Driptech.

3.7.1 Multiple linear regression

The first objective on the determination of the factors affecting profitability in blueberry production at Palmlife Driptech, multiple linear regression (MLR) is a statistical technique used to model the relationship between several explanatory variables and a response variable. It is an extension of ordinary least squares (OLS) regression. The multiple linear regression used by the researcher to the factors affecting profitability in blueberry production. The multiple linear regression function is express as

$Y=\beta 0+\beta 1X1 + \beta 2X2 + \beta 3X3 + \cdots \beta nXn + \varepsilon$

Y = Gross return for the farm

α = Constant or intercept value

X1 = Labour cost

X2 = transport cost

X3 = cost of energy

X4 = cost of pesticides/ hectare

X5 = blueberry nursery cost

X6 = drip irrigation kits cost

X7 =equipment cost

3.8 To examine the factors that influence the choice of marketing channels in blueberry production at Palmlife Driptech.

3.8.1 Descriptive statistics

Descriptive statistics was used to determine factors influencing the choice of marketing channel in blueberry at Palmlife Driptech. Bar chart and percentages were used to present the factors affecting, so that it allows easy comparison using percentages with respect to constraint severity among blueberry farmers and the bar charts provide clear visualisation and interpretation.

However the descriptive statistic restrict conclusion beyond the data we have analysed or get to the conclusion. This branch of statistics is known as descriptive statistics, and its goal is to combine, arrange, and show data. Measures of position, variability (dispersion), and central tendency, in addition to tables, graphs, and other visual aids, can be employed.

Central tendency measurement used in the examination of factors influencing choice of marketing channel blueberry.

The arithmetic average or mean

One of the most common metrics for characterizing central tendency is the arithmetic mean, or mean. Its computation is quite simple: we simply add up the measured values and divide the total by the total number of cases that were assessed.

Formula

$$\mu = \frac{\sum x}{n}$$

We use $\bar{x}$ to represent the sample mean and μ to represent the population mean.

Where, X is the total of the population values, N is the number of cases in the population, and $\bar{x}$ is equal to $\sum x$ n

3.9 To analyse the profitability of blueberry production at Palmlife Driptech

3.9.1 Gross profit margin

Gross profit margin (GPM) was used to determine the profitability of the blueberry production at Palmlife Driptech. GPM refers to ratio between the gross profit of the company and the amount of sales achieved in the same period. If the cost of goods sold increases, the gross profit margin will fall and vice versa(Mahdi and Khaddafi, 2020).

For this study, the variable cost includes the labour cost, transport cost, cost of energy, cost of pesticides / ha, blueberry nursery cost, drip irrigation cost and equipment cost. This will also include all costs associated with blueberry production and the gross profit margin was calculated for the 60 hectares of blueberries.

The formula for gross profit margin can be expressed as:

$\pi = PyQ - \sum[PxX]$

π= gross profit margin

y = blueberry fruits (tons/ ha)

P = unit price per ton

Q = quantity of blueberries per hectare

Px = unity price of variable inputs used per hectare

X = quantity of variable costs

3.10 Methodology summary

Table 1: analytical framework of the thesis methodology

Objective	Data to be collected	Data analysis tool
To identify factor affecting the profitability of blueberry production at Palmlife Driptech.	Labour cost, transport cost, cost of energy, cost of pesticides/ha, blueberry nursery cost, drip irrigation kits cost and equipment cost.	Multiple linear regression
To examine the factors influencing choice of marketing channel in blueberries at Palmlife Driptech.	Market information, quality and consistency, market demand and price, logistics and transportation capacity and access to finance and credit.	Descriptive statistics
To analyse the profitability of blueberry production at Palmlife Driptech.	Variable and fixed cost, output cost and revenue.	Gross profit margin

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The research results on the analysis of the profitability in blueberry production are presented and discussed in this chapter. The Goromonzi district blueberry farmer was the subject of a study at Palmilife Driptech. The study first focuses on household characteristics in order to provide additional insight into the variables that may affect the profitability of blueberry cultivation.

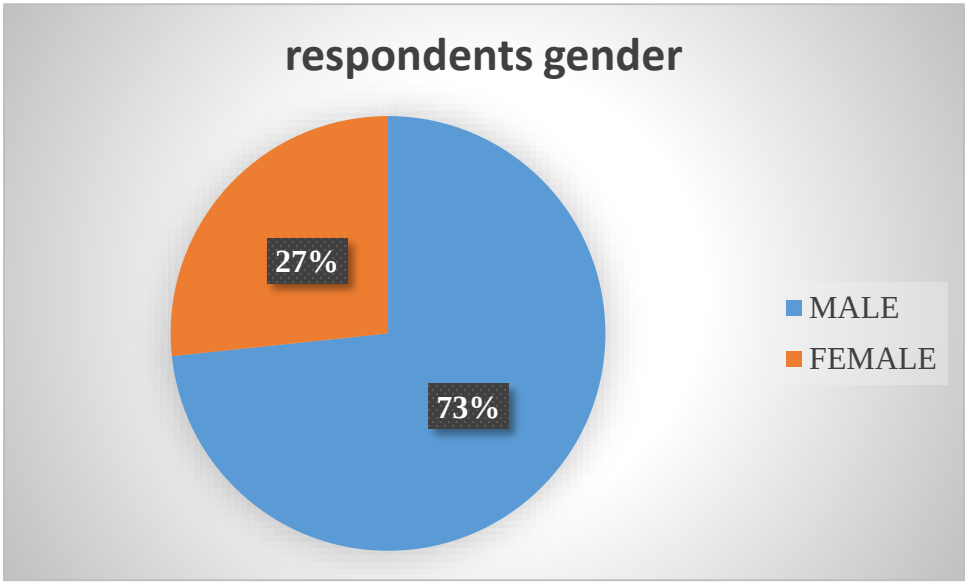
4.2 Results

These are research findings backed by the high response rate, 75 percent of the questionnaire returned after they have been distributed. The findings include the household's demographics information, factor affecting profitability, factor affecting women participation and profitability in blueberry production at Palmilife Driptech.

4.3 Characteristics of the study respondents

A sample of 73% of male and 27% of female was selected. On the sample it appears gender distribution was involved more males compared to women.

Figure 4.1: Respondents gender distribution



Age range of respondents was from 22 to 60 and the mean age was 33. The modal age was 33 and it appears the majority of the sample was around thirties. Educational level of respondents, the findings revealed twenty seven (20%) of the respondents had primary education whilst eighty five (63%) of the respondents had secondary education which proves that they were able to read and writing, in addition nineteen (14%) had tertiary educational level and lastly four (3%) were dropouts, the research did not ask the four respondents on which level of education they had dropped out.

The marital status of the respondents consist of 71 (53%) who were married, 35 (26%) who were single and 29 (21%) were divorced. The table 3 below summarises the distribution of the respondents by gender, age, educational level and marital status in terms of participation.

Table 2: distribution of the respondents by age, gender, educational level and marital status

CATEGORY	PARTICIPATING	NOT PARTICIPATING	TOTAL (%)
gender			
male	*76(56%)*	*23(17%)*	*73%*
female	*29(21%)*	*7(6%)*	*27%*
Total	*77%*	*23%*	*100%*
Educational level			
primary	*16(12%)*	*11(8%)*	*20%*
secondary	*75(55.6%)*	*10(7.4%)*	*63%*
tertiary	*12(9%)*	*7(5%)*	*14%*
drop out	*2(1.5%)*	*2(1.5%)*	*3%*
total	*78.1%*	*21.9%*	*100%*
marital status			
married	*56(42%)*	*15(11%)*	*53%*
single	*33(24%)*	*2(2%)*	*26%*
divorced	*16(12%)*	*13(9%)*	*21%*
total	*80%*	*20%*	*100%*
age			
range	*22-60*		

4.4 Objective I: To identify factors affecting profitability of blueberry production at Palmife Driptech.

4.4.1 Multiple linear regression

To identify factors affecting the profitability of blueberry production at Pamlife Driptech, a linear regression model was used. The linear regression results were obtained from SPSS as shown in table 4. The important feature for each variable were given that's Beta value the standard error and significance. The model's R squared was 0.999 and the adjusted R squared is 0.995. In this case, R square indicating a perfect fit of the regression model to the data. This means that predictors (land cost, input cost, bee and beehives cost, yield (kg)) all explains the variation in the dependent variable which is gross profit.

Table 3: linear regression results.

Model		*Unstandardized Coefficients*		*Standardized Coefficients*	*t*	*Sig.*
		B	*Std. Error*	*Beta*		
1	*(Constant)*	9288916.990	335500.876		27.687	0.023
	Input cost	-103.631	5.548	-4.297	-18.681	0.034
	Yield (kg)	22.534	1.403	3.662	16.067	0.040
	Bee and beehives cost	298.619	13.821	0.839	21.605	0.029

a. Dependent variable: gross profit

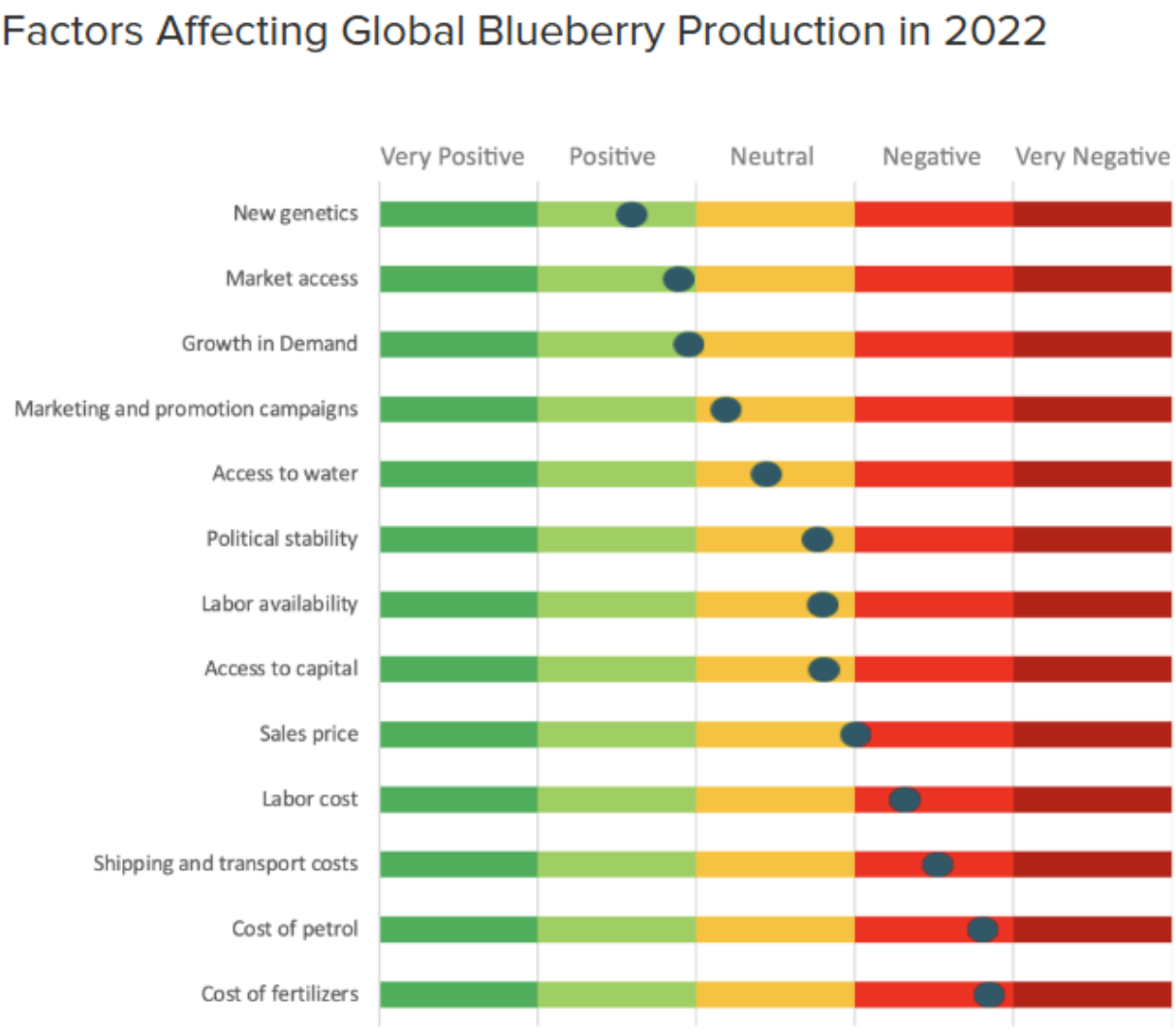
From the study table 4, it indicates that all factor including Input cost (labor, energy, pesticides, nursery, drip irrigation, tractors, mowers, fertilizer and air blast boom sprayer), yield in kg and bees with beehives cost had a statistical significant effect on gross profit at 99.9% level. An increase in input cost with coefficient of -103.631 by a unit is estimated to decrease gross profit by $103.631, also an increase in cost of bee and beehives by a unit would increase gross profit by 298.619. In addition, if there increase of yield in kilograms by single unit, the gross profit is estimates to raise by 22.534.

Furthermore the t-value represents the ratio of estimated coefficient to the standard error. It test the null hypothesis that the true coefficient is zero, lager absolute t-value indicate more significant relationship between the predictors and the dependent variable (gross profit). The significant level of predictors (input cost, yield in kilograms and bees with beehives cost indicate there are below predetermined threshold (p value > 0.05) which is 5%, suggest that the predictors are statistically significant on the effect in the dependent variable (gross

profit). The significance value of input cost (labor, energy, pesticides, nursery, drip irrigation, tractors, mower, air blast boom sprayer and fertilizer) is 0.034, yield in kilograms value of significant is 0.040 and bees and beehives cost has 0.029 respectively.

In addition according to (IBO, 2024), analyze last year's blueberry season in terms of harvest, yield, expenses, working conditions, and price. Significant reports of seasons exceeding forecasts were received from nations like China and Israel. Spain, Serbia, and South Africa, among others, performed marginally worse than expected, while Mexico and Australia slightly exceeded expectations. On the other hand, the production season was deemed "Worse than Expected" in the UK, New Zealand, Latvia, Republic of Georgia, Brazil, Zimbabwe, and Canada due to difficulties they encountered.

The factors below in the figure 4.1 highlight the factors affecting blueberry production globally.



SOURCE, International Blueberry Organization Global Production Survey 2024

There are 13 distinct parameters affected their season mentioned. This provides an overview of how each of these aspects affects global production. The elements that deviated the most from neutrality and had the most influence on the season were all negative: the price of fertilizers, the price of gasoline, and the costs associated with shipping and transportation.

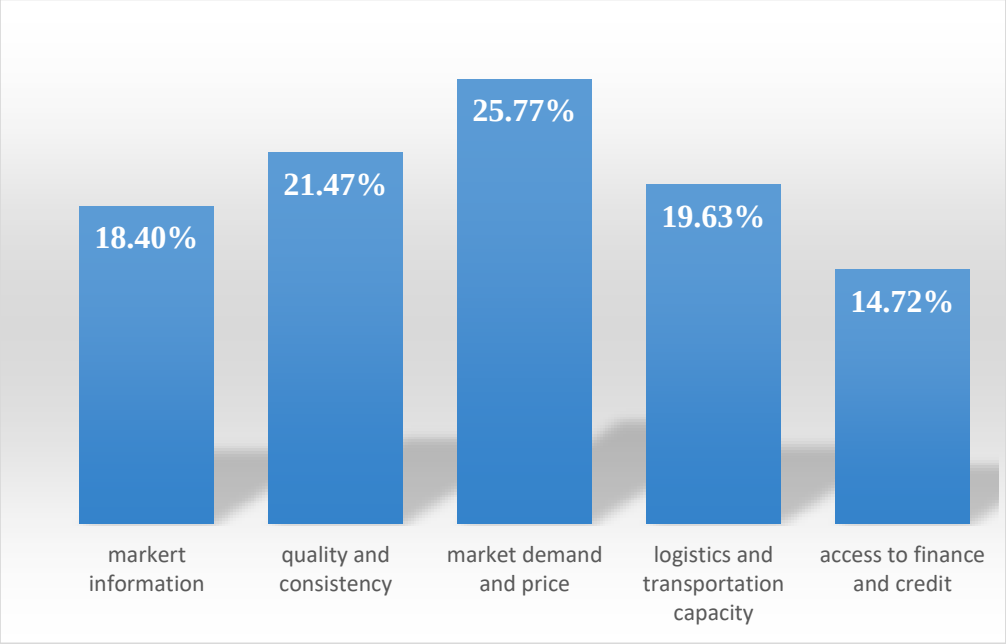
In conclusion, the results in table 3 agree that the gross margin is inversely correlated with labor, energy, shipping, and transport costs. This implies that a single increase in any of these variables which are labor, energy, or transport costs will lower the gross profit by a single unit. This shows

4.5 Objective II: To examine factors influencing the choice of marketing channel in blueberry production at Palmlife Driptech.

4.5.1 Descriptive statistics

The factor influencing the choice of marketing channel blueberries were identified by 6% (7) men and 3% (3) female and all were married. Five (5) men having secondary education and two (2) having tertiary education level, whilst all 3 women were all having secondary educational level. Fig 4.2 summaries the factors influencing the market channel of blueberries, the main factors influence the choice of market channel is market demand and price with a mean score of 25.77%, then followed by quality and consistency which have a mean score of 21.47%, logistics and transportation capacity with mean score of 19.63%, then market information have a mean of 18.40% and access to finance and credit have the smallest score mean of 14.72%.

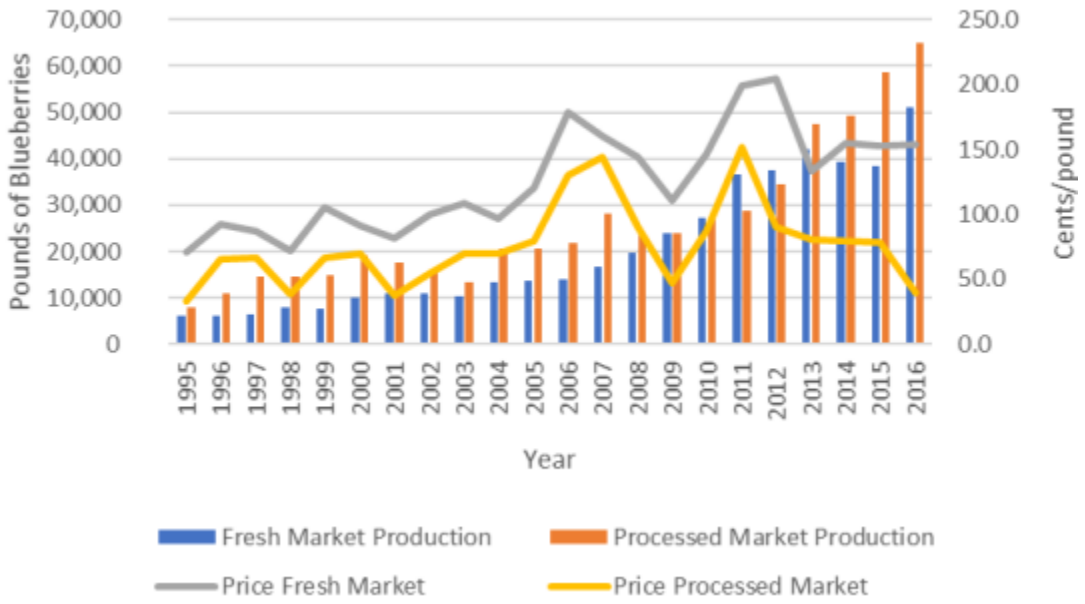
Figure 4.2: The factor influencing the choice of marketing channel blueberries.



The dominant factor influencing the choice of marketing channel of blueberry at Palmlife Driptech is market demand and price because the price and market demand are dynamic. (Sutton and Sterns, 2020), propounded that very year, the grower price for both fresh and processed blueberries has fluctuated, frequently

corresponding with changes in the country's fruit supply and demand. Although prices hit all times highs between 2005, 2007, 2010and 2012, they have since dropped from their 2007 peak as shown on fig 4.3.

Fig 4.3 shows the trends prices and market demand from 2005 to 2016



SOURCE. Blueberry economics: cost established and producing convectional blueberry in the Willamete valley 2020

4.6 Objective III: To analyse the profitability of blueberry production at Palmlife Driptech.

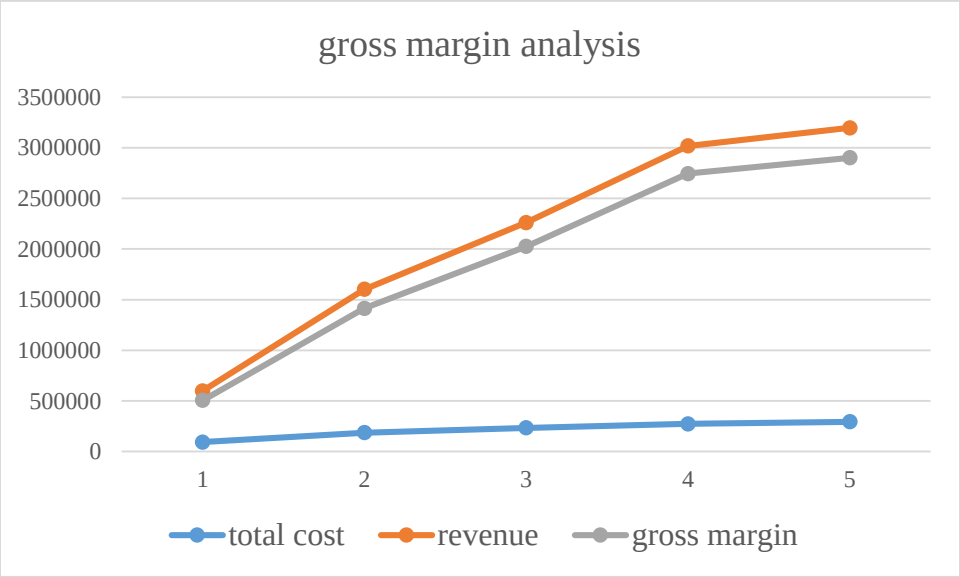
The gross margin used in this analysis of the profitability of blueberry production at Palmlife Driptech. From the gross margin, it was found that out of 60 hectares of blueberries, using the prices in Zimbabwe which four (4) to four dollars fifty (4.5) per every kilo, the total revenue and gross margin from 2019 to 2023 were given in the table 6 below.

Table 4: Gross margin analysis

Item	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Price($)/kg	4	4.5	4	4	4
yield/ton	150	356	565.2	754.6	799
Variable cost					
nursery	5120	6656	5632	6912	6400
drip irrigation	4000	4000	3999	4200	4322
tractors	12000	6000	1200	6000	6000
mowers	4000	2000	4000	2000	2000
air blast boom sprayer	15200	7600	15200	7600	7600
pesticide	600	1200	1890	2450	2980
fertilizer	13200	13210	12999	13400	13689
labor	31500	136325	178312.5	220325	241325
energy	8000	10000	11500	10300	10559
total variable cost($)	93620	186991	234732.5	273187	294875
Revenue ($)	***600000***	***1602000***	***2260800***	***3018400***	***3196000***
gross margin($)	***506380***	***1415009***	***2026068***	***2745213***	***2901125***
Return per $	*6.4*	*8.6*	*9.6*	*11*	*10.1*

The results of gross margin analysis is depicted in the table 5. Using the market price of $4.00 first year, $4.5 second year and $4.00 per kilogram from third year to the fifth year. The gross margin gradually increased from year 2019 to 2023 from $506 380 to $2 901 125 and the revenue from $600 000 to $3 196 000 this shown on the figure 4.1 below. The gross profit margin varies under price and yield scenarios in a sensitivity study of the same blueberry business. A sixteen ton output per hectare would improve profitability of blueberries (Swart, 2019).

Figure 4.4: Gross profit margin, net profit and total variable cost analysis



In addition the total gross margin from year 2019 to 2023 was found to be $9 593 795 and net profit of $10 677 200. The highest cost of production on blueberry production was found to be labour with $807 787.50 of variable cost followed by fertilizer with $66 498.

The ratio of total variable cost to the total revenue from 2019 found to be $6.4, 2020 was $8.6, 2021 was $9.6, and 2022 was $11 and $10.1 for 2023, meaning that for every dollar spend on blueberry production, the farmer stand to make profit. Blueberry farmer at Palmlife Driptech are able to cover the cost of their production and make profit from the sales of their products. Therefore, the gross margin analysis shows that blueberry farmers in Goromonzi are making profit in their production.

Gross profit margin from sales of blueberry year 2019 was calculated using the formula below.

$$\textbf{Gross profit margin} = \frac{Sales - cost of\ good\ sold}{sales} * 100$$

$$= \frac{600000 - 93620}{600000} * 100$$

$$= 84.4\%$$

Gross profit margin from sales of blueberry year 2020 was calculated using the formula below.

$$\textbf{Gross profit margin} = \frac{Sales - cost of\ good\ sold}{sales} * 100$$

$$= \frac{1602000 - 186991}{1602000} * 100$$

= 88%

Gross profit margin from sales of blueberry year 2021 was calculated using the formula below.

Gross profit margin = $\frac{Sales - cost of\ good\ sold}{sales}$ ***100**

$= \frac{2260800 - 234732.5}{2260800}$ *** 100**

= 89.6%

Gross profit margin from sales of blueberry year 2022 was calculated using the formula below.

Gross profit margin = $\frac{Sales - cost of\ good\ sold}{sales}$ ***100**

$= \frac{3018400 - 273187}{3018400}$ *** 100**

= 91%

Gross profit margin from sales of blueberry year 2023 was calculated using the formula below.

Gross profit margin = $\frac{Sales - cost of\ good\ sold}{sales}$ ***100**

$= \frac{3196000 - 294875}{3196000}$ *** 100**

= 91%

However the blueberry production at Palmlife is viable from 2019 to 2023 when gross profit margin is expressed as a percentage showing that there earning positive profits, as there are all above 50% and able to cover all variable cost .

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter present the conclusion drawn from the study and makes possible recommendations which are relevant to the blueberry production. This section will also give the promising approach suggestions taking into account the discoveries from the disserted information.

5.2 Conclusion

The main objective of the blueberry production study at Palmlife Driptech was to estimate the profitability level and the return per dollar invested. It can be concluded that blueberry farming has shown significant growth and potential in Zimbabwe. Blueberry have high domestic and international demand, and their cultivations has explained rapidly in recent years. The study indicated that blueberry production at Palmlife Driptech was reaping Blueberry's profits for five years since they could cover initial dollar invested and the gross profit margin value was positive since year one. The gross margin found to be more than 50% from year 2019 to 2023. In the end, the analysis determined that Palmlife Driptech's gross profit margin for blueberry production in 2019 was $506,380. The fact that the blueberry producers were able to pay their variable costs before deducting fixed costs is indicated by their positive gross profit margin.

The study reviews various factors affecting the profitability of blueberry production using multiple linear regression. A positive relationship existed between the dependent variable gross profit and the predictors. These factors include the input cost (pesticides, tractors, mowers, air blast boom sprayers, fertilizer, energy, and blueberry nursery), bees and beehives cost, and yield. In addition, the study examined the factors influencing the choice of marketing channel in blueberry production. , the main factors affecting the choice of market channel are market demand and price, followed by quality and consistency, logistics and transportation capacity, then market information and access to finance and credit have a significant effect.With a mean score of 25.77%, market demand and price were found to be the most significant factors influencing the choice of marketing channels, surpassing other factors such as logistics, transportation capacity, availability of credit and financing, market information, and product quality and consistency.

5.3 Recommendation to the blueberry farmers

According to the study's findings, blueberry farmers should identify factors that are affecting profitability in blueberry production and overcome with more efficient ways which include the strive to increase their farm size, as large farm size were found to be associated with more yields and higher profitability. In order to enjoy economies of scale, farmers must adopt cost saving measures such as to efficient labour utilization which the use of skilled labour and helps to reduce unnecessary wastages during production. Optimum fertilizer application which involves fertigation irrigation method and the use of programmed irrigation computer. Integration of fertilizer into watering programs is emphasized as important for blueberries and as liquid fertilizer can be incorporated into the irrigation systems.

Farmers must lower input costs because input costs and profitability are inversely correlated, blueberry growers should concentrate on lowering input costs including labor, energy, pesticides, and other expenses without sacrificing output or quality. More so blueberry farmers must boost their yields, as the results of the study showed that higher yields were associated with higher profitability. Growers of blueberries should look for ways to increase productivity by using high-yielding varieties, better farming techniques, and resource efficiency.

In addition, farmers must invest in bees and hives, as the study found a positive correlation between profitability and the cost of bees and hives. If blueberry growers want to increase pollination and, in turn, increase productivity and profitability, they should think about investing in bees and beehives.Farmers should explore better marketing linkages and channels to improve their bargaining power, access to lucrative markets and thereby increasing profits. This is when blueberry farmer report concealed blueberry production record and blocking of other farmer in Zimbabwe, by considering collaboration and sharing information to collectively benefit the blueberry production sector in Zimbabwe.

Blueberry farmers should invest in cold storage facilities, this is efficient on farm cold rooms for export grade berries have been proven beneficial for Zimbabwe's blueberry exporters. This helps farmers to maintain quality of their produce and meet export standards. In addition farmers should explore for export opportunities, recently Zimbabwe commenced blueberry export to China, indicating a growing global demand for Zimbabwean blueberries due to size and taste. They should also seek out for training programs, field works and workshops to stay updated on the latest techniques and best practices in blueberry production. It was found that blueberry require huge amount of start-up capital to cover all variable cost and fixed cost. In addition there are several factor that affect the choice of marketing channel blueberry which involves market demand and price affect more than other factors such limited access to finance and credit, limited market information, quality and consistency and logistics and transportation capacity.

Reference

Bibliography

agronometrics, 24. *CHARTING GROWTH AND NAVIGATING CHALLENGES IN ZIMBABWE'S BLUEBERRY SECTOR.* [Online]
Available at: https://www.internationalblueberry.org/2024/03/29/charting-growth-and-navigating-challenges-in-zimbabwes-blueberry-sector/
[Accessed 29 march 2024].

climate, g. h. w. a., 2024. *Mashonaland East, Zimbabwe Climate.* [Online]
Available at: https://weatherandclimate.com/zimbabwe/mashonaland-east
[Accessed 25 febfruary 2023].

IBO, 2024. *2023 IBO GLOBAL PRODUCTION SURVEY.* [Online]
Available at: https://www.internationalblueberry.org/2023/11/28/2023-ibo-global-production-survey/
[Accessed 28 NOVEMBER 2023].

oluwole, v., 2024. *Zimbabwe is the leading exporter of Blueberries in the world, according to a new study.* [Online]
Available at: https://africa.businessinsider.com/local/markets/zimbabwe-is-the-leading-exporter-of-blueberries-in-the-world-according-to-a-new-study/y74wl56#:~:text=A%20significant%20portion%20of%20Zimbabwe%27s%20blueberries%20is%20exported,the%20UK%2C%20EU%2C%20Middle
[Accessed 24 november 2023].

plaza, f., 2024. *Great blueberry development in Zimbabwe.* [Online]
Available at: https://www.freshplaza.com/north-america/article/9504951/great-blueberry-development-in-zimbabwe/
[Accessed 28 may 2024].

sheykin, h., 2024. *boost blueberry farm profits 7: essential strategies revealed.* [Online]
Available at: https://finmodelslab.com/blogs/profitability/blueberry-farm-profitability
[Accessed 6 may 2024].

usda, 2024. *Ultra-Niche Crops Series: Blueberry Enterprise Budget.* [Online]
Available at: https://njaes.rutgers.edu/fs1311/
[Accessed 29 december 2024].

wathome, t., 2024. *Fact sheet after Zimbabwe ranks 15th in global blueberry exports.* [Online]
Available at: https://www.selinawamucii.com/news/2023/12/05/fact-sheet-after-zimbabwe-ranks-15th-in-global-blueberry-exports/
[Accessed 5 december 2023].

Analysis, M.R. (2017) 'ft Pr oo f - e rib e'.

Asare, E. *et al.* (2017) 'Economic Risk of Bee Pollination in Maine Wild Blueberry, Vaccinium angustifolium', *Journal of Economic Entomology*, 110(5), pp. 1980–1992. Available at: https://doi.org/10.1093/jee/tox191.

Brazelton, C. *et al.* (2021) 'World blueberry acreage & production', *US Highbush Blueberry Council*, 22(5), pp. 1–23.

Harvey, M. (2010) '05-771 : What Is a Literature Review ?', (October).

Kalt, W. *et al.* (2019) 'Recent Research on the Health Benefits of Blueberries and Their Anthocyanins', pp. 1–13.

Ktenioudaki, A. *et al.* (2021) 'Postharvest Biology and Technology Blueberry supply chain : Critical steps impacting fruit quality and application of a boosted regression tree model to predict weight loss', *Postharvest Biology and Technology*, 179(February), p. 111590. Available at: https://doi.org/10.1016/j.postharvbio.2021.111590.

Mahdi, M. and Khaddafi, M. (2020) 'The Influence of Gross Profit Margin, Operating Profit Margin and Net Profit Margin on the Stock Price of Consumer Good Industry in the Indonesia Stock Exchange on 2012-2014', *International Journal of Business, Economics, and Social Development*, 1(3), pp. 153–163. Available at: https://doi.org/10.46336/ijbesd.v1i3.53.

Nestby, R. *et al.* (2011) 'The European blueberry (Vaccinium myrtillus L .) and the potential for The European Blueberry (Vaccinium myrtillus L .) and the Potential for Cultivation. A Review', (January).

Qadri, B. (2018) 'Role of Marketing Channels', (September), pp. 8–9. Available at: http://epaper.kashmirreader.net/epaperimages/11092018/11092018-md-hr-9/d570064.jpg.

Ramdhani, A., Ramdhani, M.A. and Amin, A.S. (2014) 'Writing a Literature Review Research Paper : A step-by-step approach Writing a Literature Review Research Paper : A step - by - step approach', (July).

Shared, A. (2019) ‘Profit: Types, Theories and Functions of Profit’, pp. 1–14. Available at: http://www.economicsdiscussion.net/business/profit-types-theories-and-functions-of-profit/3329.
Sutton, S. and Sterns, J. (2020) ‘The Costs of Establishing and Producing Conventional Blueberries in the Willamette Valley Blueberry Economics: The Costs of Establishing and Producing Conventional Blueberries in the Willamette Valley’, (March).
Swart, P. (2019) ‘The Economic Contribution of the South African Blueberry Industry The Economic Contribution of the South African Blueberry Industry’, (August).
‘The Economic Contribution of the South African Blueberry Industry’ (2019), (July), pp. 1–21.

APPENDIX1: QUESTIONAIRE

INTRODUCTION

This survey is meant to help MUDIYA ANYWHERE, a science education student at Bindura University, conduct a research study on the profitability analysis of blueberry farming. This information is personal and private, and no reference to any specific person will be made. We sincerely appreciate your devoted, sincere, and thorough cooperation in answering this questionnaire.

1. The respondent's gender is: Male {} Female {}

2. Respondent age range: under 25 { } 25–40 { } 40–55 { }56 and above { }

3. How long have you been cultivating vegetables?

4. Status of marriage: married { } single { }

5.Respondent's highest degree of education: Primary { }, secondary { }, and tertiary { }

5. How many years did Palmlife operate? .....

6. What is the cost of the investment since year 1 (one) up to now

……

7. How many hectares of blueberry production at Palmlife?

.....

8. How many tonnes of blueberries are expected per hectare?

.....

9. What is the market price of blueberries per kg?

……..……..

10. What is cost of super intensive cultural system in pots and intensive cultural in bed per hectare separately?

… ……..

11. What are techniques used for water conservation and irrigation methods?

……

SECTION B: MARKETING CHALLENGES FACED

Challenge **score/severity**

	0	**1**	**2**	**3**	**4**	**5**
Access to market information						
Market demand and price						
Access to finance and credit						
Quality and consistency						
Logistics and transportation capacity						
If any other, specify						

SCORE: no influence. 1: partly influences. 2: moderately influences. 3: greatly influence. 4: Strongly influence. Very strong. 5

SECTION B

Inputs used in the blueberry production, if yes please fill in the figures

BLUEBERRY INPUTS

Item	*Quantity*	*Unit Cost*	*Total*

Nursery			
Fertilizer: Potassium nitrate *:Ammonium Nitrate* *:90% sulphuric acid*			
Pesticides:			
Labour			
Energy			
Kubota tractors			
Air blast boom sprayer			
Bee and beehives			
Mowers			
Rent			

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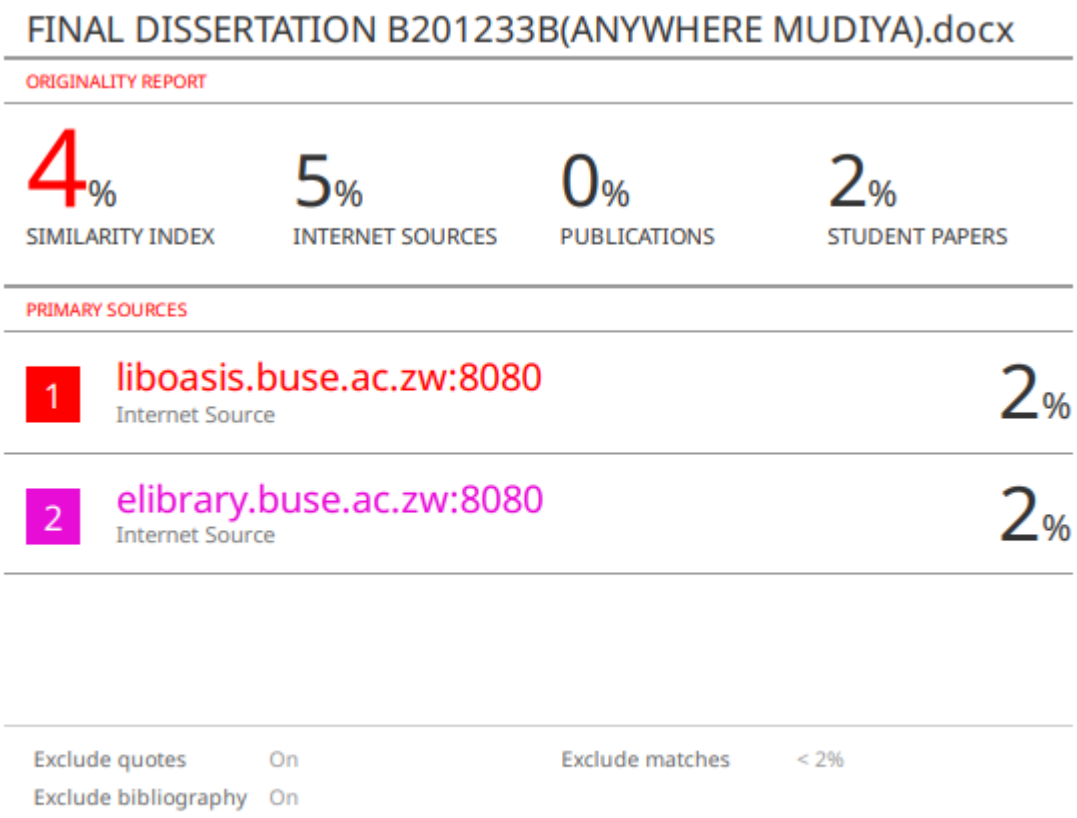

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