



UNIVERSITY OF KWAZULU-NATAL

**Developing a framework for the growing and commercialisation of Stevia in
Kenya**

by

Thandi Jane ZULU

219087118

**A dissertation submitted in fulfilment of the requirements for the degree of
Doctor of Business Administration**

**Graduate School of Business and Leadership
College of Law and Management Studies**

Supervisor: Prof M Kanyangale

Co-Supervisor: Prof TI Nzimakwe

Co-Supervisor: Dr WB Zondi

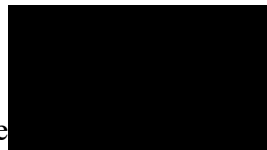
July 2025

DECLARATION

I, **Thandi Jane ZULU**, declare that.

- (i) The research reported in this dissertation, except where otherwise indicated, is my original research.
- (ii) This dissertation has not been submitted for any degree or examination at any other university.
- (iii) This dissertation does not contain any other person's data, pictures, graphs, or other information, unless specifically acknowledged as being sourced from other persons.
- (iv) This dissertation does not contain any other person's writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:
 - a) their words have been re-written, but the general information attributed to them has been referenced; and
 - b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced.
- (v) This dissertation does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the thesis and in the bibliography section.

Signature



Date: 29 April 2025

ACKNOWLEDGEMENTS

First and foremost, I extend my gratitude to the Almighty God for His unwavering presence and encouragement during the challenging phases of this journey. His guidance has been a constant source of strength.

I express my deepest appreciation to my Supervisors, Prof MacDonald Kanyangale, Prof Thokozani Nzimakwe, and Dr Bonginkosi Zondi, whose consistent support, guidance, and mentorship have been invaluable. Their brilliant suggestions and insightful comments illuminated my academic path.

Special acknowledgement goes to my editor, uGegana ka Mkasi, whose dedicated efforts in editing my work went above and beyond. I extend sincere thanks to the NECOFA Foundation, led by Miss Jane Kanyanga, for facilitating the survey with research participants.

I must acknowledge the contributions of esteemed colleagues, including Prof Julius Nyanzi from Uganda, Dr Sam from Kenya, Mr Shantanu Chankraborty, the Stevia expert from India, and Mr Richard Howe from KwaZulu-Natal. Their shared experiences in Stevia Commercialisation enriched my understanding.

A debt of gratitude is owed to the chairpersons of the University Committees involved in research oversight. Finally, but of utmost importance, I pay tribute to my late husband, King Goodwill Zwelithini, for his unwavering support and encouragement to pursue this degree. His aspirations served as a driving force during challenging times.

My heartfelt appreciation extends to my daughter, Mukelile Zibusiso, a shining star on my path to success, offering encouragement and understanding throughout the research journey. I am thankful to my entire family for standing by me through thick and thin.

ABSTRACT

While there is great potential for the commercialisation of Stevia, small and medium enterprises in many countries, including Kenya, are not clear on the cultivation and process of bringing new products, services, or innovations to the market with the goal of generating sustained revenue. The aim of this qualitative study was to explore and develop a framework for the commercialisation of Stevia in Kenya. The critical questions in this study were the crucial factors influencing Stevia's commercial viability and how farmers surmounted these to achieve sustainable development. The qualitative study involved ten experienced Kenyan Stevia farmers (six females, four males) selected using purposive sampling in Nyeri, Nakuru, and Thika. Data were collected from ten experienced Kenyan Stevia farmers using semi-structured interviews using an interview guide to get an in-depth understanding of the commercialisation of Stevia. The collected interview data were analysed using thematic analysis to reveal key themes related to Stevia commercialisation. The themes in this study reveal a complex interplay of opportunities, such as increased revenue and job creation, against challenges like high costs, financial barriers, and environmental risks. The success of Stevia farming depends on access to quality seedlings, water, and modern farming technology. While demand grows and sustainable practices are encouraged, industry growth faces limitations due to inadequate infrastructure and land availability. This study revealed that providing financial and market-readiness support to Stevia farmers is essential. The study underscores the necessity of specific financial support, the impact of environmental and technological progress on yields, and management's critical role in upholding quality. Collaboration, dedication to sustainability, and forward-thinking are critical for the success of the Stevia industry. The study has contributed a comprehensive Stevia value chain framework for the Stevia sector in Kenya, highlighting the critical role of government support, market access, and sustainable practices. It emphasises the importance of a multifaceted approach, integrating financial aid, technological advancements, and market expansion to bolster the industry's growth. The findings advocate for strategic interventions to strengthen the Stevia supply chain, which could catalyse economic progress and food security within the region. This research serves as a cornerstone for policy formulation, offering a blueprint for sustainable agricultural development and reinforcing the significance of empowering Stevia farmers in the global market.

Keywords: Development, cultivation, commercialisation, Stevia farmers, Stevia value-chain framework, Kenya, opportunities, challenges, crucial factors, interpretivist, and exploratory.

LIST OF TABLES

Table 1: Comparison of SMEs Types in Kenya’s Stevia Value Chain.....	54
Table 2: Depicting Objectives of the Study and Interview Questions	124
Table 3: Depicting Demographics of the Respondents	126

LIST OF FIGURES

Figure 1: Map of Counties and Towns, and Small towns in Kenya where Stevia is Grown	82
Figure 2: Hybrid Theoretical Framework.....	86
Figure 3: Proposed Framework for Growing and Commercialisation of Stevia in Kenya	221

TABLE OF CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENTS.....	iii
ABSTRACT.....	iv
LIST OF TABLES	v
LIST OF FIGURES	v
TABLE OF CONTENTS.....	vi
CHAPTER ONE.....	21
INTRODUCTION AND BACKGROUND OF THE STUDY	21
1.1. INTRODUCTION	21
1.2. BACKGROUND OF THE STUDY.....	21
1.3. THE ORIGINS OF STEVIA REBAUDIANA BERTONI	23
1.3.1. Botanical Description of Stevia	23
1.3.2. Naming of Stevia.....	24
1.3.3. Legal recognition of Stevia.....	24
1.4. THE RESEARCH PROBLEM.....	24
1.5. AIM OF THE STUDY	26
1.6. RESEARCH OBJECTIVES.....	27
1.7. RESEARCH QUESTIONS	27
1.8. SIGNIFICANCE OF THE STUDY	27
1.9. CHAPTER ORGANISATION.....	28
1.10. SUMMARY.....	29
CHAPTER 2.....	30
LITERATURE REVIEW.....	30
2.1. INTRODUCTION	30
2.2. STEVIA GROWTH AND COMMERCIALISATION IN KENYA.....	31
2.2.1. Defining Agricultural Commercialisation	31
2.2.2. Commercialisation Frameworks: The Linkage to Global Markets.....	31
2.2.2.1. Understanding the Global Stevia Market.....	32
2.2.2.2. Market Entry Strategies.....	32
2.2.2.3. Economic Factors and Pricing Strategies.....	32

2.2.2.4.	Regulatory Compliance and Standards	33
2.2.2.5.	Innovation and Technology Integration	33
2.2.3.	Benefits of the Framework for Stevia Growing and Commercialisation	33
2.2.3.1.	Innovation and Flexibility in Production	34
2.2.3.2.	Business Modelling for Sustainable Growth	34
2.2.4.	Opportunities for the Growing and Commercialisation of Stevia Farming in Kenya	34
2.2.4.1.	Export Market Potential	34
2.2.4.2.	Partnerships and Collaborations:	35
2.2.4.3.	Sustainable Agricultural Practices	35
2.2.4.4.	Growth of E-commerce	35
2.2.4.5.	Sustainable and Organic Farming Certifications	35
2.2.4.6.	Emerging Markets and Export Opportunities	36
2.2.4.7.	Government Support and Policy Frameworks	36
2.2.4.8.	Economic Growth and Income Generation	38
2.2.4.9.	Market Dynamics and Value Chain Implications	38
2.2.4.10.	Resource Utilisation and Environmental Considerations	39
2.2.4.11.	Access to Training and Capacity-Building Programs	39
2.2.4.12.	Cooperative Formation and Collective Marketing	39
2.2.4.13.	Technological Innovations and Advancements	40
2.2.5.	Transitioning to Market-Oriented Systems	40
2.2.5.1.	Steps in Transitioning to Commercialisation	40
2.2.5.1.1.	Initial Engagement and Awareness	40
2.2.5.1.2.	Organisational Structures: Primary, Secondary, and Tertiary Cooperatives	41
2.2.5.1.3.	Building Partnerships and Accessing Resources	41
2.2.5.1.4.	Engaging in All Stages of the Value Chain	41
2.2.5.1.5.	Full Commercialisation and Scaling Operations	42
2.2.5.1.6.	Comparative Studies from Similar Countries	42
2.3.	UNPACKING THE VALUE CHAIN AND ITS RELEVANCE TO COMMERCIALISATION	43
2.3.1.	Value Chain Access and Participation	43
2.3.1.1.	Understanding Value Chains in the Global Context	43

2.3.1.2. Linkage of Global Markets and Value Chain Dynamics	43
2.3.1.2.1. Improving Market Access	43
2.3.1.2.2. Local Adaptation and International Standards	44
2.3.1.2.3. Supply Chain Resilience and Risk Mitigation	44
2.3.1.3. Domestic Market Participation and Its Global Implications	44
2.3.2. The Importance of Value Chain in Agricultural Commercialisation	44
2.3.3. Stakeholder Collaboration within the Value Chain	45
2.3.4. Stevia Value Chain Critical components	45
2.3.5. Value Addition through Processing and Innovation	46
2.3.6. The Importance of Integration in the Stevia Value Chain	46
2.4. UNPACKING SMALL-MEDIUM AND MICRO ENTERPRISES IN STEVIA COMMERCIALISATION AND VALUE CHAIN	46
2.4.1. Definition and Description of the Small-Medium Enterprises	47
2.4.1.1. Considerations for Defining SMEs in Stevia Commercialisation	47
2.4.1.2. Recommended Definition of SMEs in Stevia Commercialisation	48
2.4.2. The Impact of Small and Medium Enterprises (SMEs)	48
2.4.2.1. Contribution to Employment	48
2.4.2.2. Economic Impact	49
2.4.2.3. Innovation	49
2.4.3. Types of SMEs in the Value Chain of Stevia Commercialisation and Competitiveness	50
2.4.3.1. Cultivation and Farming Enterprises	50
2.4.3.2. Processing and Manufacturing Enterprises	51
2.4.3.3. Packaging and Distributing Enterprises	51
2.4.3.4. Retailing and Marketing Enterprises	52
2.4.3.5. Research and Development Firms	53
2.4.3.6. Summary Comparisons of SME Types in Kenya’s Stevia Value Chain	54
2.4.4. The Organisation of SMEs into Cooperatives in Stevia Commercialisation and Value Chain: Rationale and Justification	55
2.4.4.1. The Role of Cooperatives in SMEs	55
2.4.4.2. Resource Sharing	55
2.4.4.3. Market Access	55

2.4.5.	Rationale and Justification for Cooperatives in the Stevia Value Chain	56
2.4.5.1.	Economic Justifications	56
2.4.5.2.	Social Justifications.....	56
2.4.5.3.	Market-Related Justifications.....	56
2.4.5.4.	Case Studies and Statistics	57
2.5.	THE RELEVANCE OF SMALLHOLDERS IN COMMERCIALISATION.....	57
2.5.1.	Historical Context of Smallholder Farmers in Kenya	57
2.5.2.	SMEs Participation in Kenya	57
2.5.3.	Overview of the Stevia Market in Kenya	58
2.5.4.	The Position of Smallholder Farmers in Kenya with regard to Economy	58
2.5.5.	Transition to Stevia Commercialisation	59
2.5.6.	Market Integration and Value Chain Participation of Smallholders	59
2.5.7.	Challenges faced by Smallholder Farmers in Stevia Growing and Commercialisation.....	60
2.5.7.1.	Structural Challenges	60
2.5.7.1.1.	Resource Mobilisation and Financial Constraints	60
2.5.7.1.2.	Access to Land	61
2.5.7.1.3.	Infrastructure Deficiencies.....	61
2.5.7.1.4.	Lack of Technology, Technical Knowledge and Skills	61
2.5.7.1.5.	Market Dependency.....	61
2.5.7.2.	Systematic Challenges	62
2.5.7.2.1.	Market Access and Information Asymmetry	62
2.5.7.2.2.	Price Disparities	62
2.5.7.2.3.	Limited Knowledge and Training	62
2.5.7.2.4.	Regulatory and Policy Barriers.....	63
2.5.7.2.5.	Barriers to Market Integration	63
2.5.7.2.6.	Access to Finance	63
2.5.7.2.7.	Access to Credit and Financial Services	63
2.5.7.2.8.	High Transaction Costs	64
2.5.7.2.9.	Price Volatility.....	64
2.5.8.	Strategies For Addressing Challenges Faced by Stevia Farmers.....	64
2.5.8.1.	Understanding the Market Dynamics.....	64

2.5.8.2.	Strengthening Cooperatives and Group Marketing	65
2.5.8.3.	Enhanced Access to Financial Services	65
2.5.8.4.	Building Infrastructure and Market Access	65
2.5.8.5.	Technological Adoption and Support	65
2.5.8.6.	Capacity Building and Education Programs	66
2.5.8.7.	Promoting Organic Certification and Sustainable Practices	66
2.5.8.8.	Inclusive Commercialisation of Stevia for Stevia farmers in Kenya	66
2.5.8.9.	Overcoming Barriers to Stevia Commercialisation for Stevia farmers in Kenya	67
2.6.	COOPERATIVES: COLLABORATIVE INSTRUMENT FOR SMALLHOLDERS COMMERCIALISATION	67
2.6.1.	Cooperatives in Stevia Commercialisation	67
2.6.1.1.	Market penetration	67
2.6.1.2.	Collective Bargaining and Purchasing	68
2.6.1.3.	Access to Finance	68
2.6.1.4.	Certification	69
2.6.1.5.	Access to Markets	69
2.6.1.6.	Improvement of Quality	69
2.6.1.7.	Capacity Building and Training	69
2.6.1.8.	Community Solidarity	70
2.6.1.9.	Cooperative Challenges	70
2.6.2.	Cooperative Model for Commercialisation and Value Chain Development	70
2.6.2.1.	Primary Cooperatives: Enhancing Input Access and Production Efficiency	71
2.6.2.2.	Secondary Cooperatives: Strengthening Processing, Marketing, and Distribution	71
2.6.2.3.	Tertiary Cooperatives: Facilitating Stakeholder Partnerships and Policy Support	71
2.6.2.4.	Relevance of Cooperatives in Kenya	72
2.6.3.	Current Status of Transition from Subsistence to Commercialisation in Stevia .	73
2.7.	SYNTHESIS OF COMMERCIALISATION, VALUE CHAIN, AND SMEs	74
2.7.1.	The Role of Commercialisation in Enhancing Value Chain Efficiency	75
2.7.2.	How Cooperatives Enhance Value Chain Efficiency	75
2.7.3.	Synergistic Effects of Commercialisation, Value Chain Development, and Cooperatives	76

2.8.	OVERVIEW OF GLOBAL STEVIA MARKET DYNAMICS	76
2.8.1.	Global Value Chains for Stevia	76
2.8.2.	Factors Driving Global Demand for Stevia.....	77
2.8.3.	Global Production Trends and Major Producers.....	77
2.8.4.	Global Market Trends and Dynamics	78
2.8.4.1.	The Global Market Landscape.....	78
2.8.4.2.	Growth Trends in the Food and Beverage Industry	79
2.8.4.3.	Commercial Applications of Stevia	79
2.8.4.4.	Market Segmentation and Targeting.....	79
2.8.4.5.	Branding and Marketing Strategies.....	80
2.8.5.	Consumer Preferences and Market Demand for Stevia Products	80
2.8.6.	The Rise of Alternative Sweeteners.....	80
2.9.	OVERVIEW OF KENYA'S STEVIA MARKET DYNAMICS	81
2.9.1.	Kenya's Stevia Sweet Spots: A Geographical Analysis	81
2.9.2.	The Ideal Kenya Stevia Landscape	81
2.9.3.	The Kenyan Stevia landscape	83
2.9.4.	Market Trends	83
2.9.5.	Consumer Preferences Towards Natural Sweeteners	83
2.9.6.	The Rise of Alternative Sweeteners.....	84
2.10.	POLICY REVIEW: CREATING AN ENABLING ENVIRONMENT FOR ECONOMIC DEVELOPMENT.....	84
2.11.	CRITICAL SUCCESS FACTORS FOR STEVIA GROWTH AND COMMERCIALISATION	84
2.11.1.	Government Commitment and Support of Inclusive Policies	85
2.11.2.	Infrastructure Development	85
2.11.3.	High-Quality Seed Selection and Cultivation Techniques	85
2.11.4.	Establishing Market Channels and Enhancing Competitiveness.....	85
2.11.5.	Integration into Value Chains	86
2.11.6.	Adoption of Agricultural Technologies.....	86
2.11.7.	Capacity Building and Training.....	86
2.11.8.	Robust Cooperative Structures	86
2.11.9.	Access to Finance	87

2.11.10.	Market Engagement and Promotion	87
2.11.11.	Market Intelligence and Information Access	87
2.11.12.	Quality Control and Certification	87
2.11.13.	Sustainability Practices and Environmental Management	88
2.11.14.	Networking and Partnerships	88
2.11.15.	Contribution to Local and National Food Systems	88
2.11.16.	Assessing Cost-Effectiveness and Profitability	88
2.12.	NEOLIBERAL THEORY AND ITS IMPACT ON STEVIA GROWING AND COMMERCIALISATION	89
2.12.1.	Economic Growth versus Economic Development	89
2.12.2.	Neoliberalism and Its Influence on Agricultural Policies in Kenya	89
2.12.3.	Impact of Neoliberalism on Smallholder Farmers in Kenya	90
2.12.4.	Impact of Neoliberalism on Smallholder Farmers in Kenya	90
2.12.5.	Exclusion from Value Chains	91
2.12.6.	Structural Barriers to Commercialisation	91
2.12.7.	Market Failures and Price Volatility	91
2.12.8.	Lack of Access to Credit and Financial Services	92
2.13.	THEORIES FOR A NEW THEORETICAL FRAMEWORK FOR STEVIA COMMERCIALISATION IN KENYA	92
2.13.1.	Market-Oriented Theory (Kotler, 1970s)	93
2.13.2.	Value Chain Theory (Porter, 1985)	93
2.13.3.	Supply Chain Management Theory (Christopher, 1998)	93
2.13.4.	Financial Inclusion Theory (Beck et al., 2000s)	93
2.13.5.	Institutional Theory (North, 1990s)	94
2.13.6.	Bargaining Power Theory (Smith, 1776; Galbraith, 1952)	94
2.13.7.	Diffusion of Innovation Theory (Rogers, 1962)	94
2.14.	THE INTEGRATION OF THE THEORIES	94
2.15.	THE HYBRID THEORETICAL FRAMEWORK ILLUSTRATED	94
2.15.1.	Advantages of the hybrid theoretical Framework	95
2.16.	SUMMARY OF IDENTIFIED GAPS	96
CHAPTER 3		97
RESEARCH METHODOLOGY		97

3.1.	INTRODUCTION	97
3.2.	RESEARCH DESIGN.....	97
3.2.1.	Correlational Research	97
3.2.2.	Exploratory Research.....	97
3.2.3.	Descriptive Research	98
3.2.4.	Explanatory Research	98
3.2.5.	Research design chosen for this study	98
3.3.	RESEARCH APPROACH.....	98
3.3.1.	Qualitative Approach	99
3.3.2.	Quantitative Approach.....	99
3.3.3.	Mixed-Methods Approach	99
3.3.4.	Research approach chosen for this study	99
3.4.	RESEARCH PHILOSOPHY.....	99
3.4.1.	Positivist philosophy	100
3.4.2.	Interpretivism Philosophy.....	100
3.4.3.	Pragmatism Philosophy.....	101
3.4.4.	Realism Philosophy.....	101
3.4.5.	Critical Realism Philosophy.....	101
3.4.6.	Constructivism Philosophy	102
3.4.7.	Interpretivism as a Research Philosophy for this study	102
3.5.	RESEARCH STRATEGY	103
3.5.1.	Qualitative Research Strategies.....	103
3.5.2.	Quantitative Research Strategies	104
3.5.3.	Mixed-Methods Research Strategies.....	104
3.5.4.	Justifying the Case Study Approach of the Qualitative Research Strategy	105
3.6.	RESEARCH CONTEXT.....	105
3.6.1.	Geographical and Socio-Economic Context.....	105
3.6.2.	Cultural and Technological Context.....	106
3.6.3.	Integration of Socio-Economic, Institutional, and Cultural Contexts.....	106
3.6.4.	Research Settings	107
3.7.	SAMPLING.....	108
3.7.1.	Target population	108

3.7.2.	Sample size of the study and justification.....	108
3.7.3.	Sampling Methods	109
3.7.3.1.	Probability Sampling method and techniques	109
3.7.3.2.	Non-Probability Sampling Method and Technique.....	110
3.8.	DATA COLLECTION	111
3.8.1.	Research instrument.....	113
3.8.2.	Administration of the research Instrument.....	114
3.9.	PILOT STUDY.....	114
3.10.	DATA ANALYSIS	116
3.10.1.	Qualitative Data Analysis Techniques	117
3.10.1.1.	Thematic Analysis.....	117
3.10.1.2.	Content Analysis	117
3.10.1.3.	Grounded Theory	117
3.10.1.4.	Narrative Analysis	117
3.10.2.	Justification for the use of Thematic Analysis	117
3.11.	VALIDITY AND RELIABILITY	119
3.11.1.	Validity	119
3.11.2.	Reliability.....	120
3.12.	ETHICAL CONSIDERATIONS.....	121
3.13.	LIMITATIONS OF THE STUDY	123
3.14.	DELIMITATIONS OF THE STUDY	123
3.15.	SUMMARY	123
CHAPTER 4.....		124
RESULTS OF THE STUDY		124
4.1.	INTRODUCTION	124
4.2.	OBJECTIVES AND INTERVIEW QUESTIONS OF THE STUDY	124
4.3.	RESPONSE RATE.....	125
4.4.	DEMOGRAPHICS OF THE RESPONDENTS.....	126
4.5.	PRESENTATION OF COLLECTED DATA.....	127
4.5.1.	Themes Related to Opportunities in Commercialisation of Stevia in Kenya	

- 4.5.1.1. Increase in the demand for Stevia**
- 4.5.1.2. Opportunities to Merge with International Stevia Big Players**
- 4.5.1.3. Opportunities to specialise in different Stevia products**
- 4.5.1.4. Sustainable supply to local markets and international markets**
- 4.5.2. Themes Related to Challenges in Commercialisation of Stevia in Kenya**
 - 4.5.2.1. Lack of Regional-Specific Cultivation Technologies**
 - 4.5.2.2. Lack of adequate Government support to Stevia farmers**
 - 4.5.2.3. Lack of Access to Finance**
 - 4.5.2.4. Climatic conditions**
 - 4.5.2.5. Technological Constraints**
 - 4.5.2.6. Inadequate Storage Facilities**
 - 4.5.2.7. Difficulty in accessing international markets**
 - 4.5.2.8. Lack of Comprehensive Training**
- 4.5.3. Themes Related to Factors Crucial in the Commercialisation of Stevia**
 - 4.5.3.1. Government Policy and Support**
 - 4.5.3.1.1. Regulatory Bodies in Stevia Commercialisation**
 - 4.5.3.1.2. Policy Formulation and Support in Stevia Commercialisation**
 - 4.5.3.1.3. Public-Private Partnerships (PPP)**
 - 4.5.3.1.4. Collaboration in Agricultural Strategy/Planning**
 - 4.5.3.1.5. Incentives for Sustainable Practices**
 - 4.5.3.2. Cooperatives and Stakeholder Engagement**
 - 4.5.3.2.1. Cooperative Structures: Primary, Secondary, and Tertiary**
 - 4.5.3.2.2. Stakeholder Engagement in Stevia Commercialisation.**
 - 4.5.3.3. Key Interventions**

4.5.3.3.1. Market Analysis and Demand Assessment	
4.5.3.3.2. Access to Resources	
4.5.3.3.3. Infrastructure Development: Enhancing Market Readiness	
4.5.3.3.4. Certification Processes: Ensuring Quality and Market Competitiveness	
4.5.3.3.5. Technological Factors	
4.5.3.4. Implementation Mechanisms	
4.5.3.4.1. Cooperative Development for Effective Implementation	
4.5.3.4.2. Organisational Capacity Enhancement for Operational Efficiency	
4.5.3.4.3. Monitoring & Evaluation (M&E) for Performance Improvement	
4.5.3.5. Outcomes	
4.5.3.5.1. Economic Growth, Increased Farmer Income, and Poverty Reduction	
4.5.3.5.2. Market Competitiveness: Domestic Market Penetration, Global Market Access, and Value Chain Optimization	
4.5.3.5.3. Sustainability: Environmental Conservation, Social Equity, and Long-Term Agricultural Resilience	
4.6. SUMMARY	164
CHAPTER 5	165
DISCUSSION OF THE FINDINGS	165
5.1. INTRODUCTION	165
5.2. DISCUSSION BASED ON THEMES RELATED TO OPPORTUNITIES IN THE COMMERCIALISATION OF STEVIA IN KENYA	165
5.2.1. Increasing Demand for Stevia	166
5.2.2. Opportunities to Merge with International Stevia Companies	166
5.2.3. Opportunities for Specialisation in Different Stevia Products	167
5.2.4. Sustainable Supply to Local and International Markets	168
5.2.5. Theoretical Contributions: Analysis and Implications for smallholder farmers in Stevia commercialisation	169

5.2.6.	Discussion of Opportunities and Theoretical Implications	170
5.3.	DISCUSSION BASED ON THEMES RELATED TO CHALLENGES HINDERING STEVIA COMMERCIALISATION	171
5.3.1.	Lack of Regional-Specific Cultivation Technologies	171
5.3.2.	Lack of Government Support for Processing and Value Addition	172
5.3.3.	Lack of Access to Finance	173
5.3.4.	Climatic Conditions and Environmental Challenges	174
5.3.5.	Inadequate Storage and Processing Facilities	174
5.3.6.	Limited Market Information and Access	175
5.3.7.	Stringent Export and Certification Requirements	175
5.3.8.	Difficulty in Accessing International Markets	176
5.3.9.	Weak Smallholders and SMEs Cooperatives	176
5.3.10.	Limited Research and Development Support	177
5.3.11.	Discussion of Challenges and Theoretical Implications for Stevia Smallholders and SMEs	178
5.4.	DISCUSSION BASED ON THEMES RELATED TO CRUCIAL FACTORS FOR STEVIA COMMERCIALISATION	179
5.4.1.	Role of Government Policy in Market Development	179
5.4.1.1.	Government Investment in Infrastructure and Processing Facilities	180
5.4.1.2.	Government-Led Financial Support for Stevia Smallholders and SMEs	181
5.4.1.3.	Government Role in Export Promotion and Certification Support	181
5.4.2.	Cooperatives and Stakeholder Engagement	182
5.4.2.1.	Role of Cooperatives in Strengthening Market Access	182
5.4.2.2.	Stakeholder Engagement and Value Chain Integration	183
5.4.2.3.	Cooperative-Based Financing for Stevia Commercialisation	183
5.4.2.4.	Cooperative Formation & Collective Bargaining	184
5.4.2.4.1.	Role of Cooperative Formation in Agricultural Commercialisation	184
5.4.2.4.2.	Collective Bargaining for Price Stabilisation and Market Security	184
5.4.2.4.3.	Cooperatives as Platforms for Input Access and Technology Adoption	185
5.4.2.4.4.	Policy and Institutional Support for Cooperatives in Stevia Commercialisation 185	
5.4.2.5.	Cooperative Structures: Primary, Secondary, and Tertiary	186

5.4.2.5.1. Role of Primary, Secondary, and Tertiary Cooperative Structures in Agricultural Commercialisation.....	186
5.4.2.5.2. Primary Cooperatives: Strengthening Farmer Participation and Input Access	186
5.4.2.5.3. Secondary Cooperatives: Facilitating Processing and Market Access.....	187
5.4.2.5.4. Tertiary Cooperatives: Advocacy, Policy Influence, and Industry Representation	188
5.4.2.6. Cooperatives for Training and Knowledge Sharing.....	188
5.4.2.6.1. Cooperative-Led Knowledge Sharing for Innovation Adoption	189
5.4.2.6.2. Cooperatives as Platforms for Technical Training in Certification and Export Standards	189
5.4.2.6.3. Government and Institutional Support for Cooperative Training Models	190
5.4.2.7. Cooperatives in Processing, Marketing, and Branding.....	190
5.4.2.7.1. Role of Cooperatives in Processing and Value Addition.....	190
5.4.2.7.2. Cooperatives in Marketing and Market Access Facilitation.....	191
5.4.2.7.3. Cooperative-Driven Branding for Premium Market Positioning	192
5.4.2.7.4. Institutional and Policy Support for Cooperative-Led Processing, Marketing, and Branding	192
5.4.2.8. Stakeholder Engagement in Stevia Commercialisation.....	193
5.4.2.8.1. Role of Stakeholder Engagement in Agricultural Commercialisation.....	193
5.4.2.8.2. Government’s Role in Facilitating Stakeholder Engagement.....	194
5.4.2.8.3. Private Sector Engagement in Processing, Distribution, and Market Access	194
5.4.2.8.4. Role of Research Institutions in Stevia Commercialisation	195
5.4.2.8.5. Role of Cooperatives in Strengthening Market Access	196
5.4.2.8.6. Stakeholder Engagement and Value Chain Integration.....	197
5.4.3. Key Interventions in the Commercialisation of Stevia in Kenya	197
5.4.3.1. Market Analysis and Demand Assessment	198
5.4.3.2. Access to Resources	198
5.4.3.3. Human Resources and Equipment Support.....	199
5.4.3.4. Infrastructure Development: Enhancing Market Readiness.....	199
5.4.3.5. Certification Processes: Ensuring Quality and Market Competitiveness.....	200
5.4.3.6. Technological Factors.....	200
5.4.3.6.1. Technological Barriers to Stevia Commercialisation.....	200

5.4.3.6.2.	Technological Infrastructure for Processing and Value Addition	201
5.4.3.6.3.	Digital Market Access and E-Commerce for Stevia Farmers.....	202
5.4.4.	Implementation Mechanism for Stevia Commercialisation.....	202
5.4.4.1.	Institutional Frameworks for Commercialisation	202
5.4.4.2.	Financing Mechanisms and Market Access Support.....	203
5.4.4.3.	Value Chain Development and Processing Infrastructure.....	204
5.4.4.4.	Market Linkages and Export Readiness	204
5.4.5.	Outcomes Related to the Commercialisation of Stevia	205
5.4.5.1.	Economic Outcomes: Income Generation and Market Expansion	205
5.4.5.2.	Social Outcomes: Employment Creation and Skills Development.....	206
5.4.5.3.	Market Outcomes: Export Competitiveness and Trade Expansion.....	206
5.5.	SUMMARY OF DISCUSSION ON FINDINGS	207
CHAPTER 6.....		209
CONCLUSION AND RECOMMENDATIONS		209
6.1.	INTRODUCTION	209
6.2.	AIM OF THE STUDY	209
6.3.	RESEARCH QUESTIONS	209
6.4.	FINDINGS FROM THE LITERATURE.....	209
6.4.1.	Establishing Robust Cooperative Structures	209
6.4.2.	A Diverse Consumer Landscape: Who Uses Stevia?.....	210
6.4.3.	Global Players in Stevia Commercialisation	210
6.4.4.	Challenges hindering Stevia commercialisation in Kenya.....	211
6.4.5.	A Regulatory vacuum and unfair market dynamics	211
6.4.6.	Exploitation of value chain opportunities.....	211
6.4.7.	Investing in Innovation for Sustainability	212
6.4.8.	Quality management	212
6.4.9.	Sustainability Practices and Environmental Management.....	212
6.4.10.	Diversifying Distribution Channels: A Network of Distributors	213
6.4.11.	The Streamlining Force: Logistics, Warehousing, and Transport	213
6.4.12.	Efficient Product Flow	213
6.4.13.	The Ideal Stevia Landscape.....	213

6.5.	FINDINGS FROM THE PRIMARY STUDY	214
6.5.1.	Value chain segments	214
6.5.2.	Actors in the Stevia Commercialisation in Kenya	215
6.5.3.	Inputs and outputs	215
6.5.4.	Key Markets	215
6.5.5.	Challenges hindering Stevia commercialisation in Kenya	216
6.5.6.	Factors crucial for the commercialisation of Stevia in Kenya	216
6.6.	CONCLUSIONS REACHED	216
6.7.	RECOMMENDATIONS.....	218
6.8.	PROPOSED FUTURE RESEARCH	220
6.9.	THE PROPOSED FRAMEWORK FOR STEVIA CULTIVATION AND COMMERCIALISATION OVERVIEW	220
6.9.1.	Framework Overview	222
6.10.	CONCLUSION.....	227
7.	REFERENCES	229
	APPENDIX A: LETTER OF INFORMED CONSENT	352
	APPENDIX B: DECLARATION BY PARTICIPANT	353

CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1. INTRODUCTION

Stevia, a natural sweetener derived from the *Stevia rebaudiana* plant, has emerged as a significant agricultural commodity in Kenya, driven by rising global demand for healthier sugar alternatives. Introduced initially as an experimental crop, Stevia has rapidly gained prominence among Kenyan farmers due to its high market value and relatively low input requirements compared to traditional cash crops. Kenya's favourable climatic conditions, particularly in regions like Kericho, Murang'a, and Bomet, have further fuelled its cultivation, making it a promising venture for Stevia farmers seeking to diversify their income sources and enhance their livelihoods.

Despite the potential promising venture for smallholders in the commercialisation of Stevia in Kenya, the novelty of Stevia cultivation in Kenya poses significant challenges, particularly for Stevia farmers, as they often lack the necessary knowledge and expertise, potentially leading to suboptimal yields and quality. In addition, the dominance of multinational corporations in the Stevia value chain has created an uneven playing field, often marginalising local farmers who lack the financial and technical resources to compete effectively. This situation underscores the necessity for a robust framework that addresses the unique challenges faced by Stevia farmers, ensuring equitable participation in the Stevia value chain and promoting sustainable agricultural practices. Consequently, this chapter serves as an introduction to the qualitative study on the commercialisation of Stevia by smallholder farmers in Kenya. It delves into the background of the study, the research problem, the aim of the study, the research objectives, the guiding questions, the significance of the study and the structure of subsequent chapters, and concludes with a summarising overview.

1.2. BACKGROUND OF THE STUDY

The International Diabetes Federation's *Diabetic Atlas* (2023) underscores the alarming prevalence of diabetes, with an estimated 537 million people affected in 2021, a figure projected to rise to 643 million by 2030 and 783 million by 2045. The economic impact is staggering, with costs expected to soar from \$1.3 trillion in 2021 to \$2.4 trillion by 2045. The burden is particularly acute in low- and middle-income countries, where rates are increasing more rapidly than in wealthier nations. This has necessitated to investigate alternative approaches to curb the costs, hence The World Health Organisation (WHO) has historically recommended the use of

alternative sweeteners to mitigate the adverse effects of excessive sugar consumption, suggesting a limit of 10% of daily caloric intake from table sugar according to Marya, Oberoi and Nagpal (2020). However, recent guidelines from WHO (2023) advise against using non-sugar sweeteners for weight control, citing a lack of long-term benefits and potential health risks. Despite this caution by WHO, Stevia has emerged as a sought-after alternative sweetener, with global demand anticipated to reach USD 721 million by 2025 in Kenya (Polk, 2021).

The Stevia sector's emergence in Kenya during the early 2000s signified a transformative era in agricultural practices, aligning with the worldwide trend towards natural sweeteners. Initial challenges, including limited farmer awareness and inadequate infrastructure, were overcome through the concerted efforts of governmental and non-governmental entities. Such collaboration fostered a supportive environment for Stevia cultivation, as seen in strategic partnerships and government incentives that strengthened farmer confidence and market access. By 2010, pilot projects had already bolstered farmer assurance, paving the way for knowledge sharing and market growth (Lofgren & Longwitz, 2023). Governmental support, manifesting as subsidies and technical guidance, played a crucial role in the advancement of Stevia farming, underscoring a dedication to sustainable agricultural diversification (Charlton et al., 2024). From 2019 to 2024, the industry witnessed a significant surge in Stevia production, evolving from initial experiments to large-scale operations. This growth is credited to the introduction of superior Stevia variants, the adoption of progressive farming techniques, and enhancements in processing methods, driving the industry's forward momentum (Ng'weno et al., 2019; Ochieng et al., 2020).

The evolution of Stevia cultivation in Kenya is a testament to the synergistic impact of governmental support, international collaboration, and local agricultural innovation. It underscores the potential of alternative cash crops to not only meet global market demands but also to transform the economic landscape of agrarian societies (Wanyonyi et al., 2022; Lofgren & Longwitz, 2023; Charlton et al., 2024). However, the variety of challenges facing the cultivation and commercialisation of Stevia in many countries by Stevia farmers include the lack of knowledge and experience among farmers, the absence of a local processing technology to extract and purify steviol glycosides, and yields of Stevia farmers which remain both unpredictable and insufficient to meet growing global demand because of high input costs, lack of irrigation, poor disease control and limited expertise in the cultivation of specific improved variety. Addressing these multifaceted challenges necessitates the establishment of a robust framework for the commercialisation of Stevia, which would empower farmers with the

resources and information required to thrive in the global marketplace. Despite government support and the growth of the Stevia industry in Kenya, scholars such as Obaga and Ocholla (2022) and Otieno & Ouma (2018) uphold the view that there is a lack of a cohesive commercialisation strategy to realise Stevia's full economic potential for commercialising Stevia, especially among smallholders.

1.3. THE ORIGINS OF STEVIA REBAUDIANA BERTONI

Stevia Rebaudiana Bertoni, belonging to the Asteraceae family, is a perennial herb indigenous to South and Central America, particularly Paraguay. According to Stamataki et al. (2020) and Khattab et al. (2020), Stevia's historical use by the Guarani tribes as a sweetener highlights its cultural significance and longstanding safety profile for human consumption. In Kenya, since 2008, Stevia's cultivation has been promoted as an alternative income for farmers, with over 2,200 farmers receiving training from corporations like James Finlay Kenya Limited, enhancing both agricultural practices and economic prospects. Initiatives such as Ndege Chai SACCO in Kericho District underscore the potential of Stevia as a cash crop in regions with low income and limited agricultural diversification, as noted by Odhiambo et al. (2023) and Spielman et al. (2023). The critical analysis of these developments suggests that Stevia's integration into local economies could be a sustainable model for agricultural innovation and economic growth.

The historical journey of Stevia from Morita Kagaku's research in the 1960s to its approval in Japan in 1970 illustrates the shift towards natural sweeteners over artificial ones like saccharin, which fell out of favour due to health concerns (Toskulkao et al., 2020; Roberts et al., 2019). Despite regulatory efforts to curb sugar intake due to its health implications (Popkin et al., 2019), the sweetener market dynamics remain complex, with consumer preferences for taste and cost influencing the choice between Stevia, saccharin, and sugar (Dutton et al., 2023). As this study is about Stevia and its commercialisation by smallholders, it is important to understand not only the botanical characteristics, but also health and regulatory acceptance.

1.3.1. Botanical Description of Stevia

The Stevia genus, with over 240 species, is a member of the Asteraceae family with 32,913 species across 1911 genera, classified under the Eupatorieae subfamily, as per Mabberley (2019) and Stevia Network International (2023). It is distinguished by its sweet-tasting leaves, attributed to ent-kaurene diterpene glycosides (Panghal et al., 2018; Crawley, 2023). Notably, *Stevia Rebaudiana*, one of six primary Stevia species, stands out among its 240+ species for its intense

sweetness, surpassing sugar cane by 200-300 times without the caloric impact (Singh et al., 2019). Critical compounds like stevioside and rebaudioside A not only contribute to this sweetness but also offer health benefits, such as improved insulin regulation (Toskulkao et al., 2020; Stamataki et al., 2020). The global application of these glycosides spans food, dietary products, and cosmetics, leveraging their antimicrobial and glycemic control properties (Jaiswal et al., 2020).

1.3.2. Naming of Stevia

Steviol glycosides, derived from the *Stevia rebaudiana* plant, are recognised for their non-toxic nature and absence of carcinogenic, mutagenic, or teratogenic effects, as reported by Ahmad et al. (2021). Furthermore, these compounds exhibit potential therapeutic benefits, such as anti-inflammatory and antioxidant properties, which may confer protection to essential organs and aid in the regulation of blood pressure and glucose homeostasis, corroborated by sources like Examine.com (2022), Organic Facts (2022), and Verywell Health (2022). This critical analysis aligns with recent findings that reinforce the safety and health-promoting aspects of steviol glycosides, supporting their use as a beneficial sweetener alternative.

1.3.3. Legal recognition of Stevia

Stevia rebaudiana Bertoni extracts are recognised globally for their natural sweetening properties, yet they encounter varied regulatory responses. Liu et al. (2022) emphasise the necessity for international regulatory alignment after examining Stevia's legal standing across 77 nations. Regulatory perspectives have evolved over time; for instance, the U.S. reversed its 1991 prohibition due to cancer risks, approving specific steviol glycosides in 2011 (Anton et al., 2020; King et al., 2021). Japan has been a long-time proponent of Stevia, using it since the 1970s and supporting various steviol glycosides (Yoshida et al., 2023; Yamanaka et al., 2020). The establishment of a safe consumption threshold by the FAO/WHO's JECFA in 2008 facilitated its acceptance in France and the EU (Cimpoi & Cristea, 2019; Liu et al., 2022). India sanctioned the use of steviol glycosides in food products in 2015 (Kaur & Kapoor, 2018), while South Africa's approval process, indicated as forthcoming in 2014, is reportedly still pending (Cimpoi & Cristea, 2019).

1.4. THE RESEARCH PROBLEM

Kenya's Stevia industry has immense potential to enhance the country's economy, predominantly for rural communities and smallholder farmers (Omondi et al., 2021), but its development and

growth are disadvantaged by fragmented commercialisation strategies that impede equitable stakeholder engagement and lessen its long-term sustainability (Wanjala et al, 2020). Stevia cultivation has demonstrated potential in Kenya, where collaborations between smallholder farmers and businesses such as PureCircle have increased participation from 1,500 farmers in 2012 to an estimated 4,000 or more by 2019 (Chandran, 2013; PureCircle, 2019). Regardless of the growing participation of smallholder farmers in the Stevia value chain, this growth has failed to interpret into equitable benefits for smallholder farmers, their contributions remain inadequately supported by a comprehensive commercialisation framework (Lofgren & Longwitz, 2023), due to the domination in the Stevia value chain by multinational corporations, that limits the farmers' ability to gain higher-value returns (Ng'weno et al., 2019).

The potential of the Stevia industry in Kenya is rendered vulnerable by the absence of an integrated, inclusive, and synchronised commercialisation strategy to unlock the full economic potential of Stevia, claim Obaga and Ocholla (2022) and Otieno & Ouma (2018). The absence of information and direction for the participating smallholder farmers in the Stevia value chain aggravates this issue. Without an all-encompassing and evident framework, smallholder farmers are compelled to navigate the market's complexity without knowledge of how to scale their operations or boost their earnings, which consequently can cause inadequacies in marketing and production, according to Lofgren and Longwitz (2023).

The value chain, which hypothesises that value is added at every stage of production and distribution as the product advances, is a key concept in comprehending the commercialisation process. However, this supposition is not essentially accurate with regards to Stevia market in Kenya, since smallholder farmers in Kenya experience major barriers, which limits their competitiveness due to limited market access, weak bargaining power, minimal support in integrating into higher-value segments of the chain, lack of access to funding, limited access to high-quality seeds, and knowledge gaps in cultivation techniques (Charlton et al., 2024). For example, the Kenya Agricultural and Livestock Research Organisation (2022) established that just 15% of smallholder farmers stated enjoying access to the required resources to increase Stevia output. Moreover, a lack of a clear value chain structure has led to inefficiencies; post-harvest losses may total up to 20% of production (International Stevia Council, 2021). This highlights the importance of approaching these problems from a broad perspective.

These barriers are deepened by supply chain inefficiencies and economic policy biases such as a

lack of access to quality inputs, reliable market information, and supportive financial mechanisms (Lopez & Brown, 2021). Hence, smallholder farmers are incapable of meeting the escalating demand for Stevia globally, which has been growing by about 7% annually due to consumers' increasing health concerns and need for natural sweeteners (Global Stevia Institute, 2020). Nevertheless, the contribution by smallholder farmers in Kenya to the country's Stevia export value is less than 10%, while larger commercial entities remain dominant (African Development Bank, 2023). Additionally, they remain weakened and uncompetitive due to limited access to resources and the dominance of global firms that have more efficient operations and access to resources.

The main research problem this study endeavours to tackle is the absence of a comprehensive commercialisation framework that can enable smallholder farmers' comprehensive assimilation into the Stevia value chain. According to Ng'weno et al. (2019), Globally there is increasing demand for Stevia and it has the potential to improve rural livelihoods, however, smallholder farmers in Kenya are incapable to exploit this potential due to absence of an organised plan, and barriers such as a lack of market access and technical assistance, which are crucial for increasing production and guaranteeing profitability (PureCircle, 2019). The requirement for a tailored framework that addresses these barriers, according to Lofgren and Longwitz (2023), can be achieved for smallholder farmers through market analysis, capacity-building programs, and stakeholder participation. With the development of such a framework based on a well-planned commercialisation strategy augmented by suitable policies and infrastructure, the sustainability and profitability of Stevia growing in Kenya can be enhanced to meet local demand as well as access the global market, and could amplify rural income and contribute to Kenya's overall socioeconomic development.

1.5. AIM OF THE STUDY

This study aimed at developing a framework for the commercialisation of Stevia in Kenya through the value chain approach.

1.6. RESEARCH OBJECTIVES

This study had five research objectives, which were as follows:

- a) To identify opportunities in the commercialisation of Stevia in Kenya according to smallholder farmers.
- b) To identify challenges in the commercialisation of Stevia in Kenya according to smallholder farmers.
- c) To analyse the factors that are crucial in the commercialisation of Stevia in Kenya according to smallholder farmers.
- d) To recommend an appropriate framework to be used in enhancing the commercialisation of Stevia in Kenya through the value chain approach.

1.7. RESEARCH QUESTIONS

This study had the following research questions aligned with the research objectives presented in section 1.6 above:

- e) What are the opportunities in commercialising Stevia in Kenya according to smallholder farmers?
- f) What are the challenges in the commercialisation of Stevia in Kenya, according to Stevia farmers?
- g) What are the factors that are crucial in the commercialisation of Stevia in Kenya, according to smallholder farmers?
- h) What is an appropriate framework that can be used in enhancing the commercialisation of Stevia in Kenya through the value chain approach?

1.8. SIGNIFICANCE OF THE STUDY

This study is significant in three ways. First and foremost, the study is very important as it has developed a multi-dimensional framework of Stevia commercialisation, which may help various actors in the Stevia value chain, especially smallholder farmers, to get a comprehensive view of Stevia commercialisation. The context-specific framework of commercialisation of Stevia in Kenya provides insights on how various actors may coordinate vertically and horizontally to ensure a sustainable Stevia value chain.

Second, the study is significant for policymakers in the domain of commercialisation as it has provided insights not only on the challenges but also opportunities to support smallholders and the process of commercialisation of Stevia better in Kenya. While the study was focused on Stevia commercialisation in Kenya, it also has the potential to ignite policy debates and influence how smallholder commercialisation in other countries may unfold to ensure inclusive and sustainable Stevia value chains.

Lastly, the study is likely to be helpful to scholars of agri-business and strategic management as it has provided a context-specific commercialisation framework which may be operationalised and guide future research on smallholder commercialisation in Kenya and other relevant countries. It is hoped that the findings of this study will contribute towards closing the existing gap in the available literature on the commercialisation of Stevia, especially from the viewpoint of smallholder farmers in Kenya and other similar contexts.

1.9. CHAPTER ORGANISATION

The thesis has six chapters, namely:

Chapter 1- Introduction and Background. This chapter provides the introduction and background of this qualitative study, which seeks to examine the commercialisation of Stevia in Kenya and ultimately develop a framework for Stevia commercialisation. The chapter has delved into the issues relevant to smallholder commercialisation and the history and nature of Stevia. Furthermore, the research problems, research objective and research questions are also discussed in this chapter before presenting the chapter outline and chapter summary.

Chapter 2 - Literature Review. This chapter discusses information obtained from interrogating different types of relevant literature reviews.

Chapter 3 - Research Methodology. This chapter indicates how the researcher designed and executed the qualitative study. Furthermore, this chapter discusses the research philosophy, methodology and methods used in this study. There is a discussion of sampling, data collection, analysis and ethics related to the current qualitative study.

Chapter 4 - Results. This chapter presents results from data collected and a broad discussion of the pertinent issues emanating from the data.

Chapter 5 – Discussion. This chapter analyses the collected data.

Chapter 6- Conclusions and Recommendations. This chapter provides the conclusions drawn from the data presented and analysed in chapter 4 and discussed in chapter 5. Furthermore, the researcher provides answers to the research questions and recommendations based on the findings of the study.

1.10. SUMMARY

This introductory chapter lays the foundation for the research on the commercialisation of Stevia in Kenya by initially discussing the nature of the market and the opportunity for Kenyan and African smallholders to be included in the local and international value chains of Stevia, which is an alternative sweetener. The chapter has discussed the necessity of Stevia in addressing the health problems, such as diabetes, but also the growing demand and challenges faced by smallholders in the commercialisation of Stevia in Kenya. The history and characteristics of Stevia as the crop under investigation when it comes to commercialisation are discussed in this chapter. This chapter has also focused on the origin of Stevia as a crop being investigated in terms of its smallholder commercialisation

The chapter has discussed the research problem regarding the difficulty and lack of a comprehensive framework to guide Stevia farmers in the commercialisation of Stevia. Research objectives, research questions, the significance of the study, and an outline of the various chapters which comprise this thesis are presented in this introductory chapter before presenting a chapter summary. The next chapter will delve into the relevant literature review that was consulted.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

To place Stevia within the larger discourse of agricultural commercialisation, the literature review provides a thorough synthesis of the body of knowledge regarding its cultivation and commercialisation in Kenya. The commercialisation of Stevia has the potential to greatly benefit Stevia farmers in Kenya as it becomes more and more popular as a high-value crop in the global market for health-conscious consumers (Nguyen et al., 2024). This review assesses how structural and systemic obstacles, such as restricted financial access, policy limitations, and market inefficiencies, hinder their capacity to fully take advantage of this opportunity by combining pertinent scholarly literature, official documents, and industry analyses (Mutai et al., 2022).

This literature review has four main goals: evaluating current commercialisation frameworks and their suitability for Kenyan Stevia cultivation; analysing policy environments, government interventions, and cooperative models that impact smallholder participation in Stevia markets; comparing Kenya's commercialisation trajectory with international best practices and providing evidence-based suggestions for better smallholder incorporation into competitive markets; and developing a structured framework for the sustainable commercialisation and growth of Stevia that incorporates value chain development, cooperative structures, financial access, and policy-driven support mechanisms (Karanja et al. (2022).

This review attempts to give Kenyan smallholder Stevia farmers a solid foundation for creating an expandable, sustainable commercialisation strategy by methodically assessing market and value chain frameworks, policy frameworks, financial inclusion mechanisms, and cooperative-based commercialisation models that are pertinent to Stevia farmers (Adebo & Otieno, 2023).

2.2. STEVIA GROWTH AND COMMERCIALISATION IN KENYA

This section discusses the Stevia growth and commercialisation in Kenya by first clarifying the definition of agricultural commercialisation, then unpacking commercialisation frameworks, benefits of the framework for Stevia growing and commercialisation, opportunities for the growing and commercialisation of Stevia, and transitioning to market-oriented systems.

2.2.1. Defining Agricultural Commercialisation

Agricultural commercialisation refers to the transition from subsistence farming to market-oriented production, emphasizing distribution, value addition, and competitiveness (Pingali & Rosegrant, 2020). It enables smallholders to access broader markets, increasing income potential while fostering innovation and productivity through improved resource allocation and modern techniques (Reardon & Timmer, 2021). Formalized trade networks and supply chains strengthen resilience but require government intervention to address institutional and financial barriers in developing economies (Pingali, 2019; Muriithi & Wanzala, 2022).

For Stevia, key commercialisation steps include marketing, processing, and farming, reliant on robust strains and advanced methods for higher yield and quality (Mwangi et al., 2023). In Kenya, while 80% of Stevia is exported, 40% of farmers face exclusion from export-driven programs due to quality gaps, with international market reliance exposing them to price fluctuations and middlemen inefficiencies (Adebo & Otieno, 2023; Mutai et al., 2022).

2.2.2. Commercialisation Frameworks: The Linkage to Global Markets

Commercialisation frameworks play a vital role in integrating products into global markets, emphasizing the alignment of consumer preferences and ensuring profitability (Ge, 2021). For Stevia farmers, these frameworks involve creating an environment conducive to effective production and marketing through research and development policies, financial incentives, and trade agreements aimed at overcoming market barriers (Baxter et al., 2024; Muriithi et al., 2022). Collaboration among stakeholders—government bodies, private entities, and research institutions—is essential to address multifaceted challenges and foster innovation, enabling a sustainable and profitable Stevia industry globally (Nyangweso et al., 2023; Mwaura & Ochieng, 2023).

Critical phases, such as input procurement, production, processing, marketing, and distribution, require enhanced stakeholder synergy (Bongomin et al., 2021). Financial assistance programs further mitigate smallholder farmers' economic burdens, facilitating investment in advanced practices like precision irrigation, resulting in improved yields (Khan et al., 2023; Arimi et al., 2022). For example, Kenya's allocation of \$1.2 million in 2022 for Stevia research and seed distribution exemplifies targeted strategies addressing cultivation costs (Roberts et al., 2023). These frameworks underscore the importance of comprehensive policies promoting innovation and sustainability, allowing Stevia farmers to compete effectively in international markets while achieving growth and quality advancements (Choudhary et al., 2022; Kinsella et al., 2022; Getahun, 2020). Overall, well-structured commercialisation frameworks ensure profitable and sustainable expansion within the sector.

2.2.2.1. Understanding the Global Stevia Market

According to Research and Markets (2022), the global Stevia market is expected to reach USD 1.2 billion by 2024 at a compound annual growth rate (CAGR) of 14.6%, due to the rising demand and use of low-calorie sweeteners for health benefits and wellbeing by customers. For Kenya, Stevia farmers and the agricultural industry as a whole stand to gain a great deal from entering this growing market.

2.2.2.2. Market Entry Strategies

Successful commercialisation frequently depends on choosing the right market entry strategy, such as a hybrid strategy, which is influenced by export, licensing, franchising or joint venture formation, and is influenced by global market conditions, resulting in improved success rates in foreign markets by 15–25% (Anderson & Narus, 2023). This necessitates adaptability in commercialisation frameworks, which may involve several entry tactics based on knowledge of international markets.

2.2.2.3. Economic Factors and Pricing Strategies

Pricing strategies and adjustments in commercialisation frameworks are directly influenced by economic indicators such as consumer purchasing power, inflation, exchange rates, and currency rates, to which companies need to adjust their prices to remain in a competitive position in global markets (Modi & Modi, 2019). The World Bank (2023) estimates as much as a 15% price adjustment to maintain competitiveness for long-term success during uncertain economic times.

2.2.2.4. Regulatory Compliance and Standards

Companies must deal with a number of locally distinct regulatory requirements if they wish to participate in global marketplaces. An OECD (2024) analysis states that compliance with international standards can increase their market acceptance by 30%, hence expanding their market reach. Consequently, integrating regulatory compliance within the commercialisation framework is necessary to lower market entry risks.

2.2.2.5. Innovation and Technology Integration

The rapid advancement of technology affects both the global market environment and commercialisation frameworks. Businesses that employ technology for product development, advanced analytics in their commercialisation plans, and marketing might experience 40% shorter market entry durations (Geer et al., 2023). This highlights how important it is to employ technology-driven tactics in commercialisation frameworks to enhance commercialisation efforts.

2.2.3. Benefits of the Framework for Stevia Growing and Commercialisation

To improve the economic sustainability of Stevia production, a strong marketing framework in Stevia growing and commercialisation framework, which incorporate consumer insights and flexible enough to adjust to shifting consumer preferences (Croll & Yoskovitz, 2018), create sustainable business models, and match agricultural output with market demands is essential (Kagunda et al., 2024). Such frameworks can increase farmers' incomes by 30% to 40% by utilizing efficient pricing mechanisms and market linkages, according to research by Wamalwa and Serem (2023). For example, Stevia farmers who directly market superior products that satisfy demands from customers prepared to pay premium rates, conduct market research that includes customised agricultural methods to produce quality product, apply methodical procedures to produce value added products, market and distribution based on compelling value proposition advantageous to rivals, can dramatically boost their profit margins (Kardes et al., 2019). According to a poll, 65% of consumers give health advantages top priority when choosing sweeteners, indicating that Stevia's marketing can successfully match consumer preferences (Kagunda et al., 2024).

2.2.3.1. Innovation and Flexibility in Production

The commercialisation of Stevia, based on the framework for growing and commercialisation of Stevia, depends on innovative agricultural methods, cultivation technologies, and product processing advances, options for long-term viability as health trends change. The use of agile approaches realises a 30% improvement in product development timetables, which helps farmers react quickly to market changes—a crucial skill in the unstable sugar industry (Schwaber, 2021).

2.2.3.2. Business Modelling for Sustainable Growth

The Growing and commercialisation of the Stevia framework depends on a successful business modelling to achieve sustainable growth and long-term success (Osterwalder et al., 2018). A business model producing a comprehensive business plan for Stevia production can strike a balance between consumer value and economical cultivation practices, which can increase profit margins by 40% in cooperative enterprises in emerging markets (Wamalwa & Serem, 2023). Cooperative methods of production, marketing, and distribution can give Kenyan smallholders a competitive advantage.

2.2.4. Opportunities for the Growing and Commercialisation of Stevia Farming in Kenya

Kenya's Stevia farming industry is still in early stages, consisting of more than 70% of Stevia smallholders, crucial for food security and economic stability (Kenya National Bureau of Statistics, 2021). It will need major value chain improvements in cooperative development and networks, adequate construction of domestic processing facilities, infrastructure, restricted funding for Stevia farmers, value addition, innovation of technology and its integration, fortifying farmer associations, and regulatory frameworks that support smallholders to take full advantage of new market prospects, even while demand for natural sweeteners increases globally (Gosnell & Abrams, 2020; Fernandez-Stark & Bamber, 2023; Roberts et al., 2023; Bamber & Gereffi, 2024). These initiatives will increase Kenya's competitiveness in the global Stevia market and increase local production capacity (Ahmad et al., 2024).

2.2.4.1. Export Market Potential

The global demand for stevia is growing, with African markets expected to reach USD 400 million by 2025 (Market Research Future, 2023). This opens the door for Kenyan SMMEs to establish themselves as alternative suppliers to established producers from China and South America.

2.2.4.2. Partnerships and Collaborations:

Collaborative efforts between SMMEs and research institutions or NGOs can foster innovation and knowledge transfer. Studies indicate that investments in R&D can enhance product quality and marketability, yet only about 30% of SMMEs engage in R&D (Dutta et al., 2022). Increased collaboration can bolster competitiveness and spur innovation.

2.2.4.3. Sustainable Agricultural Practices

As consumers increasingly demand sustainable and environmentally friendly products, SMMEs engaged in organic stevia cultivation can leverage this trend effectively (Thompson, 2023). By capitalising on sustainable farming methods, they can appeal to a conscientious consumer base and potentially command higher prices.

2.2.4.4. Growth of E-commerce:

The rise of e-commerce presents a significant opportunity for SMMEs to reach broader markets beyond their geographical limitations. By utilizing online platforms, SMMEs can increase their visibility and accessibility, driving sales growth. As of 2023, approximately 45% of consumers in Kenya reported purchasing health products online, underlining the importance of establishing e-commerce capabilities (Kenya National Bureau of Statistics, 2024).

2.2.4.5. Sustainable and Organic Farming Certifications

The growing demand for items that are ethically sourced and organic through the supply chain, globally, presents Stevia farmers with an opportunity to enter niche markets. Organically certified produce can retail for 25% to 50% over its conventional counterparts, proving that certification programmes give access to premium pricing and align well with the global commitment to sustainability (Mwangi et al., 2024).

Despite these potential benefits, only 35% of smallholder farmers successfully access international markets due to stringent quality standards, lack the resources and significant time, know-how to meet international quality standards, strict attention to instructions, due to costs (which often exceed \$1,000), expenses for certification ranging from \$500 to \$2,000 annually (Owino & Otieno, 2021), certification requirements (USAID, 2020). Furthermore, Fairtrade Africa (2021) and Mwangi et al. (2024) indicate that only about 15% of Stevia farmers are involved in Fairtrade-certified supply chains, which significantly limits their access to premium markets. This leaves a considerable number of smallholders exposed to exploitation and

exclusion from the value chain, and access to more lucrative market opportunities. This requires policy support by the government, as in the tea and sugar value chains for smallholders.

2.2.4.6. Emerging Markets and Export Opportunities

At a compound annual growth rate (CAGR) of 10%, the worldwide Stevia market is expected to reach over \$1.5 billion by 2026 (MarketsandMarkets, 2023). Consequently, Stevia farmers have the enticing opportunity to increase their revenue by 50% to 100% through direct exports with the help of the Kenyan Export Promotion and Branding Agency (Export Promotion and Branding Agency, 2022) in international markets. However, 20% of smallholders are aware of export laws (Njuguna, 2024). The potential to benefit from export-based revenue development opportunities is limited by this discrepancy. The government intervention to provide access to smallholders regarding trade and export opportunities can improve this situation, to take advantage of the opportunity.

2.2.4.7. Government Support and Policy Frameworks

The institutional support available to Stevia farmers and the current policy framework like Kenya Vision 2030, the Agricultural Sector Transformation and Growth Strategy (ASTGS), and the National Agricultural Policy Framework have a considerable impact on the Stevia market's opportunities in the form of improved market access, certification, financial aid, capacity-building programs, technology adoption, agricultural innovation, and climate resilience strategies, and significantly impact the agricultural industry and national economy (Otieno et al., 2023).

Despite these policy interventions, Stevia smallholders remain marginalised in favour of multinational agribusinesses, since current agricultural policies frequently fall short of meeting their smallholders' needs (Wekesa & Karanja, 2024). This absence of specialized assistance may reduce the potential advantages that might otherwise result from Stevia cultivation and commercialisation, creating a scenario in which regulations act as obstacles rather than enablers. To attain these policy improvements, targeted interventions, participation from stakeholders, and ongoing evaluation are required. The support needed for effective market integration and sustainable farming practices is ensured for Stevia farmers through these programs (Abubakar & Mutundu, 2024). Utilising government assistance, forming cooperatives, and adopting technological advancements can significantly raise smallholders' level of living (Oyugi, 2024). Increasing access to markets and certification chances would also help Kenya's agriculture

industry become more robust in the future (AgriFI Kenya Challenge Fund, 2019; Wafullah et al., 2024).

Expanded access to financial assistance programs offered 15% of the national budget, which was reserved about 40% toward increasing the ability of Stevia farmers, which increases significant prospects for Stevia farmers in Kenya (Ministry of Agriculture, 2022). This financial investment creates an environment that is favourable for Stevia by expanding access to resources, markets, and technology (Ministry of Agriculture, 2022).

However, corruption and ineffective bureaucracy undermine the Kenyan government's 15% national budgetary allotment to agricultural development, of which 40% is used to strengthen Stevia smallholders' capacity (Ministry of Agriculture, 2022). 70% of Stevia farmers think bureaucratic processes are overly complex and inefficient, per a poll by Odhiambo et al. (2023a). As a result, only about 30% of the money really reaches the intended farmers. Thus, government frameworks may exist, but their actual application often fails to yield the intended outcomes. Addressing this enhances the opportunities.

Additionally, to the 40% to increase the ability of Stevia farmers, the government set aside KES 150 million (\$1.2 million) in 2022, with an emphasis on seed distribution, farmer training, and research (Roberts et al., 2023). However, weak policy enforcement, bureaucratic inefficiencies, and policy gaps—particularly in contract enforcement, financial incentives, and export facilitation—have resulted in tardy cash release, delaying timely farmer help.

The government and other entities such as Kenya Agricultural and Livestock Research Organization (KALRO) have initiated initiatives to broaden financial inclusion through Smallholder Agricultural Productivity that offers low interest rate of 8% for loans in contrast to the market norm of 12–15% (Agricultural Finance Corporation, 2023; KALRO, 2023). This program aims to increase productivity by 20% over the next five years (KALRO, 2023). This financial support enables smallholders to invest in better seeds, fertiliser, and technologies, boosting their production and profitability. This is crucial because just 14% of smallholders currently have access to formal funding (Karanja, 2023a).

The National Climate Change Action Plan promotes climate-smart farming practices to increase resilience and sustainability, and drought-resistant crop subsidies are being used to improve food

security for smallholders in areas that are at risk, can boost their yields by as much as 40% (National Environment Management Authority, 2022; Kinsella et al., 2022) in the face of adverse weather conditions.

2.2.4.8. Economic Growth and Income Generation

Natural sweeteners are in high demand worldwide due to their potential for greater economic expansion and revenue generation, which makes them a desirable market for smallholder growers. The FAO estimate from 2023 predicts that the worldwide Stevia market would expand by 8.5% a year until 2027, which will present substantial prospects for producers. However, access to markets and resources is frequently a prerequisite for smallholders to be able to take advantage of this expansion. Mwangi and Wambua (2021) pointed out that although some farmers have begun to witness a rise in their earnings, many lack basic resources like high-quality seeds and financial assistance, and continue to be generally shut out of these financial gains. Available opportunities are not equally accessible, which exacerbates already-existing disparities among Stevia farmers.

2.2.4.9. Market Dynamics and Value Chain Implications

Through initiatives like the Kenya Market-Led Agricultural Program, the Agricultural Sector Transformation and Growth Strategy (ASTGS), and Public-Private Partnerships (PPPs) promote the creation of value chains to obtain better seeds, agricultural training, and market connections and access, by collaborating with cooperatives and private businesses (Gikonyo & Muriuki, 2021), lessen the influence of middlemen, to increase smallholders' profitability and negotiating strength. Ng'ang'a et al. (2024) found that Stevia farmers who sell in organized groups or cooperatives achieve 30% higher prices than those who sell alone, highlighting the importance of group marketing tactics and laws that support farmer group development.

However, Otieno and Onyango (2022) point out that Stevia farmers sometimes face difficulties integrating and accessing premiums in the market because of low infrastructure and ignorance of market demands. Farmers' markets may be restricted as a result of this mismatch, so reducing their potential gains. According to Ndung'u and Gikonyo (2023), failure to adhere to market norms can result in substantial financial losses, proving that opportunity alone does not ensure success.

2.2.4.10. Resource Utilisation and Environmental Considerations

Sustainable Stevia growing demands techniques and technologies to better use resources like water and land, especially in semi-arid areas. Unsustainable agricultural methods, such as an excessive dependence on chemical pesticides and fertilizers, can endanger the long-term sustainability of Stevia production, soil degradation and diminished biodiversity, ultimately affecting the sustainability of farmers' operations, even though they may initially benefit from higher yields (Zhang & Chen, 2024). The integration of sustainable agriculture techniques that guarantee resource conservation with rising prospects is imperative.

2.2.4.11. Access to Training and Capacity-Building Programs

It has been demonstrated that cooperative arrangements increase farmers' production, sales and output gains by 25% (Muriuki et al., 2023) as a result of training programs that transfer knowledge and skills, and access to market from the Kenyan government and other non-governmental organisations based on the current agriculture policy. Nonetheless, the way cooperatives are run and organized greatly affects how effective they are. Gitau et al. (2023b) found that only about 30% of Kenyan cooperatives operate effectively, while 70% struggle due to poor management, poor governance, and a lack of transparency, which limits many smallholders from gaining access to markets.

2.2.4.12. Cooperative Formation and Collective Marketing

It has been demonstrated that pooling resources, sharing knowledge, and collective exposure to larger markets result in better pricing negotiations, lowering transaction charges through cooperative arrangements, and increasing farmers' prices by 25% (Muriuki et al., 2023) compared to individual sales. Nonetheless, the way cooperatives are run and organized greatly affects how effective they are. Gitau et al. (2023b) found that only about 30% of Kenyan cooperatives operate effectively due to poor management, poor governance, and a lack of transparency. Many

smallholders may not benefit as planned as a result, which would limit cooperatives' overall capacity to assist Stevia producers in gaining access to markets.

2.2.4.13. Technological Innovations and Advancements

Digital innovations, such as M-Farm and iCow, enhance agricultural decision-making with real-time data (Karanja et al., 2023b). By 2025, 50% of Stevia farmers in Kenya are projected to adopt such technologies, optimising production and reducing costs (Ministry of Agriculture, 2023). Farmers using digital platforms report a 40% productivity increase and a 20% decrease in input costs, significantly boosting Stevia cultivation (Omwenga & Ochieng, 2023). Despite these benefits, adoption faces barriers like high knowledge and investment demands, coupled with inadequate rural infrastructure (Omondi & Chumo, 2023). Overcoming these challenges is vital for realising the full potential of digital agriculture.

2.2.5. Transitioning to Market-Oriented Systems

Kenyan Stevia farmers require resource mobilisation, technical support, and capital to transition from subsistence to commercial farming, enhancing sustainable agricultural practices (Bamber & Gereffi, 2024; Fernandez-Stark & Bamber, 2023). A proposed commercialisation framework emphasises organisational development, stakeholder collaboration, and value chain integration for market-oriented systems. Smallholders face diverse developmental stages, addressing market challenges while improving competitiveness and resilience. Policies supporting this framework aim to empower farmers, enabling effective market engagement and unlocking Stevia's economic potential. These strategies provide systematic pathways to navigate commercialisation, ensuring sustainable growth and significant benefits for smallholder farmers (Hossain et al., 2023).

2.2.5.1. Steps in Transitioning to Commercialisation

2.2.5.1.1. Initial Engagement and Awareness

The foundational steps essential for the transition of smallholders from subsistence towards commercialisation involve raising awareness and enhancing capacity building and training programs to educate farmers on optimal agricultural practices, processing techniques, market dynamics, and profit potential. These programs are typically organized by government bodies, agricultural institutions, and private sector entities (Arimi et al., 2022). A study by Kambole and Juma (2020) reveals that farmers who receive such programmes are 60% more likely to adopt

commercial practices compared to untrained peers. Access to the programs equips farmers with the necessary skills for comprehensive production engagement. In Kenya, agricultural cooperatives like the Network for Eco-farming in Africa (NECOFA) are pivotal in supporting farmers and facilitating knowledge exchange, ensuring the dissemination of best practices (Gosnell & Abrams, 2020) besides the government.

2.2.5.1.2. Organisational Structures: Primary, Secondary, and Tertiary Cooperatives

Farmers join cooperatives to boost bargaining power, reduce costs, and access market knowledge, training, and equipment, achieving profit margins up to 35% higher through economies of scale (Fernandez-Stark & Bamber, 2023; Gosnell & Abrams, 2020). Primary cooperatives focus on bulk purchasing and production, secondary cooperatives handle aggregation and processing, while tertiary cooperatives engage in advocacy and policy frameworks. In Brazil, cooperatives improved credit access and markets, increasing smallholder incomes by over 30% (Gonzalez & Tadeo, 2021).

2.2.5.1.3. Building Partnerships and Accessing Resources

Cooperatives provide a unified voice that enhances their capacity to access resources and attract funding from philanthropic organisations and development agencies. Such partnerships can stimulate investment in essential infrastructure, including processing plants and storage facilities, which are vital for adding value to Stevia products. Research indicates that cooperatives in developing contexts typically secure 40% more funding compared to individual farmers (Baba & Senzu, 2022).

2.2.5.1.4. Engaging in All Stages of the Value Chain

Organised smallholder farmers can engage effectively across the Stevia value chain, encompassing resource mobilisation, production, processing, and marketing. Access to financial resources for high-quality inputs, such as fertilizers and irrigation systems, can boost yields by 25%, though financial constraints remain a barrier for 60% of farmers (Arimi et al., 2022; Roberts et al., 2023).

Cooperatives enhance production efficiency by 25% through collective agronomic practices (Demke et al., 2022). Processing facilities enable value addition, increasing profits by 50% compared to raw leaves (Hossain et al., 2023; Ahmad et al., 2024). Direct market connections negotiated by cooperatives secure 15-20% higher prices and foster competitive advantages

(Khalid et al., 2023; Bamber & Gereffi, 2024). Transitioning to structured value chains and national markets provides insights into consumer preferences, paving the way for regional and global trade. This comprehensive approach strengthens profitability and resilience in Stevia commercialisation.

2.2.5.1.5. Full Commercialisation and Scaling Operations

Achieving full commercialisation entails a strategic focus on expanding production capacity by increasing their cultivated acreage, embracing technological innovation, establishing centralized processing facilities, diversifying product offerings, enhancing market competitiveness in both domestic and international markets, improve supply chain efficiency ensures competitiveness and economic sustainability domestically and global markets (Roberts et al., 2023). An increase in production volume leads to reduced costs per unit, positioning Kenya as a recognised global supplier of Stevia. Empirical research shows that businesses expanding their acreage by 50% or more can expect an average revenue increase of 35% over three years (Roberts et al., 2023).

2.2.5.1.6. Comparative Studies from Similar Countries

Examining the experiences of countries like Ghana and Ethiopia, which are at a comparable stage of development, provides a benchmark for effective strategies for transitioning smallholders to commercialisation.

- a. **Ghana:** The cocoa sector illustrates the significant impact of cooperatives on agricultural commercialisation in Ghana in collective bargaining and negotiations with multinational companies, resulting in enhanced income stability. In 2020, cooperative-led marketing strategies contributed to approximately \$1.35 billion in earnings for cocoa farmers (International Cocoa Organization, 2021).
- b. **Ethiopia:** The coffee sector in Ethiopia showcases how cooperative structures can improve farmers' access to training and global markets. The establishment of the Coffee Exporters Association has enabled organized farmers to engage in direct trade, leading to substantial income increases and the sustainability of coffee production (Asfaw et al., 2021). This success underscores the critical importance of collective organisation in advancing commercialisation efforts.

2.3. UNPACKING VALUE CHAIN AND ITS RELEVANCE TO COMMERCIALISATION

Value chain development focuses on optimizing the sequence of activities involved in producing and delivering goods to the market by addressing inefficiencies, market access, reducing transaction costs, improving the quality of produce, and fostering collaboration among stakeholders, which ultimately ensures that smallholders can maximize their returns (Reardon et al., 2023; OECD, 2023). Furthermore, a robust value chain facilitates smallholder integration into high-value markets through improved storage, processing, and certification programs (Zhang et al., 2024). For instance, in the Stevia sector, value chain improvements have significantly increased global competitiveness among smallholder farmers in China and Paraguay (FAO, 2023).

2.3.1. Value Chain Access and Participation

The value chain, which includes all the steps necessary to take a product from conception to consumption, is integrated in both domestic and international markets.

2.3.1.1. Understanding Value Chains in the Global Context

Global value chains encompass interconnected actions that add value, enhancing competitiveness and profitability (Kaplinsky & Morris, 2023). They integrate local production with international trade dynamics, optimising resources, investment flows, and market accessibility (Gereffi & Lee, 2019; Cox & Chicksand, 2020). This integration fosters economic growth and facilitates cross-border trade, benefiting both regional producers and global markets.

2.3.1.2. Linkage of Global Markets and Value Chain Dynamics

Improving market access, local adaptation and global standards, supply chain resilience, and risk mitigation are all part of connecting global markets and value chain dynamics.

2.3.1.2.1. Improving Market Access

Taking part in international markets might lead local producers to be exposed to new technologies and operational procedures that can increase the effectiveness of the value chains, enable access to bigger, more profitable clientele, and receive higher prices (Mburu & Muiruri, 2023). Innovation and knowledge transfer are made easier by this connection, which is essential for maintaining competitiveness in home markets.

2.3.1.2.2. Local Adaptation and International Standards

Local producers may improve their operating procedures in order to comply with international quality standards on food safety and quality regulations, which are necessary for entry into the global market, have a positive effect on the value chain by boosting customer trust and brand reputation in both domestic and international markets, according to research by Nyaga et al. (2024). Market opportunities may be lost if these criteria are not met, highlighting how crucial it is to incorporate quality management throughout the value chain.

2.3.1.2.3. Supply Chain Resilience and Risk Mitigation

Value chains in a worldwide economy are vulnerable to significant shocks. Businesses can diversify their supply chains and clientele by participating in both domestic and foreign markets, which lowers the risk of geopolitical unpredictability or regional economic downturns (Stentoft et al., 2020). Buying raw materials from different regions of the world increases the supply chain's resilience and flexibility, which is crucial for sustaining operations when the market conditions change.

2.3.1.3. Domestic Market Participation and Its Global Implications

Domestic market participation fosters innovation, quality improvement, and expertise in production, distribution, and marketing, which are crucial for international competitiveness (Benard & Juma, 2023). Effective local market management enhances understanding of consumer behaviour and market dynamics, enabling organisations to outperform global rivals (Owino & Koske, 2021). Moreover, value-added products developed in regional markets build brand loyalty, which can seamlessly extend to international markets (Mwangi et al., 2019), demonstrating the interconnectedness between domestic performance and global success.

2.3.2. The Importance of Value Chain in Agricultural Commercialisation

The agricultural value chain is vital for commercialisation, fostering resource access, technology integration, and market efficiency to enhance competitiveness (Makhura et al., 2020; Alarcon et al., 2023). Analysis identifies interdependencies critical for sustainability and profitability. For example, Stevia commercialisation benefits from comprehensive value chain strategies, linking production to consumption, and promoting value addition that transforms inputs into market-ready products (Kaplinsky & Morris, 2020; Bongomin et al., 2021). This holistic approach strengthens resilience in the agricultural sector and drives market success.

2.3.3. Stakeholder Collaboration within the Value Chain

Stakeholder collaboration is essential for the successful commercialisation of Stevia in Kenya, involving farmers, processors, and distributors within the value chain (Saidi et al., 2022). Such collaboration fosters shared value, aligns objectives, and promotes sustainability. Strengthening ties among stakeholders enhances knowledge exchange, innovation, and the adoption of best practices, increasing productivity and preparing farmers for market demands (Humphrey & Memedov, 2020).

Cooperatives play a crucial role in linking Stevia producers to local and international markets, particularly for organic and speciality sweeteners. Research shows that Stevia growers in contract-backed cooperatives experienced a 50% increase in sales volume over three years, while non-affiliated farmers faced price instability and limited access (Roberts et al., 2023). Efficacy in these cooperatives relies on value chain support services, including financing, technology adoption, and quality control (Kamau & Odhiambo, 2024).

Additionally, government agencies provide essential quality control, input subsidies, and technological improvements, with KES 150 million allocated in 2022 for enhancing the Stevia value chain (Roberts et al., 2023). Private firms and NGOs further contribute by facilitating training, market connections, and technology transfer, promoting innovations that enhance productivity and competitiveness (Andrianyta et al., 2024; Nery et al., 2024). Digital technologies like blockchain improve market access and efficiency, allowing farmers to respond promptly to market demands (Hossain et al., 2023). These collaborations empower farmers and strengthen cooperative resilience, fostering industry growth (Paudel, 2024).

2.3.4. Stevia Value Chain Critical Components

The value chain critical components involved in the Stevia value chain framework are production, processing, marketing and distribution, creating value at each stage (Kaplinsky & Morris, 2018). Each of the many segments that make up the Stevia value chain are nursery operations, cultivation, harvesting, processing (extraction, refining, manufacturing), marketing, and distribution, is bolstered by focused interventions such as quality control, R&D, traceability systems, and sustainability practices (Gosnell & Abrams, 2020).

2.3.5. Value Addition through Processing and Innovation

Value addition through processing is crucial for smallholder farmers involved in Stevia production, enabling them to extract refined steviol glycosides from dry leaves (Fernandez-Stark & Bamber, 2023). This integration of quality control and processing methods enhances product purity and aligns with global market standards, potentially allowing smallholders to command prices 50% higher than those who sell unprocessed leaves (Bamber & Gereffi, 2024). Currently, only 15% of Stevia is processed domestically in Kenya (Fernandez-Stark & Bamber, 2023), highlighting a significant opportunity for value addition through activities like branding and packaging, which can boost revenues by 20% to 50% (Ndung'u & Gikonyo, 2021).

Such enhancements facilitate entry into higher-margin markets, supporting overall sales and aligning with global sustainability objectives (Hossain et al., 2023). Furthermore, robust value chains promote investments in technology and infrastructure, which foster agricultural innovation and productivity (Thompson & Narding, 2022). Incorporating research and development can further improve efficiency and minimize environmental impacts (Ahmad et al., 2024).

2.3.6. The Importance of Integration in the Stevia Value Chain

Integrating the various segments of the Stevia value chain is essential for enhancing production efficiency, sustainability, and quality. This approach streamlines processes from farming to processing and distribution, addressing industrial challenges while minimizing delays and waste (Hossain et al., 2023). By aligning planting schedules with market demands (Karanja & Mureithi, 2020), farmers can improve product quality to meet consumer tastes and international standards. Integrated quality management systems enable stakeholders to monitor all production phases, from seed selection to post-harvest handling, which can increase consumer confidence and market prices (Mwangi et al., 2021). Additionally, sustainability-focused practices, such as eco-friendly farming and effective waste management, are crucial for long-term compliance with environmental standards, enhancing the overall resilience of Kenya's Stevia sector (Wambua & Muturi, 2023). Ultimately, this integrative strategy fosters better resource management and positions the Kenyan Stevia industry as more competitive and sustainable.

2.4. UNPACKING SMALL-MEDIUM AND MICRO ENTERPRISES IN STEVIA COMMERCIALISATION AND VALUE CHAIN

Small and medium-sized enterprises play a crucial role in the commercialization of stevia and its associated value chain in Kenya. Their influence spans cultivation, processing, marketing, and

innovation, making them vital players in the agricultural sector. By capitalising on local resources, SMES not only contribute to job creation, innovation, economic development, and economic growth but also promote sustainability and innovation within the stevia market.

2.4.1. Definition and Description of the Small-Medium Enterprises

Small and Medium Enterprises (SMEs) are defined differently across countries, but generally, they are businesses that maintain revenues, assets, or a number of employees below a certain threshold. Definition of small enterprises by The European Commission are organisations that typically employ fewer than 50 people and have an annual turnover or balance sheet total not exceeding €10 million; and medium enterprises as organizations employing fewer than 250 employees and having an annual turnover not exceeding €50 million or a balance sheet total of not more than €43 million (European Commission, 2020). In the United States, the Small Business Administration (SBA) categorises small businesses based on industry-specific standards. For instance, a manufacturing business may qualify as small if it has fewer than 500 employees (U.S. Small Business Administration, 2021).

Micro-enterprises, typically defined as businesses with fewer than 10 employees, play a crucial role in global economies, especially in developing countries. They are characterized by low capital investment, limited resources, and a strong local consumer base. Micro-enterprises contribute significantly to job creation, poverty alleviation, and economic diversification. According to the World Bank (2023), micro-enterprises represent approximately 90% of all businesses in low and middle-income countries, highlighting their importance in the informal and formal economies.

2.4.1.1. Considerations for Defining SMEs in Stevia Commercialisation

Nganga and Obara (2023) emphasise the essential role of SMEs in driving innovation and research, asserting that their contributions are crucial to the agricultural sector and local economies, particularly within the context of emerging crops like stevia. Ouma et al. (2020) explore the socio-economic advantages of stevia cultivation, highlighting how micro, small, and medium enterprises (MSMEs) create job opportunities and bolster economic resilience in rural areas. Similarly, Thompson (2023) analyses the marketing strategies adopted by SMEs in the stevia industry, reinforcing the notion that these businesses target health-conscious consumers and support the growth of organic and natural product markets. Additionally, Karanja et al.

(2024) offer insights into how various sizes of SMEs participate in stevia commercialisation, emphasising the importance of diverse enterprise scales in fostering agricultural sustainability.

2.4.1.2. Recommended Definition of SMEs in Stevia Commercialisation

Small, Medium, and Micro-Enterprises (SMEs) engaged in stevia commercialisation are defined as privately-owned businesses that, depending on their scale and employee count, contribute significantly to the production, processing, and distribution of stevia products. Typically, micro-enterprises employ fewer than 10 individuals, small enterprises employ between 10 and 50 individuals, and medium enterprises employ between 51 and 200 individuals. These entities play a crucial role in strengthening local economies, promoting agricultural diversification, and fostering innovation within the natural sweetener market (Nganga & Obara, 2023; Ouma et al., 2022).

2.4.2. The Impact of Small and Medium Enterprises (SMEs)

SMMEs contribute to employment, job creation, innovation, economic development, and economic growth.

2.4.2.1. Contribution to Employment

SMEs contribute significantly to employment, accounting for approximately 60-70% of total employment in many economies (OECD, 2021). For instance, in the European Union, SMEs represented 99.8% of all enterprises, employing over 100 million people (European Commission, 2020), representing 70% of total employment (European Commission, 2022). In the United States, SMEs create about 1.5 million net new jobs annually, according to the SBA (2022). In the EU, SMEs provide around 100 million jobs.

SMEs in Kenya are estimated to provide approximately 80% of total employment, creating about 5.1 million jobs annually (Kenya National Bureau of Statistics, 2024). This highlights the essential role SMEs play in absorbing labour, especially among the youth. According to Omanga (2023), SMEs have been responsible for creating nearly 80% of new jobs in Kenya, with the sector employing an estimated 14 million individuals across various industries, including agriculture, manufacturing, and services.

2.4.2.2. Economic Impact

SMEs contribute significantly to GDP and employment. According to the World Bank (2021), SMEs account for approximately 90% of all businesses and contribute 60-70% of employment globally. SMEs are critical for economic development and make a notable contribution to GDP. In the EU, SMEs accounted for around 56% of the gross value added (GVA) in the private sector (European Commission, 2020). In the U.S., small businesses created 64% of new jobs in the past 27 years (SBA, 2021).

SMEs contribute about **30%** of Kenya's Gross Domestic Product (GDP), underscoring their significance in the national economy. This contribution has been steadily increasing as SMEs expand their roles in various sectors (Nganga & Obara, 2023). A report by the Kenya National Chamber of Commerce and Industry (2023) suggests that SMEs are projected to grow at an annual rate of **6-7%**, significantly impacting the economic landscape through increased production and consumption.

2.4.2.3. Innovation

SMEs are often considered drivers of innovation recognized, particularly in technology and services. A study by the OECD (2022) notes that, despite making up only about 30% of business investment in R&D and all innovative product launches (OECD, 2021), they generate a disproportionately high number of patents relative to their size. Furthermore, research indicates that SMEs provide a substantial share of patents, further driving technological advancement (European Commission, 2019). The digital transformation has become crucial for SME survival and growth. According to a 2023 survey, around 50% of SMEs have adopted digital tools to enhance operational efficiency and customer engagement (Digital SME, 2023).

Approximately 45% of SMEs in Kenya engage in some form of innovation, improving product quality and processes, which is vital for competitiveness in both local and international markets (Karanja et al., 2024). Data from the Kenya Industrial Property Institute (2022) indicates that there was a 20% increase in patent applications from SMEs focused on innovations in agriculture and food processing, including natural sweeteners like stevia. Increasingly, SMEs are focusing on sustainability. A 2022 report found that **55%** of SMEs implemented sustainable practices to reduce their environmental impact (McKinsey, 2022). This trend is expected to continue as consumers demand more environmentally friendly products and services.

2.4.3. Types of SMEs in the Value Chain of Stevia Commercialisation and Competitiveness

The value chain of stevia encompasses several segments, ranging from cultivation to processing and distribution. SMEs play a crucial role in each of these stages, which can be categorized as Cultivation and Farming Enterprises, Processing and Manufacturing Enterprises, Packaging and Distribution Enterprises, Retail and Marketing Enterprises, and Research and Development Firms

2.4.3.1. Cultivation and Farming Enterprises

Farming SMEs are pivotal and foundational in the initial stages of the stevia value chain. These SMEs are primarily responsible for the cultivation of stevia plants, which require specific climatic conditions and agricultural techniques. They typically operate small-scale farms, often focusing on organic or sustainable farming practices. According to the Food and Agriculture Organization (FAO) (2021), around 80% of global stevia production comes from smallholder farms, particularly in countries like China and Paraguay, and it involves about 70% of stevia cultivators are SMEs, particularly in countries like Brazil and China, which collectively account for over 60% of global stevia production. SMEs are responsible for employing approximately 25 million people in the stevia farming sectors worldwide, contributing about 60% of the rural employment in these regions (FAO, 2021).

In Kenya, Smallholder farmers cultivate stevia, particularly in regions with suitable climatic conditions like Central and Western Kenya. The potential for high profit margins from stevia cultivation in Kenya is up to 300% compared to traditional crops, illustrating its attractiveness (Kira & Nyangena, 2021). Approximately 70% of stevia in Kenya is produced by smallholder farmers, with about 15,000 farmers currently engaged in cultivation (Kenya Agricultural & Livestock Research Organization [KALRO], 2022) indicating a strong presence in the market. According to a report by the Kenya National Bureau of Statistics (2024), Kenyan stevia competes with products from countries like China and Brazil, which dominate over 80% of the global supply. Kenyan SMMEs need to enhance quality and productivity to meet international standards. These farmers often engage in organic farming practices, driven by the high pricing of organic stevia in the international market (Ouma et al., 2022). Cultivation of stevia provides direct and indirect employment for an estimated 200,000 individuals across Kenya, contributing substantially to rural income (Kenyan Ministry of Agriculture, 2023). As per a study by Mutinda

et al. (2024), around 60% of stevia producers in Kenya are SMMEs, with an average farm size between 0.5 and 1.5 hectares (Nganga & Obara, 2023). Their ability to cultivate stevia organically is a competitive advantage contributing to both local and export markets.

2.4.3.2. Processing and Manufacturing Enterprises

Some SMEs focus on processing raw stevia leaves into commercially viable products, such as steviol glycosides, which are used in food and beverages. Processing can include extraction, purification, and formulation. Processing SMEs account for about 30% of the total value of the stevia supply chain (Global Stevia Institute, 2022). These enterprises typically focus on converting raw leaves into high-purity stevia extracts, catering to both local and international markets. According to a recent market analysis, the global stevia market was valued at approximately USD 547 million in 2021 and is projected to reach USD 1.6 billion by 2027, with processing SMEs capturing a significant share of this growth (Mordor Intelligence, 2023).

In Kenya, as of 2023, processing firms represent about 20% of SMMEs involved in the stevia value chain, with approximately 10 registered processing facilities (Kenya Bureau of Standards [KEBS], 2023). However, recent reports by Makunyi (2023) indicate that about 40% of stevia processors in Kenya are small to medium enterprises. Whilst Kenya Agricultural and Livestock Research Organization (2023) highlights that processing of stevia is dominated by SMMEs, accounting for approximately 45% in domestic competitiveness. This gap affects their ability to meet both local and international quality standards. As of 2023, it was reported that only about 25% of stevia processors in Kenya comply with international food safety regulations, which significantly impacts their competitiveness in the export market (Makunyi, 2023). This statistic underscores the critical need for investment in processing capabilities and quality assurance mechanisms. Their profit margins are typically lower (around 20-25%) compared to farming due to operational costs (Juma & Mureithi, 2022). This segment has seen a significant increase, with an estimated growth rate of 15% annually, largely driven by rising demand for natural sweeteners in the food and beverage industry (Market Research Africa, 2023).

2.4.3.3. SMEs in Packaging and Distribution Enterprises

The SMEs involved in packaging and distribution essentially are involved in the supply chain, providing essential raw materials, packaging the processed stevia products and distributing finished products through distributive channels to supply retailers and manufacturers, and exporting internationally. Local marketing strategies often leverage digital platforms to reach

consumers. About 15% of SMEs involved in the stevia value chain focus on packaging and logistics (International Journal of Food Science & Technology, 2022). Research indicates that SMEs make up 60% of distribution channels for natural sweeteners, including stevia (Food and Agriculture Organization, 2023). These enterprises often adopt eco-friendly packaging solutions, responding to the increasing consumer demand for sustainable practices, with 62% of consumers expressing a willingness to pay more for sustainable packaging (Nielsen, 2021).

In Kenya, approximately 10% of SMEs in the stevia value chain focus on packaging and distribution, with a growth rate of 8% annually (Kenya National Bureau of Statistics [KNBS], 2022). A recent survey indicated that 65% of packaging SMEs utilise eco-friendly materials to align with global sustainability trends (Moore, 2023). Their profit margin typically ranges from 15-20%, which is lower than farming but comparable to processing (Otieno & Mburu, 2021). SMEs make up about 60% of the distribution framework for stevia in Kenya, indicating their importance in reaching consumers (Kenya National Bureau of Statistics, 2024). However, about 70% of SMEs report challenges in accessing international markets due to compliance, logistical issues and high export costs (Nganga & Obara, 2023).

2.4.3.4. Retailing and Marketing Enterprises

These SMEs sell stevia products directly to consumers and businesses. Retail SMEs are the final link in the value chain. They often include health food stores, online retailers, and speciality shops that focus on organic or natural products distributing stevia products to end consumers, either through physical stores or online platforms (Kenya National Bureau of Statistics, 2024). Approximately 55% of the market for stevia products is captured by SMEs, which have been growing in presence due to the increasing demand for healthier alternatives (Market Research Future, 2023). The market for stevia products in retail was estimated to grow by 12% annually from 2020 to 2025, indicating a rising consumer preference for healthier alternatives to sugar (IBISWorld, 2023).

In Kenya, retailers account for approximately 25% of the SMMEs in this value chain. Approximately 55% of the market for stevia products in Kenya is captured by SMMEs focused on online and brick-and-mortar retailing (Kenya National Bureau of Statistics, 2024). About 55% of Kenyan consumers report a preference for natural sweeteners, driving demand for stevia products (Consumer Insights Africa, 2023). Their profit margins often reach up to 40%, reflecting higher consumer willingness to pay for healthy alternatives (Gikunda & Maishanu,

2023). A study found that stevia product sales in retail increased by over 30% between 2021 and 2023 (Karanja & Ogutu, 2022). Kenyan SMEs' participation in international markets remains limited, with the majority exporting less than 10% of their production by 2023 (Nganga & Obara, 2023). Competitive pressures from established suppliers in China and Brazil hinder their ability to grow market share internationally.

2.4.3.5. Research and Development Firms

SMEs in this category focus on improving cultivation techniques, on developing new stevia-derived products, improving extraction techniques, enhancing the quality and yield of stevia products, researching new applications for stevia, and researching health benefits. Innovations can lead to higher yields and better-quality products. Research firms account for about 10% of the total SMEs involved in the stevia value chain. Their contributions include advancements in breeding and cultivation practices that cater to specific market demands (Journal of Agricultural and Food Chemistry, 2022). Approximately 30% of the R&D investments in the stevia sector have been directed towards cross-breeding programs aimed at improving yield and taste profiles of stevia (Food Research International, 2023).

In Kenya, R&D enterprises comprise about 5% of the SMEs in the stevia value chain, with total investments reaching approximately USD 2 million in the last two years (Kenya Industrial Research and Development Institute [KIRDI], 2023). However, Nganga and Obara (2023) estimated that only 20% of SMMEs in the stevia value chain invest in R&D, which is crucial for staying competitive in domestic markets and expanding market reach. Whilst only approximately 30% of SMEs are involved in R&D for new stevia-based products (Dutta et al., 2022). This lack of innovation is a significant barrier to capturing new market opportunities, especially as consumer preferences shift towards diverse natural sweetener products.

SMEs that have diversified their product lines to include stevia blends and ready-to-use stevia packets have found increased market success in Kenya (Thompson, 2023). Only 15% of Kenyan SMEs in the stevia sector have successfully launched new products that meet international market trends (Thompson, 2023). These firms have contributed to the development of drought-resistant strains and cost-effective extraction methods, increasing effectiveness by 15-20% (Njue et al., 2022). Their profit margins can be inconsistent, mainly depending on successful product development (Abuya et al., 2022).

2.4.3.6. Summary Comparisons of SME Types in Kenya's Stevia Value Chain

The table below shows the maximum to minimal participation of SMEs in the stevia value chain in Kenyan Stevia commercialisation.

Table 1: Comparison of SMEs Types in Kenya's Stevia Value Chain

SME Type	% of Value Chain	Estimated Employment	Profit Margin
Farming	70%	200,000	300% (high)
Processing	20%	~1,000	20-25%
Packaging	10%	~500	15-20%
Retail	25%	~2,000	40%
R&D	5%	~100	Variable

Source: Researcher

The SME types reflected in Table 1 depict the involvement of SMEs in the value chain, their impact on employment and profit margin. From table 1, the majority of SMEs in stevia commercialisation are in Farming, and their presence in the processing, packaging, retail and R&D is minimal.

Farming SMEs are depicted as the largest segment of the stevia value chain in Kenya, comprising 70% and employing about 200,000 smallholder farmers. The sector boasts a profit margin of 300%, attributed to low input costs and high market prices for stevia leaves due to rising global demand for natural sweeteners (Nganga & Obara, 2023).

Processing SMEs account for 20% of the stevia value chain, employing approximately 1,000 individuals who convert raw leaves into extracts and sweeteners. Profit margins range from 20-25%, lower than farming due to higher production costs and increasing competition from new market entrants (Karanja, Mwangi, & Muriuki, 2024).

The packaging SMEs segment of the stevia value chain accounts for 10% and employs around 500 individuals. With profit margins between 15-20%, packaging is vital for branding and marketability, especially to health-conscious consumers (Ouma et al., 2022). Innovative, sustainable packaging can enhance market share.

Retail SMEs represent 25% of the value chain, offering approximately 2,000 jobs and achieving a profit margin of 40%. This higher margin compared to processing is due to retailers' direct consumer engagement and the rising demand for healthy products (Thompson, 2023). Effective marketing strategies targeting health-conscious consumers can further increase profitability.

Research and development (R&D) SMEs constitute 5% of the value chain, employing about 100 individuals. While profit margins are variable, investments in R&D may lead to long-term benefits, such as improved farming techniques and new products (Karanja, Mwangi, & Muriuki, 2024). Successful R&D initiatives can enhance the overall efficiency of the stevia value chain.

2.4.4. The Organization of SMEs into Cooperatives in Stevia Commercialisation and Value Chain: Rationale and Justification

The organisation of small and medium enterprises (SMEs) into cooperatives plays a significant role in the commercialisation and value chain of stevia in Kenya. This structure not only enhances collective bargaining power but also assists in optimising resource use, improving access to markets, and fostering innovation among member enterprises.

2.4.4.1. The Role of Cooperatives in SMEs

Cooperatives enable SMEs to pool resources, share risks, and improve efficiencies. The cooperative model is particularly relevant in the context of agriculture, where collective action can lead to significant economic advantages. In Kenya, cooperatives have been instrumental in various agricultural sectors, including tea, coffee, and horticulture, and they are now evolving in the stevia market.

2.4.4.2. Resource Sharing

By banding together, SMEs can share the costs associated with production, processing, and marketing. According to a study by Karanja et al. (2024), cooperatives engaged in stevia cultivation reported a 20% reduction in operational costs due to shared resources and amenities. Cooperatives can collectively negotiate better prices for seeds, fertilizers, and agricultural machinery, benefiting all members.

2.4.4.3. Market Access

Cooperatives enhance the bargaining power of SMEs against larger buyers and processors. Research shows that cooperatives can increase sales margins by as much as 15-20%, allowing

farmers to receive fairer prices for their produce (Nganga & Obara, 2023). Cooperatives provide SMEs with the structure needed to access larger markets, both locally and internationally. By consolidating their products, cooperatives can participate in trade fairs and exhibitions, showcasing stevia products more effectively (Ouma et al., 2022).

2.4.5. Rationale and Justification for Cooperatives in the Stevia Value Chain

The rationale behind organising SMEs into cooperatives in the stevia value chain is multifaceted, encompassing economic, social, and market-related justifications.

2.4.5.1. Economic Justifications

The cooperative model facilitates improved profitability for SME members. According to the Kenya National Bureau of Statistics (2024), cooperatives account for approximately 35% of the agricultural sector's revenue in Kenya, illustrating their impact on enhancing income through collective marketing and sales strategies. Cooperatives enhance agricultural productivity by providing members with access to training, technology, and extension services. The World Bank (2023) reports that cooperative members experience a 30% increase in productivity due to shared knowledge and resources, translating into higher yields of stevia.

2.4.5.2. Social Justifications

Cooperatives empower smallholder farmers by providing them with a voice in decision-making processes and access to essential services. This empowerment fosters a sense of community and belonging among members and encourages sustainable practices within the stevia value chain (Thompson, 2023). Through cooperatives, members can benefit from training programs focused on sustainable farming practices and market skills. According to Ouma et al. (2022), 70% of cooperative members reported improved knowledge and skills in stevia cultivation and processing.

2.4.5.3. Market-Related Justifications

With the rising demand for natural sweeteners, cooperatives allow SMEs to adapt quickly by pooling resources to develop new products and improve processing techniques (Karanja et al., 2024). Cooperatives can implement quality control measures that ensure all products meet market standards, thus enhancing the marketability of stevia products. An assessment by Nganga and Obara (2023) revealed that cooperatives with quality control measures achieved a 25% higher acceptance rate in international markets compared to individual producers.

2.4.5.4. Case Studies and Statistics

Several successful cooperative initiatives have emerged in Kenya's stevia commercialisation, one of which is the Stevia Farmers Cooperative Society. It has seen considerable success by organizing local farmers. It claims to have increased its members' incomes by an average of 40% over three years, demonstrating the effectiveness of the cooperative model in enhancing economic outcomes (Kenya Agricultural and Livestock Research Organization [KALRO], 2023). Cooperatives have allowed SMEs to penetrate larger markets such as Europe and the United States. Statistics indicate that cooperatives contributed to a 30% increase in export volumes of stevia products in 2023 (KNBS, 2024).

2.5. THE RELEVANCE OF SMALLHOLDER FARMERS IN COMMERCIALISATION

Smallholder farmers are defined as individuals or households that rely predominantly on family labour and operate on small plots of limited land size, generally less than two hectares, with limited resources and capital compared to larger commercial farms (FAO, 2020). This classification is significant because it highlights their unique challenges and contributions to the agricultural economy, particularly in developing countries like Kenya.

2.5.1. Historical Context of Smallholder Farmers in Kenya

The historical context of smallholder farming in Kenya reflects a transition from colonial agrarian policies favouring large plantations to a renewed focus on subsistence farming post-independence in 1963, aimed at empowering local communities and enhancing food security (Nkonya et al., 2020). By the early 2000s, smallholders were recognised for their vital contributions to food production and rural employment, currently generating 75% of Kenya's agricultural output (KNBS, 2021; FAO, 2019; Doss et al., 2021; Kassa et al., 2023).

2.5.2. SMEs Participation in Kenya

Micro-enterprises dominate the SME landscape in Kenya, representing about 98% of all registered businesses and employing over 2.5 million individuals across sectors like agriculture, manufacturing, and services (Kenya National Bureau of Statistics [KNBS], 2024). This employment accounts for approximately 30% of the country's total workforce, underscoring their vital role in economic resilience. In the context of stevia commercialisation, micro-enterprises

provide significant opportunities as they participate in diverse stages of the value chain, including farming, processing, packaging, and retailing.

Smallholder farmers, categorized as micro-enterprises, cultivate around 30% of the total area planted with stevia, contributing to the sector's growth and increasing demand for this natural sweetener (Nganga & Obara, 2023; Karanja et al., 2024). Emerging micro-processors are also carving out niches by producing locally sourced stevia extracts and organic products, enhancing product differentiation (Wainaina, Gikonyo, & Muriithi, 2022). By leveraging local markets through direct sales channels, micro-enterprises report profit margins of 30-35%, reflecting their effective engagement with health-conscious consumers (Ouma, Nyang'au, & Anyona, 2022).

2.5.3. Overview of the Stevia Market in Kenya

Stevia has gained recognition in Kenya as a potential substitute for sugar, particularly in the context of rising health concerns related to sugar consumption. The Kenyan government has supported the cultivation of stevia as part of agricultural diversification initiatives. The potential market size for stevia-based products in Africa is projected to reach USD 400 million by 2025, with Kenya being a key player due to its favourable climatic conditions for stevia cultivation (Market Research Future, 2023). As of 2024, the global stevia market is projected to grow to approximately USD 1.14 billion, with Kenya positioned as a significant player (Market Research Future, 2023).

2.5.4. The Position of Smallholder Farmers in Kenya with regard to the Economy

Smallholder farmers in Kenya primarily engage in subsistence farming, comprising about 80% of the 3.5 million agricultural households (KNBS, 2021). They typically cultivate 0.2 to 2.0 hectares, with 90% operating on less than 2 hectares, which limits scale and productivity (FAO, 2020). Despite these constraints, smallholders are crucial for local and national food security, producing staple crops like maize and beans (Nkonya et al., 2020). Their farming practices are also deeply embedded in cultural traditions, fostering community cohesion (Karanja et al., 2022). Smallholders generate approximately 70% of Kenya's agricultural output, highlighting their role in the economy and the necessity for policies that improve their productivity and sustainability while acknowledging their precarious working conditions (Kenya National Bureau of Statistics, 2021).

2.5.5. Transition to Stevia Commercialisation

The transition to Stevia commercialisation in Kenya reflects a significant shift toward commercial agriculture for smallholders, driven by emerging market opportunities, government support, and changing consumer preferences. This shift is crucial for the livelihoods of about 18 million Kenyans reliant on agriculture (World Bank, 2021). The global demand for natural sweeteners is projected to grow from USD 500 million in 2022 to USD 1.5 billion by 2025 (Market Research Future, 2023), providing a vital opportunity for smallholder farmers to diversify their income through Stevia.

Recent government initiatives have improved access to agricultural inputs, finance, and market information, facilitating smallholders' integration into commercial markets (Ministry of Agriculture, 2023). Many have formed cooperatives, enhancing their bargaining power and economic resilience (Kimani et al., 2023). However, transitioning from subsistence to commercial agriculture requires access to quality inputs and education on best practices for cultivating and processing Stevia. Strategic investments in rural infrastructure and market-access initiatives, as well as policies promoting training and capacity-building, are essential for empowering smallholders to enhance their participation in the Stevia value chain (Ghosh et al., 2021; Mwangi et al., 2023; Ochieng et al., 2024).

2.5.6. Market Integration and Value Chain Participation of Smallholders

Kenya's Stevia market is fragmented, with most smallholders selling raw, unprocessed leaves and operating at a subsistence level (Bamber & Gereffi, 2024). Only 30% of farmed Stevia is exported, limiting profitability due to insufficient processing capabilities (Fernandez-Stark & Bamber, 2023). Consequently, Kenyan Stevia is priced about 40% lower than processed varieties from established producers in China and South America (Hossain et al., 2023). While 25% of farmers engage in contract farming, most lack long-term supply contracts, making them vulnerable to price fluctuations (Ahmad et al., 2024). The weak market systems dissuade growth and limit production potential. Compared to leading exporters that process 80% of their output, Kenya's inadequate processing infrastructure keeps profit margins low for local farmers until significant investments are made.

2.5.7. Challenges faced by Smallholder Farmers in Stevia Growing and Commercialisation

There are both potential and problems in commercializing Stevia because smallholders produce more than 80% of Kenya's agricultural output (IFAD, 2022). Stevia farmers face systemic and structural challenges that are highlighted by these frameworks. To ensure smallholders can thrive in a competitive global market and improve the agricultural environment, targeted policies and actions are needed to deal with these issues.

2.5.7.1. Structural Challenges

Access to resources and land, financial and credit limitations, inadequate infrastructure, a lack of technical expertise, reliance on the market, and restricted access to resources are some of the structural issues.

2.5.7.1.1. Resource Mobilisation and Financial Constraints

Limited access to financial resources is a major barrier for Stevia farmers in Kenya, with only 14% having access to formal finance (Karanja, 2023a). Approximately 60% of farmers face financial constraints that hinder investment in essential inputs like quality seedlings and irrigation systems (Roberts et al., 2023). About 70% report insufficient access to high-quality seeds and fertilizers, resulting in yields 50% below potential (Karanja & Ng'ang'a, 2021). Compared to established crops like tea and coffee, Stevia remains underfunded and unsupported (Gosnell & Abrams, 2020).

High input costs also dissuade farmers; they spend around KES 120,000 (approximately \$900) per hectare, 40% above ideal levels (Arimi et al., 2022). This financial strain limits their ability to adopt modern agricultural practices and ultimately hinders market competitiveness (Mwangi et al., 2021). Additionally, the perception of smallholders as high-risk borrowers due to limited collateral perpetuates a cycle of poverty and underinvestment (Muthini & Njeru, 2023).

To facilitate the transition from subsistence to commercial farming, targeted financial measures are essential. Structured credit facilities and support programs can empower farmers to access necessary resources, significantly enhancing their productivity and participation in the Stevia value chain (Otieno et al., 2022).

2.5.7.1.2. Access to Land

Insufficient access to land is a significant structural barrier for Stevia farmers in Kenya. Most smallholders operate on plots smaller than three acres, primarily using labour-intensive, subsistence farming methods (Mutai et al., 2022). With 67% of farmers cultivating less than one hectare, productivity is constrained, yielding averages of 2.5 tons per hectare compared to 4–5 tons in China and 3–4 tons in India (Zhou et al., 2020). Moreover, only 25% of farmers have secure land titles, deterring long-term investments due to fears of losing land (Obeng & Adger, 2022). Insecure land tenure reduces investment likelihood by 40%, ultimately leading to lower yields and sustainability challenges (Obeng & Adger, 2022).

2.5.7.1.3. Infrastructure Deficiencies

Infrastructure deficiencies in rural areas pose significant challenges for Kenyan Stevia farmers. A study indicates that 40% of these farmers cite poor infrastructure as a major barrier to market access (Nyangweso & Arach, 2024). Inadequate road networks and storage facilities lead to over 30% post-harvest losses due to spoilage (National Agricultural and Rural Inclusive Growth Project, 2021). Additionally, insufficient transportation raises transaction costs by 15% to 20% of total sales, forcing farmers to sell at lower prices to local brokers. Enhancing rural infrastructure is crucial for improving market access and profitability for smallholders.

2.5.7.1.4. Lack of Technology, Technical Knowledge and Skills

The lack of mechanized farming significantly hinders Stevia production, with 70% of farmers still relying on manual labour (Adebo & Otieno, 2023). Furthermore, 45% lack access to modern technology and financial resources (Mutai et al., 2022). While 20% of smallholders use precision farming technologies, many remain ignorant of optimal pest management and crop production techniques (Kinsella et al., 2022). Despite frameworks promoting technology adoption, a lack of technical expertise persists. Research indicates that effective irrigation technologies can enhance yields by 25%, yet high costs impede widespread adoption (Ahmad et al., 2024). Comprehensive training and improved access to mechanisation are essential for increasing productivity and ensuring market preparedness.

2.5.7.1.5. Market Dependency

Market dependence is a major problem for small-scale Stevia growers. Because of the erratic cash crop markets, almost 60% of Kenyan smallholders have inconsistent incomes, according to the FAO (2020).

Muriuki and Ndung'u (2023) highlight that smallholders are particularly susceptible to changes in the global market, which could result in decreases in income of up to 30% during times of low demand. To make quick money, farmers may prefer high-risk production methods as a result of this vulnerability (Muriuki & Ndung'u, 2023).

2.5.7.2. Systematic Challenges

Price discrepancies, a lack of knowledge and training, legal and legislative hurdles, market access and information asymmetry, financial services and credit availability, high transaction costs, and price volatility are all examples of systematic problems.

2.5.7.2.1. Market Access and Information Asymmetry

Access to timely and accurate market information is crucial for Stevia farmers' commercialisation, yet information asymmetry hinders their ability to negotiate fair prices. In Kenya, only 25% of Stevia farmers have access to relevant market data (Republic of Kenya, 2023). Poor infrastructure and weak relationships with larger agribusinesses further limit market access. Improved access could potentially increase Stevia exports from 30% to 60% in five years (Ahmad et al., 2024).

2.5.7.2.2. Price Disparities

Price disparities between Stevia farmers and larger producers are significant, with smallholders earning \$1.50 to \$2.50 per kilogram, while larger companies can command prices between \$3.00 and \$4.50 per kilogram (Makoko et al., 2023b). Another study found smallholders receive \$2.00 to \$2.50 per kilogram compared to \$3.50 to \$5.00 for larger firms (Owino et al., 2023c). This highlights the challenges smallholders face in achieving fair compensation in a market dominated by larger producers.

2.5.7.2.3. Limited Knowledge and Training

According to a study, 60% of Stevia farmers in Kenya were not aware of the best practices for growing Stevia, which ultimately hindered productivity. Stevia is a relatively new crop, and farmers' lack of access to Extension Services, which offer crucial knowledge on cultivation practices, pest and disease management, and post-harvest handling, poses serious challenges.

2.5.7.2.4. Regulatory and Policy Barriers

Regulatory barriers significantly hinder effective Stevia commercialisation for Kenyan farmers. Although the National Agricultural Policy Framework promotes cash crops, bureaucratic obstacles complicate licensing and certification, while strict food safety standards restrict smallholders from accessing profitable markets (Wamalwa & Serem, 2023). Studies indicate that 65% of Stevia farmers face such obstacles, consuming up to 20% of their operating time and expenses on compliance (Karanja, 2022), ultimately reducing their market competitiveness and agricultural output.

2.5.7.2.5. Barriers to Market Integration

For Stevia farmers, market integration is severely hampered by structural and systemic issues. Due to their limited ability to negotiate prices, smallholders are frequently marginalised by the dominance of market power within a small number of agricultural enterprises. Because of middlemen and brokers' exploitation, smallholders only receive 50–60% of the market price for their produce, which denies them just recompense and threatens their capacity to make a living (Ng'ang'a et al., 2024).

2.5.7.2.6. Access to Finance

Their capacity to invest in agricultural innovations and technology is limited because almost 80% of Stevia farmers do not have access to formal financial institutions (Karanja & Ng'ang'a, 2021). Due to high loan rates and inadequate collateral, many farmers are forced to rely on unofficial lending schemes, which charge interest rates exceeding 40% annually. This limited access to financing hinders the growth of Stevia growing by reducing agricultural production by 25% (Karanja & Ng'ang'a, 2021).

2.5.7.2.7. Access to Credit and Financial Services

For Stevia farmers, one of the biggest obstacles to commercialisation is the availability of financing. The inability of 86% of smallholders to obtain formal financial services restricts their capacity to make investments in essential technology and inputs (Karanja, 2023a). Many smallholders are unable to enter value-added marketplaces or scale production without sufficient financial resources. To empower small farmers, commercialisation frameworks that incorporate financial inclusiveness measures like agriculture insurance and microcredit are essential.

2.5.7.2.8. High Transaction Costs

Up to 30% of Stevia farmers' earnings may be spent on high transaction costs brought on by market inefficiencies, significantly reducing their profitability (Muriuki & Ndung'u, 2023a). Economic stability is impacted by smallholders' frequent lower prices when selling products to middlemen. A market power imbalance results from this dependency on middlemen; smallholders only receive roughly 60% of the final consumer price for their goods (Muriuki & Ndung'u, 2023a).

2.5.7.2.9. Price Volatility

According to Njuguna (2024), smallholder cash crop farmers may experience annual revenue fluctuations of up to 50% due to price volatility in agricultural markets. Because of the unpredictable nature of Stevia market prices, growers are compelled to choose short-term tactics over long-term ones. Because of this volatility, less money is spent on crucial agricultural technologies (Njuguna, 2024).

2.5.8. Strategies For Addressing Challenges Faced by Stevia Farmers

Kenyan Stevia farmers encounter systemic and structural challenges due to inadequate regulations and business models that disadvantage smallholders (Karanja, 2023a). To address these issues, creating a well-organised value chain is essential, enabling approximately 70% of smallholders without formal associations to access markets and enhance their bargaining power. Establishing cooperatives can facilitate group marketing, resource pooling, and collaborations with exporters and agribusinesses to penetrate higher-value markets (Ng'ang'a et al., 2024). Additionally, promoting supportive policies and regulatory frameworks is crucial for commercializing Stevia. This includes favourable laws for production and sales and tax incentives for processors, which can facilitate the transition of smallholders to commercial operations and encourage investment in infrastructure and technology (Muthini & Njeru, 2023). Implementing these strategies can create a robust foundation for Stevia cultivation and marketing, empowering farmers to realise their full potential.

2.5.8.1. Understanding the Market Dynamics

A comprehensive understanding of market dynamics is crucial for overcoming barriers to Stevia commercialisation. The Stevia market is projected to grow at a CAGR of 8.3%, reaching \$4.3 billion by 2027 (Mordor Intelligence, 2023). Kenyan farmers can capitalize on this growth by

conducting market analyses to align production with consumer preferences (Kagunda et al., 2024).

2.5.8.2. Strengthening Cooperatives and Group Marketing

Forming and strengthening cooperatives allows Stevia farmers to reduce transaction costs and enhance negotiating power through collective marketing. In India, farmer producer organisations (FPOs) have increased incomes by 30% (Kumar et al., 2022a). This approach can similarly benefit Kenya's Stevia farmers, who have a 45% cooperative membership (Kenya National Bureau of Statistics, 2022).

2.5.8.3. Enhanced Access to Financial Services

Cooperatives enable Stevia farmers to reduce transaction costs, enhance negotiating power, and collectively market their products. In India, farmer producer organisations (FPOs) have led to a 30% income increase due to improved negotiation skills and reduced reliance on middlemen (Kumar et al., 2022a). This model, applicable in Kenya where 45% of Stevia farmers are cooperative members (Kenya National Bureau of Statistics, 2022), can bolster market access. Furthermore, low-interest loans and microfinance can facilitate access to quality inputs and technology, with Vietnam's microcredit initiatives boosting production by 60% (Nguyen et al., 2021a).

2.5.8.4. Building Infrastructure and Market Access

Putting money into rural infrastructure, like roads, warehouses, and processing plants, can greatly improve Stevia farmers' access to markets. Agriculture production efficiency has increased by 40% in Paraguay as a result of better road networks (Martinez et al., 2023). For Stevia products to be transported to markets in Kenya, improving rural infrastructure is essential to reducing costs and spoilage rates. The government should give rural transportation and storage systems top priority in order to increase access to domestic and foreign markets.

2.5.8.5. Technological Adoption and Support

Technological adoption can significantly enhance the productivity and decision-making of Stevia farmers through digital platforms, precision agriculture, and mobile applications. For instance, investments in agricultural technology in China have increased smallholder productivity by 30% (Zhang et al., 2024). In Kenya, smartphone apps providing real-time market data and pest control information enable informed decision-making.

Governments and IT companies can collaborate to ensure these technologies are accessible and effective, while precision agriculture tools like drones and soil sensors can boost productivity and resource efficiency. Research indicates that modern technologies can improve yields by 15-20%, highlighting their transformative potential for smallholder farming (Wamalwa & Serem, 2023).

2.5.8.6. Capacity Building and Education Programs

Enhanced capacity-building and education programs in Kenya can optimize Stevia cultivation and market readiness. Regular training on farming and processing practices is crucial for knowledge dissemination. In India, similar initiatives have improved farmers' understanding of sustainable practices by 45% (Rathi et al., 2023). Structured training can boost sustainability, marketing strategies, and financial literacy, increasing productivity by 30% (Kinsella et al., 2022). Improving technical skills ensures higher yields and quality, essential for accessing premium markets.

2.5.8.7. Promoting Organic Certification and Sustainable Practices

Kenya's position in the international Stevia market would be further cemented by investments in export certification, irrigation technology, and training initiatives. Considering the growing market demand for organic products, smallholders' income potential can be greatly increased through urging them to implement organic agricultural practices and get organic certification. Organic certification has resulted in 30–50% price hikes in Paraguay (Koch et al., 2022). Kenyan farmers' incomes can be increased while encouraging sustainable farming methods by offering them financial assistance and training to fulfil organic standards.

2.5.8.8. Inclusive Commercialisation of Stevia for Stevia farmers in Kenya

To ensure fair inclusion of Stevia farmers in Kenya's production and marketing, a multifaceted strategy is essential. Key facilitators include investment in infrastructure, strengthening cooperatives, and enhancing access to financial services (Bamber & Gereffi, 2024). Additionally, leveraging technology, implementing capacity-building initiatives, and promoting organic practices will improve productivity and market competitiveness (Fernandez-Stark & Bamber, 2023). Adopting successful foreign models and emphasizing policy-driven initiatives can enhance farmers' incomes and strengthen Kenya's position in the global Stevia market (Roberts et al., 2023; Ahmad et al., 2024).

2.5.8.9. Overcoming Barriers to Stevia Commercialisation for Stevia farmers in Kenya

The commercialisation of Stevia in Kenya faces several barriers for smallholder farmers, including land access limitations, financial constraints, inadequate infrastructure, and regulatory inefficiencies (Bamber & Gereffi, 2024). To address these issues, collaboration among the private sector, NGOs, and the government is essential. Enhancements in market information, farmer training, rural infrastructure, and financial accessibility are crucial for empowering smallholders (Fernandez-Stark & Bamber, 2023). Integrating Stevia farmers into the value chain and promoting policy reforms can foster a more resilient agricultural sector, positioning Kenya's Stevia industry for sustainability and competitiveness (Ahmad et al., 2024).

2.6. COOPERATIVES: COLLABORATIVE INSTRUMENT FOR SMALLHOLDERS COMMERCIALISATION

Cooperatives are defined as autonomous associations of individuals who voluntarily collaborate to meet their common economic, social, and cultural needs through a democratically controlled enterprise (International Cooperative Alliance, 2021) because they operate on the principles of cooperation, mutual aid, and collective action, enabling members to benefit from pooled resources and shared risks.

2.6.1. Cooperatives in Stevia Commercialisation

Cooperatives play a crucial role in facilitating the transition of smallholder farmers in Kenya from subsistence to commercial Stevia agriculture by offering operational advantages, including value chain integration, training, and essential infrastructure (Kimani et al., 2023). By providing resources such as storage and transportation facilities, cooperatives help reduce post-harvest losses and enhance market efficiency. Additionally, the profitability of smallholders increases significantly through value-added production; profits from processing Stevia leaves can be 50% higher than selling them raw (Bamber & Gereffi, 2024).

2.6.1.1. Market penetration

According to Mordor Intelligence (2023), cooperative members can also increase their market penetration by 40%, which would increase their attractiveness to consumers looking for trustworthy suppliers. Due to their lack of negotiating leverage, smallholders frequently pay less under current frameworks that rely on direct sales, outgrower programs, or contract farming (Makoko et al., 2023).

2.6.1.2. Collective Bargaining and Purchasing

Cooperatives significantly enhance the bargaining power of Stevia farmers by enabling them to collectively negotiate prices, share resources, and reduce risks associated with market fluctuations. Research indicates that cooperative members can experience revenue improvements of up to 50% compared to individual farmers (Muthoni et al., 2024). This collective strength allows cooperatives to negotiate profit margins that are 30% higher than those of independent producers (Bamber & Gereffi, 2024), thereby increasing overall market stability (Karanja et al., 2022).

Despite these advantages, only 35% of Kenyan Stevia farmers are affiliated with cooperatives, compared to 70% in more established cash crop sectors like tea and coffee (Gosnell & Abrams, 2020). Cooperative membership improves access to market connections, input subsidies, and extension services, yet many farmers lack participation in organized networks, limiting their negotiating leverage (Fernandez-Stark & Bamber, 2023). Members of well-structured cooperatives can negotiate bulk purchase agreements, achieving farm-gate prices that are 40% higher than those of independent sellers (Bamber & Gereffi, 2024) while reducing input costs by 30% and increasing market revenues by 45% through economies of scale (Fernandez-Stark & Bamber, 2023).

Moreover, contract growers earn 40% more than those using informal selling methods (Santos et al., 2019). Collaborations with the private sector and outgrower programs provide essential inputs, market access, and lower price volatility risks (Roberts et al., 2023). Access to credit, quality seeds, and agricultural training through cooperatives addresses critical challenges faced by individual farmers (Kimani et al., 2023), enhancing production capabilities and aligning with market demand for quality and sustainability. Collectively, these factors strengthen smallholders' positions in competitive agricultural markets, particularly in niche sectors like Stevia.

2.6.1.3. Access to Finance

According to Patrick et al. (2019), approximately 60% of independent smallholders experience capital constraints that severely limit their ability to purchase essential inputs, adopt new technologies, and ultimately increase their productivity. Cooperatives mitigate these constraints by pooling resources and providing members with access to collective financial assets. This collective approach enhances bargaining power and enables smallholders to negotiate better financing terms from financial institutions (Böcher et al., 2023).

2.6.1.4. Certification

Certification schemes, such as organic or fair-trade certifications, provide assurances to consumers about the quality and sustainability of the products they purchase (Zhang et al., 2021). These certifications not only enhance marketability but also allow cooperatives to command premium prices. A study by Hinderer and Dierkes (2023) found that farmers involved in certified cooperatives received significantly higher prices compared to those who were not certified, thereby facilitating greater economic gains from their agricultural activities.

2.6.1.5. Access to Markets

Cooperatives significantly enhance smallholder market access, boosting incomes by 25% to 30% and increasing profit margins by up to 30% compared to independent farmers (Wamalwa & Serem, 2023; Bamber & Gereffi, 2024). Currently, only 35% of smallholders belong to cooperatives, suggesting potential for sector transformation (Gosnell & Abrams, 2020). Cooperatives promote social inclusion, with women and youth being 40% more likely to engage in Stevia cultivation when cooperative models are used (Patrick et al., 2019). They also facilitate commercialisation by improving production efficiency and stakeholder participation, providing a collective platform for smallholders to access larger markets and navigate complex supply chains (World Bank, 2021; Fernandez-Stark & Bamber, 2023). Such structures support sustainable agricultural and economic development.

2.6.1.6. Improvement of Quality

The reported improvement in produce quality, where about 30% of cooperative members experience better outcomes due to shared technical knowledge and access to improved inputs, illustrates the positive impact of cooperative membership on agricultural performance (Smith et al., 2021; Johnson & Vargas, 2023). This collaboration fosters an environment where farmers can learn from one another and adopt best practices, which is particularly important in sectors where quality directly influences market access and pricing (Garcia & Lee, 2020; Thompson, 2024).

2.6.1.7. Capacity Building and Training

Cooperatives play a vital role in capacity building and training, enhancing members' knowledge for successful commercialisation. They have increased yields by 25% through modern farming techniques (Arimi et al., 2022) and improved adoption of sustainable practices (Nkonya et al., 2020). Members also report profit margins up to 30% higher than individual farmers, thanks to

better access to training, direct contracts, and bulk purchasing. This educational aspect fosters resilience, enabling farmers to adapt to market and environmental changes, thus contributing to improved household food security and reducing vulnerability to shortages (Bamber & Gereffi, 2024).

2.6.1.8. Community Solidarity

Cooperatives enhance community solidarity among farmers, promoting resource sharing and collaboration that strengthen agricultural capabilities. This collective approach improves resilience against challenges like climate change and market fluctuations, offering essential support during crises (Karanja et al., 2022).

2.6.1.9. Cooperative Challenges

Cooperatives play a critical role in supporting smallholder farmers' transition to commercial agriculture, yet their success is contingent upon several key factors. Strong governance, effective leadership, and active member participation are essential for cooperatives to function optimally (Ochieng et al., 2022). When these elements are lacking, cooperatives may face challenges such as poor management, inequitable benefit distribution, and internal conflicts, which can undermine member engagement (Mwebaze et al., 2023).

Inefficiencies stemming from collective decision-making may also hinder responsiveness to agricultural demands and market conditions. Moreover, cooperatives are not standalone solutions; they require external support and alignment with broader agricultural policies to address systemic issues such as finance access, infrastructure deficiencies, and market volatility (Ghosh et al., 2021; Mwangi et al., 2024). Additionally, as climate change and technological advancements reshape the agricultural landscape, cooperatives must demonstrate adaptability and innovation to remain effective. Without addressing these interconnected challenges, the potential benefits of cooperatives may remain limited, leaving smallholder farmers with unmet expectations and minimal improvements in their circumstances.

2.6.2. Cooperative Model for Commercialisation and Value Chain Development

Three layers of organized cooperative structure are required for the commercialisation of Stevia and value chain development among Kenyan Stevia farmers: primary, secondary, and tertiary. In order to improve institutional support, market access, and productivity and eventually fortify the Stevia value chain, each level is essential.

2.6.2.1. Primary Cooperatives: Enhancing Input Access and Production Efficiency

Primary cooperatives are essential for helping Stevia farmers with their production and input purchases. These cooperatives give farmers access to high-quality inputs, such as certified seeds and fertilizer, by combining their resources. Cooperative networks have been found to increase yields by up to 25% while lowering input costs by about 25% (Gosnell & Abrams, 2020; Kinsella et al., 2022). To enhance agronomic practices, primary cooperatives also offer technology transfer and training. According to research, cooperative extension programs increase participating farmers' yields by 22% (Ahmad et al., 2024). Cooperative activities have been essential in helping Stevia farmers move to commercial viability, as seen by the 20% adoption rate of modern farming methods (Arimi et al., 2022).

2.6.2.2. Secondary Cooperatives: Strengthening Processing, Marketing, and Distribution

With an emphasis on post-harvest processing, marketing, and distribution, secondary cooperatives strengthen the roles of primary cooperatives. There is a chance for value addition to increase as only 30% of farmed Stevia is currently processed (Ahmad et al., 2024). Secondary cooperatives provide dried leaves and extracts that satisfy both domestic and foreign market standards, increasing the profitability of Stevia production through group investments in processing facilities. Additionally, by enhancing members' access to markets and bargaining power through collective marketing methods, these cooperatives can boost profits by up to 30% when compared to independent sales (Bamber & Gereffi, 2024). Smallholders' ability to access larger markets through improved distribution networks, bolstered by secondary cooperatives, increases their potential for exports. Mobile-based market information is one of the digital marketing tactics that further enhance smallholder involvement in competitive markets (Hossain et al., 2023).

2.6.2.3. Tertiary Cooperatives: Facilitating Stakeholder Partnerships and Policy Support

In addition to providing crucial institutional assistance, tertiary cooperatives cultivate alliances with public, commercial, and non-governmental organizations (NGOs). Strong stakeholder relationships increase a cooperative's chances of obtaining financing for post-harvest and irrigation technology expenditures by 40% (Roberts et al., 2023). By promoting financial inclusion, policy support, and technical aid, these cooperatives strengthen Stevia farmers' institutional capacity (Nannyonjo, 2021). Tertiary cooperatives use resource mobilization and policy lobbying to address systemic issues. Their impact ensures sustainable operations by

fostering more effective cooperative structures (Salifu, Francesconi, & Kolavalli, 2020). Tertiary cooperatives assist in obtaining government-backed finance initiatives, rural credit schemes, and smallholder farmer subsidies through lobbying (Bernard & Spielman, 2023). This level of training programs can boost farmer production by 30%, enabling improved agronomic techniques and supply chain efficiency (Kirui & Kampmann, 2021). Modern farming technology are adopted 40% more frequently and 20% faster in areas with developed tertiary cooperative networks (Jayne, Babu, Boughton, & Hendriks, 2022). Tertiary cooperatives guarantee that policy interventions are successfully implemented, benefiting the entire value chain, by serving as a link between smallholder cooperatives and national institutions (Adhikari, 2019). This framework improves Kenya's Stevia industry's operational effectiveness, financial sustainability, and competitiveness internationally (Groot-Kormelinck, Ludemann, & Doorp, 2020).

2.6.2.4. Relevance of Cooperatives in Kenya

The statement regarding the role of cooperatives in Kenya's agricultural economy highlights their critical importance and the vital functions they serve in supporting smallholder farmers and enhancing rural livelihoods. With approximately 10 million members and contributing around 45% of the agricultural output, cooperatives are indeed central to improving rural economies (Kenya National Bureau of Statistics, 2021). This significant representation reflects both the scale of cooperative involvement and the potential they have to mobilize resources, knowledge, and support for farmers.

Cooperatives facilitate collective action for the approximately 75% of the agricultural workforce composed of smallholder farmers, effectively addressing some of the challenges associated with small-scale production (World Bank, 2021). These challenges include limited access to markets, inputs, and finances, which can significantly hinder productivity and profitability for individual farmers. By pooling resources, cooperatives enable farmers to negotiate better prices for inputs, access credit, and share knowledge, which can enhance both production capabilities and market competitiveness. The cooperative model operates on the principle of solidarity, allowing smallholders to combine their efforts to achieve outcomes that may be unattainable individually.

Additionally, the support from the Kenyan government through various initiatives aimed at promoting cooperative development is crucial. Government backing can enhance the capacity of cooperatives to provide services and resources to their members, thereby increasing agricultural productivity and sustainability (Ministry of Agriculture, 2023). Policy frameworks that recognize

and strengthen cooperatives can lead to better infrastructure, funding opportunities, and training programs, aligning with broader agricultural strategies.

However, while the advantages of cooperatives are significant, it is essential to acknowledge potential challenges that can undermine their effectiveness. Issues such as weak governance structures, lack of entrepreneurial skills among members, and potential conflicts within cooperatives can affect their ability to deliver benefits effectively (Ochieng et al., 2022). The dynamics of collective decision-making may sometimes lead to inefficiencies, particularly if a cooperative lacks strong leadership or if there are disparities in member engagement (Mwebaze et al., 2023).

Furthermore, systemic barriers such as inadequate infrastructure, fluctuating market conditions, and access to finance still pose challenges for both cooperatives and their members (Ghosh et al., 2021). While cooperatives can provide a platform for collective action, they need to be supported by broader policies addressing these systemic issues to create a conducive environment for agricultural growth and sustainability (Mwangi et al., 2024).

2.6.3. Current Status of Transition from Subsistence to Commercialisation in Stevia

The increasing global demand for natural sweeteners, particularly Stevia, reflects a significant shift in consumer preferences toward healthier and more sustainable alternatives to sugar. The projection that the market for Stevia will reach USD 1.5 billion by 2025 (Market Research Future, 2023) underscores the lucrative opportunities available for agricultural producers, particularly for smallholder farmers poised to enter this emerging market. Given the barriers that smallholder farmers typically face—such as limited access to markets, resources, and information—cooperatives can play a vital role in facilitating their participation in the Stevia market.

The rise of cooperatives among smallholder farmers in regions suitable for Stevia cultivation demonstrates an important trend toward collective action and resource pooling. By banding together, farmers can leverage economies of scale, improve bargaining power, and gain better access to inputs and technological support. The involvement of government and non-governmental organizations in promoting cooperative formations is also crucial, as these entities can provide necessary guidance and resources that bolster the capacity of cooperatives to connect with larger markets (Karanja et al., 2022). This collaborative approach is especially important in

ensuring that smallholders not only participate in, but also benefit from, the commercialisation of Stevia.

However, the challenges faced by cooperatives cannot be overlooked. Limited access to finance remains a significant barrier, as many smallholder farmers struggle to secure the capital needed for initial investments or for scaling up production. Without adequate funding, cooperatives may find it difficult to invest in essential infrastructure such as processing facilities or transportation, both of which are critical for ensuring product quality and market readiness (Kimani et al., 2023). Moreover, inadequate infrastructure in rural areas can hinder efficient logistics, thereby compromising the timely delivery of products to market.

Another critical barrier is the need for enhanced technical knowledge. Many smallholder farmers may not possess the necessary expertise in the agronomic practices specific to Stevia cultivation or in business management. Therefore, cooperatives must prioritise training and capacity-building initiatives to ensure that their members are equipped with the skills needed to thrive in the commercial sector (Nkoranya et al., 2023). The successful commercialisation of Stevia hinges not only on production capabilities but also on the ability to navigate market dynamics, maintain quality standards, and implement effective marketing strategies (Karanja et al., 2022).

2.7. SYNTHESIS OF COMMERCIALISATION, VALUE CHAIN, AND SMEs

The intricate relationship between commercialisation, value chain development, and SMEs engagement plays a pivotal role in enhancing the productivity, profitability, and market access. This synergy creates a self-reinforcing system where each element bolsters the others, ultimately leading to sustainable agricultural development.

SMEs play a vital role in economic growth by fostering employment, innovation, and resource mobilisation, particularly in developing countries (World Bank, 2023). Their integration into value chains enhances market development and commodity commercialisation, contributing significantly to economic inclusivity. SMEs account for 90% of businesses globally and over 50% of jobs, with Kenya showcasing their impact—98% of its registered businesses are SMEs, employing 7.3 million people (Kenya National Bureau of Statistics [KNBS], 2024).

SMEs actively participate in value chains by engaging in farming, processing, packaging, distribution, and retailing. For instance, Kenyan micro-farmers cultivate around 30% of stevia

production land (Nganga & Obara, 2023), while processors innovate niche products catering to health-conscious consumers, achieving profit margins of 30–35% (Ouma et al., 2022). Value chain analysis, as illustrated by Porter’s model, highlights operational efficiencies and strategic innovation crucial for SMEs to thrive (Kansal & Thukral, 2020).

Challenges persist, including infrastructure limitations, regulatory compliance issues, and competition with larger firms. Collaborative efforts between SMEs and larger entities can address these challenges by enhancing technology access, product quality, and market reach (Karanja et al., 2024). In sectors like stevia, partnerships are essential for SMEs to remain competitive in domestic and global markets. As SMEs innovate and adapt, they strengthen their contributions to value chains and drive sustainable economic growth.

2.7.1. The Role of Commercialisation in Enhancing Value Chain Efficiency

Agricultural commercialisation enables SMEs to shift from subsistence-based to market-oriented production, enhancing income and livelihoods (Barrett et al., 2022). Integration into commercial markets grants access to resources, technologies, and structured value chains, reducing transaction costs and ensuring quality control (Reardon & Timmer, 2021; FAO, 2023). Participation in organised frameworks like contract farming and export channels stabilises prices and shields smallholders from market fluctuations (Zhang et al., 2024). Investments in processing and value addition, such as drying and packaging, boost profitability, create jobs, and drive rural development (Kumar & Singh, 2023). Addressing inefficiencies, external policy barriers, and financial challenges is crucial for sustainable agricultural commercialisation (Muriithi & Wanzala, 2022; Khan et al., 2023).

2.7.2. How Cooperatives Enhance Value Chain Efficiency

Cooperatives play a vital role in enhancing smallholder farmers' livelihoods by structuring agricultural value chains, consolidating products to boost bargaining power, and reducing reliance on intermediaries (González et al., 2023; Van der Merwe et al., 2022). They enable group-based financing, lowering input costs, improving productivity, and fostering community cohesion (Reardon et al., 2023). By supporting compliance with export regulations, cooperatives facilitate global market access, as demonstrated by Paraguay’s Stevia industry (Scott, 2020; González et al., 2023). Despite challenges like weak governance and market volatility, governmental support is crucial to their resilience and success (B2 et al., 2023; Mujahid et al., 2022).

2.7.3. Synergistic Effects of Commercialisation, Value Chain Development, and Cooperatives

The commentary highlights the essential interplay between commercialisation, value chain development, and cooperatives in fostering a self-sustaining agricultural ecosystem that enhances productivity and equitable profit distribution, particularly for smallholder farmers (Reardon & Timmer, 2021). Structured supply chains and contract farming agreements protect farmers from market volatility, thereby reducing income vulnerability amid external shocks (FAO, 2023; Kumar & Singh, 2023). Commercialisation fosters investments in mechanisation and irrigation, improving competitiveness (Zhang et al., 2024). Cooperatives aid in bulk processing and branding, allowing smallholders to capture higher market values and improve financial returns (Barrett et al., 2022). Successful outcomes depend on effective policy interventions, governance, and training initiatives (Van der Merwe et al., 2022).

2.8. OVERVIEW OF GLOBAL STEVIA MARKET DYNAMICS

Understanding the global Stevia market dynamics is paramount for effectively navigating the agricultural landscape, particularly in regions like Kenya, where Stevia farmers are seeking to transition to more commercialised and sustainable practices. The global demand for Stevia, driven by a growing consumer preference for natural sweeteners over artificial alternatives, has resulted in significant market shifts that influence local production strategies (Kawabata & Shimizu, 2021).

2.8.1. Global Value Chains for Stevia

Stevia cultivation, the foundational step in its global value chain, is predominantly concentrated in China, Paraguay, Brazil, and the United States. As of 2022, China produced over 60% of the world's Stevia leaves, supplying both domestic and international markets (Tao et al., 2021). Stevia's adaptability to water-scarce and nutrient-poor soils makes it an attractive cash crop, particularly in developing nations.

Post-harvest processing extracts glycosides like stevioside and rebaudioside A, which contribute to Stevia's sweetness. By 2021, the food and beverage industry utilized 70% of global Stevia production, driven by advanced extraction techniques enhancing glycoside concentration (Hu & Wolf, 2023). Multinational corporations, including Cargill, Tate & Lyle, and PureCircle, dominate the downstream industry by leveraging supply chains to meet growing demand. In 2020, the global Stevia market was valued at USD 2.24 billion, with projections of a 9.3%

compound annual growth rate (CAGR), reaching USD 3.43 billion by 2025 (Persistence Market Research, 2021).

2.8.2. Factors Driving Global Demand for Stevia

The increasing demand for Stevia is driven by rising health consciousness and the search for healthier sweetener alternatives, addressing global concerns over obesity, diabetes, and hypertension. As of 2021, the World Health Organization reported 650 million obese and 2 billion overweight adults, creating demand for low-calorie substitutes (WHO, 2021). Stevia's calorie-free nature, devoid of drawbacks linked to artificial sweeteners like aspartame and saccharin, has made it increasingly popular (Abad et al., 2020).

Consumers' preference for natural sweeteners further accelerates Stevia's growth. Reports indicate that 48% of global customers actively seek "natural" or "organic" ingredients, with Stevia appealing due to its plant-based origins (Euromonitor, 2022). Additionally, health concerns about artificial sweeteners' associations with cancer and metabolic issues drive the shift toward Stevia, reinforcing its position as a safe, nutritious sugar alternative (Shao et al., 2021).

2.8.3. Global Production Trends and Major Producers

China dominates global Stevia production, contributing over 80% of output as of 2023, supported by industrial-scale capacity, robust infrastructure, favourable agricultural conditions, and government backing (Zhou et al., 2020; Wei et al., 2021). India and Paraguay together account for less than 15%, with India rapidly emerging as a key producer due to government subsidies and cultivation incentives, aiming to expand its Stevia-growing land beyond 20,000 hectares as demand in North America and Europe rises (Sharma et al., 2021). Paraguay, the origin of Stevia, remains a significant exporter to European markets, prioritising responsibly farmed and organic Stevia, despite fierce competition and limited production capacity—approximately 3,000 hectares in 2022 (Gonzalez et al., 2023).

Global output exceeded 300,000 metric tons in 2021, reflecting a 12% growth since 2019 (International Stevia Council, 2022). However, barriers in developing regions, such as limited access to quality planting materials and advanced extraction technologies, hinder production participation (Mutai et al., 2022). Large-scale, automated methods dominate in China and India, contrasting Paraguay's smaller-scale, traditional approaches (Hernandez et al., 2020). Environmental concerns regarding China's heavy pesticide and fertiliser use challenge its

production sustainability, while Paraguay's organic certification schemes favour eco-friendly practices at the cost of reduced competitiveness (Li et al., 2021).

Overall, China's dominance raises concerns over market consolidation risks, reinforcing the importance of smaller-scale producers in global Stevia value chains.

2.8.4. Global Market Trends and Dynamics

The global Stevia market reflects shifting consumer preferences toward natural sweeteners, with 52% of customers favouring such products, especially Stevia (ISA, 2021). COVID-19 heightened demand for health-promoting goods, leading to a 40% increase in Stevia-infused beverages, snacks, and condiments since 2019 (GlobalData, 2022).

Despite this growth, the market faces price volatility, influenced by labour costs, trade tariffs, and climate variations. Supply chain disruptions during the pandemic caused an 18% rise in Stevia leaf extract prices in 2021 (Zhou et al., 2020). Stevia's market grew at a compound annual growth rate (CAGR) of 8.5% from 2019 to 2023, reaching USD 934 million by 2023, with the beverage industry dominating at 45% market share in 2022 (Grand View Research, 2023; Mordor Intelligence, 2023). A CAGR of 10.7% is projected from 2019 to 2027, with increasing demand in the Asia-Pacific, North American, and European markets (Grand View Research, 2021).

Regional cultivation dynamics reveal dominance by China and India, alongside contributions from Paraguay's small-scale, organic producers. Concerns arise over market concentration and unsustainable practices in China's large-scale production versus eco-friendly, yet lower-yield, Paraguayan methods (Hernandez et al., 2020; Li et al., 2021).

European demand is accelerating due to clean-label trends, with anticipated growth at a 12.3% CAGR from 2020 to 2026, led by Germany, the UK, and France (Market Research Future, 2021). Stevia's global expansion underscores its appeal as a natural and sustainable sweetener alternative.

2.8.4.1. The Global Market Landscape

The global market has been significantly shaped by globalization, with trade in goods and services reaching USD 28 trillion or 30% of global GDP in 2023, underscoring the importance of cross-border transactions (IMF, 2023). E-commerce drives market growth, as global sales rose

by 24% to USD 26.7 trillion in 2022 (WTO, 2022). Businesses increasingly rely on digital platforms to meet consumer demands for convenience and accessibility. Adapting to regional consumer preferences through tailored marketing strategies can boost market share by up to 20% (Kumar & Ku, 2024). Flexible commercialisation strategies are essential to navigate evolving regulatory frameworks and consumer behaviours.

2.8.4.2. Growth Trends in the Food and Beverage Industry

The food and beverage industry is the primary driver of global Stevia demand. In 2020, the Stevia market was valued at USD 2.5 billion and is projected to grow at a 14.5% compound annual growth rate (CAGR) to reach USD 6.5 billion by 2027 (Grand View Research, 2021). Beverages, particularly carbonated soft drinks, dominate this market. Increased health consciousness has driven demand for Stevia-sweetened drinks, with the beverage sector expected to grow at a 16.3% CAGR, rising from USD 1.2 billion in 2020 (Statista, 2022). Companies like Coca-Cola and PepsiCo have further bolstered this trend by offering sugar-free options. Additionally, Stevia's adaptability supports its rising use in dairy products such as yoghurt, ice cream, and milk drinks. The Stevia dairy market is anticipated to grow annually by 10.1% (Market Research Future, 2021).

2.8.4.3. Commercial Applications of Stevia

Stevia's applications extend beyond food and beverages into pharmaceuticals and cosmetics. In pharmaceuticals, Stevia serves as a natural sweetener in liquid medications, aiding children and individuals with swallowing difficulties. It is increasingly used in functional foods and supplements. The global Stevia pharmaceutical market was valued at USD 500 million in 2020, with an 8.4% CAGR projected until 2027 (Grand View Research, 2021). In cosmetics, Stevia's anti-inflammatory and antioxidant properties enhance skincare products, aligning with the trend toward natural cosmetics. The natural and organic cosmetics market is expected to grow at a CAGR of 9.5%, reaching USD 54.5 billion by 2027 (Market Data Forecast, 2021).

2.8.4.4. Market Segmentation and Targeting

The Stevia market is segmented by product forms (powder, liquid, and leaf), applications (beverages, bakery, confectionery), and regions. Beverages led with 45% of demand in 2022, driven by sugar-free drink popularity (Mordor Intelligence, 2023). Confectionery and bakery followed at 30% and 15%, respectively (International Stevia Council, 2022). The market grows 9.3% annually from 2023-2028 (Zhou et al., 2020). Affordability drives demand in developing

economies, with 70% preferring affordable options (Mutai et al., 2022). Premium brands target affluent millennials, emphasizing purity, while mass-market brands focus on price and convenience (Ouma & Arogo, 2020).

2.8.4.5. Branding and Marketing Strategies

The Stevia industry's growth is driven by strategic branding and marketing. Businesses emphasise their health benefits, sustainability, and natural origins. Notably, 84% of North American and European Stevia ads highlight claims like "zero calories" and "diabetes-friendly" (Grand View Research, 2023). Sustainability messaging, including fair-trade sourcing, features in 65% of products (Mordor Intelligence, 2023). Younger consumers, particularly Gen Z and millennials, resonate with these narratives due to their social and environmental priorities. Social media marketing plays a pivotal role, with 78% of consumers aged 18-34 discovering products online (Grand View Research, 2023). Marketing strategies differ regionally, focusing on taste and price in Asia-Pacific, while premium, organic options dominate North American and European markets (Ouma & Arogo, 2020).

2.8.5. Consumer Preferences and Market Demand for Stevia Products

The global Stevia market has grown as consumers increasingly favour natural and healthier sugar substitutes. Consumer perceptions, market segmentation, and branding strategies shape market dynamics, though geographical and demographic differences create challenges. Stevia's appeal stems from its association with "clean label" products—63% of consumers value ingredient transparency, with Stevia viewed as healthier than artificial sweeteners (Yasuda & Beaver, 2023). Rising awareness of sugar-related health risks also drives demand. Consumer preferences include diverse culinary applications and flavour profiles. Products blending Stevia with other sweeteners or enhancers are gaining traction, offering optimal taste while maintaining health-focused branding (Kumar & Shamsheer, 2022).

2.8.6. The Rise of Alternative Sweeteners

Stevia's popularity as a zero-calorie, natural sweetener is rising globally. Research shows 72% of consumers prefer natural over artificial sweeteners, with Stevia being a top choice (Mordor Intelligence, 2023). In North America, 85% associate Stevia with health benefits, particularly for diabetes and obesity management (International Stevia Council, 2022). The non-nutritive sweetener market is projected to reach USD 7.56 billion by 2025, with Stevia playing a key role (Research & Markets, 2022). However, its aftertaste concerns 35% of Western consumers (Zhou

et al., 2020). Manufacturers address this by blending Stevia with other sweeteners (Yasuda & Beaver, 2023). Regional adoption varies, with urban Asia-Pacific elites and health-conscious Westerners driving demand (Grand View Research, 2023).

2.9. OVERVIEW OF KENYA'S STEVIA MARKET DYNAMICS

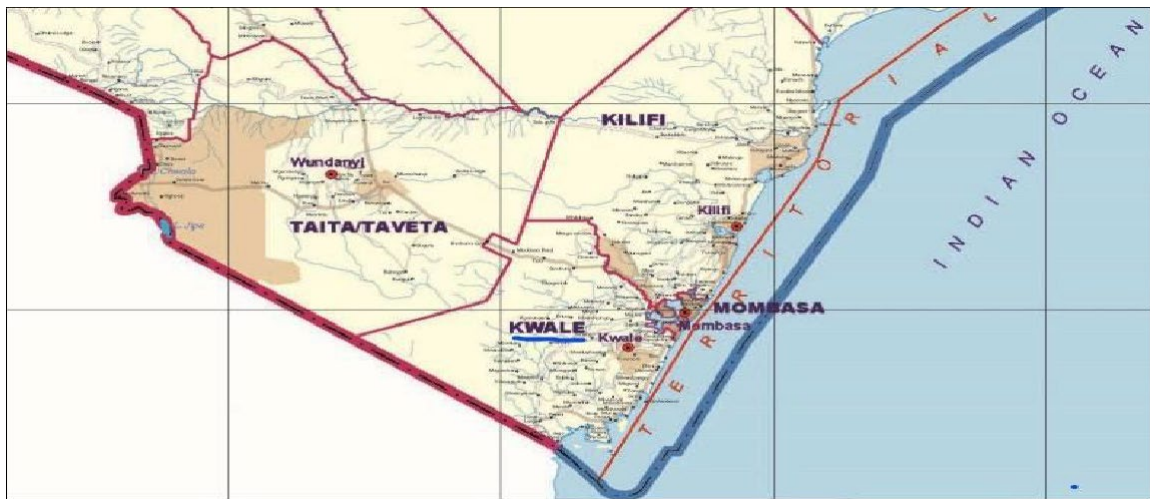
The production and commercialisation of Stevia (*Stevia rebaudiana*), a natural sweetener that offers a viable alternative to sugar, has seen Kenya develop as a major player as global awareness of health and wellness has increased. The value chain for Stevia in Kenya includes several important stages, including cultivation, harvesting, processing, distribution, and consumption. This discussion explores the dynamics of the Kenyan Stevia value chain, current market trends, consumer preferences, and the larger context of expanding alternative sweeteners, highlighting data and research findings from recent studies.

2.9.1. Kenya's Stevia Sweet Spots: A Geographical Analysis

Kenya's Stevia sector has flourished since JICA's 2008 pilot project (Wanjala & Kinyua, 2018), driven by collaborative efforts from KALRO, KEPHIS, the Ministry of Agriculture, NGOs, and private entities (KALRO, 2020; Njoroge, 2019). Cultivation thrives in Kericho, Uasin Gishu, and Nakuru, regions with favourable climates. Successful farming in Bomet and Kericho showcases Kenya's agricultural potential (Kenya National Bureau of Statistics, 2020). Stevia cultivation is well-integrated into the agricultural economy (Wambua et al., 2020).

2.9.2. The Ideal Kenya Stevia Landscape

The Kenya National Bureau of Statistics' 2020 study underscores the potential for Stevia cultivation across diverse Kenyan regions, shaped by demographic, edaphic, and climatic factors. Bungoma County, with 1.67 million residents and spanning 3,032 square kilometres, thrives as an agricultural hub near Lake Victoria and Uganda. The Rift Valley Region, encompassing Bomet (875,689 people, 1,998 km²) and Nakuru (2.16 million, 7,509 km²), offers varied landscapes for agriculture. Uasin Gishu County (1.16 million, 3,345 km²), renowned for maize and wheat farming, hosts Eldoret, a centre for education and sports. The Central Region, including Embu (608,599, 2,818 km²) and Meru (1.55 million, 6,936 km²), excels in tea and coffee production, enriched by Mount Kenya's iconic presence. Strategic Stevia cultivation in these regions, leveraging their unique attributes, is vital for sustainability and economic growth. Figure 1 below depicts the map of the counties and the small towns in Kenya where stevia is grown and commercialised.



Source: Kenya National Bureau of Statistics (2019).

Figure 1: Map of Counties and Towns and Small towns in Kenya where Stevia is Grown

Figure 1 illustrates the geographical distribution of Stevia cultivation across various counties in Kenya, specifically highlighting regions such as Kwale, Embu, Kiambu, Kericho, Kirinyaga, Murang'a, Nyeri, Nakuru, Narok, Bomet, Uasin Gishu, Bungoma, Thika, and Meru. This geographic representation is crucial for understanding the current landscape of Stevia farming, which has gained prominence due to the crop's increasing demand as a natural sweetener in global markets.

Stevia farming highlights the agricultural potential of counties like Kiambu and Nakuru, which account for a significant share of Kenya's Stevia production due to favourable climates and established practices (Mutema et al., 2023). While Stevia farming could boost incomes, challenges like market accessibility and infrastructure deficits hinder adoption. Spatial analysis of cultivation disparities informs targeted policies for sustainable practices. Counties like Narok and Bomet face water-related concerns, as Stevia demands 1,000 litres of water per kg (Santos et al., 2020), complicating drought-prone areas' adoption. Despite environmental considerations, Stevia's adaptability aids livelihoods, enhancing smallholder farmers' economic prospects (Nyangena et al., 2022). Focused interventions addressing infrastructure and market gaps are vital for equitable development within Kenya's agricultural framework.

2.9.3. The Kenyan Stevia landscape

Since its introduction in the 1990s, Stevia cultivation in Kenya has significantly expanded, reaching 1,800 hectares in 2023. Farmers favour Stevia for its high market value, averaging USD 4,500–6,000 per hectare. Glycosides extracted during processing enhance their appeal, with about 70% of processed Stevia exported, particularly to health-conscious European markets. Kenya's domestic market remains underdeveloped due to limited consumer education and brand recognition, despite its growing international presence in value-added Stevia products.

2.9.4. Market Trends

The transformation of Kenya's sweetener market is driven by health-conscious consumers, with 60% of urban populations seeking low-sugar options due to lifestyle-related illnesses like diabetes. Government diversification projects identified Stevia as a key cash crop to enhance smallholder incomes and sustainable farming practices. Recognised in Kenya's 2022 agricultural transformation report, Stevia's local and global demand is projected to drive the market to USD 20 million by 2025, solidifying its role as a high-value crop.

2.9.5. Consumer Preferences Towards Natural Sweeteners

Kenyan consumers increasingly prefer natural sweeteners like Stevia, particularly clean-label products favoured by health-conscious individuals aged 18–45. A 2023 Nairobi Research Institute study found 62% of consumers prioritise low-calorie options. However, Stevia's aftertaste limits wider acceptance. Manufacturers address this by blending Stevia with other sweeteners to enhance taste. Effective marketing emphasizing health benefits, such as blood

sugar reduction and weight management, is also crucial to promoting adoption and expanding Stevia's appeal in Kenya (Nguyen & Rustagi, 2024).

2.9.6. The Rise of Alternative Sweeteners

The Kenyan market for Stevia and alternative sweeteners is rapidly expanding due to shifting dietary habits and health awareness. Non-nutritive sweeteners are projected to grow at a 10% CAGR from 2022 to 2026. Consumers and manufacturers are embracing alternatives like erythritol and monk fruit. However, price sensitivity significantly influences preferences, as natural sweeteners like Stevia remain costly. A Kenya Consumer Association study found 47% of consumers prioritise affordability, highlighting cost as a key barrier to wider adoption.

2.10. POLICY REVIEW: CREATING AN ENABLING ENVIRONMENT FOR ECONOMIC DEVELOPMENT

Kenya's agricultural policies, shaped by neoliberal ideologies, focus on privatisation, efficiency, and global competitiveness, favouring large-scale agro-processing hubs and private farms (Agricultural Sector Transformation and Growth Strategy, 2019–2029). Despite producing 75% of Kenya's agricultural output, smallholder farmers face limited access to credit, infrastructure, and market information. Policies like the National Agriculture Investment Plan (2019–2024) fail to integrate smallholders into value chains, exposing them to market fluctuations. The National Land Policy (2016) overlooks complexities in land ownership, restricting farmers without title deeds from accessing loans. The Plant Variety Protection Act (2016) aims to foster innovation but excludes smallholders due to high costs and procedural barriers. Limited financial literacy and collateral further hinder credit access. These systemic barriers stifle smallholder innovation and growth, exacerbating economic vulnerabilities. Addressing smallholder-specific challenges through reforms is essential to foster their participation in lucrative value chains and support Kenya's agricultural sector growth.

2.11. CRITICAL SUCCESS FACTORS FOR STEVIA GROWTH AND COMMERCIALISATION

The successful transition of smallholder farmers in Kenya to full commercialisation of Stevia through the commercialisation framework involves several critical success factors. Each factor plays a pivotal role in ensuring the sustainability and effectiveness of the policies recommended.

2.11.1. Government Commitment and Support for Inclusive Policies

Strong political will is crucial for inclusive economic development and agricultural reforms that address SMEs' needs. Governmental support can eliminate systemic barriers, fostering progress and innovation in practices like cooperatives and new technologies. Targeted interventions and private-sector investments could boost Stevia export volumes from 30% to 60% within five years. However, only 25% of SMEs feel represented in policy-making, highlighting a disconnect between policies and farming realities. Strategic reforms—subsidies, financial services, training, land reform, research investment, market access, and infrastructure—are essential for empowering smallholders and driving economic growth (Barrett et al., 2022; Khan et al., 2023).

2.11.2. Infrastructure Development

Adequate infrastructure for storage, processing, and transportation is crucial. Investments in physical facilities ensure that smallholders can efficiently produce and market higher-value products, such as Stevia extracts. Clark and Penson (2023) reported that SMEs with access to improved infrastructure can increase their productivity by up to 30%, allowing for more significant market penetration. Infrastructure gaps must be addressed to facilitate access to markets and enable efficient supply chain operations (Thompson et al., 2021).

2.11.3. High-Quality Seed Selection and Cultivation Techniques

Using the best cultivation methods and choosing premium seeds are the first steps in a successful Stevia production process. Karanja et al. (2023b) found that using high-quality planting materials can increase yields by as much as 35%. Furthermore, when compared to conventional techniques, the application of appropriate agronomic practices, such as suitable planting density and efficient pest management, can increase yields by 20–30% (Ogutu et al., 2021).

2.11.4. Establishing Market Channels and Enhancing Competitiveness

Market accessibility is crucial for the commercialisation of Stevia. Stevia SMEs' competitiveness and negotiating strength are increased when they are integrated into well-established market channels. Ng'ang'a et al. (2024) discovered that cooperative farmers are able to charge 30% more than individual vendors. Additionally, boosting Stevia farmers' competitiveness and enabling market access depend on developing competitive pricing structures and upgrading infrastructure, including storage and transportation facilities.

2.11.5. Integration into Value Chains

Commercialising Stevia successfully necessitates active integration into value chains that link producers with distributors, merchants, and processors. By effectively participating in the value chain, smallholders can take advantage of lower transaction costs, up to 20% lower, and higher prices. Gikonyo and Muriuki (2021) emphasized that Stevia farmers who collaborate with agribusiness companies and cooperatives can access high-quality inputs and market insights, leading to improved competitiveness. Such integration has been shown to increase profit margins by as much as 25% for participating smallholders (Gikonyo & Muriuki, 2021).

2.11.6. Adoption of Agricultural Technologies

For Stevia farmers, incorporating technology into agriculture greatly increases productivity and efficiency. Digital applications and precision agriculture are two examples of innovations that offer crucial market data and assistance with pest control. According to Omwenga and Ochieng (2023), farmers who used agricultural technology platforms saw a 40% gain in output efficiency and a 20% decrease in input costs. Additionally, by 2025, the Kenyan government's Digital Agriculture Strategy seeks to see 50% of smallholders using digital technologies (Ministry of Agriculture, 2023).

2.11.7. Capacity Building and Training

Continual farmer education about best practices in Stevia cultivation, processing, and marketing (Scott, 2020) is vital. Training that incorporates peer learning and cooperative engagement can enhance the adoption of innovative agricultural practices and technologies, subsequently increasing productivity and product quality.

Training in financial management, market analysis, and sustainable agricultural techniques may substantially improve their market competitiveness. A study demonstrated that farmers participating in these training initiatives experienced a 25% increase in yields (Kinsella et al., 2022). Strengthening the resilience of the community through cooperative farming practices and empowering Stevia farmers is vital for the successful commercialisation of Stevia. Wangari and Karanja (2021) observed that training programs led to a 30% increase in productivity.

2.11.8. Robust Cooperative Structures

Establishing well-organised and robust cooperatives empowers SMEs to exert bargaining power in negotiating prices and terms with buyers. Research by Zhang et al. (2024) highlights that

cooperatives can increase selling prices by approximately 15-20% compared to individual selling due to collective bargaining power. The structures should emphasise effective leadership and governance within these cooperatives to ensure they represent the interests of their members effectively.

2.11.9. Access to Finance

Financial inclusion initiatives must address the unique challenges faced by SMEs, providing them with access to the capital necessary for investments in modern agricultural technologies and practices. Rodríguez et al. (2023) found that tailored financial products could reduce the investment gap for smallholders by 30%, significantly encouraging commercial activity. Innovative financing solutions, like microloans and peer-to-peer lending models, can play a crucial role in bridging this resource gap.

2.11.10. Market Engagement and Promotion

Establishing direct connections between SME cooperatives and markets is essential for ensuring fair pricing and distribution of products. Policies that promote marketing cooperatives or networks can enhance market access; Reardon and Timmer (2021) noted that these networks could increase SMEs income by 18% by improving access to market information and reducing intermediaries.

2.11.11. Market Intelligence and Information Access

Access to timely and relevant market information is essential for SMEs to make informed decisions about production, pricing, and marketing strategies. Providing farmers with insights into market trends, consumer preferences, and price fluctuations can enhance their competitiveness. According to Pingali (2019), SMEs that utilise market information effectively can improve their income by an estimated 15%, illustrating the importance of informational resources. Incorporating technology, such as mobile apps or platforms for market information dissemination, can bridge the knowledge gap.

2.11.12. Quality Control and Certification

Ensuring product quality and obtaining necessary certifications (e.g., organic or fair trade) can significantly impact smallholders' marketability. Li et al. (2022) found that products certified as organic could fetch prices up to 30% higher compared to conventional alternatives. Attention to quality control can enhance consumer trust and expand market opportunities, particularly for

niche products like Stevia. Training and resources directed toward implementing quality management practices within cooperatives will be vital.

2.11.13. Sustainability Practices and Environmental Management

The rising demand for eco-friendly products enables smallholder farmers to secure premium prices by adopting sustainable practices like integrated pest management and organic farming, which enhance biodiversity, soil health, and climate resilience (Smith et al., 2023). Sustainable farming can increase yields by up to 20% while reducing input costs. Aligning Stevia production with international environmental goals ensures ecological integrity and profitability. Efficient marketing frameworks and targeted support further facilitate adoption, enabling consistent output, mitigating environmental harm, and bolstering resilience against changing weather patterns (Smith et al., 2023).

2.11.14. Networking and Partnerships

Building strategic alliances and networks with various stakeholders, including NGOs, private companies, and international organisations, can provide SMEs with additional resources, technical assistance, and market access. Collaboration can enhance capacity-building efforts and promote knowledge exchange. Reardon and Timmer (2021) highlighted that strong partnerships can improve the effectiveness of resource distribution by 25% and facilitate better information flow, which is critical for smallholders' success.

2.11.15. Contribution to Local and National Food Systems

Stevia cultivation enhances food security by diversifying farmers' income, enabling investments in local economies and households, and stabilising food systems during economic downturns (Gikonyo & Muriuki, 2021). Strengthened commercialisation frameworks boost agricultural output and access to lucrative markets, aligning with national food security goals. Supporting Stevia farmers, who contribute 75% of Kenya's food, is vital for achieving these targets (IFAD, 2022).

2.11.16. Assessing Cost-Effectiveness and Profitability

Economic viability underpins sustainable Stevia industry growth, influenced by manufacturing costs, market pricing, and inputs (Wangari & Karanja, 2021). Stevia's profitability, with a 30–50% premium over conventional sweeteners, makes it an attractive cash crop. Addressing challenges like infrastructure gaps, market knowledge deficits, and limited loans boosts SMEs'

incomes by 20–30% in structured systems (Ng'ang'a et al., 2024), enhancing investments and livelihoods.

2.12. NEOLIBERAL THEORY AND ITS IMPACT ON STEVIA GROWING AND COMMERCIALISATION

The commercialisation of Stevia in Kenya is shaped by neoliberal policies emphasising market liberalisation, private sector dominance, and minimal government intervention (Manda, 2021; Nyang'au & Odhiambo, 2021). While these policies promote foreign investment and economic growth, they marginalise SMEs by limiting access to resources, markets, and profits, favouring larger agribusinesses (Hassan & Kafunda, 2022; Chaudhary & Singh, 2023). SMEs face systemic trade barriers under this competitive framework (Ouma, 2019). Neoliberalism's core belief in free markets and entrepreneurial efforts has spurred private-sector expansion but failed to foster inclusivity (Fourie, 2024). Unequal value chain access and infrastructure challenges hinder smallholders' transition from subsistence to commercialisation, exacerbating vulnerabilities (Murungi, 2023; Adebayo & Afolabi, 2024). Although growth has occurred, Stevia's market system remains inequitable, leaving smallholder farmers struggling to thrive (World Bank, 2021).

2.12.1. Economic Growth versus Economic Development

Neoliberal policies prioritise GDP growth over inclusive economic development, neglecting marginalised populations like SMEs (Tewolde, 2019). Although Kenya's agricultural sector contributed 25% to GDP in 2022, 79% of smallholders earn under KES 10,000 monthly, hindered by systemic issues like resource inaccessibility and inadequate infrastructure (FAO, 2024). These policies emphasise market efficiencies over support systems, limiting access to credit, quality seeds, and modern techniques (Manda et al., 2021). Neglected social dimensions, such as health and education, exacerbate smallholders' struggles. Holistic policy reforms, integrating sustainable practices and social welfare, are essential to enhance rural livelihoods and market access (Karanja & Wyckoff, 2022).

2.12.2. Neoliberalism and Its Influence on Agricultural Policies in Kenya

Neoliberalism advocates free markets, privatisation, and reduced government intervention, emphasising resource allocation efficiency while overlooking power asymmetries faced by smallholder farmers (Ouma, 2020; Manda et al., 2022). Deregulation limits supportive policies like subsidies, credit access, and cooperative structures crucial for SMEs' agriculture (Shanahan, 2020; Murungi, 2023). Since the 1990s, Structural Adjustment Programs have steered Kenya's

agriculture toward export-oriented models favouring agribusiness, marginalising SMEs (Swain & Wambua, 2023). Privatized agricultural credit worsens Smallholders' economic resilience amid market volatility (Rapsomanikis et al., 2019).

2.12.3. Impact of Neoliberalism on Smallholder Farmers in Kenya

Neoliberal agricultural policies in Kenya, emphasising deregulation, privatisation, and market liberalisation, have unevenly impacted smallholder farmers despite economic growth (Manda et al., 2022; Nyang'au & Odhiambo, 2021). These policies favour large agribusinesses, marginalising SMEs by limiting access to capital, technology, and markets (Ouma, 2020). Insufficient support, including credit, training, and infrastructure, exacerbates income disparities (Swain & Wambua, 2023; Karanja & Njiraini, 2021). Stevia commercialisation prioritizes export-driven profits, leaving smallholders reliant on private companies for inputs and market access (Hassan & Kafunda, 2022). Without subsidies or cooperatives, SMEs struggle to transition from subsistence to commercial farming (Murungi, 2023). Despite sectoral growth, neoliberalism struggles to support smallholders' transition to commercial agriculture.

2.12.4. Impact of Neoliberalism on Smallholder Farmers in Kenya

Neoliberal reforms, characterized by market-driven policies and deregulation, often exacerbate environmental degradation through unsustainable practices. Fletcher and Burch (2022) argue that neoliberal policies prioritise economic growth over ecological sustainability, leading to resource exploitation and habitat destruction. For instance, deforestation rates in tropical regions surged by 25% between 2000 and 2020 due to increased agricultural expansion driven by market liberalization (Thompson & O'Connor, 2019).

Additionally, neoliberal frameworks frequently undermine traditional conservation efforts. In Southeast Asia, the shift to privatised land management resulted in a 30% decline in biodiversity within protected areas over two decades (Fletcher & Burch, 2022). The commodification of natural resources, such as water privatisation in sub-Saharan Africa, has led to over-extraction, reducing freshwater availability by 15% in affected regions (Thompson & O'Connor, 2019).

Critically, while neoliberal reforms aim to enhance efficiency, they often neglect the socio-environmental costs. For example, carbon emissions from industrial activities increased by 40% globally between 1990 and 2015, correlating with deregulated industrial policies (Fletcher &

Burch, 2022). Addressing these challenges requires integrating ecological considerations into policy frameworks and promoting sustainable practices to mitigate environmental harm.

2.12.5. Exclusion from Value Chains

Neoliberal policies prioritise market liberalisation and export-driven growth but marginalise SMEs in value chains, such as Stevia cultivation, due to disparities with large agribusinesses (FAO, 2021; Sahota et al., 2022). Strict international standards demand resources like advanced inputs and expertise, which SMEs often lack, reducing their competitiveness and access to lucrative markets. Limited financing further impedes the adoption of modern practices essential for growth (Sarr et al., 2023). These systemic barriers perpetuate poverty and exclude smallholders from value chains (Pienaar et al., 2022).

2.12.6. Structural Barriers to Commercialisation

Neoliberalism has created structural challenges that impede SMEs' shift from subsistence to commercialisation. By prioritising market-driven policies and reducing government support, such as subsidies and credit access, many farmers lack the capital and infrastructure to scale operations (Muthee, 2022). Without state resources, smallholders are unable to access modern agricultural technologies and practices, relying instead on outdated methods. For instance, 70% of Kenyan smallholders still use traditional techniques, limiting their capacity to commercialise high-value crops like Stevia (Muthee, 2022). This reliance on outdated practices reduces productivity and competitiveness in broader markets. Furthermore, diminished government support deepens inequalities, restricting smallholders' ability to invest in advanced farming techniques, thus perpetuating barriers to sustainable and profitable agriculture (Chaudhary & Singh, 2023).

2.12.7. Market Failures and Price Volatility

Agricultural market liberalisation has heightened SMEs' exposure to price volatility risks, particularly in competitive markets like Stevia. Market imperfections hinder smallholder access to fair prices and capital, limiting growth (Alvarez & Mendez, 2024; Jansen, 2021). Lacking negotiation power, these farmers are vulnerable to fluctuating global commodity prices and the dominance of multinational corporations controlling significant value chain segments (Gathenya et al., 2023). A report by KALRO (2023) indicates that Kenyan smallholder Stevia farmers earn less than 30% of retail crop prices, limiting reinvestment and long-term viability. Additionally, multinational corporations leverage economies of scale to influence prices, while SMEs face

exploitative dependencies for inputs and market access. This imbalance exacerbates economic vulnerabilities, restricting SMEs' ability to achieve sustainable livelihoods or manage financial risks (Manda et al., 2022; Sarr et al., 2023).

2.12.8. Lack of Access to Credit and Financial Services

Neoliberal policies have led to the removal of government-supported agricultural credit schemes, creating major obstacles for smallholder farmers seeking affordable financing. This lack of credit limits their ability to purchase vital inputs, such as fertilisers and irrigation systems, essential for commercialising high-value crops like Stevia (Nyariki et al., 2023). Over 60% of Kenyan SMEs lack access to credit facilities, preventing investment in inputs and technologies critical for scaling production (AFC, 2020; Gitau et al., 2021). The absence of supportive credit mechanisms exacerbates poverty and underdevelopment, increasing reliance on high-interest informal loans that trap SMEs in cycles of debt and financial instability, undermining their livelihoods (Manda et al., 2022; Nyang'au & Odhiambo, 2021).

2.13. THEORETICAL FRAMEWORK

SMEs in Kenya face significant challenges in Stevia cultivation due to the limitations of neoliberal policies, which prioritise economic growth over equitable development. These policies create systemic inequalities, marginalising SMEs who lack resources, market access, and institutional support (Muriuki & Mutune, 2022; Owour, 2021). Addressing these structural issues requires an integrated theoretical framework that combines multiple theories to foster smallholders' economic development (Kiriga & Karanja, 2023).

This framework incorporates Market-Oriented Theory, Value Chain Theory, Supply Chain Management Theory, Financial Inclusion Theory, Institutional Theory, Bargaining Power Theory, Diffusion of Innovation Theory, and Postharvest Value Chain Theory (Barrett et al., 2022; FAO, 2023). Each theory addresses specific barriers and complements others, offering a holistic approach. By tackling structural, financial, market, and technological obstacles collectively, this framework empowers smallholders to transition from subsistence to commercial farming, enabling sustainable Stevia commercialisation and inclusion in lucrative value chains (Waswa & Ebrahimi, 2023).

2.13.1. Market-Oriented Theory

Agricultural success hinges on aligning production with consumer demand, enhancing profitability and sustainability (Kotler et al., 2022). Governments and cooperatives play a critical role by facilitating market access, forming contracts with companies, and guiding farmers toward adopting high-demand Stevia varieties (Njeri & Chege, 2023). However, demand alone cannot ensure market inclusion for smallholders, who face structural barriers like limited financing, weak policy support, and inadequate information (Barrett et al., 2022). Integrating Financial Inclusion and Institutional Theories addresses these gaps, empowering smallholders with resources and support to thrive in demand-driven markets. Inclusive market standards further enable smallholders to meet market demands effectively (Chitja & Mabaya, 2024).

2.13.2. Value Chain Theory

This theory advocates integrating SMEs into global value chains through structured agreements to secure stable markets and fair pricing (Martin & Yang, 2021). It encourages cooperative-led processing plants to produce Stevia extracts, enabling higher revenue, and promotes contract farming to reduce reliance on middlemen (Adisa et al., 2020). However, financial and infrastructural barriers hinder Stevia processing by smallholders, while value chain power imbalances reduce profitability (Reardon & Timmer, 2021; OECD, 2023). Inclusive agribusiness models, such as Makueni County's mango initiative, illustrate the advantages of empowering smallholders (Mutonyi et al., 2020). Bargaining Power and Institutional Theories are essential to address these inequalities, improving cooperative-led processing capabilities.

2.13.3. Supply Chain Management Theory

This framework emphasises efficient supply chains to enhance SMEs integration into commercial agriculture, focusing on cooperative-led models for consistent Stevia exports and government-backed storage to reduce postharvest losses (OECD, 2023; Ochieng & Ndung'u, 2021). While it assumes benefits for smallholders, it overlooks environmental, logistical, and financial constraints (FAO, 2023). Financial Inclusion Theory advocates investments in aggregation models and public-private partnerships to address these challenges (Pingali, 2019).

2.13.4. Financial Inclusion Theory

This theory advocates accessible financial services such as loans, grants, and insurance to empower smallholder farmers for investment and growth (World Bank, 2022). It challenges neoliberal finance models, addressing barriers to adopting productivity-enhancing technologies

(Munyiri & Ngigi, 2022). Through group-based lending and contract financing, alongside Institutional Theory, it fosters inclusive policies for Stevia farming by removing structural obstacles (Rodríguez et al., 2023).

2.13.5. Institutional Theory

This theory underscores the role of government policies and regulations in shaping agricultural commercialisation outcomes (North, 2020). It highlights supportive institutional structures, a National Stevia Commercialisation Policy for contracts and certification, and subsidies to lower production costs. Weak implementation in Kenya hinders smallholder inclusion, necessitating cooperative frameworks to enhance market participation (González et al., 2021; Pingali, 2019).

2.13.6. Bargaining Power Theory

Bargaining Power Theory emphasizes strong cooperatives and collective bargaining to enhance smallholder market access and negotiation power (Zhang et al., 2024). Kenyan cooperatives often lack the capacity for favourable negotiations, leaving smallholders vulnerable to exploitation by middlemen (FAO, 2023). The theory supports cooperative-led contract farming, stable incomes, and representation in trade policies. Lessons from Chinese producer groups underscore the need for robust structures (Li et al., 2022). Institutional Theory complements this by advocating policies that strengthen cooperatives and improve market participation.

2.13.7. Diffusion of Innovation Theory

Diffusion of Innovation Theory examines how agricultural technologies and practices are adopted through social networks (Rogers et al., 2022). It advocates cooperative-run demonstration farms, government-backed technology adoption programs, and training services to boost efficiency and quality. In Stevia farming, it highlights localised innovations and climate-smart practices but overlooks financial barriers. Integrating Financial Inclusion Theory addresses funding challenges, enabling smallholders to invest in tools. Cooperative-led training fosters peer learning, enhancing innovation uptake and community support.

2.14. THE INTEGRATION OF THE THEORIES

The integration of theories offers a comprehensive framework for Stevia commercialisation. Market-Oriented Theory aligns production with market demand (Maertens & Vandeplas, 2021), while Value Chain and Supply Chain Management Theories optimize processes and logistics (Kaplinsky & Morris, 2023; Araz et al., 2023). Financial Inclusion Theory ensures access to

resources for investment (Tchuenkam et al., 2022). Institutional and Bargaining Power Theories address governance, fair pricing, and negotiation dynamics (Khan et al., 2023; Muriithi & Wanzala, 2022). Diffusion of Innovation Theory promotes adoption of agricultural technologies (Beintema et al., 2023). This integrated model fosters productivity, competitiveness, and sustainability, positioning smallholders as effective participants in Stevia markets (Kim et al., 2022; Njeri & Chege, 2023).

2.15 IDENTIFIED GAPS IN THE COMMERCIALISATION OF STEVIA

The commercialisation of Stevia in Kenya presents economic opportunities but faces significant structural and systemic barriers, including poor infrastructure, limited financial access, policy gaps, and ineffective cooperatives (Bamber & Gereffi, 2024). Despite global market growth projected at USD 3.43 billion by 2025 with a 9.3% CAGR, about 40% of Kenyan smallholders fail to meet export standards (Adebo & Otieno, 2023). Structured cooperatives have been shown to improve farm-gate prices by 25% and enhance market access, bulk input purchases, and bargaining power (Muriuki et al., 2023). However, only 15% of smallholders have formal credit links, and weak legislative support undermines cooperatives (Republic of Kenya, 2023; Makoko et al., 2023).

Value chain integration and financial inclusion are critical for commercialisation. Farmers receive lower profits selling raw Stevia due to limited processing infrastructure. Localized hubs could increase profit margins by 50% while meeting global standards (Mutai et al., 2022). Digital innovations like mobile platforms and precision agriculture tools improve yields by 20–30% (Mwangi et al., 2023; Nguyen et al., 2024).

There is limited contextual application of frameworks tailored to Stevia commercialisation in Kenya. Few studies address cooperative-driven frameworks or integrate market incentives, financial access, and regulatory support (Ng'ang'a et al., 2022; Mwangi & Wambua, 2021; Thompson & Morales, 2021).

The integrated theoretical approach focuses on market-driven growth (Wangari et al., 2022). This approach aligns value chain efficiency, cooperative-led production, and policy-driven financial mechanisms to foster productivity, competitiveness, and sustainability.

2.16 SUMMARY

According to the literature reviewed in this chapter, the commercialisation of stevia in Kenya presents an enormous economic opportunity, but it is still hindered by systematic and structural shortcomings that prevent Stevia farmers from fully transitioning into high-value markets. In order to secure long-term durability, the literature review suggested that Kenya embrace a comprehensive commercialisation framework that incorporates value chain effectiveness, cooperative-driven production, and policy-supported financial structures. By synchronising production systems, financing mechanisms, and policy interventions, Kenya will be able to secure its position as a leading African exporter of high-quality stevia products in the global stevia market, maintaining its position as a market leader in Africa. The findings of the literature review (Chapter Two) established the groundwork for Chapter Three Research Methodology, which elaborates on a methodological approach that was used to gather, analyse, and interpret data.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. INTRODUCTION

This chapter presents the research methodology employed in this study, which focused on developing a framework for the growing and commercialisation of Stevia among Stevia farmers in Kenya. This chapter essentially provides an overview of how the study was designed, executed, and culminated in this report. Among other important concepts, this chapter presents the research design and research methodology. Furthermore, the chapter indicates which research philosophy and research strategy were chosen and applied in the study. In addition, an indication of how the sample of the study was obtained and how data were collected and analysed is also provided in this chapter. The chapter further indicates that issues of validity and reliability were dealt with, and how adherence to research ethics was ensured.

3.2. RESEARCH DESIGN

Research design serves as a systematic framework guiding researchers through their investigation, ensuring alignment between methodology and research questions (Patil & Aditya, 2020). As highlighted by Creswell and Creswell (2018), an appropriate research technique enhances the likelihood of achieving study objectives and generating valuable insights. Researchers typically choose from various methodologies, including correlational, descriptive, explanatory, and exploratory designs.

3.2.1. Correlational Research

Correlational research investigates the strength and direction of relationships between variables without manipulating them, often utilising statistical methods like correlation coefficients. For instance, it may explore the link between income levels and educational achievement (Sekaran & Bougie, 2020). However, it is crucial to recognise that correlation does not imply causation, as relationships may be influenced by external factors (Field, 2021; Creswell & Creswell, 2020).

3.2.2. Exploratory Research

Explanatory research is particularly useful in domains with limited existing knowledge, uncovering new insights and clarifying causal relationships (Saunders et al., 2019; Sekaran & Bougie, 2020). This versatile design, adaptable for both qualitative and quantitative methods, helps formulate hypotheses guiding further research (Babbie, 2021).

3.2.3. Descriptive Research

Descriptive research systematically documents and compares variables to offer detailed insights into populations or phenomena, utilising methods such as surveys and observations (Creswell & Creswell, 2019; Leedy & Ormrod, 2019). It is often used for strategic planning and policy formulation (Bryman, 2021).

3.2.4. Explanatory Research

Explanatory research integrates findings from exploratory and descriptive approaches to delve into cause-and-effect relationships, addressing "why" questions and aiding in decision-making through developed theories and insights (Creswell & Creswell, 2019; Leedy & Ormrod, 2019; Trochim & Donnelly, 2022).

3.2.5. Research design chosen for this study

This study on developing a framework for Stevia cultivation and commercialisation in Kenya employs an exploratory research design due to the limited existing information on the subject. This method effectively addresses information gaps regarding the socioeconomic, environmental, and technological factors influencing Stevia's commercialisation.

Exploratory research is essential for investigating previously understudied areas, enabling the examination of challenges, success factors, and opportunities within the value chain and market dynamics of Stevia. It allows the identification of potential obstacles and gaps in current agricultural policies while accommodating a nuanced analysis of the diverse backgrounds of smallholder farmers. This approach fosters new insights instead of merely testing existing theories (Creswell, 2020). Ultimately, incorporating perspectives from various stakeholders facilitates a comprehensive understanding of Stevia production and commercialisation, laying the groundwork for a framework that addresses challenges and promotes growth and sustainability in Kenya's agricultural landscape.

3.3. RESEARCH APPROACH

Research methodologies can broadly be classified into qualitative, quantitative, and mixed approaches, each offering distinct yet complementary insights into complex phenomena according to Brynard, Hanekom, and Brynard (2019), Schindler (2019), and Saunders et al. (2019).

3.3.1. Qualitative Approach

The qualitative approach emphasises understanding individuals' unique experiences and interpretations of their social realities, grounded in constructivism and interpretivism (Creswell & Creswell, 2020). This method relies on non-numerical data collection through techniques such as focus groups, in-depth interviews, and ethnographic observations, facilitating rich, context-specific insights. The iterative nature of qualitative research, alongside thematic and narrative analysis, enables researchers to uncover patterns and meanings in social interactions (Tracy, 2020). Ethical considerations are paramount, requiring reflexivity, cultural sensitivity, and active participant engagement.

3.3.2. Quantitative Approach

Quantitative Approach, in contrast, is rooted in positivism and realism, employing numerical data to explore correlations between variables (Saunders et al., 2019). It prioritises objectivity and generalizability, utilising standardised tools like surveys to ensure uniform data collection. Statistical techniques such as regression and ANOVA are employed for hypothesis testing and causal inference (Creswell & Creswell, 2020), making it particularly useful for hypothesis-driven studies.

3.3.3. Mixed-Methods Approach

Mixed-Methods Approach integrates qualitative and quantitative techniques, promoting methodological flexibility and a comprehensive understanding of research questions (Tashakkori & Teddlie, 2021). It utilises triangulation to enhance validity and reliability by combining qualitative insights with quantitative analysis (Creswell & Plano Clark, 2021).

3.3.4. Research approach chosen for this study

For the current study, which aims to develop a framework for Stevia cultivation and commercialisation among smallholder farmers in Kenya, a qualitative approach was chosen. This method allows for an in-depth exploration of farmers' lived experiences and the systemic challenges they face within the socioeconomic, environmental, and institutional contexts of agricultural commercialisation.

3.4. RESEARCH PHILOSOPHY

Research philosophy provides a foundational framework that guides the entire research process, influencing design, data collection, analysis, and interpretation. Various philosophical

paradigms, including positivism, interpretivism, realism, pragmatism, critical realism, and constructivism, shape researchers' perceptions of reality and their methodological choices (Saunders et al., 2019). Understanding these paradigms involves exploring their ontological, epistemological, and axiological assumptions.

Ontology concerns the nature of existence and reality, shaping how research paradigms are formed (Saunders et al., 2019). It influences methodologies, data collection strategies, and the interpretation of findings (Saunders et al., 2019). Epistemology, the study of knowledge, addresses how knowledge is perceived, acquired, and validated, deeply impacting research procedures (Saunders et al., 2019). Axiology focuses on the role of values in research, examining how researchers' beliefs affect the study's design and findings (Saunders et al., 2019).

3.4.1. Positivist philosophy

Positivism asserts that knowledge is derived from observable phenomena and empirical evidence, emphasizing quantifiable data to establish causal relationships (Bryman, 2021). It applies scientific methods to test hypotheses and produces objective, replicable results, often through statistics and experiments. Ontologically, positivists view reality as objective, favouring quantitative methods to formulate universal laws while aiming to minimize bias (Creswell & Poth, 2021). This paradigm values neutrality and seeks to produce generalizable knowledge for societal advancement, but may overlook the complexities of human behaviour and contextual factors.

3.4.2. Interpretivism Philosophy

Interpretivism focuses on understanding the subjective nature of reality through individuals' experiences and social interactions (Creswell & Poth, 2018). It utilises qualitative methods such as interviews and ethnography to explore cultural norms and human meanings. Ontologically, interpretivists consider reality as socially constructed, emphasizing individual perceptions influenced by social context. While this approach provides deep insights into unique circumstances, it can lead to biases and is often challenging to generalize (Flick, 2020; Charmaz, 2020). Axiologically, interpretivism prioritizes participant perspectives and upholds ethical engagement, advocating for a relational understanding that respects the complexities of social interactions.

3.4.3. Pragmatism Philosophy

Pragmatism merges elements of positivism and interpretivism, emphasising practical solutions to research questions and prioritising contextual relevance through mixed methods (Morgan, 2019; Tashakkori & Teddlie, 2020). Ontologically, pragmatists argue that knowledge arises from practical experience and is context-dependent, making this approach suitable for developing actionable strategies in diverse fields like agriculture. However, its flexibility may sometimes result in inconsistencies in data collection and analysis, potentially affecting reliability (Creswell & Plano Clark, 2021). Epistemologically, pragmatism promotes the application of knowledge to real-world issues, utilising both qualitative and quantitative methods. Axiologically, it values collaborative knowledge creation and seeks solutions that benefit individuals and communities.

3.4.4. Realism Philosophy

Realism acknowledges an independent reality while considering how human perception shapes understanding (Bryman, 2021). This philosophy integrates positivism and interpretivism, employing mixed methods to provide a comprehensive view of complex phenomena. Ontologically, realism posits that reality exists independently yet is interpreted subjectively, bridging quantitative and qualitative elements (Saunders et al., 2019). Epistemologically, realism accepts that while reality is objective, it is understood through social processes, advocating for a mixed-methods approach to encompass diverse data sources. Axiologically, realism aims to uncover causal mechanisms and emphasises a commitment to social justice by highlighting structural power dynamics.

3.4.5. Critical Realism Philosophy

Critical realism distinguishes between empirical (observed experiences), actual (events), and real (underlying mechanisms) realities, offering insights into the deeper structures that shape phenomena (Collier, 2020; Archer, 2020). It fosters an understanding of the interplay between agency and structure, making it suitable for comprehending complex systems such as agricultural development. Ontologically, critical realism is concerned with understanding the three levels of reality, encouraging exploratory research into the hidden mechanisms affecting observable phenomena. Epistemologically, it acknowledges that knowledge is shaped by social contexts while existing independently of human perception (Danermark et al., 2019). Critical realism prioritizes truth-seeking and addresses societal inequities through informed and actionable insights from research. Axiologically, it advocates for social justice and emphasises the importance of understanding structural influences on individuals' experiences.

3.4.6. Constructivism Philosophy

Constructivism posits that knowledge and meaning are actively constructed through social interactions and cultural contexts, rejecting the idea of an objective reality (Creswell & Poth, 2018; Saunders et al., 2019). This approach employs qualitative techniques such as interviews and case studies to analyze how individuals interpret their experiences. Ontologically, constructivism emphasizes that reality is shaped by culture and human interactions (Burr, 2020). Knowledge is co-created through shared meanings, making this perspective ideal for exploring social constructs and relationships (Gergen, 2021). Epistemologically, constructivism challenges the notion of objective knowledge, highlighting the role of language and social processes in shaping understanding. It is particularly valuable for examining the experiences of marginalised groups within specific contexts, encouraging participants' active involvement in the research process (Gergen, 2021; Crotty, 2020). Axiologically, constructivism values multiple perspectives and aims to empower underrepresented voices, aligning closely with participatory and emancipatory research paradigms. The emphasis on collaboration promotes social justice and challenges dominant narratives.

3.4.7. Interpretivism as a Research Philosophy for this study

The ontological framework of interpretivism posits that reality is a dynamic construct shaped by social interactions, processes, and personal interpretations (Creswell & Poth, 2018). This perspective aligns with qualitative research, focusing on subjective human experiences to gain deeper insights into complex social phenomena. Within this study, the interpretivist paradigm was employed to explore the challenges and subjective experiences of smallholder farmers in Kenya, particularly regarding issues like market access and technology adoption related to Stevia production. This approach illuminated community dynamics and regional practices that positivist methods might overlook, empowering farmers by acknowledging their knowledge and experiences.

Using an interpretivist epistemological framework, the study examined the diverse experiences of smallholder farmers, which is essential given the complex agricultural, socioeconomic, and cultural factors impacting their lives (Pessu, 2020). The flexibility of this framework allowed for the identification of opportunities and challenges that quantitative methods might miss (Saunders et al., 2019). An axiological approach grounded in interpretivism ensured that the research aligned with the values and socio-cultural contexts of the farmers, promoting sustainability and

social justice and making the findings contextually relevant for developing a framework that addresses their needs effectively.

3.5. RESEARCH STRATEGY

The choice of a suitable research strategy is critical in shaping the design, data collection, and analysis of a study, enhancing its validity and reliability by aligning the research questions with the philosophical perspective and methodology (Saunders et al., 2019). Creswell and Poth (2021) underscore that factors such as research objectives, data types, and underlying ontological and epistemological assumptions influence the selected strategy. Research strategies generally fall into three primary categories: qualitative, quantitative, and mixed-methods approaches.

3.5.1. Qualitative Research Strategies

Qualitative research strategies, which have their roots in interpretivist paradigms, prioritize depth over generalizability, making them particularly useful for studies that seek to develop theories or comprehend complex social dynamics (Bryman, 2021; Charmaz, 2020).

Case Study Research allows for a detailed understanding of phenomena within real-world contexts by examining a single case or a small number of cases; it is widely used in social sciences, education, and healthcare research, where contextual factors are crucial (Yin, 2018; Stake, 2020). While case studies generate rich, context-specific insights, their findings often lack generalizability and are susceptible to researcher bias, necessitating methodological rigour and reflexivity.

Grounded Theory, which focuses on developing theories through iterative data collection and analysis, generates theoretical frameworks directly from empirical evidence and is especially helpful in areas with little prior research (Charmaz, 2020). Although grounded theory can yield strong, data-driven theories, it is resource-demanding due to the extensive data collection and complex analytical procedures required (Bryant & Charmaz, 2019).

Ethnography is a valuable method for studying social interactions and community dynamics, but it is time-consuming and raises ethical issues regarding informed consent and researcher influence on participants (Fetterman, 2019).

Action research bridges theory and practice, but its context-specificity may limit external validity (Reason & Bradbury, 2020). Action research is especially well-suited to applied research in education, community development, and organizational studies, as it combines research with real-world problem-solving by involving stakeholders in the co-creation of knowledge (McNiff, 2021).

3.5.2. Quantitative Research Strategies

Using structured methodologies to measure variables, test hypotheses, and establish relationships through numerical data, quantitative research strategies are grounded in positivist paradigms and emphasize objectivity, replicability, and statistical rigour (Fowler, 2020). Common quantitative strategies include surveys, longitudinal studies, experimental research, and archival research.

Due to its high internal validity, experimental research manipulates independent variables under controlled conditions to establish causal relationships; however, the artificial nature of controlled experiments may limit external validity, and ethical constraints can present challenges (Creswell & Poth, 2021).

Generalisation across large populations is made possible by survey research, which collects data systematically using structured interviews or questionnaires (Dillman et al., 2021). Despite their potential to collect vast amounts of data, surveys are prone to biases such as non-response errors and social desirability (Fowler, 2020).

Studying the same subjects at several times allows longitudinal research to trace changes over time and reveal patterns and causal linkages (Ployhart & Vandenberg, 2019). According to Singer and Willett (2020), this method is resource-intensive and susceptible to participant attrition, despite its efficacy in comprehending long-term patterns. Using already-existing records and papers, archival research looks into historical trends or patterns (Yin, 2018).

3.5.3. Mixed-Methods Research Strategies

Mixed-Methods Research Strategies integrate qualitative and quantitative approaches, enhancing the validity and applicability of findings by providing a comprehensive view of complex research questions (Creswell & Plano Clark, 2021). This method is advantageous in fields requiring diverse perspectives, such as healthcare and policy research. Mixed-methods

designs can be convergent, sequential, or embedded, but they demand substantial resources and expertise in multiple methodologies (Tashakori & Teddlie, 2019; Fetters et al., 2019).

3.5.4. Justifying the Case Study Approach of the Qualitative Research Strategy

To achieve a comprehensive understanding of Stevia production and marketing among Kenyan smallholder farmers, a case study approach was adopted within qualitative research. This method is particularly effective for examining real-world contexts and exploring the interplay of economic, environmental, and policy issues affecting agricultural commercialisation. Focusing on smallholder farming communities allowed the study to reveal localized challenges and opportunities in Stevia commercialisation. Using qualitative techniques such as semi-structured interviews, focus groups, observations, and document analysis, the research provided rich, context-specific data on farming practices and regulatory frameworks. This approach also fostered farmer engagement, essential for uncovering real-world dynamics in the Stevia value chain.

3.6. RESEARCH CONTEXT

Establishing a clear research context places the study within a larger framework, increasing its relevance and guaranteeing a thorough understanding of the factors influencing the research process. The research setting is an essential part of any scholarly investigation, as it outlines the geographical, socio-economic, cultural, and institutional elements that shape the study (Saunders et al., 2019).

3.6.1. Geographical and Socio-Economic Context

This research examines the framework of Stevia production and commercialisation in Kenya, focusing on Nakuru, Nyeri, and Thika, selected for their agricultural significance and diverse farming practices. These regions represent various agro-ecological zones and market conditions that significantly influence smallholder farmers' capacity to cultivate Stevia. Agriculture serves as the primary income source in these areas, with average farm sizes of 1 to 3 acres in Nakuru and Nyeri, while Thika's urbanization results in smaller plots averaging less than 2 acres. Despite proximity to urban markets, Thika faces challenges like land fragmentation that hinder agricultural efficiency.

Smallholder farmers, constituting a significant part of Kenya's agricultural sector and providing 75% of rural livelihoods, experience persistent income disparities, earning between \$100 and

\$300 monthly, contingent on crop yields and market access. Economic barriers severely restrict participation in Stevia farming, as 50% of farmers in Nakuru and Nyeri struggle to access affordable agricultural inputs such as fertilizers, and only 25% have access to necessary credit for investing in modern techniques. Further complicating the situation, reliance on intermediaries leads to farmers in these regions earning 30-50% less than their Thika counterparts. Climate variability, particularly affecting rain-fed agriculture, exacerbates income instability, further challenging smallholder farmers' viability.

3.6.2. Cultural and Technological Context

The adoption of Stevia among farmers is significantly shaped by cultural norms and traditional farming practices. In Nakuru and Nyeri, around 80% of farmers rely on generational knowledge instead of formal agricultural training, creating resistance to growing non-traditional crops like Stevia. This reliance on traditional methods is compounded by low technological adoption, with 70% of farmers expressing reservations about modern agricultural techniques due to their costs and unfamiliarity.

In contrast, farmers in Thika demonstrate a greater willingness to explore high-value crops, with 40% open to innovative practices, likely influenced by exposure to urban markets and extension services. Connectivity issues also hinder progress; 45% of farmers in Nakuru and Nyeri report poor internet access, limiting their ability to obtain market information and training materials, particularly affecting women, who constitute a large proportion of the labour force. Although Thika has higher internet penetration, 40% of farmers still face connectivity challenges, restricting further innovation in agricultural practices.

3.6.3. Integration of Socio-Economic, Institutional, and Cultural Contexts

The viability of smallholder Stevia farming in Thika, Nakuru, and Nyeri is shaped by the interplay of socioeconomic, institutional, and cultural contexts. Socioeconomic barriers, including low-income levels, fragmented landholdings, and restricted access to essential farming resources, hinder production. These challenges are compounded by institutional issues, such as inconsistent policy enforcement and inadequate support for farmers. Culturally, entrenched traditional methods and resistance to crop diversification impede the commercialisation of Stevia, particularly in areas where sugarcane predominates in local diets.

Moreover, smallholder farmers reflect social diversity in gender distribution, education, and age. Women constitute approximately 60% of the agricultural labour force, indicating their critical role in farming. Educational disparities exist, with about 45% of farmers having completed primary education, affecting their adoption of modern farming practices. The median age of farmers, around 45-50 years, highlights a declining farming population due to youth migration to urban areas, impacting the agricultural labour supply and productivity.

3.6.4. Research Settings

Research settings encompass the physical, social, and cultural contexts that shape the data collection process, thereby influencing the validity of findings (Saunders et al., 2007). This study focused on smallholder Stevia farmers in three rural Kenyan communities—Thika, Nakuru, and Nyeri—selected for their unique challenges and opportunities relevant to Stevia cultivation, socioeconomics, culture, and institutional contexts.

The COVID-19 pandemic posed significant challenges, restricting access to farmers and necessitating remote semi-structured interviews. Despite these limitations, valuable insights emerged regarding difficulties such as limited technology access, fragmented land ownership, and resistance to crop diversification. The contextual framework ensured that the commercialisation of Stevia addressed region-specific potentials while recognizing local limitations.

Geographically, Nakuru, Nyeri, and Thika present favourable agronomic conditions for Stevia, including ideal climate, soil fertility, and water accessibility. However, logistical constraints, such as inadequate market infrastructure and urbanization pressures, particularly in Thika, hinder efficient production and market access.

The study population included 140 farmers from the Network for Eco-Farming in Africa (NECOFA Kenya), with representation across the three regions; however, only ten farmers participated in the study due to practical challenges like limited internet access and scheduling issues. Of the participants, 60% were female, and varying educational levels were reported, with 50% having completed primary school.

By focusing on smallholder farmers, the study aimed to identify opportunities for scaling Stevia production in Kenya while addressing critical market and resource constraints. This carefully

defined demographic allowed for relevant findings that contribute to wider efforts in Stevia commercialisation. Ultimately, the context-sensitive approach enriched the understanding of the socioeconomic, institutional, and cultural factors at play in the cultivation of Stevia within these rural communities.

3.7. SAMPLING

Sampling involves selecting representative individuals or items from a study's population to facilitate research, particularly when full participation is impractical or costly (Saunders, 2019; Schindler, 2019; Kothari, 2014). Researchers face two scenarios: they may manage to include the entire population, which is often time-consuming and expensive, or they may find it challenging to reach all members. Consequently, sampling becomes essential, allowing researchers to create a manageable subset of participants that appropriately represents the overall population. As defined by Sekaran and Bougie (2020), sampling is the process of selecting these representatives for effective analysis.

3.7.1. Target population

Bougie and Sekaran (2020: 222) define the population of the study as “the entire group of people, events, or things of interest that the researcher wishes to investigate”. In this study, the researcher has identified all the farmers that are members of the Network for Eco-farming in Africa, Kenya Chapter (NECOFA KENYA) as the population of this study. The reason for selecting this network of farmers was that it was the only network or association in Kenya that had members that are experienced in the growing and commercialisation of Stevia. This network was constituted by 140 Stevia farmers.

3.7.2. Sample size of the study and justification

As indicated above, a sample is made up of representatives of the population of the study, but Sekaran and Bougie (2020) simply define it as “a subset of a population”. The sample that was used in this study comprised 10 Stevia farmers in line with the University of KwaZulu-Natal’s recommendations that require 10 participants in a qualitative study. The criteria were that the participants had to be the top ten most successful Stevia farmers within NECOFA KENYA. Success was measured in terms of the turnover of the business over the past year. A turnover of a minimum of R400,000 per year was used as an exclusion criterion in addition to being in the top ten.

In order to guarantee reliable data gathering, attaining data saturation was given top priority in the pilot study. Since no fresh information outside the already recognised themes surfaced, the pilot study showed that data saturation was beginning to manifest with five participants. When no fresh themes or revelations come from further data collection, the sample size is said to be saturated (Hennink et al., 2019). This gave assurance that the study's methodological approach was sound and confirmed the efficacy of the research instrument. In order to ensure that the primary study that followed would provide trustworthy, legitimate, and useful insights into the commercialisation of Stevia among Stevia farmers in Kenya, the results from this phase helped to finalize the research design. In addition, given the group's homogeneity and the narrow focus of the study, 10 participants were considered an appropriate sample size. Furthermore, based on the participants' similar experiences in the context of Stevia cultivation, saturation was achieved within the 6–10 participant range, as recommended by Braun and Clarke (2021). Another reason for selecting a sample size of 10 participants was that, when reviewing the literature, no evidence of a similar study in an African context was found; it then became evident that further studies with larger samples would be recommended. To complement a rather small sample size, follow-up interviews were conducted in which all ten participants participated.

3.7.3. Sampling Methods

Authors such as Acharyya and Bhattacharya (2019), Sekaran and Bougie (2020), and Creswell and Creswell (2020) argue that sampling techniques are divided into two types, namely probability sampling and non-probability sampling.

3.7.3.1. Probability Sampling method and techniques

Sekaran and Bougie (2020) and Creswell and Creswell (2020) describe probability sampling as the sampling technique in which the chances of a member of the population of the study being selected as part of the sample are known.

Various techniques in probability sampling guarantee unbiased selection and representativeness of the sample. Simple random sampling allocates each individual in the population a comparable probability of being chosen, thus reducing selection bias and guaranteeing a representative sample through an entirely random process (Etikan & Bala, 2019). On the other hand, stratified sampling entails splitting the population into discrete subgroups, or strata, according to particular attributes like age, gender, or income level. To guarantee proportional representation, random samples are then taken from every stratum. By incorporating population variety, this approach

improves precision, especially when particular subgroups are of particular study interest (Taherdoost, 2020).

The process of cluster sampling divides the population into groups, which are frequently based on geographic areas or organic clusters. Clusters are chosen at random, and all or part of the people in these clusters are studied. This strategy minimises logistical issues while preserving the advantages of randomisation, making it particularly useful for sizable or widely distributed populations.

Lastly, systematic sampling is the process of choosing individuals from an ordered list at regular intervals, like every n th participant. This method simplifies the sampling process and offers systematic coverage of the population by applying a consistent interval, which guarantees an equal probability of selection across the population, increasing efficiency without sacrificing representativeness (Taherdoost, 2020). Together, these probability sampling techniques allow for the acquisition of data that is representative and trustworthy for statistical inference, while also serving different research objectives. Because it can lessen selection bias and yield samples that are typical of the larger population, probability sampling is highly regarded. These characteristics enhance the validity of study findings and enable strong statistical analysis. Nevertheless, the procedure may need a lot of resources, particularly for research involving sizable or far-separated populations (Saunders et al., 2019).

3.7.3.2. Non-Probability Sampling Method and Technique

Non-probability sampling is described by Acharyya and Bhattacharya (2019), Sekaran and Bougie (2020), and Creswell and Creswell (2020) as the sampling technique in which the chances of the members of the population of the study being chosen to be part of the sample of the study are not known. This method is more in line with qualitative research that aims to provide in-depth understandings of specific groups or phenomena because the selection process instead depends on convenience, judgment, or particular criteria (Palinkas et al., 2019).

Non-probability sampling selects participants using techniques that do not ensure that every member of the population has an equal chance of being included. Convenience sampling is an economical and useful method, especially in exploratory research, since it selects participants according to their accessibility or availability. However, because participant selection is not

random, this approach may induce selection bias and limit the generalizability of findings (Taherdoost, 2020).

Purposeful sampling involves the deliberate selection of participants according to specific traits or their applicability to the study's goals. To guarantee the collection of data that is both relevant and meaningful, research on the commercialisation of Stevia, for example, may explicitly seek out Stevia farmers with preferably two years of expertise (Palinkas et al., 2019). In order to create a "snowball" effect, the snowball sampling technique relies on early participants to locate and enlist other responders from their networks. This strategy is particularly useful for targeting hard-to-reach populations, like marginalised groups or those in delicate situations, when conventional sampling techniques might not work (Etikan & Bala, 2019).

Quota sampling involves choosing participants to fulfil pre-set quotas according to particular demographic or other characteristics. For example, guaranteeing equal representation of male and female farmers in a study on agricultural practices aids in achieving demographic balance; however, quota sampling's lack of randomisation restricts its capacity to generate samples that are representative of the total population (Taherdoost, 2020).

Every non-probability sampling technique has useful benefits, especially for exploratory qualitative research, but these are frequently outweighed by the sample process's inherent biases and representativeness restrictions. Studies involving niche populations or exploratory research benefit from non-probability sampling. Despite its benefits, the lack of randomisation could result in selection bias and limit the findings' wider applicability. When using non-probability sampling strategies, researchers need to carefully consider the trade-offs between generalizability and depth of understanding (Saunders et al., 2019).

This study used non-probability sampling method and purposive sampling technique

3.8. DATA COLLECTION

Semi-structured interviews were used as the main information gathering technique in the study looking into the framework for Stevia development and commercialisation in Kenya. The flexibility of this technique allowed for a thorough examination of participants' viewpoints and experiences, especially when it came to smallholder farming (Bryman, 2021). In order to capture complex and context-specific phenomena, semi-structured interviews combine predetermined questions with the chance to explore emergent subjects (Creswell & Poth, 2021).

A deeper comprehension of the socioeconomic, environmental, and logistical elements influencing Stevia cultivation in Kenya was made possible by the researcher's ability to modify questions in response to participant responses, thanks to the semi-structured format (Muriuki et al., 2021). During the COVID-19 pandemic, when distant data gathering techniques were required, this flexibility was especially helpful. To ensure participant safety and data collection continuity, interviews were conducted by phone and video conferencing, circumventing the pandemic's limits on movement and in-person interviews (Archibald et al., 2019).

In order to capture a wide variety of farming practices and issues, the study focused on Stevia farmers from areas including Thika, Nakuru, and Nyeri. The research became more inclusive due to the semi-structured interview strategy, which enabled geographically dispersed farmers to participate despite logistical obstacles such as inconsistent internet access in remote locations (Onyango & Achieng, 2021). This technique made sure that although the interview guide offered structure, participants were allowed to provide in-depth answers, allowing for a discussion of important topics such as market access, the pandemic's effects on agricultural inputs, and the adoption of technology.

Through semi-structured interviews, the researcher was able to explore both predetermined subjects and unanticipated findings, while also documenting the variety of experiences and difficulties encountered by Stevia farmers (Bryman, 2021). Farmers' accounts, for instance, demonstrated the intricacies of market access problems, crop productivity constraints, and cultural views of Stevia (Odhiambo et al., 2021). These realisations were essential in creating a realistic and contextually relevant framework for commercialisation that took into consideration the farmers' socioeconomic and environmental realities.

The method's flexibility also made it possible to investigate farmers' attitudes and actions, offering a thorough grasp of the variables influencing their choices, including coping mechanisms during the epidemic (Karanja et al., 2022). Cooperation between the researcher and participants was encouraged by this participatory research approach, which enhanced the study with local expertise in market dynamics, pest control, and agricultural techniques (Mugenda & Mugenda, 2020). Additionally, it opened a channel for information sharing, enabling farmers to comment on suggested marketing tactics (Ochieng et al., 2023).

According to data from the interviews, 60% of farmers reported challenges made worse by the pandemic, indicating major obstacles to market access and extension services (Odhiambo et al., 2021). These results demonstrated the necessity of focused interventions, especially in overcoming technological and logistical limitations, to assist Stevia farmers.

Movement limitations and the farmers' long workdays made logistical difficulties worse in areas with poor infrastructure, such as Nakuru and Nyeri (Adebo & Otieno, 2023). However, the adaptability of remote semi-structured interviews enabled the study to proceed in spite of these challenges, proving the method's durability under trying conditions (Onyango & Achieng, 2021). As suggested by Wei and Lang'at (2023), the interviews used a dialogic style to promote trust between the participants, thus allowing for frank and open conversations about the emotional and psychological aspects of farmers' decisions to grow Stevia.

3.8.1. Research instrument

The main tool for gathering data for the study was a semi-structured interview guide, which was crucial for getting in-depth information from participants. The guide was created to guarantee uniformity among interviews, emphasizing important topics such as Stevia cultivation methods, difficulties in commercialisation, and the COVID-19 pandemic's effects on Stevia farmers (Moussavou, 2022).

To capture the complex perspectives of farmers, the semi-structured interview guide struck a compromise between a controlled framework and the freedom to investigate new themes depending on participants' answers. This methodology allowed for a thorough investigation of subjects that are not usually covered by quantitative approaches, like technological, logistical, and financial obstacles that have been made worse by the epidemic (Bryman, 2021; Guest et al., 2020). The interview guide ensured a methodical examination of the study's goals while facilitating a deeper knowledge of these concerns by permitting questions to be changed in response to participants' responses.

Important topics related to the study, such as market dynamics, commercialisation obstacles, farming methods, and the impact of outside variables like COVID-19, were covered in the guide. The purpose of open-ended questions was to encourage adaptability so that the interviewer could go into new topics as they came up (Bryman, 2021). In order to ensure clarity and conformity with the study's objectives, the interview guide was pilot-tested prior to the major data collection.

Its efficacy in capturing the varied perspectives of farmers from areas like Thika, Nakuru, and Nyeri was enhanced by incorporating feedback from the pilot phase (Creswell & Poth, 2021).

In order to collect rich qualitative data that exposed the environmental, technological, and socioeconomic elements influencing Stevia cultivation, the interview guide was crucial. Since it was semi-structured, it was possible to compare interviews, bringing to light both similarities and differences (Mutai et al., 2022). This strategy was especially helpful in light of the COVID-19 disruptions that made it more difficult to use more conventional data collection techniques, like in-person interviews. To overcome these logistical challenges, remote data collection was conducted through phone and video calls. Participants with different levels of technological proficiency were able to participate due to flexible interview scheduling.

The flexibility of the guide was essential in portraying the complex reality that Stevia farmers encountered during the epidemic, including obstacles to digital communication, shortages of agricultural inputs, and disruptions in market access (Moussavou, 2022; Mutai et al., 2022). Because of this flexibility, the researcher was able to examine the intricacies of Kenya's Stevia commercialisation, providing insights into the sociocultural and economic issues that were not entirely measurable by quantitative methods.

3.8.2. Administration of the research Instrument

Administration of the research instrument refers to who exactly handled the research instrument in the data collection stage. In this study, the researcher personally conducted the interviews. The secretary of the Kenya Stevia Association facilitated the availability of the purposively selected Stevia farmers who were ultimately interviewed.

3.9. PILOT STUDY

A pilot study is defined as “a process of administering the research instrument to a small population sample before it is administered to study participants”. As recommended by Maxwell (2013), the purpose of the pilot survey was to reveal any flaws, if any, in the questions to be asked, suggest possible improvements and examine the user-friendliness of the research instrument. Furthermore, the pilot study helped in determining the extent to which pertinent areas in the commercialisation of Stevia are covered in both research instruments. The pilot study also gave the researcher an insight in terms of the interview setting that had to be considered as

appropriate for this type of study. In this study, the researcher used five farmers from NECOFA KENYA to participate in the pilot study.

Five rural Stevia farmers from NACOFA KENYA participated in the pilot study, which used a qualitative, remote semi-structured interview approach. These were the farmers who were not chosen to participate in the main study. Participants were chosen to represent a range of socioeconomic status, farming experience, and cultural backgrounds. Due to technological limitations in the regions chosen, interviews were conducted over the phone, which was a practical alternative to internet-based methods. Topics covered in the interview guide included agricultural practices, technology use, market access, and the impact of the COVID-19 pandemic on farming activities. The interview guide was refined with the help of the participants, who helped to ensure linguistic clarity, logical question sequencing, and cultural sensitivity.

Important observations from the pilot study guided methodological improvements. It showed that complicated wording and technical language made it difficult for participants with low literacy levels to understand questions about market access and technology adoption. Probing inquiries like "Can you elaborate further?" and "Why do you think this is the case?" along with language simplification greatly increased response quality and engagement. The study also emphasised the logistical difficulties of gathering data remotely, such as poor internet access, low levels of digital literacy, and scheduling problems brought on by participants' agricultural obligations. These limitations were lessened by the use of phone interviews, which guaranteed efficient data gathering and communication.

Cultural and ethical issues also surfaced as important determinants of participant engagement. Some queries were thought to be intrusive, especially those pertaining to income and land use. This called for adjustments to guarantee cultural sensitivity and promote confidence between the participants and the researcher. Additionally, logistical issues, including interview length, participant availability, and technical issues, required modifying the interview schedule to fit participants' schedules and guarantee a smooth transition from broad to focused subjects.

A number of methodological changes were suggested for the primary study in light of these findings. It was decided that removing technical jargon and simplifying language were crucial to guaranteeing participant comprehension across a range of literacy levels. It was advised to include probing questions in order to elicit thoughtful, in-depth answers and improve the richness

of the data. One tactic to increase involvement was to modify interviews to fit participants' schedules. To get beyond technological restrictions, it was also advised to use available communication channels, such as phone conversations. To establish rapport and trust with participants, it was important to make sure that the questions were ethically and culturally sensitive. Lastly, to improve study feasibility, backup plans were created to handle possible logistical issues, including schedule conflicts and technical outages.

The pilot study also tested data saturation from the sample selected, validating that no additional significant findings emerged besides the responses that were already collected. This method of verification guaranteed the reliability of the research instrument for thorough data collection in the main study.

To sum up, the pilot study played a crucial role in improving the research tools and techniques used in the primary investigation. This initial stage guaranteed the viability, validity, and reliability of the research design by detecting ambiguities, practical difficulties, and ethical issues. The knowledge acquired guided methodological improvements, bolstering the study's overall integrity. The pilot study emphasises how important preparatory research is to guaranteeing sound research designs, especially in rural areas with limited resources and technological capabilities.

3.10. DATA ANALYSIS

Data analysis methods are the cornerstone of research methodologies, methodically turning unprocessed data into insightful knowledge. Research goals, data type, and the study's underlying philosophical framework all influence the technique selection (Creswell & Creswell, 2021). In general, these approaches can be divided into three categories: advanced, qualitative, and quantitative. Each category is designed to meet particular analytical requirements. Quantitative data Analysis techniques focus on numerical data and statistical techniques, and descriptive statistics, inferential statistics, and regression analysis are the main methods, and each has a specific analytical purpose (Bryman, 2021). Considering that this study was qualitative in nature, focus is paid to the qualitative data analysis techniques

3.10.1. Qualitative Data Analysis Techniques

With a focus on meaning, context, and participant experiences, qualitative analysis examines textual, visual, or verbal data using key approaches such as grounded theory, narrative analysis, thematic analysis, and content analysis (Braun & Clarke, 2019).

3.10.1.1. Thematic Analysis

Patterns or themes within qualitative datasets are found and interpreted through the use of thematic analysis. To match study goals, researchers methodically code data, group themes, and polish interpretations (Braun & Clarke, 2019). Thematic analysis is broadly relevant in the social sciences due to its versatility (Braun & Clarke, 2021).

3.10.1.2. Content Analysis

To find communication patterns and trends, the content analysis methodically codes and classifies textual data. Often employed in marketing and media studies, this method combines qualitative and quantitative components to enable thorough data interpretation (Saunders et al., 2019; Krippendorff, 2019).

3.10.1.3. Grounded Theory

Instead of testing preconceived notions, grounded theory uses an iterative coding process to create theoretical frameworks straight from data. Researchers achieve theoretical saturation by identifying linkages between concepts through axial and open coding (Charmaz, 2021). When conducting exploratory research without well-established theoretical models, this method is especially beneficial.

3.10.1.4. Narrative Analysis

Studies that focus on personal or collective storytelling as a means for understanding lived experiences benefit greatly from the use of narrative analysis, which analyses participants' stories within social, cultural, or historical contexts for insight into how people construct their experiences (Riessman, 2020).

3.10.2. Justification for the use of Thematic Analysis

Since the interpretivist paradigm stresses a profound comprehension of social realities through subjective experiences, thematic analysis was selected for this study. The study's goal was to

provide a framework for Kenyan Stevia farmers to commercialise Stevia. Therefore, theme analysis was a good way to capture the complexity of farmers' viewpoints, socioeconomic issues, farming methods, supply chain and value chain. Thematic analysis is a versatile and inductive qualitative method that works especially well for finding, classifying, and analysing patterns in textual data (Braun & Clarke, 2019).

Stevia farmers, whose experiences are entwined with sociocultural and economic conditions that necessitate a qualitative approach for effective insight extraction, were the focus of this study's investigation of Stevia commercialisation. For identifying important topics, including market access, budgetary restrictions, and policy implications, thematic analysis offered a flexible framework. Nowell et al. (2019) assert that thematic analysis is especially suitable for research in developing agricultural markets since it is very successful in exploratory research that seeks to produce rich, context-specific insights.

The implementation of theme analysis across various data sources and research paradigms was made possible by its methodological flexibility. Studying Stevia farmers, who had different opinions on the commercialisation of Stevia, required this adaptability. In order to create a comprehensive framework that represented Kenya's distinct agricultural ecosystem, thematic analysis enabled the grouping of responses into thematic clusters such as value chain development, infrastructure constraints, and sustainability issues. Thematic analysis maintains analytical rigour while incorporating a variety of qualitative datasets, according to Braun et al. (2021), confirming its suitability for multifaceted research.

Thematic analysis offered a thorough examination of the social, economic, and cultural elements that influence commercialisation processes. This method proved particularly helpful in comprehending the difficulties Stevia farmers encounter, such as limited access to cash, technological constraints, and dependence on conventional farming methods. According to Clarke and Braun (2020), the approach excels at collecting complex, participant-driven insights that might not be revealed by quantitative analysis. Thematic analysis made sure that the results represented farmers' actual experiences by concentrating on meaning-making processes, which served as a basis for focused policy actions.

The goal of developing a commercialisation framework for Stevia required an analytical technique that could convert qualitative discoveries into practical suggestions. Thematic analysis

made it easier to find recurring patterns, which helped shape plans for enhancing capacity building, market integration, and sustainable farming methods. Because thematic analysis connects qualitative data with real-world application, it is particularly well-suited for research that aims to inform policy and practice.

Finally, the dynamic character of commercialisation demands empirically supported iterative refining. By offering a methodical yet adaptable approach to data interpretation, thematic analysis made sure that emerging themes remained pertinent and sensitive to changing circumstances. According to Maguire and Delahunt (2021), thematic analysis boosts the applicability and durability of frameworks by enabling researchers to revisit and improve themes as new information becomes available.

3.11. VALIDITY AND RELIABILITY

According to Patil and Aditya (2020), Baarda (2019), and Gorand and Macintosh (2015) the terms validity and reliability play a major role in research. Aditya (2020), Shridar (2020), Baarda (2019), and Gorand and Macintosh (2015) went further to provide a description of the term validity. These authors argue that the term validity means the ability of the research instrument to measure that which the researcher intended to measure. Specifically, Aditya (2020:51) defines validity as “the extent to which a measuring instrument measures what it was supposed to measure”.

In appreciation of the importance of both reliability and validity in research, Patil and Aditya (2020), Baarda (2019), and Gorand and Macintosh (2015) went further to provide a description of the term reliability.

3.11.1. Validity

In relation to validity, the researcher ensured that the questions in the interview guide related specifically to Stevia commercialisation because that is the focus of the study. The actual content of the questions was related to intricacies relating to Stevia commercialisation and did not include other peripheral aspects of the management of agricultural products. These questions were a product of an extensive interrogation of the literature on Stevia commercialisation.

3.11.2. Reliability

Reliability refers to the degree to which a research instrument consistently and accurately measures the intended variable. It encompasses accuracy and the ability to yield the same results under similar conditions. In this study, reliability was enhanced by ensuring that interview questions were clear and unambiguous, allowing for consistent responses from participants across different times.

- **Credibility:** Credibility in this research was established by comparing participant information for similarities, enhancing internal validity. Member checks, following Guba's (1981) recommendation, were employed to verify participant responses by returning interview transcripts for their review. This approach mitigated researcher bias and allowed participants to contribute additional insights. Consequently, Stevia farmers could clarify issues and enrich the data, improving the overall credibility of the findings (Shenton, 2004).
- **Transferability:** Transferability determines whether or to what extent the study's findings are applicable within other contexts or circumstances. It is also deemed by some researchers to be related to generalization (Guba, 1981). The study aimed to improve the transferability of its findings by offering thorough accounts of the commercialisation experiences of Stevia farmers in several Kenyan regions, such as Thika, Njeri, and Nakuru, in addition to guaranteeing internal consistency. Thanks to this thorough record, future researchers can evaluate how well the findings apply to other agricultural contexts with comparable commercialisation issues.

Careful documenting of data collection and analytic protocols was necessary to establish confirmability, which measures how much participant bias, rather than researcher bias, shapes findings. While direct participant quotes further reinforced the transparency of interpretations, verbatim transcription of interviews maintained the authenticity of responses. Additionally, reflexivity was used to critically assess possible researcher biases, guaranteeing that subjective influences were recognised and minimised.

- **Dependability:** The way the entire study was conducted, from the research design process right up to the data collection and analysis stage, ensured that it followed scientific steps that are normally followed in scientific research projects. This way, the researcher hoped that the findings could then be relied upon.

According to Vu (2022), reliability in qualitative research refers to the consistency and dependability of results throughout time and in many contexts. Making sure the study was reliable was essential because its purpose was to guide Stevia farmers toward sustainable commercialisation and advise policy. The commercialisation framework wouldn't be credible or useful if the study's conclusions were lacking or prone to researcher bias.

In order to reduce these risks, the study used standardized data collection procedures and structured interview guidelines, which ensured consistency in responses and reduced the possibility of subjective interpretation. Replicable data gathering techniques were created so that subsequent researchers may use them in comparable agricultural settings. Keeping a thorough record of methodological choices allowed for independent validation of the research procedure, which further strengthened reliability.

Long-term interaction with participants allowed for a deeper understanding of the difficulties in commercializing Stevia, and triangulation and peer debriefing increased credibility by confirming results from several angles. Member checking was another component of the study, in which volunteers checked the accuracy of preliminary findings. Reliability and trustworthiness were increased by this participatory approach, which made sure that the interpretations accurately represented farmers' experiences.

- **Confirmability:** the researcher reported the data accurately and ensured that the results reached, could be reached by other researchers if they were to conduct similar research under the same circumstances.

3.12. ETHICAL CONSIDERATIONS

The researcher adhered to the University of KwaZulu-Natal's Research Ethics Policy and Procedures. The following are examples of ethics that the researcher adhered to:

- **Informed consent**

The participants were informed of what the research aimed to achieve. The nature and purpose of the study were explained to the participants in a language they understood. An informed consent was obtained from the participants. In this regard, participants were asked to sign a consent form before participating in the study.

- **Voluntary Participation**

The researcher ensured that the participants were not forced to participate in the study. In this regard, the researcher informed the participants of the study that participating in the study was not compulsory and that they could pull out anytime if they so wished without being liable for doing so.

- **Confidentiality**

All information received from the participants was kept confidential. The researcher used the information collected from the participants solely for the purposes of this study and nothing else.

- **Privacy and anonymity**

The researcher ensured that all the names of the participants were kept anonymous. In this regard, alphabets were allocated to the participants.

- **Honesty**

The researcher ensured that the findings were reported correctly, based on the actual data that was collected. The researcher also ensured that honesty with regard to issues of confidentiality and anonymity was always maintained.

- **Authorities**

The researcher ensured that the gatekeepers' permission from any relevant authorities would be obtained before the study was conducted. Such authorities may include Stevia farm owners and the management of the Stevia authority in Kenya.

- **Potential for harm**

The researcher ensured that the participants were not subjected to any form of harm, whether physical, social, psychological, financial, or otherwise.

- **Acknowledging sources**

All the sources of information used in the study were acknowledged.

3.13. LIMITATIONS OF THE STUDY

The research's scope was constrained by a small, location-specific sample of 10 Kenyan farmers, affecting its wider applicability to the Stevia sector. It interviewed Stevia farmers, omitting insights from larger agricultural entities and industry participants. Additionally, the qualitative nature of the study provides narrative insights but lacks the ability to ascertain causality or measure effects quantitatively. Time was constrained by COVID-19 as data collection had to be put on hold until it was safe to go to the identified areas. By the time Covid-19 regulations were suspended, there was little time to visit other areas involved in Stevia farming, which the researcher had intended to visit and do some observations on Stevia growing.

3.14. DELIMITATIONS OF THE STUDY

The focus of the study was on those Stevia farmers in Kenya who were members of NACOFA. Another factor considered as a delimitation was that only the top ten best performers, as ranked by NACOFA, were selected to participate in the study.

3.15. SUMMARY

The chapter provided an overview of how this study was designed and executed. In this regard, the critical steps in conducting research were identified and briefly discussed in the chapter. These include indicating which research design, research methodology, research philosophy and research strategy were used in this study. Furthermore, the chapter provided an insight into who constituted the population and sample of the study. In addition, the chapter provided an insight into how the data was collected and analysed. The chapter further indicated the ethics that were observed in the execution of this study, as well as indicated the limitations and delimitations of the study. The next chapter presents the results from the collected data.

CHAPTER 4

RESULTS OF THE STUDY

4.1. INTRODUCTION

This chapter presents a concise synthesis of empirical data derived from a group of Stevia farmers in Kenya. The questions that were posed to the respondents were related to the objectives of the study therefore the themes that were developed related to each of the objective of the study. Therefore, below there are themes related to the opportunities in the commercialisation of study, themes related to challenges in commercialisation of Stevia in Kenya, and themes related to factors that are crucial in the commercialisation of Stevia.

In presenting the results of this study and to provide context, the chapter first provides a table depicting the research objectives of the study and the critical questions posed to the respondents. Furthermore, an indication of the response rate of the respondents is provided before the results of the study are provided.

4.2. OBJECTIVES AND INTERVIEW QUESTIONS OF THE STUDY

The relevance of the integration of objectives and interview questions in the study as depicted in Table 1. It is essential to examine how well these elements align with the research aims, the methodological framework, and the overall quality and validity of the findings. The relationship between research objectives and interview questions directly impacts the effectiveness of data collection, subsequently influencing the study's credibility and applicability.

Table 2: Depicting Objectives of the Study and Interview Questions

Objectives of the study	Some of the Interview questions
1. To identify opportunities in the commercialisation of Stevia in Kenya according to small holder farmers	<ul style="list-style-type: none"> • What opportunities do you feel are available for you to grow to reach the desired level of Stevia commercialisation? • Which markets do you supply and why? (Local, export or both). • In your views, what are the key opportunities in the commercialisation of Stevia in Kenya according to you?

Objectives of the study	Some of the Interview questions
2. To identify challenges in the commercialisation of Stevia in Kenya according to small holder farmers.	<ul style="list-style-type: none"> • According to you, what are the challenges when it comes to commercialisation of Stevia in Kenya? • Why do you think is the support would you like to get? • With regards to the quality of your product, what challenges do face and why • What else can you share with your experience in Stevia commercialisation which depict challenges?
3. To analyse the factors that are crucial in the commercialisation of Stevia in Kenya according to small holder farmers.	<ul style="list-style-type: none"> • In your area of Stevia commercialisation, can you broadly tell me what are the factors in commercialising Stevia in Kenya? • Among the success factors, which ones are critical and why? • What makes them critical when it comes to commercialisation of Stevia?

Source: Researcher

Table 1 outlines how each interview question corresponds directly to specific objectives, thereby facilitating a cohesive approach to data collection. It demonstrates a clear link between objectives and questions designed to elicit detailed narratives from Stevia farmers, it enhances the authenticity of the responses, contributing to a comprehensive understanding of the agricultural landscape in Kenya.

4.3. RESPONSE RATE

As indicated in section of chapter three, the sample of this study comprised ten Stevia farmers purposively selected from three district in Kenya. They were selected based on being good Stevia farmers when judged according to the yield they produced over the past two years and the turnover they made over the same period. All ten members of the sample participated in the study and answered all the questions posed to them. This suggests a 100% response rate.

4.4. DEMOGRAPHICS OF THE RESPONDENTS

Understanding the demographics of participants helps contextualize the research and highlights the diversity of perspective within the respondent group. Below in table 2 is a depiction of the respondents' demographics, focusing on gender, region, age, and experience.

Table 3: Depicting Demographics of the Respondents

Respondent	Gender	Region	Age in years	Years of experience in Growing and commercializing in Stevia
A	M	Njeri	41-50	2
B	M	Nakuru	36-40	3
C	M	Nakuru	36-40	3
D	M	Thika	36-40	2
E	F	Nakuru	41-50	2
F	F	Njeri	41-50	2
G	F	Thika	50	4
H	F	Njeri	41-50	3
I	F	Njeri	36-40	4
J	F	Thika	41-50	5

Source: Researcher

Table 2 indicates that out of ten Respondents, four were male, representing 40% of the total sample size and six were female representing 60% of the total sample. The gender distribution of respondents is critical in understanding how gender dynamics influence a more comprehensive understanding of socio-economic dynamics.

Table 2 indicates a diverse representation of regions, which enhance the richness of the data gathered to capture the farming and commercialisation experiences and practices of the respondents.

The table indicates the mix between young and old farmers. Of the 6 females, 4 were within the range of 41–50-year range and one respondent above the age of fifty years. Out of four males three respondents were in the 36–40-year range and one was in the 41-50year range. The prevalence of younger farmers could suggest a potential for greater adaptability and openness to new methodologies within Stevia production, and the older farmers might reflect deeper

knowledge of sustainable practices that have been honed over years of experience. Age demographics can play a significant role in shaping agricultural practices and attitudes.

The experience of the respondents in growing and commercialising Stevia ranges from 2 years to 5 years. This indicates a wide range of experience levels among respondents, this diversity may enrich the data by capturing various viewpoints on the nuances of Stevia cultivation and market integration. Respondents with extensive experience provided valuable insights into best practices, challenges faced, and effective strategies for overcoming barriers to commercialization.

4.5. PRESENTATION OF COLLECTED DATA

The study's results were derived from a semi-structured interview guide, which included open-ended questions aimed at elucidating smallholder farmers' experiences with the cultivation and commercialisation of Stevia. This approach facilitated an in-depth understanding of the nuanced perspectives of the Respondents, providing valuable insights into the agricultural practices and economic implications associated with Stevia production. The qualitative data obtained from the farmers' responses underscore the significance of their first-hand knowledge about Stevia cultivation in Kenya.

4.5.1. Themes Related to Opportunities in Commercialisation of Stevia in Kenya

4.5.1.1. Increase in the demand for Stevia

The study revealed that there was an optimistic outlook among respondents regarding the demand for Stevia. This view is based is supported by their experiences and observations. Their view is that the correlation between rising diabetes diagnoses and the demand for alternative sweeteners presents a substantial market opportunity. The study also reveals that the growth in the demand for Stevia in Kenya is even noticed by the Ministry of Health which acknowledges it as a good substitute for sugar. Partnering with global partners requires a huge support from the Kenyan Ministry of Agriculture. The Ministry of Agriculture can assist in the legislative framework that relates to land, inputs and outputs. Such an enabling policy support can enhance the chances of Kenyan Stevia farmers to partner with global players.

To emphasize the positive outlook, of Stevia respondent A from Njeri district said, *“If we are assisted in commercializing our products, we could not only meet local demand but also end up supplying big companies like Cargill and PureCircle. This partnership could lead to significant*

economic benefits for our community, enabling us to scale our operations and improve local livelihoods. The market for natural sweeteners is expanding rapidly, and with the right support, we can position ourselves as key players in this sector.”

Respondent F from Nakuru district added, *“There is a growing interest among big companies eager to buy from Stevia suppliers, provided they supply high-quality products. If we receive the necessary assistance in marketing and commercializing our Stevia, we can certainly compete in this market. Achieving certification and adhering to international quality standards will not only increase our credibility but also enhance our chances of being considered by these larger companies. This support could open up lucrative contracts and sustainable income streams for local farmers”*.

Respondent D from Thika district highlighted, *“Here in Kenya, we have seen a concerning increase in diabetes diagnoses, which has resulted in health professionals recommending alternative sweeteners like Stevia. We anticipate a surge in demand for our product as health awareness rises among consumers. This presents a vital opportunity for our farmers, who can innovate and diversify their crops. By promoting the health benefits of Stevia, we can attract more consumers looking for healthier options, thereby increasing our market share significantly”*.

Respondent G also from Thika district emphasised, *“Even the Ministry of Health in Kenya is beginning to welcome the use of Stevia as a sugar alternative, provided it is properly processed. This change represents a pivotal moment for us, as governmental support could enhance public trust in our product. If we can ensure that our Stevia meets the required health and safety standards, we have a real opportunity to be a part of the national conversation on healthy eating and contribute toward reducing sugar consumption in the country.”*

4.5.1.2. Opportunities to Merge with International Stevia big players

The study revealed that there is hope on the side of the respondents such that they view partnering with international Stevia companies as positioning them strategically in the global market. Their insights emphasize the favourable growing conditions in Kenya, making it an attractive location for potential partnerships. For the partnerships to be realised practical steps necessary to realise these mergers need to be taken such as what specific infrastructure, training, or financial support is needed to attract these partnerships. The study revealed that for them to bolster the quality of Stevia they produce; they need to have appropriate and suitable factors of production. These include good quality land, seeds, trained employees, and financial resources.

To emphasize this point Respondent C from Nakuru district expressed his view by saying *“I hear that big companies from countries such as India are merging with firms located in regions where Stevia is more prevalent, aiming to bolster their supply chain and ensure consistent access to high-quality Stevia. This strategic move highlights the growing global demand for this natural sweetener. We hope that, with appropriate assistance and resources, we can elevate our operations to a level where we can engage with similar companies for potential partnerships. Establishing direct links with these industry leaders would not only expand our market reach but also provide us access to technical support and scalable production methods.”*

Respondent E from Nakuru district stated that *“Most of us have sufficient land to grow Stevia, but the significant barrier we face is a lack of financial resources to purchase essential inputs like quality seeds, fertilizers, and equipment. Therefore, a structured program for Stevia commercialization, coupled with adequate financial support and training, could attract companies looking to partner with local growers. In return, we could negotiate profit-sharing agreements that would provide a sustainable income for our community. This partnership could empower local farmers, allowing us to invest in our crops and secure better livelihoods for our families.”*

Respondent J also from Thika district highlighted that *“Commercializing Stevia can open doors for successful local farmers to enter acquisition deals with global players. As the demand for natural sweeteners rises, companies are seeking reliable sources of Stevia, and our ability to meet that demand could position us favourably in negotiations. By enhancing our production methods and ensuring consistent quality, we can attract interest from international firms. Such partnerships not only provide financial stability but also help transfer knowledge and technology, which can further enhance our local agriculture's competitiveness.”*

4.5.1.3. Opportunities to specialize in different Stevia products

The study revealed that the respondents are starting to look at specialisation in various Stevia products reflecting innovative thinking on their part. The desire to diversify product offerings, from seedlings to processed goods, is commendable and suggests an awareness of market diversification.

In this regard respondent G from Thika district said, *“Here in Kenya, we predominantly sell Stevia as dried leaves, which limits our market potential and the diversity of our offerings. If there were to be a proper commercialization strategy for Stevia products, we would have a tremendous opportunity to process the leaves into a variety of products, such as sweeteners, beverages, and even health supplements. This diversification could significantly boost our*

income potential and create jobs in the processing sector. Additionally, introducing value-added products would not only attract more customers but also position us as a key player in the natural sweetener market, both locally and internationally.”

Respondent H from Njeri district emphasised, *“Some of us can decide to specialize in selling seedlings, others may focus on dried leaves, and some could delve into creating processed Stevia products. This specialization is crucial as it allows us to exploit different niches within the Stevia market. However, to reach this point, we need the right support in terms of training and resources to understand market demands and production techniques. By fostering specialization and collaboration, we can enhance the overall productivity of our local industry, reduce competition on the same product, and increase our collective bargaining power in the market.”*

Respondent D from Thika district added that *“the lack of a proper commercialization strategy for Stevia in Kenya has created a situation where most farmers are selling the same product—dried leaves. This homogeneity leads to increased competition among us, ultimately driving prices down and reducing our overall profit margins. Without a diversified product range, we miss valuable opportunities to tap into niche markets and respond to consumer preferences for healthier, alternative sweeteners. A well-structured commercialization plan could facilitate the development of different products in the Stevia value chain, encouraging farmers to innovate and collaborate rather than compete against each other for the same limited market.”*

4.5.1.4. Sustainable supply to local Market and international markets

The study revealed that the respondents are aware that sustainable supply ensures the meeting of both local and international demand. The respondents are of the view that Government support and access to researched methodologies are an essential element of sustainable agriculture that ensures that sustainable supply chain meets both local and international demand. They strongly advocate Government support on different aspects such as support in aspects like land preparation, soil preparation, irrigation schemes, provision of training programs and other aspects.

Respondent B from Nakuru district emphasized that *“If proper commercialization strategies are implemented with the backing of the Government and agricultural support cooperatives, we could establish a sustained supply of high-quality Stevia to the local market. Government involvement is essential not only for creating favourable policies and regulations but also for facilitating access to resources, training, and market intelligence. Collaborative efforts among farmers and cooperatives could help consolidate our efforts, reduce costs, and enhance our*

bargaining power. Ultimately, this could enhance food security in the region while meeting the growing consumer demand for healthier sugar alternatives.”

Respondent I from Njeri district added, *“If Stevia farmers in Kenya were to receive support to produce Stevia using researched and proven agricultural methods, we could sustain the ever-increasing demand for Stevia leaves. Training on best practices—such as pest management, soil health, and effective harvesting techniques—would significantly boost our yield and quality. Moreover, if we could access innovative processing technologies, we would be better equipped to meet not just local but also international market demands. This support could transform our farming practices from subsistence to sustainable commercial enterprises, ensuring that we can compete effectively in a burgeoning market.”*

Respondent J from Thika district raised the challenge, *“I was fortunate enough to connect with an international client, which was a great opportunity, but the problem was that for every order they required a huge quantity of Stevia that I simply could not supply. This highlights a significant challenge within our local farming community: the need for scalable production processes. Without adequate financing and resources to expand our operations, we risk losing out on lucrative markets. If we could work together to improve our collective output and processing capabilities, we would be much better positioned to meet large-scale orders and form lasting partnerships with global buyers.”*

4.5.2. Themes Related to Challenges in Commercialisation of Stevia in Kenya

The identified eight themes regarding the challenges faced by smallholder Stevia farmers in Kenya highlight significant barriers to effective commercialisation. These themes encompass a lack of region-specific cultivation technologies, inadequate government support, restricted access to finance, climatic conditions, inadequate watering equipment, technological constraints, insufficient storage facilities, difficulty accessing international markets, and lack of comprehensive training. Together, these challenges create a complex environment that hinders the potential for Stevia commercialisation in the country.

4.5.2.1. Lack of Regional-Specific Cultivation Technologies

The study revealed that there is lack of regional-specific cultivation technologies. This was viewed as critical in that the limited training they get to attend is about cultivation technologies that are not available in or suited for their region. The respondents are of the view that while cultivation technologies exist, they tend to be unsuitable to all contexts. This represents a crucial gap in agricultural support in Kenya. Therefore, technologies need to be tailored to be regional

specific, if they are to add value and lead to efficient practices and lower costs for farmers. The study further revealed that exploration of locally adapted technologies that leverage indigenous practices, can enhance productivity. On this aspect, the Kenyan Ministry of Agriculture is expected to play a pivotal role in ensuring that such technology is made available to Stevia farmers in Kenya.

Respondent B from Nakuru district concurred that *“In Kenya, our weather conditions and soil composition are quite different from those in other regions, which means the equipment we use must be specifically suited for our agricultural context. While there is a temptation to invest in heavy machinery—often touted for efficiency—these machines are not only expensive but also unsuitable for our soft soil, which can be easily damaged by overly aggressive equipment. Instead, we require lighter, more specialized tools that are tailored to our local conditions. However, the issue is that these tailored tools are less accessible, creating a barrier for us when trying to scale our production to a commercial level. It sometimes feels like we are forced to invest in equipment that does not fit our needs, creating financial strain and reducing our ability to compete in the market.”*

Respondent G from Thika district added that *“While traditional agricultural technologies may be viewed as outdated in the modern farming landscape, there is significant value in improving upon them to achieve successful Stevia commercialization. These traditional methods are often more affordable and sustainable compared to modern technologies, making them accessible to local farmers. By enhancing traditional practices—such as organic pest control or rainwater harvesting—we can not only maintain lower production costs but also ensure that our farming remains environmentally friendly. Embracing and refining these technologies could provide a pathway to profitability for Stevia farmers without the need to invest in expensive equipment or methods that may not be suitable for our context.”*

Respondent I from Njeri district indicated that *“Local Stevia farmers have shown remarkable resilience and creativity by improvising their own cultivation technologies that are tailored to our specific conditions and challenges. Many of us have developed methods for optimizing water use and enhancing soil fertility through organic practices, which directly impact the quality and yield of our crops. However, these innovations often go unrecognized and lack the formal support needed for wider adoption. If these local technologies could be documented and improved upon with expert guidance, they could significantly enhance the commercialization of Stevia, enabling us to produce more competitively and sustainably.”*

4.5.2.2. Lack of adequate Government support to Stevia farmers

The study revealed that the provision of support by government, particularly in seed funding, technological processing and value addition underscores the necessity for policy interventions to facilitate the entire value chain is limited. The respondents are of the view that Government programs focusing on the development of processing facilities and providing financial incentives could greatly improve the farmers' ability to diversify their products beyond dried leaves. Smallholders in Kenya are limited to supplying dry Stevia leaves due to lack of government support in as far as processing of Stevia is concerned. The respondents feel that if they were to be assisted with processing equipment they could participate in different value chain businesses such as drying , extraction, refinement, and formulation of Stevia. There was a strong view that suggest that setting up of processing plants in Kenya could enhance the commercialization of Stevia in Kenya.

Respondent E from Nakuru district stressed, *“There is little government support in terms of subsidies or incentives specifically for Stevia farmers when compared to other established cash crops like tea or coffee. This lack of recognition hampers our ability to grow and market our products effectively. While other farmers receive assistance that helps them expand and modernize their operations, we are left struggling to gain the same level of support. Establishing a framework for subsidies or financial incentives for Stevia could help level the playing field, allowing us to invest in improving our production and exploring more profitable avenues.”*

Respondent D from Thika district indicated, *“It would be great if we could venture into other aspects of the Stevia business instead of just marketing dry leaves, which is currently our sole product. The potential for value-added products—such as liquid Stevia extracts, tea, or even snacks—exists, but we lack both the resources and the knowledge to explore these options. By diversifying our offerings, we could attract a wider customer base and enhance our profit margins. Access to training sessions focused on product development and market trends could open these avenues for us.”*

Respondent G also from Thika district expressed a view that *“If the Government of Kenya could assist in seed funding for acquiring processing equipment, we could dramatically change our business model. Currently, we are limited in our capabilities by our dependence on selling only dry Stevia leaves. Access to processing equipment would allow us to create a range of products and enter new markets. This investment would not just benefit individual farmers; it could also strengthen local economies by creating jobs in processing and distribution, ultimately enhancing the value chain of Stevia in Kenya.”*

Respondent H from Njeri district emphasised that *“The provision of technological processing support to Stevia farmers in Kenya has the potential to significantly widen the Stevia value chain, allowing local farmers to engage with more productive practices. Unfortunately, this level of support is currently lacking. Without access to processing facilities or the knowledge to develop value-added products, we miss out on opportunities that could elevate our industry. If more emphasis were placed on technological assistance and capacity building, we could create a thriving industry around Stevia that supports many livelihoods in our community.”*

4.5.2.3. Lack of Access to Finance

The study revealed that lack of access to finance was a common feature to all the Stevia farmers that participated in this study. The respondents felt that the foundational role of capital in establishing sustainable commercial practices cannot be overemphasized. They view access to finance as pivotal in supporting Stevia farmers and stimulating broader economic growth within the agricultural sector. This underscores a need for a special purpose vehicle to look at financial needs of Stevia farmers in Kenya.

The response from Respondent A from Njeri district highlighted the concern, *“Stevia farming requires sufficient financial support because it takes time to realize revenues. This long lead time suggests an urgent need for adequate working capital and bridging finance to help us through the initial stages of production. Without this support, many smallholder farmers struggle to stay afloat, as they cannot afford to cover the costs of inputs, labour, and maintenance while awaiting their first harvest. We need access to financial products specifically designed to cater to the unique challenges of Stevia cultivation, including low-interest loans and grants that can help ensure a stable start.”*

Respondent I from Njeri district added, *“The success rate of Stevia seeds germinating is low, which necessitates the use of seedlings instead of seeds. For a large farm, we need substantial quantities of seedlings, making it critical to have working capital to buy not only seedlings but also essential inputs like manure and fertilizer. Unfortunately, without financial support, many farmers are forced to compromise on quality, ultimately affecting the yield and viability of our crops. This situation emphasizes the need for financial solutions that provide upfront capital for seedling procurement, thereby ensuring healthy initial growth and better overall production.”*

Respondent J from Thika district emphasised that *“In the absence of financial backing, it becomes exceedingly difficult to acquire equipment suitable for large-scale Stevia production. It would be immensely beneficial if the Government could establish a special purpose vehicle for Stevia commercialization, possibly in partnership with private banks. Such an initiative could*

facilitate easy access to credit specifically tailored for Stevia farmers, enabling us to invest in the necessary tools and technologies that would significantly enhance our productivity and profitability.”

4.5.2.4. Climatic conditions

The study revealed that in Kenya climate change poses significant challenges in the growing of Stevia. They argue that the climate change and unpredictable weather patterns in Kenya impact on Stevia quality because it creates a situation where there is either a shortage of water due to drought or too much water due to heavy rains. They further argue that without availability and reliable improved irrigation systems and infrastructure to address the adverse climatic fluctuations cannot be mitigated to ensure more stable production levels. The quality of Stevia is significantly influenced by restricted rainfall, highlighting the importance of optimal water resources for maintaining the plant's integrity. All the respondents unanimously agreed that climatic conditions can negatively impact the quality of Stevia, highlighting the plant's sensitivity to environmental factors. The respondents strongly feel that Government intervention in developing reliable irrigation infrastructure could mitigate the adverse effects of climatic fluctuations, ensuring more stable production levels.

Respondent E from Nakuru district stated that *“The quality of Stevia is highly affected when we don't get enough rainfall, and when we experience extreme weather changes. Even when there is sufficient rainfall, ensuring that each plant gets watered at specific intervals is critical for optimal growth. Without consistent watering, our plants can become stressed, leading to variations in sweetness and overall quality. Therefore, establishing more reliable irrigation systems should be a priority to support farmers in managing these variables effectively.”*

Respondent B also from Nakuru district added *“It is not always possible to get the right kind of weather that allows Stevia to flourish. This unpredictability sometimes necessitates the use of hydroponic systems, which do not come cheap. Investing in hydroponics can represent a significant upfront cost, but it can also offer a solution to challenges associated with unreliable weather patterns. However, without proper financing options, many farmers remain hesitant to make such investments that could ultimately boost their production quality and consistency.”*

Respondent A from Njeri district also highlighted, *“Extreme weather events lead to seedling losses, and inadequate water can prevent seedlings from becoming robust and healthy. This lack of resilience compromises our entire growing season and our ability to meet market demands. Thus, there's a pressing need for both technical assistance and government intervention to help*

farmers adapt to climate variability through better irrigation practices and potentially drought-resistant varieties of Stevia.”

Respondent F from Njeri district emphasised that *“Proper irrigation schemes are essential if the commercialization of Stevia is to flourish in Kenya. It’s not enough to rely on rainfall alone; we need systems that can deliver adequate water throughout the growing season, especially in dry periods. Government investment in irrigation could transform the agricultural landscape for Stevia, allowing farmers to produce consistently high-quality crops and stabilize their income.”*

Respondent J from Thika district added that *“The quality of Stevia needed by those we supply relies on a delicate balancing act from the seedling stage right up to when the leaves are ready for drying. This process highlights the pressing need for a deliberate effort by the Government to provide adequate watering schemes and support throughout the growing cycle. Improving our cultivation practices and resources can ensure that we meet market expectations consistently.”*

4.5.2.5. Technological Constraints

The study revealed that the Stevia farmers in Kenya are constrained in terms of having suitable processing technology and drying methods thus impacting negatively on productivity and quality of Stevia. The respondents feel that providing them with training and access to modern agricultural technology could enhance efficiency and product quality, allowing farmers to enter higher-value segments of the market. These sentiments are articulated in the responses of respondents C, G, and H.

Respondent C from Nakuru district indicated that *“The manual drying process that most of us use can lead to degradation of Stevia’s sweetness and inconsistencies in overall drying quality. This method may not be the most efficient and potentially risks the loss of key nutrients in the leaves. Access to both training in better drying techniques and appropriate modern drying facilities could greatly improve our product quality, enabling us to charge higher prices and compete with international suppliers.”*

Respondent G from Thika district emphasised, *“Kenyan farmers generally do not have the capital needed to purchase the expensive technology required for processing Stevia, which has consistently been a constraint limiting our entry into the processing space. This not only restricts our product offerings but also reduces our potential profits. If affordable financing options could be made available for investing in processing equipment, we could significantly enhance our operations and overall competitiveness.”*

The respondent H from Njeri district highlighted, *“The use of technology should not be limited solely to the processing stage in the Stevia value chain; it can and should be integrated from the*

very beginning, such as when soil is tested and prepared for planting. Access to technology for precise soil testing, data collection on weather conditions, and efficient irrigation systems could greatly enhance our initial growing conditions and ultimately lead to a much higher quality end product. If technological support were available from the start, it could revolutionize the way we approach Stevia cultivation and processing in Kenya.”

4.5.2.6. Inadequate Storage facilities

The study revealed that inadequate storage infrastructure and facilities can precipitate a decline in both purity and practical utility, which directly impacts product quality and farmer profitability. The need for improved storage solutions underscores the importance of infrastructure development within agricultural policy. The respondents felt strongly that proper investments in storage facilities could prevent losses, preserve the inherent qualities of Stevia, including its freshness, aroma, and nutritional value, and enhance the overall efficiency of the supply chain, allowing for better market positioning. These views are captured in the responses provided by respondents J, I, and F.

Respondent J from Thika district said, *“Stevia farmers often incur significant losses due to the lack of proper storage facilities. For instance, if we purchase many seedlings but then cannot plant them due to adverse weather conditions, we have no option but to keep them in inadequate conditions, which increases their chances of dying. Losing seedlings not only represents a financial setback but also affects our overall production capacity when the growing season finally arrives. Having access to proper storage facilities would allow us to preserve our seedlings until conditions improve, thus safeguarding our investments and enabling a more reliable planting schedule.”*

Respondent I from Njeri district emphasised, *“Stevia seedlings are particularly sensitive; they need to be stored in proper facilities to enhance their chances of thriving into mature plants. Without proper climate control—like humidity and temperature management—these young plants can wilt or become diseased. As a result, many farmers who lack storage options end up with low survival rates of seedlings, impacting their overall yield. Investment in good storage infrastructure is crucial not just for preserving seedlings but also for improving the overall viability of Stevia farming in the region.”*

Respondent F from Nakuru district emphasized *“Stevia leaves easily absorb moisture from the air. Excessive moisture can have a negative impact on the quality of the final product. It becomes necessary therefore, that we store our Stevia in well-ventilated storage facilities. This we must do from harvest to the final product. Stevia farmers who have financial resources use very*

sophisticated and expensive humidity systems a luxury we do not have. Stevia is also sensitive to excessive light thus facilities that can block direct sunlight are useful.”

4.5.2.7. Difficulty in accessing international markets

The study revealed that the challenges of entering international markets, particularly for smallholder farmers, highlight the need for enhanced market access strategies. The respondents were of the view that addressing barriers to trade by government and providing them with the tools and connections necessary to engage with global markets could open new avenues for income and growth. They argue that currently, only the big conglomerates in Kenya have direct access to the markets. These views are better captured in the responses provided by respondents C, H, and J.

Respondent C from Nakuru district highlighted that *“There is a company that most of the Stevia farmers who are members of NECOFA rely on. This company, in turn, supplies larger Stevia processors but the complexities of these relationships are not well understood by us. We often feel disconnected from the larger market, unaware of the opportunities that this company has with bigger buyers. It would be beneficial for farmers to have more transparency and engagement in these partnerships so we can better appreciate how to leverage them for our own growth. Increased information would empower us to develop more strategic relationships and potentially negotiate better prices for our crops.”*

Respondent H from Njeri district added, *“I know that companies like Coca-Cola have begun using Stevia as an alternative sweetener, which is exciting for us. However, if I were to approach Coca-Cola for a partnership, I often wonder where to begin. The process seems daunting, and without a clear path to entry, many farmers like me feel overwhelmed. We need guidance on how to approach such large corporations, including points of contact and the kind of proposals that are likely to resonate with them. A bridge between local farmers and these major buyers could foster valuable partnerships.”*

Respondent J stressed that *“Most of the global markets for Stevia are in Asia and North America. Accessing these countries can be extremely difficult for us, which is why government intervention is essential. Support could include establishing trade agreements that favour smaller producers or organizing trade missions where farmers can meet potential international buyers. By facilitating connections between local farmers and global markets, we could significantly expand our reach and profitability.”*

4.5.2.8. Lack of Comprehensive Training

The study revealed that the emphasis on the need for extensive training identifies a crucial factor in optimizing both production and processing techniques. Addressing knowledge gaps through structured training programs would empower farmers, leading to improved practices and increased market competitiveness. In this regard the respondents felt that training on agronomic practices, irrigation schemes, soil preparation, processing and even marketing the end product is pivotal in the success of Stevia farmers in Kenya.

In this regard respondent A from Njeri district expressed, *“To succeed in Stevia farming, it is crucial that farmers receive proper training. Understanding and following scientifically proven techniques for growing and processing Stevia will directly impact our productivity and quality. Training that covers everything from soil health to pest management, and from harvesting to processing techniques, can equip us to meet the demands of both local and international markets. A well-informed farmer is better positioned to innovate and adapt to changing conditions.”*

Respondent B from Nakuru district added that *“The techniques we sometimes rely on are not always scientifically validated, which is a significant reason why the quality of our Stevia can vary so much. Access to contemporary agricultural knowledge is essential for uniformity in quality and increased production. Therefore, initiatives that promote education and training in best practices are critical for us to thrive. When farmers are educated about the latest advancements in Stevia cultivation, this knowledge can lead to improved market competitiveness.”*

Respondent from Thika emphasized *“We need training to optimize our ability to plant, irrigate, control pests, and harvest our Stevia. We even need to be capacitated on how to handle our product after harvesting it. When it comes to processing stevia we lac, for example a simple process like grinding, we are not able to do it optimally. The training gaps make us under utilize our limited land and resources resulting in reduced incomes. This also leads to missed export opportunities.”*

4.5.3. THEMES RELATED TO FACTORS CRUCIAL IN THE COMMERCIALISATION OF STEVIA

The study effectively identifies five broad themes that encapsulate critical success factors in the commercialisation of Stevia in Kenya, namely government policy and support, cooperatives and stakeholder engagement, key interventions, implementation mechanisms, and outcomes. Each of these categories presents an insightful perspective into the multifaceted aspects influencing the

commercialisation landscape. However, while the themes provide valuable insights, there are areas where further exploration could enhance the analysis.

4.5.3.1. Government Policy and Support

Literature and responses from the respondents revealed that Government policy and Government support are the cornerstone for successful commercialisation because it could provide supportive frameworks to address financial resources, inputs, resources, extension services and training. This so particularly because some issues can be done only when policy has been revised to suit what is needed. Such support can be accessed easily by NGOs, cooperatives, and other formations.

Respondent B emphasised that *“There are three critical aspects to consider in the commercialization of Stevia: land availability, seedling availability, and production and processing capabilities. Market access is also paramount. If the Government could help organize these aspects more effectively, such as through collaborative initiatives or resource sharing among farmers, we would see a much more efficient Stevia production ecosystem. This would create a more sustainable industry for everyone involved.”*

Respondent C stressed, *“I received input support from NECOFA, which has been instrumental for me. However, it would be fantastic if the Government could step in to provide us with additional inputs, such as financial resources or seedlings, because small organizations like NECOFA often find themselves constrained financially. Government involvement could help us extend support to a broader reach, thus benefiting more farmers who may not have the means to invest in their own operations effectively”.*

Respondent E from Nakuru district added, *“We currently get support from NGOs like NECOFA, the Ministry of Agriculture, and other farmer associations. This support encompasses essential elements such as training, the supply of necessary resources, and the provision of extension services. However, while these organizations play a crucial role, their capacity is often limited. If the government could supplement this support with more comprehensive programs—such as offering direct funding for projects that enhance Stevia production and processing—we could significantly boost our collective capabilities and secure better market access.”*

Respondent D from Thika district highlighted *“Training for farmers and the provision of quality planting materials through organizations like NECOFA and the Ministry of Agriculture are critical for our success. However, the frequency and scope of these trainings need to be expanded. We require ongoing education that not only introduces us to best practices but also provides*

continuous support as we implement new strategies. Increased training can empower us to adapt to new challenges and improve our productivity, leading to better returns on our investments.”.

4.5.3.1.1. Regulatory Bodies in Stevia Commercialisation

The study revealed that the role that the regulatory bodies play in the growing and commercialisation of Stevia is crucial. Clear and effective regulations cannot only facilitate market access but also ensure product safety and quality. This is crucial for Stevia cultivation and commercialisation to avoid market distortions, inferior goods, and unethical business practices that could impede the expansion of Stevia industry in Kenya. The study revealed that there is limited intervention of the regulatory bodies in Stevia commercialization in Kenya. This is evidenced by the responses provided by the respondents below:

Respondent A stressed that *"The lack of well-defined regulatory guidelines for Stevia farming creates a significant hurdle for us. Farmers struggle to understand and comply with export standards, which ultimately affects our ability to access premium international markets. If we had clearer policies that outline the requirements for Stevia cultivation and processing, we could align our practices accordingly and be better positioned to compete on a global scale. This clarity would reduce uncertainty and enable us to focus on producing quality Stevia that meets international standards."*

Respondent B raised the constraint that *"Farmers are often required to meet stringent organic certification requirements for certain lucrative markets, but the certification process is both costly and complex. If the government could streamline this process, it would significantly reduce the financial burden on smallholder farmers. Simplifying the certification requirements or offering subsidies to cover the costs would open up export opportunities that many of us are currently missing out on, thus enhancing our market reach and financial viability."*

Respondent D emphasized the frustration that *"It feels like Stevia is often overlooked in local agricultural policies compared to traditional cash crops like tea and coffee. We need government intervention that promotes Stevia as a strategic agricultural product. Advocacy for Stevia in policy discussions could lead to better funding, more research opportunities, and overall increased credibility for Stevia farming. Recognizing Stevia's potential not only validates our efforts as farmers but also encourages more people to consider it as a viable crop."*

4.5.3.1.2. Policy Formulation and Support in Stevia Commercialisation

The literature that was reviewed revealed that well-established regulatory frameworks have been shown to improve consumer safety, encourage fair trade, and boost market confidence (World

Bank, 2022). Lack of regulation frequently results in price manipulation, inconsistent products, and farmer exploitation. The respondents revealed that they can benefit from effective policies, such as policies relating to financial services, research funding, subsidies, and integration into larger agricultural plans. These views are captured by the responses of respondents H, J, and F below:

Respondent H from Njeri emphasised that *"If the government could provide financial incentives, such as tax breaks or subsidies on seedlings, it would greatly encourage more farmers to grow Stevia. By alleviating some of the financial burdens that come with starting and maintaining Stevia farms, these incentives could stimulate more interest in cultivating this crop and expand our overall production base. When farmers feel supported financially, they are more likely to invest in better practices and technologies that improve quality."*

Respondent J from Thika added that *"When the government implements policies that protect farmers from price fluctuations by establishing guaranteed markets, it instils confidence in us to invest in Stevia farming for the long term. Knowing that we have a reliable market for our produce allows us to commit to quality improvements and long-term cultivation plans. Stable pricing would alleviate some of the risks associated with farming and enable us to focus on scaling our operations and accessing new markets."*

Respondent F from Nakuru emphasized *"My assessment of the situation here in Kenya is that Stevia is not regarded as a fully-fledged agricultural crop that can be fully included in Kenyan Agricultural programs. For example, I am not aware of a crop insurance that includes Stevia as a crop. In our country we do not have clear policies that aimed specifically at supporting export and imports of Stevia products. I feel that Stevia is more of an experimental crop, as a result we as Stevia farmers are excluded from main agricultural programs."*

4.5.3.1.3. Public-Private Partnerships (PPP)

The study revealed that there was a strong view supporting the positive role that Public-Private Partnership (PPP) can play in connecting smallholder farmers with the infrastructure, resources and knowledge required to enhance their Stevia farming methods. The study also revealed that PPP can help in overcoming financial limitations and practices, overcome financial limitations, implement new technology, satisfy consumer needs, increase their production capabilities, access to innovation, and market integration for the commercialisation of Stevia. These views are captured in the respondents views provided below

Respondent H emphasised that *"There is a pressing need for the Ministry of Agriculture to form a multipronged Special Purpose Vehicle (SPPV) to tackle the diverse needs that Stevia farmers*

face. Such an initiative could streamline resources, foster collaboration among stakeholders, and ensure that inefficiencies are minimized. By pooling expertise from different sectors, we could address challenges more effectively and create a supportive ecosystem for Stevia cultivation and commercialization that would benefit all farmers.”

Respondent E from Nakuru district added, *“We need robust collaboration between the government and the private sector to secure the funding and training necessary for farmers. Without these strategic partnerships, accessing the resources required for expansion becomes nearly impossible. It's crucial for both entities to come together to leverage their strengths—government support in regulation and guidance, paired with private sector investment and innovation. This combination can help us scale up production and establish a more competitive presence in the market.”*

Respondent G from Thika district stressed that, *“Forming alliances with both the government and private sector is critical for our success. We require support to access financial resources, the latest technology, and effective market channels that we wouldn't be able to reach alone. These partnerships could unlock opportunities for growth, innovation, and market access that smallholder farmers have historically struggled to achieve.”*

Respondent H from Njeri district highlighted that *“Public-private partnerships are essential for the large-scale processing of Stevia, especially as we transition towards mass production. The private sector brings vital investment and technological expertise, while the government provides the necessary regulatory framework to ensure fairness and sustainable growth in the sector. Together, they can create a thriving ecosystem that benefits farmers and consumers alike.”*

4.5.3.1.4. Collaboration in Agricultural Strategy/Planning

The study also revealed that for all stakeholders involved in agricultural strategy and planning farmers, governments, non-governmental organizations, and private sector participants need to coordinate their efforts toward a single objective to achieve synergy. The respondents felt that effective collaboration is essential in pulling resources together to mitigate constraints relating to resources, infrastructure, best farming practices, environmental sustainability, market access, and meeting market expectations.

Respondent A from Njeri district emphasised, *“There has to be a concerted effort among various stakeholders in agriculture to ensure that everyone aligns with the same long-term vision for Stevia commercialization. This collaboration is not just about sharing resources; it's about cultivating a shared understanding of the challenges and opportunities we face, so we can work together towards common goals that uplift the entire industry.”*

Respondent C from Nakuru district highlighted, *“A shared strategy is vital for the Stevia sector to establish a clear roadmap for growth and sustainability. This unified vision is essential for long-term success, as it allows us to coordinate actions, align resources, and hold each other accountable for achieving our shared objectives. A clear strategy also provides a framework for monitoring progress, identifying barriers to success, and adjusting our approaches as needed.”*

Respondent G from Thika district added that *“Implementing a strategy that involves collaboration among farmers, researchers, and agricultural experts will ensure that we are planting the right varieties, utilizing the best farming practices, and targeting the appropriate markets. This multi-disciplinary approach not only enhances production efficiency but also fosters innovation in cultivation and processing, ensuring that we remain competitive in both local and international markets.”*

4.5.3.1.5. Incentives for Sustainable Practices

The study revealed that in the regions that were researched there are no incentives for sustainable practices. Continually emphasized as another critical success component is the incorporation of environment friendly Stevia organic farming practices, sustainable land management, and green technologies incentives for long-term economic and sustainable practices of Stevia production, such as maintain soil health, conserve water, and use less chemicals for the sustainable growth of Stevia cultivation. Government and private sector actors can assist farmers in implementing measures that guarantee long-term productivity and marketability by providing financial and logistical support.

Respondent B from Nakuru district concurred that, *“Farmers are much more likely to adopt sustainable practices if they can see tangible benefits, such as tax breaks or direct financial incentives. These incentives encourage responsible farming and make it easier for farmers to invest in eco-friendly methods. By demonstrating that sustainability can also be profitable, we can motivate more farmers to embrace practices that benefit both the environment and their livelihoods.”*

Respondent D from Thika district added, *“Incentives such as subsidies for organic farming or tax breaks for adopting environmentally friendly practices would significantly impact our ability to ensure sustainable production of Stevia. If the government were to take the lead in offering these incentives, we could create a better environment for sustainable practices, ultimately benefiting our farms and the broader community.”*

Additionally, respondent H from Njeri district, *“Incentives are critical because they help farmers transition to more sustainable farming methods that might otherwise seem prohibitively costly.”*

When farmers receive financial support to experiment with new practices, they are more likely to succeed and feel empowered to contribute to a more robust agricultural system.”

4.5.3.2. Cooperatives and Stakeholder Engagement

The study revealed that there are no Cooperatives established specifically to assist farmers in production, processing, branding, marketing, sales, and financial access. The study also revealed that the farmers are aware that through stakeholder engagement, collective bargaining for lower prices, obtain bulk inputs, and guarantee steady incomes, training and knowledge sharing to promote sustainable agricultural practices, improve resource mobilization, market access, participation in supply chain, can enhance the commercialization in Kenya. The integral role of training and knowledge sharing within cooperatives underscores their importance not just as commercial entities but also as educational networks.

According to respondent G from Thika district, *“Cooperatives are the backbone of smallholder farmers in this context. They provide not only bargaining power but also pooled resources and access to shared infrastructure. By coming together in cooperatives, we can jointly acquire quality seeds, equipment, and fertilizers. This collective procurement increases production efficiency and reduces costs significantly for individual farmers.”*

Respondent A from Njeri district highlighted, *"Individual Stevia farmers have very little negotiating power with buyers. In contrast, a cooperative structure allows us to collectively bargain for better prices and secure bulk contracts. By uniting, farmers can reduce production costs, gain better market access, and even explore opportunities to establish our own processing plants. Collectively, we can create a stronger voice in negotiations and elevate our standing within the market."*

Respondent C from Nakuru district added, *"Through cooperatives, we gain access to valuable technical training on various aspects of Stevia cultivation, processing, and value addition. This knowledge transfer is crucial for improving product quality. By pooling our resources and expertise, we can reduce costs and enhance our bargaining power, which ultimately leads to better economic outcomes for all members. It's a cooperative effort that can raise the quality of our produce and help us meet market standards."*

Respondent F from Njeri district emphasized, *"Most farmers currently sell raw Stevia leaves, but if we had a cooperative that managed processing and branding, we could capture significantly more value in the market. By processing our Stevia into more refined products, we can appeal to higher-end consumer markets and command better prices. A strong cooperative structure that*

includes processing capabilities would enable us to expand our product offerings and better secure our livelihoods."

Additionally, Respondent B from Nakuru district stated that *"Cooperatives play a crucial role in collective bargaining. They provide us with a united voice when negotiating prices with buyers or seeking funding from financial institutions. By coming together, we can strengthen our negotiating position, which is vital in an environment where individual farmers often have little leverage."*

Finally, Respondent H from Njeri district noted. *"Market access is often significantly better when approached through cooperatives because they can engage with larger buyers and exporters more effectively than individual farmers. By banding together, we can improve our visibility and credibility in the marketplace, thereby opening doors to contracts and partnerships that would otherwise remain inaccessible to us as individuals."*

4.5.3.2.1. Cooperative Structures: Primary, Secondary, and Tertiary

The study revealed that there are no strong cooperative structures that deal with Stevia farming. The study revealed that the respondents were concerned that in the Primary, Secondary, and Tertiary stages of Stevia production, there is no established and well-organized and resourced cooperative that is helping Stevia farmers in Kenya. This challenge, according to the respondents, emphasizes the need for specialized groups to tackle different aspects of the Stevia value chain. Through these structures, farmers can obtain the information and resources they need for healthy crops, pest control, correct cultivation, value addition through processing and branding, and policy conversations that represent the interests of Stevia growers.

Response B from Nakuru district explained, *"Primary cooperatives are essential not only for nursery cultivation but also for pest control and training, which are crucial for helping farmers improve their yield and quality. By working together in primary cooperatives, we can share best practices, learn from each other's experiences, and thus enhance our overall production capacity."*

Respondent C from Nakuru added, *"Secondary cooperatives, which focus specifically on processing and marketing Stevia, are crucial because they empower us to add value to our products and help us reach broader markets. These cooperatives can facilitate clustering effects where farmers aggregate their output and process it collectively, increasing efficiency and creating higher quality products that appeal to consumers."*

Respondent H from Njeri concluded, *"Tertiary cooperatives that focus on policy advocacy and building partnerships are also essential for creating an environment that supports Stevia farming"*

at a larger scale. They can negotiate on our behalf with government entities and stakeholders to create favourable policies, address regulatory hurdles, and ensure that our voices as Stevia farmers are heard in the agricultural policy discourse. This level of advocacy can lead to systemic changes that benefit the entire Stevia farming community.”

4.5.3.2.2. Stakeholder Engagement in Stevia Commercialisation

The study revealed that there was limited stakeholder engagement in the districts from the participants come. However the respondents are aware that effective commercialisation of Stevia requires multi-sector collaboration involving government agencies, non-governmental groups, private sector investors, research institutions, and financial organizations, all depend on stakeholder participation.

These connections guarantee that every link in the Stevia value chain is supported and give Stevia farmers access to market knowledge, technical assistance, research and development, financial opportunities, and policy influence.

Respondent D from Thika concurs, *“We need a wide range of stakeholders involved at every step of the production process—from seedling production all the way to market access. NGOs can provide crucial training and resources, the government can offer subsidies to reduce costs, and financial institutions can supply loans to enable farmers to invest in their operations. This multi-faceted support system is essential for creating a sustainable farming ecosystem. When these various entities collaborate effectively, they can address both the immediate needs of farmers and the long-term goals of the Stevia industry.”*

Respondent E from Nakuru district highlighted, *“Having robust connections with various stakeholders enables farmers to access invaluable resources, including research and funding from agricultural institutions, which is often challenging to obtain independently. Agricultural research bodies should work more closely with farmers to develop Stevia varieties that are specifically suited to Kenya's unique climate and soil conditions. This collaboration can lead to innovations that enhance our productivity and resilience against environmental challenges.”*

Respondent J from Thika district emphasised, *“If the government and private sector focused on enhancing input supply chains, farmers would be able to access affordable, high-quality fertilizers and agrochemicals. When all stakeholders—including the government, NGOs, private entities, and research organizations—engage with farmers in a coordinated manner, it creates a more robust support system for the entire farming ecosystem. This holistic approach helps ensure that farmers can thrive and remain competitive in the market.”*

Respondent F from Njeri district added, *“Effective stakeholder engagement facilitates resource aggregation that genuinely benefits all farmers. We need access not just to funding, but also to markets, technology, and expertise. It's through these partnerships that we can build a solid foundation for our operations. By pooling resources and knowledge, we can tackle challenges collectively and create a more sustainable future for Stevia farming.”*

Respondent H from Njeri district pointed out, *“We must foster stronger collaborations with agricultural research institutions focused on developing drought-resistant Stevia varieties and precision farming techniques. These partnerships could significantly enhance our resilience to climate variability and improve overall farm productivity. The more we invest in research tailored to our needs, the better equipped we will be to face future challenges in farming.”*

4.5.3.3. Key Interventions

The section addressing key interventions in the commercialisation of Stevia presents a comprehensive overview of the challenges and strategies that smallholder farmers in Kenya face. By highlighting market analysis and demand assessment, resource access, and the significant aspects of cultivation including land, finance, seeds, fertilizers, human resources, and equipment. This discussion outlines the multifaceted approach required for successful Stevia commercialisation.

4.5.3.3.1. Market Analysis and Demand Assessment

The study revealed that there was limited knowhow on analysing the Stevia market and demand. The respondents alluded to the fact that market analysis and demand assessment are essential for farmers to align production with market needs, ensuring profitability and sustainability. Cooperatives enhance resource management and bargaining power, helping Stevia farmers navigate challenges and minimize risks of oversupply or undersupply, as supported by respondents' insights.

Respondent A from Njeri emphasised, *“We need to be informed about where the market is headed. Conducting surveys and research about farmers’ needs and market trends helps us make informed decisions about what to plant and how much to produce. Without this understanding, we risk growing products that may not be in demand, leading to financial loss.”*

Respondent E from Nakuru district echoed the same sentiment, *“Without proper market analysis, our actions become mere guesses. Knowing what the market demands allows farmers to strategically plan their production, marketing, and pricing strategies effectively. This insight is*

vital to ensuring that not only do we meet market needs but also that we do so in a way that is profitable.”

Respondent D from Thika district added, *“When you're disconnected from the market, you don't even know what the competitive price should be for Stevia per kilogram. This lack of awareness can result in missed opportunities for profit and growth. It's essential for farmers to have access to real-time market data to make informed decisions.”*

Respondent F from Njeri district emphasized, *“Without ongoing research and demand assessments, we might find ourselves producing more Stevia than the market can handle or cultivating the wrong varieties. Such missteps not only waste resources but also jeopardize our financial stability. It is essential for the success of our operations that we understand market dynamics and consumer preferences.”*

Respondent H from Njeri district added, *“Conducting thorough market research is vital because it provides insights into what consumers need, what prices to expect, and how we can best position our products. Armed with this knowledge, we can approach our farming strategies with confidence and adaptability. Ignoring market research is a gamble that could cost us dearly.”*

Finally, Respondent G from Thika district concluded that *“When we are familiar with the market landscape, we become aware of new entrants and potential competitors, which represents growth opportunities for us. If we don't engage in market research, critical information might come too late to allow us to make necessary adjustments. Staying informed is a proactive approach to ensuring our success.”*

4.5.3.3.2. Access to Resources

All of the participants agreed that the Stevia value chain desperately needed improved support systems. The commercialisation of Stevia in Kenya is mostly determined by the availability of resources including land, funding, premium seeds, and fertilizers. In the absence of these vital resources, smallholder farmers find it difficult to increase output, maximize yields, and maintain profitability. The call for improved access to resources is essential for the successful commercialisation of Stevia.

a) Access to Land for Stevia Cultivation

The study revealed that as expected land availability was deemed crucial for Stevia commercialisation, yet many Kenyan smallholder farmers operate on small, fragmented plots, limiting competitiveness and sustainability. Secure land tenure enhances investment in high-value crops like Stevia by reducing uncertainty and improving financing access.

Respondent I highlighted that *“When you do not have land, farming becomes an impossible endeavour. Land availability is the foundation upon which all agricultural activities must be built. Without access to land, it’s difficult for farmers, especially smallholders, to invest in crops like Stevia and secure the long-term benefits they need for sustainable livelihoods.”*

Respondent A added, *“Many farmers are eager to grow Stevia commercially, but without clear land ownership, making long-term investments in the crop becomes a risky proposition. The uncertainty of leases or communal land rights disincentivizes potential investments in necessary infrastructure, such as irrigation or processing facilities. This instability can lead to hesitation among farmers, ultimately hindering the growth of the Stevia industry in Kenya.”*

Respondent D stated that *“For Stevia cultivation, the realities are stark: a hectare of land typically produces only 3 to 3.5 tons of Stevia per year. Therefore, for farmers serious about scaling their operations, it makes business sense to allocate more land to cultivation. We generally make between 50,000 to 100,000 Kenyan Shillings per acre; consequently, the more land a farmer can dedicate, the more sustainable their farming operation will be. This financial rationale underscores the importance of land access in the profitability of Stevia farming.”*

Respondent C suggested, *“If farmers could pool their land through cooperatives, we could produce Stevia at a scale that attracts large buyers. By coming together to cultivate larger plots, we could achieve economies of scale that not only reduce costs but also enhance our bargaining position in the market. This collective approach also allows us to share resources such as machinery and labour, which can significantly lower the barriers to entry for smaller farmers.”*

b) Access to Finance for Commercialisation

The study revealed that growing Stevia requires substantial upfront investments in processing facilities, high-quality seeds, irrigation, and fertilizers. However, smallholder farmers struggle to secure financing due to high interest rates and stringent collateral requirements, hindering their ability to invest in commercial production. Access to tailored financial instruments is crucial for enhancing output and facilitating the transition from subsistence to profitable farming operations. Respondent C provided, *“The high cost of farm inputs, such as fertilizers and seedlings, makes it incredibly difficult for us to expand our production. Every year, we watch as prices for these essentials skyrocket, which limits our ability to invest in our farms. This situation is compounded by the fact that many farmers cannot bulk purchase or negotiate better rates due to their small-scale operations. Consequently, we are forced to compromise on quality or limit the scale of our planting, which ultimately impacts our profitability and growth potential.”*

Respondent E emphasised, *“The time it takes to grow Stevia and realize financial rewards is quite lengthy. During this interval, farmers need financial resources to pay for essential processes like labour, insecticides, and manure. Without proper financial support that acts as bridging finance, we find ourselves in a precarious situation. We need funding to sustain our operations during the growth period, otherwise, many of us risk falling into debt or abandoning our crops altogether due to a lack of resources.”*

Respondent D highlighted, *“Banks often require collateral for loans that many small-scale Stevia farmers simply do not have. This places us at a distinct disadvantage when seeking investment capital. Without access to loans, we are unable to invest in larger plots of land, quality seedlings, or the necessary equipment to make our operations more efficient. This financial exclusion not only stifles our growth but also perpetuates the cycle of poverty among smallholder farmers in the sector.”*

Respondent G proposed, *“Access to microfinance institutions and government grants could significantly aid farmers in getting started with Stevia cultivation without the burden of high-interest loans. These financial tools would provide the necessary capital for supplies and labour without the suffocating pressure of repayment that comes with traditional loans. If structured correctly, these programs could empower many farmers to grow and ultimately thrive.”*

c) Access to Quality Seeds for Productivity, fertilisers, and Market Competitiveness

The study revealed that there was a challenge in accessing quality seeds in Kenya. The respondents appreciate the fact that productivity, marketability, and profitability of Stevia is influenced by the quality seeds, and fertilizers used. Commercial viability is decreased by absence of certified Stevia seed varieties, low germination rates, limited resilience to pests and diseases caused by poor seed quality, and exorbitant fertiliser prices. For Stevia to develop as best it can, it needs enough nutrients, thus fertilizer is crucial. The respondents acknowledge these challenges in their responses

Respondent B mentioned, *“Getting high-quality Stevia seedlings is consistently a challenge for farmers. In many cases, we resort to using low-grade varieties that have been proven to yield significantly less. This reliance not only diminishes our productivity but also impacts the overall quality of Stevia that we can offer the market. We need better access to superior seedlings that can guarantee us satisfactory yields and enhance our competitive edge.”*

Respondent G from Thika district emphasised that *“Out of ten seeds you put in the ground, only one is likely to germinate. This dismal rate underscores the necessity for dedicated infrastructure for seedling generation. Imagine if there could be a communal resource where one large area*

was dedicated to producing quality seedlings—this would not only ensure a steady supply of healthy plants but would also elevate our overall productivity as farmers. It would be a game-changer for all of us.”

Respondent H from Njeri district pointed out that, *"Fertilizer prices have soared, and without government subsidies, many farmers simply can't afford to apply the necessary nutrients for Stevia growth. Given that Stevia has specific nutritional requirements to thrive, this issue directly affects our yields and profitability. Without supportive policies that subsidize these critical inputs, we are at a significant disadvantage compared to larger commercial farms that can absorb these costs more easily."*

d) Human Resources

Stevia farming is labour intensive form planting, weeding, pest and disease control, and harvesting. All the responders stressed the necessity of human resources in the cultivation of Stevia. Respondent F from Njeri district emphasized, *"One must be prepared with enough labour to manage Stevia farming effectively. The crop requires steady attention, from planting and nurturing seedlings to harvesting. The cost and management of labour must be factored into our business plans if we want to achieve sustainable commercialization."*

Respondent H from Njeri district reiterated, *"The labour-intensive nature of farming is very much applicable in Stevia commercialization. No Stevia farmer can hope to successfully commercialize without employing sufficient labour. We need to ensure that we have enough hands available to manage the workload, which can sometimes present an additional financial challenge if we cannot afford to pay fair wages. The reliance on labour not only impacts our operational capacity but also our ability to scale production effectively."*

Respondent G from Thika district emphasized *"A well planned Stevia commercialization program must include strategically acquiring talent so that individual capabilities can be aligned to organizational goals. Furthermore, human resources needed must not only be people responsible for cultivation and harvesting of the product but must also be able to do post -harvest handling of the product. Once the commercialization process has graduated to processing, human resources with technical skills are needed. Furthermore, research and development require experiences researchers."*

e) Support with equipment

There are various types of equipment for preparing the soil for planting, weeding, pest and disease control, harvesting, and driers required for farming to post harvest essential for Stevia farmers in order to support the quality production of Stevia.

Respondent H from Njeri district said, "*We would like to receive support in acquiring specialized equipment to dry Stevia leaves and to provide value addition to our dried products. Specifically, solar driers could significantly enhance our operations. The ability to dry leaves effectively not only helps preserve the quality of Stevia but also enables us to create a value-added product that can fetch higher prices in the market. Investing in such equipment would be a game-changer for many of us, allowing us to scale our operations and improve profitability.*"

Respondent G from Thika district highlighted, "*I would appreciate support specifically tailored to processing the dried Stevia leaves into more refined products. This could include assistance in setting up processing units or access to training in processing techniques. If we could convert our raw Stevia into high-quality powder or extracts, we would significantly increase market value and unlock new revenue streams. This support could help elevate our brand and make our products more appealing to both local and international buyers.*"

Respondent C from Nakuru district emphasized, "*Equipment is needed throughout the value chain. For example, in the cultivation stage we need tractors and tillers to help us in land preparation. When the seeds or seedlings have been planted proper watering levels are needed requiring equipment such as drip irrigation systems. During the harvest time at least, semi-automatic equipment is needed to collect leaves. Even in the post-harvest stage equipment such as dryers and leaf strippers, sand storage bins are needed. For farmers who have graduated to processing Stevia leaves, they might need equipment such as extraction equipment, filtration systems, and so forth. Equipment is not only needed for making the work lighter, but it is also needed to preserve the quality of the product.*"

4.5.3.3.3. Infrastructure Development: Enhancing Market Readiness

Infrastructure development is crucial for enhancing the commercialisation of Stevia in Kenya, particularly through implementing climate-resilient irrigation systems to increase yield reliability and profitability. Effective storage and processing facilities are essential for preserving quality and reducing post-harvest losses, with cost-sharing models or partnerships with government and NGOs suggested for feasible solutions. Moreover, developing transportation logistics is important to lower expenses and boost market access. Emphasizing specific processing technologies proven effective in other crops would offer actionable insights for farmers.

Incorporating sustainable irrigation practices such as drip irrigation and rainwater harvesting could further aid farmers in adapting to climate variability.

Respondent D noted: *"It's crucial to understand that Stevia loses its quality if it is not dried and stored properly. Hence, we need specialized storage facilities designed to maintain product quality for export markets. Without consistent storage solutions that control temperatures and humidity, we're left vulnerable to losses and product degradation that can disqualify us from accessing premium markets. Investing in proper storage infrastructure is essential for sustaining quality over time."*

Respondent B emphasized: *"Most farmers currently sell raw Stevia, but the realization of significantly increased market value hinges on processing it into powder or extracts. This transformation process not only enhances profitability for us but also meets consumer demand for convenient forms of Stevia. If more of us could be trained in processing techniques and have access to the necessary equipment, we could collectively improve our market position and financial outlook."*

Respondent C emphasised *"The support I need right now is focused on transport logistics. I require assistance to package seedlings to food fairs and events aimed at education and marketing. By promoting our crops at these events, we create greater awareness of Stevia's benefits, but without proper transport solutions, we miss out on potential customers and connections that could help us grow."*

Respondent F stated: *"Many of our Stevia farms are located in rural areas where poor road networks severely hinder our ability to transport produce efficiently. Improved transport infrastructure would make a significant difference, helping us get our products to market faster and reducing spoilage. Additionally, the limited access to irrigation facilities means we are overly reliant on unpredictable rainfall, which adds another layer of risk to our agricultural practices."*

Respondent J finally highlighted, *"Unpredictable rainfall significantly impacts our Stevia yields. Having reliable irrigation systems in place would help stabilize our production and ensure that we can meet market demands consistently. By investing in irrigation technology, we can enhance our resilience against climate variability and increase our production levels, benefiting both our families and the local economy."*

4.5.3.3.4. Certification Processes: Ensuring Quality and Market Competitiveness

Quality certification is vital for Stevia farmers to meet domestic and international market standards, enhancing product legitimacy, market access, and profitability. Organic certification

facilitates entry into high-value markets, while export-oriented certifications ensure competitiveness globally. Supporting certification processes, including training programs, is crucial for compliance. Strategies to secure organic certification should leverage smallholder cooperatives in processing and distribution, alongside specific international market requirements. Additionally, addressing potential barriers and available supports, like trade agreements and government initiatives, is essential for enabling successful export opportunities for Kenyan Stevia farmers.

Respondent H stated: *"A certification system would help us meet the required standards for quality assurance that buyers expect. Certification not only validates our farming practices but also builds consumer trust in our products. By adhering to a recognized standard, we can improve our marketability and attract a wider array of buyers."*

Respondent I emphasised, *"There's a growing demand for organic Stevia in Europe, but we lack the certification necessary to penetrate that market. Gaining organic certification would open doors for us to tap into this high-value segment, significantly enhancing our profitability. We need support to guide us through the certification process and ensure we meet all requirements."*

Respondent A added, *"To compete effectively on a global scale, we must meet the stringent quality and safety standards required by international buyers. This necessitates an investment in both training and resources to elevate our practices. If we can establish a reputation for high-quality Stevia, we can compete with established suppliers from other regions and increase our market share."*

4.5.3.3.5. Technological Factors

There were strong views from the respondents that technology integration is vital for the commercialisation of Stevia in Kenya, enhancing decision-making, market access, and productivity. Effective implementation maximizes resources and ensures timely interventions, addressing challenges and improving market readiness for smallholder farmers through necessary infrastructure and certification processes. There was an appreciation of a need to transition from traditional ways to modern technology while factoring in regional dynamics in the technology being used.

Respondent G from Thika district, *"We can't just rely on traditional farming methods anymore. By incorporating technology into our farming practices—whether it's in crop management, processing, or marketing—we have a real chance to compete globally. Embracing technological advancements will not only improve our efficiency but also position us as forward-thinking producers in the eyes of buyers."*

Respondent H from Njeri district emphasized, *“Technological factors are the main impediment to our success in competing globally. Most of the value chain components require some form of technology for them to be efficient and compete in the global market. Technological factors are critical particularly because we are dealing with a very sensitive plant. In today’s environment absence of technology is a deal breaker.”*

Respondent C from Nakuru district argued, *“If we are serious about entering Stevia global market, we as Kenyan Stevia farmers must invest in technology. Technology is critical if one wants to produce a product that can compete in the global stage. The Stevia players from other countries make use of technology from cultivating the land, to harvesting, processing, and packaging of the product. Technology does not only saves time, it guarantees consistency in terms of quality. Unfortunately, in Nakuru and perhaps in Kenya as a whole the use of technology is limited. The inability to acquire the relevant technology makes us remain local players instead of acting in the bigger stage.”*

a) Market Access and Stability

There was a strong view from the respondents that support effective market access and distribution channels to benefit Stevia producers and consumers in Kenya. The study revealed that there was little support relating to Market access. For smallholder farmers facing market access challenges and price volatility, collaborative digital market platforms can provide stable revenue, reduce reliance on middlemen, and foster official buyer agreements, ultimately encouraging investment in Stevia cultivation. Price stability is crucial for growers.

Respondent B from Nakuru district said *“Access to both local and international markets is fundamental if we are serious about commercialization. Without these avenues, we remain confined to smaller profit margins and limited growth opportunities. We need strategic support to navigate the complexities of connecting with larger markets, especially given the increasing demand for Stevia products globally.”*

Respondent J from Thika district said *“Currently, we only have access to a few buyers, which doesn’t provide us with a true market. To tap into real, viable markets, we need substantial government support to create connections and facilitate our participation in trade shows or export opportunities. A governmental initiative to assist us in building relationships with larger buyers would be invaluable. This support could help us diversify our client base and stabilize our sales channels.”*

Respondent F from Njeri district argued, *“We struggle to find consistent buyers, and market prices fluctuate too much. If we had a digital platform designed to connect us directly with buyers,*

we could help stabilize prices and ensure better market access. Such a platform could enable us to negotiate better terms and directly reach consumers who are increasingly seeking out high-quality Stevia products. A dedicated online marketplace could also reduce dependency on middlemen, allowing us to retain more of our profits.”

b) Optimized Resource Use and Increased Productivity

The study revealed that in Stevia farming, resource optimization is crucial due to the high cost and limited availability of inputs like water and fertilizers. Precision agriculture technologies address this challenge by enabling data-driven insights to enhance farming methods. Using sensors and satellite imagery, farmers can monitor crop development, optimize water use, and assess soil health, resulting in better resource utilization, increased yields, and profitability. Given the sensitivity of Stevia crops to resource management, these techniques are vital for rural agricultural communities to efficiently manage water and nutrients, minimizing waste while ensuring crops receive the necessary inputs for growth.

Respondent B from Nakuru district emphasized, *“Utilizing precision agriculture tools such as soil moisture sensors and GPS mapping could revolutionize our farm management. By implementing these technologies, we can optimize input usage, significantly reducing costs while simultaneously increasing our yields. These tools enable us to make data-driven decisions that can adapt to the unique conditions of our fields, allowing for precise interventions that enhance productivity.”*

Respondent F from Njeri district emphasized, *“Water use is critical in Stevia farming, and with the adoption of precision irrigation techniques, we could ensure that our crops receive just the right amount of water. This targeted approach not only prevents waste but also boosts production by creating ideal growing conditions. By monitoring soil moisture levels in real-time, we can mitigate water stress during critical growth stages and enhance overall crop health.”*

Respondent I from Thika district Stated, *“It is true that one has to use the resources efficiently however in our case such is not very much applicable in the sense that we do not have the resources we need to fully compete in the Stevia market. We can efficiently manage our human resources and land but without ownership of critical resources such as modern equipment, it becomes difficult to talk about efficient use of resources. I mean one can efficiently manage resources that are available to one’s disposal, currently we can do not have many resources to efficiently manage.”*

c) Access to Knowledge and Information

The study revealed that there was limited access to knowledge and information among Stevia farmers in Kenya. The respondents felt that if they were to be trained on Mobile apps they can provide farmers with real-time updates on weather, pest outbreaks, and market trends, enabling timely decision-making in rural areas where information sources are scarce. These applications are crucial for improving farm operations, allowing proactive measures against adverse conditions. By facilitating access to domestic and international markets, mobile technology expands the reach of Stevia producers, potentially increasing sales that may be limited by local market constraints, ultimately enhancing crop health and productivity.

Respondent D from Thika district highlighted that *“Mobile applications that offer farming advice, weather forecasts, and market data can be a game-changer for farmers operating in remote areas. Access to real-time information empowers us to make informed decisions quickly. For instance, knowing an impending drought could prompt us to adjust our irrigation schedules promptly, ultimately saving our crops and ensuring better yields.”*

Additionally, Respondent A from Njeri district stated, *“Having an app that not only shows us the latest weather conditions but also alerts us to pest outbreaks would be incredibly beneficial. Timely notifications can help us protect our crops from threats before they escalate. The integration of mobile technology in our farming practices can significantly uplift our productivity by making us proactive rather than reactive to environmental and agricultural challenges.”*

Respondent C from Nakuru district emphasized, *“Mobile technology will help us connect to a wider market, even those buyers outside our local area. This connectivity allows us to expand our businesses and tap into new opportunities that were previously inaccessible. It can foster direct communications with consumers looking for high-quality Stevia products, which can lead to higher profit margins.”*

d) Monitoring Systems

The study revealed a need for Sensor-equipped monitoring systems connected to smartphone apps provide real-time information on crop health, weather, and soil moisture, allowing farmers to swiftly respond to environmental changes and minimize potential losses due to drought, pests, or diseases. According to the respondents these tools facilitate data-driven decision-making, helping Stevia farmers identify plant stress signals and nutritional deficiencies, leading to better management techniques and increased yields. Timely interventions become possible with real-time data, enabling farmers to effectively manage irrigation, fertilization, pest control, and harvesting schedules, ensuring crop health and maximizing productivity in Stevia farming, where soil and environmental conditions significantly impact outcomes.

As stated by Respondent E from Nakuru district highlighted, *“The ability to monitor crop growth and soil conditions in real-time is essential for timely and effective interventions. With technological advancements, we can track the health of our crops continuously, helping us respond to any issues, such as nutrient deficiencies or pest infestations, as soon as they arise. This proactive management is vital for maintaining sustainability in our agricultural practices.”*

Respondent D from Thika district emphasized, *“By continuously monitoring soil conditions, weather patterns, and crop growth, we can make more informed decisions that significantly reduce the risk of crop failures. Data-driven insights allow us to optimize our inputs and better manage our resources, leading to more resilient farming practices.”*

Respondent C from Nakuru district added, *“In Nakuru district, and I can argue in other districts as well, the little monitoring that we do is manual and is subjective. Individual Stevia farmers do manual monitoring that is rudiment in nature. Developed countries use electronic monitoring systems. We are lagging behind in that regard. If we are to compete for the same market, we need to improve our monitoring methods. This becomes a task in which the Government of Kenya should be involved in as equipment is very expensive.”*

e) Collaborative Digital Market Platforms for Information Sharing

The study also revealed that Stevia farmers in Kenya feel that collaborative digital platforms that connect farmers directly with buyers are essential for reducing price volatility and ensuring consistent sales while enhancing profitability by eliminating middlemen. These platforms provide crucial market data and farming information, which supports informed decision-making for smallholder farmers. Emphasizing digital literacy, technology access, and buyer readiness is vital for implementation. Additionally, these platforms can improve real-time communication through feedback systems among farmers, extension services, and government bodies, ultimately enhancing decision-making and productivity in agricultural practices.

Respondent D from Thika district highlighted, *“We struggle to find consistent buyers, and the fluctuating market prices create uncertainty for us as farmers. If we had access to a digital platform that allowed us to connect directly with buyers, we could stabilize prices and enhance our market access. Such a platform would empower us by reducing the influence of middlemen and giving us more control over our sales.”*

Respondent B from Nakuru district emphasized, *“An innovative platform that connects farmers, government bodies, and other stakeholders would facilitate the faster dissemination of information regarding best farming practices and market trends. This tool could serve as a hub*

for knowledge sharing and collaboration, helping us stay updated on must-know industry insights that can impact our farming decisions.”

Respondent I from Njeri district added, *“Collaborative digital marketing platforms are increasingly becoming essential in the Stevia commercialization particularly because there is a global push for a healthier alternative to sugar. This has resulted in many digital marketing collaborations such as co-funded marketing campaigns, co-created marketing content and so forth.”*

4.5.3.4. Implementation Mechanisms

Successful Stevia commercialisation in Kenya requires structured implementation procedures ensuring effective leadership and governance. Without these methods, growers face challenges in output expansion, quality maintenance, and market access.

4.5.3.4.1. Cooperative Development for Effective Implementation

The study revealed that Cooperatives play a crucial role for smallholder Stevia producers by facilitating resource pooling and equitable market access. However, ineffective governance and leadership can hinder their potential. Bridging knowledge gaps through extension services and government-led training programs can improve production efficiency and sustainable practices. Addressing barriers like cultural resistance and historical distrust enhances understanding of farmer dynamics. Implementing structured governance, including suitable frameworks, external audits, accountability measures, and stakeholder engagement is essential for transparency. Leadership training, through workshops and mentorship, emphasizes the importance of local leadership in enhancing cooperative performance over external expert guidance.

Respondent A from Njeri district underlined, *"Many farmer cooperatives collapse due to poor governance and a lack of accountability mechanisms. Without clear leadership and defined roles, the cooperative framework often falls apart. It's crucial that we implement solid governance structures to ensure transparency and effective decision-making, which are essential for the success of any cooperative initiative."*

According to respondent from Nakuru district, *"Without proper leadership training, cooperative leaders often struggle to negotiate effectively with buyers and policymakers. Investing in educational programs for our leaders can empower them with the skills necessary to advocate for our needs and secure better deals that benefit all members of the cooperative."*

Respondent H from Njeri district discussed, *"Without adequate agricultural extension services, many farmers lack the technical knowledge required to cultivate Stevia profitably. Policy reforms*

should prioritize training initiatives that equip farmers with the skills they need to maximize their yields and improve their overall farming techniques."

4.5.3.4.2. Organizational Capacity Enhancement for Operational Efficiency

The study revealed that effective Stevia cooperatives require strong operational capabilities, skilled personnel, and streamlined administrative processes. Based on the views of the respondents, key elements of organizational capacity include succession planning and knowledge transfer, while addressing management turnover challenges is essential for long-term organizational sustainability.

Respondent E from Nakuru district underlined, "*We need trained cooperative managers who can plan finances and manage resources efficiently. Effective management within cooperatives is essential for leveraging collective strength, and without knowledgeable managers, we risk misallocating resources and failing to achieve our goals.*"

Respondent G from Thika district pointed out, "*Currently, many farmers lack the knowledge on how to turn Stevia farming into a profitable business model. We need practical training that focuses on market dynamics, financial management, and effective marketing strategies. By gaining insights into how to position our products in the market, we can enhance our profitability and ensure the sustainability of our farms over the long term.*"

Respondent F from Njeri district emphasised, "*It would be incredibly beneficial to partner with companies like PureCircle and seek their mentorship. Learning from industry leaders who have experience in large-scale commercialization of Stevia can provide us with invaluable insights and practical advice on navigating the complexities of scaling our operations. Their guidance on best practices, quality control, and marketing strategies could greatly enhance our competitiveness.*"

4.5.3.4.3. Monitoring & Evaluation (M&E) for Performance Improvement

The study revealed a lack of good monitoring and evaluation skills on the part of Stevia farmers in Kenya. The respondents however are aware that monitoring and evaluation (M&E) systems are vital for ensuring the profitability and sustainability of Stevia commercialisation projects. Training on Monitoring specific performance metrics, including yield per acre, cost of production, and market access rates, provides a clear roadmap for farmers and cooperatives. Additionally, implementing feedback mechanisms like farmer meetings, digital surveys, or peer reviews fosters a culture of continuous improvement among farmers, enhancing the overall effectiveness of Stevia initiatives.

Respondent B from Nakuru district highlighted, *"Without reliable data on productivity and sales, we cannot effectively measure whether Stevia farming is profitable or sustainable. Access to comprehensive data analytics tools would allow us not only to track our performance over time but also to identify areas for improvement. By understanding what works and what doesn't, we can adjust our practices accordingly and enhance our overall productivity."*

Respondent J from Thika district highlighted, *"Farmers need regular feedback on what works and what doesn't to improve their Stevia farming techniques. Establishing a system for ongoing communication between farmers and agricultural experts can facilitate this exchange of information. Regular workshops and feedback sessions would allow us to share experiences, learn from one another, and implement effective strategies that have been proven to work in similar contexts."*

Respondent A from Njeri district added that, *"When we talk about exporting our products it means we must be prepared to be consistent in being able to supply the required quantities and the quality of the product we supply must be of acceptable standards. We will not be able to know where we are if we do not monitor our processes throughout the value chain. Monitoring includes looking at market trends. This allows us to position ourselves and improve where necessary. Through monitoring and evaluating our processes we can identify our shortcomings. Through monitoring and evaluation, we can be able to influence new policy developments from an informed standpoint."*

4.5.3.5. Outcomes

The section on outcomes associated with the commercialisation of Stevia offers a multi-faceted view of its potential impacts on economic growth, market competitiveness, and sustainability.

4.5.3.5.1. Economic Growth, Increased Farmer Income, and Poverty Reduction

The commercialisation of Stevia is closely tied to economic growth, offering opportunities for income diversification and poverty alleviation. It enhances market resilience and reduces reliance on traditional crops, benefiting smallholder farmers through increased income and financial independence. However, dependence on Stevia poses risks such as market fluctuations, necessitating diversification strategies. Illustrating how Stevia farming can lead to regional development, including enhanced local services and better access to education and healthcare, is essential to fully realize its economic potential.

According to Respondent A from Njeri district, *"Stevia farming has the substantial potential to transform rural economies by providing farmers with a reliable income source that is less*

susceptible to extreme price fluctuations seen with traditional crops like maize or sugarcane. This stability in income can empower farmers to invest in better agricultural practices, increasing overall productivity. It also has broader implications for community development—transforming local economies through enhanced purchasing power and creating a ripple effect that supports local businesses and services.”

Respondent B from Nakuru district highlighted, *“If Stevia is promoted as a high-value cash crop with appropriate market linkages, we could see many farmers escape the cycle of poverty. By creating access to both local and international markets, farmers can secure better prices for their produce, enabling them to reinvest in their farms and improve overall practices. Education around the economic benefits of Stevia cultivation is essential, along with providing the necessary resources to help farmers transition to this profitable crop.”*

Respondent F from Njeri district added, *“The earnings from Stevia are indeed higher per hectare compared to traditional crops like maize or sugarcane. This means even small plots of land can generate significant income. Establishing clear benchmarks for profitability and sharing these success stories might encourage more farmers to consider Stevia cultivation. Additionally, we should explore cooperative models that allow smallholders to pool resources and share knowledge, maximizing the financial benefits associated with Stevia farming.”*

4.5.3.5.2. Market Competitiveness: Domestic Market Penetration, Global Market Access, and Value Chain Optimization

The study revealed that in Kenya Stevia Farmers feel that their market competitiveness is not yet at the envisaged level. The respondents share a view that for them to thrive commercially in Kenya, they must achieve competitive pricing and high quality in local and international markets. Enhancing processing skills, branding, and value chain optimization can boost farmer profits and consumer trust. Developing infrastructure to address logistical challenges is essential for local consumption, while compliance with international quality standards and examining existing frameworks can further support market success.

Respondent D from Thika district emphasized that *“There's an increasing demand for healthier sweeteners in Kenya, but unfortunately, most of our Stevia is exported. We need to actively encourage local industries to incorporate Stevia into their products, whether that's food manufacturers looking for natural sweeteners or beverage companies aiming to reduce sugar content. Building local partnerships can create a more stable home market for Stevia, which in turn can benefit farmers by providing consistent demand.”*

Respondent H from Njeri district highlighted that *“Kenyan Stevia has great potential to compete on an international level, but to do so, we need to meet global quality standards and create reliable supply chains. This means not just focusing on production but also ensuring that our processing methods align with international best practices. Investing in quality assurance processes and accreditation will help build trust with buyers in global markets, making it more likely that they will choose Kenyan Stevia over products from other countries.”*

Respondent J from Thika district added, *“Currently, most farmers only sell raw Stevia leaves, but if we could process these into refined products like Stevia extract, we could substantially increase our profits and overall market value. This shift requires capacity building, as well as investment in processing facilities that can handle these transformations efficiently. Encouraging collaboration with established companies in the Stevia industry might provide the technical expertise and resources farmers need to make this shift.”*

4.5.3.5.3. Sustainability: Environmental Conservation, Social Equity, and Long-Term Agricultural Resilience

The study revealed that while there is a positive outlook in as far as sustainability is concerned, continued sustainability can be achieved if there is a major involvement of the Kenyan Government particularly the Ministry of Agriculture and Ministry of Trade. Sustainability in Stevia farming is vital for social equity, economic viability, and soil health, fostering food security and resilience to climate change. The discussion should include metrics like biodiversity and carbon footprint, while emphasizing inclusive commercialisation and targeted programs for marginalized groups. Addressing external challenges is crucial for long-term viability.

Respondent C from Nakuru district expressed, *“Stevia is such a promising crop because it requires significantly less water than sugarcane, making it particularly well-suited for regions facing water scarcity. Given the impacts of climate change, this attribute could make Stevia an increasingly viable option for farmers in affected areas. By promoting Stevia as a drought-resistant alternative, we can encourage more sustainable farming practices and contribute to food security in regions that are vulnerable to changing weather patterns.”*

Respondent E also from Nakuru district emphasised, *“If we want Stevia farming to be a sustainable endeavour for generations to come, we must prioritize integrating organic farming methods and reduce our reliance on synthetic chemicals. This not only protects our soil health and biodiversity but also appeals to a growing market segment that values organic products. Educating farmers about organic practices and providing the resources needed to transition can enhance the long-term viability of Stevia farming while promoting environmental sustainability.”*

Respondent G from Thika district added, *“It is vital that women and youth are prioritized in Stevia farming programs so that the economic benefits reach a broader base within rural communities. Involving these groups can enhance household incomes, empower families, and promote gender equality. Support programs should provide training tailored to women and youth, ensuring they have access to the resources and networks necessary to thrive in Stevia cultivation. This inclusive approach not only enriches lives but can also significantly boost local economies.”*

4.6. SUMMARY

The chapter provided the views of the Respondents based on different themes that were deemed critical to reveal the opportunities, and challenges and critical factors for the commercialisation of Stevia in Kenya. The results showed a variety of opportunities that can be exploited by Kenyan smallholders as the country moves forward in the commercialisation of Stevia. The chapter also provides views of the smallholder farmers on factors that they regard as critical for Kenya to consider when forging ahead with the commercialisation of Stevia in Kenya. The results are clear that there is a variety of challenges but also various forms of support which are viewed as critical if commercialisation of Stevia is to succeed in Kenya according to the views of smallholder Stevia farmers. The next chapter discusses the findings of this qualitative study in relation with literature and existing theories.

CHAPTER 5

DISCUSSION OF THE FINDINGS

5.1. INTRODUCTION

This chapter presents the findings obtained from the ten respondents that participated in this study. The presentation is arranged according to the themes that related to each of the objectives of the study.

5.2. DISCUSSION BASED ON THEMES RELATED TO OPPORTUNITIES IN THE COMMERCIALISATION OF STEVIA IN KENYA

The Kenyan Stevia industry's commercialisation provides significant opportunities for smallholder farmers. This analysis applies theories on value chains, agricultural

commercialisation, and smallholders and SMEs, comparing Kenya's context with successful international case studies and offering critical insights for stakeholders.

5.2.1. Increasing Demand for Stevia

The chapter explores the commercialisation of *Stevia rebaudiana*, a low-calorie natural sweetener gaining popularity due to rising health concerns like obesity and diabetes (WHO, 2021). Utilizing Market-Oriented Theory, it emphasizes how consumer demand drives agricultural success, highlighting Stevia's growing market potential. Smallholders and SMEs in Kenya recognize Stevia's expanding domestic and international demand but face significant barriers, including limited technological knowledge, inadequate infrastructure, and restricted financial access, which hinder production expansion.

The study contrasts with prior research by explicitly linking findings to Market-Oriented Theory, providing detailed insights into Kenya's unique challenges and adding empirical evidence to the discourse on agricultural policies and farmer empowerment. Addressing these obstacles requires protective policies and coordinated market connections to integrate smallholders into the Stevia market effectively (Nguyen et al., 2023). Government interventions, such as financial aid, input subsidies, and logistical support, are proposed, alongside organized programs connecting SMEs with processors and export quality compliance initiatives to enhance market readiness (FAO, 2022).

India serves as a comparative case study, demonstrating successful Stevia commercialisation through public-private partnerships, subsidies, and technical support, enabling smallholders to participate in global supply chains and export to North America and Europe (FAO, 2022). This evidence underscores the alignment with Market-Oriented Theory, emphasizing consumer-driven agricultural commercialisation. For Kenyan farmers, overcoming production barriers and aligning with industry demands is crucial to leveraging Stevia's increasing global market opportunities. This analysis offers actionable recommendations to empower smallholders and stimulate sustainable development in the Stevia sector.

5.2.2. Opportunities to Merge with International Stevia Companies

The global rise in demand for Stevia, particularly in North America and Asia, presents significant commercialisation opportunities for smallholders and SMEs in developing nations like Kenya. The study utilizes concepts of contract farming and value chain integration to analyse these

opportunities within the Kenyan context. It identifies foreign partnerships as crucial for enabling smallholders and SMEs to access capital, technology, and broader markets, addressing key production challenges. However, the lack of robust regulatory frameworks governing contract farming is highlighted as a major obstacle, exposing farmers to price volatility and exploitation.

Unlike prior research that broadly examined agricultural policies, this study specifically links its findings to contract farming and value chain theories, providing practical insights for rural development. It underscores the necessity for effective regulatory mechanisms to ensure equitable agreements that protect smallholders' interests. Comparative insights from Thailand demonstrate how government regulation of contract farming guarantees fair prices and reliable market access. Thailand's success, driven by public-private partnerships, subsidies, and sustainable policies, serves as a model for Kenya (Pingali, 2019).

Recommendations include creating legal frameworks for transparent and enforceable contracts, implementing tax incentives for multinational investments, and fostering local Stevia sector growth. Organized market linkages could stabilize farmer incomes while enhancing global competitiveness.

The study's findings affirm that well-regulated contract farming can empower Kenyan smallholders by strengthening bargaining power and integrating them into global Stevia value chains. Aligning regulatory frameworks with these concepts is critical for enabling equitable and sustainable smallholder participation in international markets.

5.2.3. Opportunities for Specialization in Different Stevia Products

This study identifies significant opportunities for Kenyan smallholder farmers to specialize in value-added Stevia products, such as extracts, powders, and beverages, rather than solely producing raw leaves. Rooted in Value Chain Theory, the findings suggest that value addition enables SMEs to capture higher market revenues, access profitable niches, and enhance sustainability (Reardon & Timmer, 2021). However, SMEs face substantial barriers, including limited access to processing technologies, product development training, and infrastructure investment, hindering their ability to diversify and improve their economic position.

China provides a comparative case study, exemplifying successful Stevia commercialisation through government-supported value addition initiatives. Cooperative models in China integrate

smallholders and SMEs into the value chain, granting access to shared processing facilities and advanced technologies for drying, extraction, and refinement, thereby boosting profitability and global competitiveness (OECD, 2022).

To address these challenges, the study recommends immediate formation of Stevia SMEs cooperatives to pool resources and invest in shared processing infrastructure. Government financial incentives, such as grants for small-scale processing facilities, can facilitate access to value-added markets. Additionally, fostering research and development (R&D) is critical for improving extraction techniques, developing innovative product formulas, and enhancing processing methods. Partnerships with research institutions can spur innovation and capacity-building.

The study contributes uniquely to the discourse on agricultural commercialisation by linking findings to Value Chain Theory, emphasizing the need for enabling frameworks and cooperative governance to enhance value creation. These recommendations provide practical pathways for Kenyan smallholders and SMEs to overcome barriers, achieve product diversification, and participate effectively in high-value Stevia markets.

5.2.4. Sustainable Supply to Local and International Markets

The commercialisation of Stevia faces challenges for Kenyan smallholders and SME farmers, particularly in meeting bulk order requirements for local and international markets. Production constraints, such as limited resources, outdated farming practices, and environmental concerns, hinder farmers' ability to achieve consistency, quality, and quantity demanded by buyers. Theories of supply chain management and institutional theory emphasize the importance of aggregation models and farmer cooperatives in stabilizing supply chains (FAO, 2023). Without cooperative approaches, smallholders struggle with commercialisation opportunities.

Paraguay serves as a relevant comparative case study, where farmer cooperatives enable resource pooling, collective price bargaining, and increased production capacity. These cooperatives provide vital technical training and support, allowing farmers to meet international export quality standards (UNCTAD, 2023).

The study identifies three key strategies for overcoming production constraints: promoting smallholders and SMEs cooperatives to improve efficiency and market stability, fostering public-

private partnerships to enable aggregation models, and enhancing collective bargaining power to secure better prices and access to resources (Siche et al., 2022). Institutional support networks like cooperatives are essential for preparing smallholders and SMEs to meet market demands, bolstering their competitive advantage, and integrating them into larger supply chains.

By linking production constraints to established theories, the study contributes uniquely to agricultural commercialisation discourse, offering actionable recommendations to address challenges. Institutional frameworks that empower smallholders and SMEs through cooperative governance and systematic approaches are critical for successful Stevia commercialisation in Kenya, enabling farmers to tap into expanding global markets.

5.2.5. Theoretical Contributions: Analysis and Implications for smallholder farmers in Stevia commercialisation

Stevia, a calorie-free sweetener, presents growing opportunities for smallholders and SMEs as global demand rises. To capitalize, farmers must understand market dynamics and agricultural commercialisation theories. These include demand responsiveness (Chanza & Mgalamadzi, 2025), value chain integration (Truelove et al., 2023), product specialization (Abman & Lundberg, 2024), and sustainable supply chain development (Alem & Jena, 2022). Their implications highlight strategies for enhancing smallholder market integration.

Table 5. 1.

Table 4: Theoretical Contributions: Supporting or Challenging Prevailing Theories

Opportunity	Supports or Challenges Prevailing Theory?	Implications for Smallholder Stevia Commercialisation
Growing Demand for Stevia	Supports Market-Oriented Theory but challenges smallholder responsiveness due to structural barriers.	Highlights the need for investment in production capacity to enable smallholders to capitalize on demand.
Mergers with International Companies	Supports Value Chain Integration Theories but challenges the assumption that demand alone creates linkages.	Demonstrates that policy support and investment frameworks are necessary for successful integration.

Opportunity	Supports or Challenges Prevailing Theory?	Implications for Smallholder Stevia Commercialisation
Product Specialization & Value Addition	Supports Value Chain Theory but highlights financial and infrastructural constraints.	Shows that value addition potential exists but requires institutional intervention.
Sustainable Supply Chain Development	Supports Supply Chain Management Theories but challenges assumptions of market-driven sustainability.	Demonstrates that smallholder farmers require structured cooperative models and logistical support.

Source: Researcher

Rising consumer demand for Stevia highlights market opportunities, yet structural limitations hinder Kenyan smallholders and SMEs from leveraging this growth. The study underscores the importance of capacity investment to access these opportunities. Table 4. illustrates the alignment between smallholders and SMEs’ potential and agricultural theories, emphasizing the role of modern strategies like mergers with foreign businesses to enhance market access. These demand-driven models call for legislative support to bridge gaps between smallholders and SMEs, and larger market actors.

Value Chain Theory emphasizes the potential for product specialization and value addition to expand smallholders’ offerings. However, infrastructural and financial limitations necessitate institutional support to realize these opportunities. Table 4.’s findings advocate for comprehensive interventions, including partnerships with financial institutions, policymakers, and industry stakeholders.

Developing structured support systems such as infrastructure investment, technical training, and financing will enable smallholders to thrive in global Stevia markets. Sustainable Supply Chain Development highlights the importance of cooperative frameworks and logistical support, ensuring smallholders’ effective integration into supply chains while fostering sustainability.

5.2.6. Discussion of Opportunities and Theoretical Implications

The study reveals that Kenyan smallholders and SMEs can greatly benefit from the rising global demand for Stevia by specializing in producing diverse derivatives such as steviol glycosides and liquid extracts. Partnering with international companies offers access to advanced agricultural

technologies and practices, boosting competitiveness and profitability (Barrett & Bevis, 2022). Yet, overcoming market constraints demands deliberate strategies aligned with agricultural commercialisation theories.

The Market-Oriented Theory underscores the importance of proactive responses to consumer demand and market trends (Barrett et al., 2022). Structured interventions, such as fostering partnerships and improving supply chain integration, are critical for smallholders and SMEs' success. Contract farming, cooperatives, and SMEs are identified as essential mechanisms to scale production and stabilize incomes, minimizing risks tied to price volatility (Knox et al., 2021).

Strategic policy actions, including infrastructure investment, financial support, and solid market connections, are pivotal. These measures ensure smallholders can navigate challenges and capitalize on Stevia's growing popularity, emphasizing the necessity of institutional frameworks for sustainable commercialisation.

5.3. DISCUSSION BASED ON THEMES RELATED TO CHALLENGES HINDERING STEVIA COMMERCIALISATION

Stevia commercialisation offers opportunities for Kenyan smallholders, but institutional and regulatory barriers hinder their full participation in the value chain. Challenges include limited access to technology, financing, and markets. The study critiques traditional marketing strategies and proposes alternatives, emphasizing value chains and SMEs. Stakeholders and policymakers must adopt targeted strategies to empower smallholders and SMEs, and strengthen their integration into the Stevia market.

5.3.1. Lack of Regional-Specific Cultivation Technologies

The study emphasizes the critical role of localized agricultural technologies tailored to Kenya's diverse soil and climate conditions in achieving smallholder commercialisation success (Pingali, 2019). Generic agricultural models, often unsuitable for local contexts, have resulted in suboptimal productivity in Stevia cultivation (FAO, 2022). Kenyan smallholders and SMEs face challenges due to limited access to region-specific cultivation technologies, agronomic expertise, and institutional support. While traditional and locally invented practices exist, their scalability and effectiveness are constrained by disorganization and lack of institutional backing (Nyangena et al., 2022).

The findings advocate for co-created agricultural innovations developed collaboratively by researchers, extension officers, and smallholder farmers. Participatory Development Theory underscores the importance of integrating smallholders' practical knowledge into solution development, ensuring relevance and higher adoption rates (Pretty, 2020). This approach contrasts with Modernization Theory, which inadequately addresses context-specific constraints by emphasizing top-down technology transfer (Berzins et al., 2023).

To overcome barriers, the study calls for research and development (R&D) initiatives that engage smallholders in creating regionally appropriate cultivation techniques. Such collaboration can enhance productivity, empower farmers, and strengthen the foundation for Stevia's successful commercialisation in Kenya. Institutional support and participatory frameworks are vital for enabling innovation, scalability, and sustainable integration into high-value markets.

5.3.2. Lack of Government Support for Processing and Value Addition

Government support is vital for agricultural commercialisation, particularly value addition, as evidenced by successful Stevia-producing nations like China and India. Tax exemptions, technology transfer programs, and subsidies for processing facilities significantly enhance farmers' ability to add value, boosting competitiveness in global markets (Barrett et al., 2022; OECD, 2023). Kenyan Stevia SMEs, however, face barriers due to the absence of government-funded infrastructure for processing and value addition. Selling raw Stevia leaves limits their ability to capture higher supply chain value and compete internationally (Muriuki et al., 2024).

The study emphasizes the need for local processing facilities to enable SMEs to access higher-value market segments through diversified products like Stevia extracts and powders. Kenya's agricultural policy framework inadequately addresses Stevia farming's unique requirements, undermining smallholder participation in high-value industry segments (Nyangena et al., 2022).

Aligned with Value Chain Theory, the study highlights the importance of value addition in improving market competitiveness (Kaplinsky & Morris, 2019). Legislative amendments are recommended to encourage private sector investment in processing facilities, cooperatives, and training programs. Cooperatives can enhance resource-sharing, bargaining power, and fair pricing, fostering collaboration among smallholders and SMEs. Targeted institutional support is

essential for empowering smallholders and SMEs, and ensuring their effective integration into global markets.

The study challenges assumptions that Stevia smallholders and SMEs can join value chains without government intervention, emphasizing the need for financial investments and incentives. A coordinated effort to develop infrastructure and processing capabilities can significantly improve the economic viability and sustainability of Stevia farming in Kenya.

5.3.3. Lack of Access to Finance

Government support is crucial for the commercialisation of Stevia, particularly in value addition, as demonstrated by China and India. Initiatives like tax exemptions, technology transfer programs, and subsidies for processing facilities empower farmers to add value to their produce, enhancing competitiveness in global markets (Barrett et al., 2022; OECD, 2023). Kenyan Stevia SMEs, however, face significant barriers due to insufficient government-funded infrastructure for processing and value addition. Reliance on selling raw Stevia leaves limits their ability to capture higher value along the supply chain and compete internationally (Muriuki et al., 2024).

The study highlights the importance of establishing local processing facilities to enable SMEs to access higher-value market segments through diversified products such as Stevia extracts and powders. Kenya's current agricultural policies fail to adequately address the specific needs of Stevia farming, undermining smallholders and SMEs' participation in high-value segments of the industry (Nyangena et al., 2022).

Aligned with Value Chain Theory, the study underscores the significance of value addition in improving market competitiveness (Kaplinsky & Morris, 2019). It recommends legislative amendments to incentivize private sector investment in processing facilities, cooperatives, and training programs. Cooperatives can enhance resource sharing, bargaining power, and fair pricing, fostering collaboration among smallholders.

The findings challenge the assumption that smallholders and SMEs can easily integrate into value chains without government intervention, emphasizing the need for financial investments and infrastructure development. Structured institutional support is essential for empowering smallholders and SMEs, enabling their effective participation in global markets, and ensuring the economic sustainability of Stevia farming in Kenya.

5.3.4. Climatic Conditions and Environmental Challenges

Climate fluctuation poses significant challenges to Kenyan Stevia farming, as the crop requires consistent water supply and stable temperatures to thrive (Pingali, 2019). Erratic rainfall and droughts result in unpredictable yields, undermining productivity and smallholders' ability to meet contractual commitments, which introduces risk to the supply chain (FAO, 2021; Adeleke et al., 2022). Unlike staple crops, Stevia lacks structured climate adaptation methods, leaving smallholders unsupported and vulnerable to environmental disruptions.

This study expands on Supply Chain Risk Theory, illustrating how climate instability affects production capacity and introduces supply chain uncertainty, and aligns with Climate Adaptation Theory by emphasizing the need for localized climate-smart agricultural models (Duncan et al., 2023). Tailored solutions, such as drought-resistant Stevia cultivars and improved irrigation systems, can mitigate risks and enhance resilience (Mutia et al., 2024). Furthermore, weather-indexed insurance schemes could provide financial security during climate-related stress periods.

Collaborative research and the adoption of customized interventions are critical to addressing these challenges. By focusing on localized climate-smart practices, policymakers and stakeholders can improve agricultural resilience and enable sustainable Stevia commercialisation for smallholders and SMEs.

5.3.5. Inadequate Storage and Processing Facilities

Post-harvest practices play a vital role in the commercialisation success of Kenyan smallholder farmers and SMEs. Inadequate storage and processing facilities lead to substantial losses and degraded product quality, impeding smallholders and SMEs' competitiveness and limiting their access to higher-value markets (OECD, 2022). Without proper infrastructure such as drying and extraction equipment, Stevia leaves deteriorate quickly, forcing smallholders to sell at lower prices and reducing their earnings potential.

The study critiques Market-Oriented Theories, which focus solely on demand and pricing, and supports Post-Harvest Value Chain Theory, emphasizing that effective storage and logistics enhance profitability (Otegunrin et al., 2019; Kumar & Singh, 2022). Unlike previous research that focused on staple crops, the findings highlight how inadequate post-harvest infrastructure constrains smallholders from entering high-value markets for Stevia.

To address these challenges, investments in shared storage facilities and cooperative models are essential for stabilizing supply chains and improving market readiness. Collaborative efforts between public and private entities to establish regional processing facilities can further enhance Stevia's competitiveness in domestic and international markets. Strengthened post-harvest infrastructure can reduce losses, improve product quality, and empower smallholders economically, fostering sustainable farming practices and supporting Kenya's Stevia commercialisation.

5.3.6. Limited Market Information and Access

Technology is integral to agricultural commercialisation, yet Kenyan smallholder farmers face barriers such as financial constraints and knowledge gaps, limiting adoption of key technologies like post-harvest processing, precision irrigation, and pest control (Barrett et al., 2022; FAO, 2023). The study highlights how unequal access to market information, consistent with Information Asymmetry Theory (Mapiye, 2023), further hampers informed decision-making on pricing and demand trends. Addressing these challenges requires digital platforms, cooperative price monitoring systems, and government-funded training to improve market efficiency and empower farmers. Targeted initiatives can enhance technology accessibility and bridge gaps hindering Stevia production commercialisation.

5.3.7. Stringent Export and Certification Requirements

Smallholder farmers face significant challenges in meeting stringent export certification requirements for high-end foreign markets, such as food safety laws, traceability procedures, and organic certification. These processes involve substantial financial burdens due to assessments, inspections, and compliance monitoring (Lerche et al., 2022; Zografos et al., 2021). Limited resources and knowledge hinder smallholders and SMEs' ability to navigate these complex systems, as observed in studies like Mutuna et al. (2023), which show that prolonged certification processes discourage smallholders and MSEs from pursuing exports, restricting their income potential.

The study highlights collective certification programs facilitated by smallholder and SME cooperatives as a solution to improve competitiveness. By pooling resources and expertise, smallholders can reduce the financial and logistical challenges associated with certification. Additionally, government interventions such as compliance training subsidies and certification

fee support could alleviate financial strains on smallholders and SMEs. These measures would empower smallholders and SMEs to access international markets, fostering sustainable agricultural growth and competitiveness.

5.3.8. Difficulty in Accessing International Markets

Smallholder farmers and SMEs face significant challenges in accessing foreign markets for high-value crops like Stevia. Obstacles include stringent quality standards, legal restrictions, and costly certifications for fair trade, organic compliance, and food safety regulations, which hinder their entry into international markets (Reardon & Timmer, 2021; FAO, 2022). Smallholders' reliance on middlemen reduces their bargaining power and profits, while complex export regulations further exacerbate these challenges (Zhang et al., 2021).

This study highlights how certification deficiencies and regulatory complexities disproportionately disadvantage smallholders and SMEs, aligning with Institutional Theory, which emphasizes the impact of regulations on market access (North, 2020). It also critiques Neoclassical Trade Theory, challenging the idea that price competitiveness alone drives agricultural exports (Berkum & Meijl, 2020). Attaining certifications, adhering to compliance, and simplifying regulations are equally critical for global market entry.

Recommendations include government support for certification processes, cooperative structures to share resources, and clear export guidelines. These measures would reduce financial burdens, improve market readiness, and foster equitable access to global trade, enabling smallholders and SMEs to navigate regulatory complexities more effectively.

5.3.9. Weak Smallholders and SMEs Cooperatives

The study emphasizes the critical role of strong cooperatives in enhancing smallholders and SMEs' collective bargaining power, market access, and resource acquisition. Weak organizational structures leave smallholders and SMEs unable to negotiate fair prices or establish long-term buyer agreements, jeopardizing future production planning and perpetuating cycles of poverty. This inadequacy undermines their market position and economic stability.

Findings align with Collective Action Theory, which asserts that farmer cooperation improves marketplace influence, enabling better price negotiations and access to resources such as funding, technology, and inputs (Gündüz & Benitez, 2020). Cooperatives facilitate unified communication

and strengthen smallholders and SMEs' financial positions. They also achieve economies of scale, enhancing smallholders and SMEs' ability to enter commercial markets effectively (Makate et al., 2019).

By pooling resources and fostering mutual learning, cooperatives improve marketing strategies and production capacities, boosting smallholders and SMEs' competitiveness domestically and globally. Moreover, cooperative models encourage resilience and adaptability to external market challenges, fostering sustainability.

Conversely, fragmented smallholder communities and SMEs with weak organizational structures face inefficiency and reduced market competitiveness (Mazzocco et al., 2021). Strengthening cooperatives is essential for improving individual farmer and SME's economic outcomes and optimizing supply chain efficiency and stability.

5.3.10. Limited Research and Development Support

The lack of research and development (R&D) support for Stevia cultivation in Kenya hinders agronomic improvements and market expansion efforts. Unlike cash crops benefiting from significant R&D investments, Stevia's peripheral position in agricultural policies limits opportunities for productivity and competitiveness (Mutai et al., 2023). Smallholders face challenges due to the absence of advancements in seed varieties, pest control, and agronomic practices, which could improve economic viability.

Innovation Systems Theory emphasizes collaboration among farmers, academic institutions, and government agencies for successful agricultural commercialisation (Davis & Fazio, 2021). The study suggests that targeted R&D funding could address local agricultural conditions, boosting yields and economic growth (Majid et al., 2023). Government-backed initiatives can enable the development of technologies and practices tailored to Stevia farming.

Juma and Oduor (2024) underline that bridging the R&D gap benefits the entire value chain by improving growing conditions, pest resistance, and post-harvest processes. This would enhance sustainability, efficiency, and competitiveness in Kenya's Stevia industry.

5.3.11. Discussion of Challenges and Theoretical Implications for Stevia Smallholders and SMEs

Kenya's smallholders and SMEs have the opportunity to commercialize Stevia, improving livelihoods, sustainability, and global integration. However, systematic and structural barriers hinder progress. Based on the study findings, Table 5 details these challenges and theoretical contributions that are essential for creating effective solutions. The table emphasizes real-world interventions informed by theories, offering insights into empowering smallholders and SMEs. It evaluates whether challenges align with or contradict accepted theories, guiding policy and practices to enhance Stevia value chain integration for smallholder farmers and SMEs.

Table 5: Theoretical Contributions: Supporting or Challenging Prevailing Theories

Challenges	Supports or Challenges Prevailing Theory	Implications for Smallholders and SMEs' Stevia Commercialisation
Lack of Regional-Specific Cultivation Technologies	Challenges Value Chain Theory	Highlights the need for tailored technologies that align with local conditions to enhance productivity and market integration.
Lack of Government Support for Processing and Value Addition	Challenges Neoliberal Agricultural Finance Theory	Illustrates the necessity of government intervention in supporting infrastructure and value addition to empower smallholders.
Lack of Access to Finance	Challenges Neoliberal Agricultural Finance Theory	Emphasizes the importance of innovative financing mechanisms tailored to smallholder needs, rather than relying on traditional financial systems.
Climatic Conditions and Environmental Challenges	Challenges Modernization Theory	Supports the argument that technological transfer without consideration of local environmental conditions leads to inefficiencies.
Inadequate Storage and Processing Facilities	Challenges Value Chain Theory	Underlines the critical need for investments in local processing facilities to facilitate value addition and market access.
Limited Market Information and Access	Challenges Participatory Development Theory	Highlights that lack of information inhibits effective market participation and emphasizes the need for inclusive information dissemination methods.
Stringent Export and Certification Requirements	Challenges Modernization Theory	Demonstrates that bureaucratic barriers can hinder market access, contradicting the assumption that globalization naturally benefits all market players.
Weak Farmer Organizational Structures	Challenges Participatory Development Theory	Suggests that strong farmer organizations are essential for collective bargaining, knowledge sharing, and more effective advocacy for resources.

Challenges	Supports or Challenges Prevailing Theory	Implications for Smallholders and SMEs' Stevia Commercialisation
Limited Research and Development Support	Challenges Value Chain Theory	Indicates that without targeted research efforts, smallholder needs remain unaddressed, hampering innovation and productivity improvements.
Difficulty in Accessing International Markets	Challenges Neoliberal Agricultural Finance Theory	Shows that global market access requires more than just market principles; it necessitates supportive policies to equip smallholders for competition.

Source: Researcher

Table 5 is pivotal in analysing agricultural commercialisation issues, showcasing connections between challenges and theories while emphasizing Kenyan smallholders and SMEs' unique contexts in Stevia production. By critiquing theoretical applications, it guides policy suggestions and support systems to enhance SMEs' socioeconomic standing, enabling their participation in domestic and global markets. The insights foster sustainable farming practices and bolster smallholder and SMEs' economic resilience, essential for Stevia's commercialisation success in Kenya.

5.4. DISCUSSION BASED ON THEMES RELATED TO CRUCIAL FACTORS FOR STEVIA COMMERCIALISATION

5.4.1. Role of Government Policy in Market Development

Government intervention is essential for agricultural commercialisation, particularly in niche markets like Stevia. Effective policies ensure market stability, infrastructure investment, and export promotion (Pingali, 2019; Zhang & Zhai, 2022). A defined policy framework supports production, processing, and trade, directly influencing market success (FAO, 2022; Kamau et al., 2023). However, in Kenya, the absence of structured policies undermines smallholders and SMEs' participation, with unclear regulations, insufficient incentives, and limited export support hindering competitiveness.

The study highlights a gap: crop-specific frameworks tailored to Stevia's unique dynamics. Findings align with Institutional Theory, which asserts government policies' influence on commercialisation outcomes (Scott, 2020). Examples like India's National Stevia Policy,

offering subsidies and export incentives (Singh et al., 2021), and Paraguay's public-private partnerships (González et al., 2023), demonstrate policy-driven success.

Kenya's reliance on Neoliberal Agricultural Market Theories, assuming market forces alone suffice, has exposed SMEs to barriers, restricting market entry and sustainability (Patel, 2021). The study recommends developing a National Stevia Commercialisation Policy to regulate markets and provide stakeholder clarity. Export facilitation programs could improve competitiveness, addressing systemic challenges and fostering SMEs' integration into formalized value chains (Mwenda et al., 2023). These measures are crucial for sustainable Stevia commercialisation.

5.4.1.1. Government Investment in Infrastructure and Processing Facilities

Government investment in rural infrastructure and processing facilities is crucial for enhancing agricultural commercialisation by boosting productivity and reducing transaction costs (OECD, 2023). Stevia smallholders and SMEs in Kenya face significant challenges, including inadequate road networks, insufficient irrigation, and limited processing facilities, hindering production scaling and market competitiveness (Wang et al., 2022). Unlike broad analyses of African agriculture (Mudida et al., 2022), this study highlights targeted needs such as drying, extraction, and refinement facilities essential for Stevia value addition and competitiveness.

Examples from China and South Africa demonstrate the benefits of infrastructure investments. China's Stevia processing plants have improved value addition and global competitiveness (Zhao et al., 2023), while South Africa's initiatives for Rooibos tea farmers enhanced supply chain efficiency (Smith & Steyn, 2021).

Aligned with Supply Chain Integration Theory, the findings emphasize that infrastructure investments are critical for commercialisation (Kumar & Singh, 2020). The study critiques Market-Oriented Theories, showing that market forces alone are insufficient without structural support (Njeru, 2022). To address these challenges, policy recommendations include establishing government-backed Stevia processing hubs and upgrading irrigation and transportation infrastructure, ensuring effective production, distribution, and market access for smallholders and SMEs.

5.4.1.2. Government-Led Financial Support for Stevia Smallholders and SMEs

Financial exclusion poses a critical barrier to the commercialisation of Kenyan smallholders and SMEs in agribusiness, particularly for Stevia smallholders who struggle with high input costs and limited financial support (FAO, 2022; Kihara et al., 2023). This study highlights Stevia's unique challenges, such as its long cultivation cycle and niche market, which require specialized financing models. Smallholders and SMEs face significant difficulties accessing credit and government subsidies, hindering their ability to scale production and adopt mechanization (Ochieng et al., 2020).

In contrast to broader agricultural finance studies, this research underscores the need for tailored financial solutions for Stevia commercialisation. Smallholders and SMEs advocate for government-backed loans, subsidies, and specialized credit schemes. Successful examples include India's subsidized loans and grants, which improved Stevia production scalability, and Argentina's crop-specific financial inclusion policies aimed at high-value crops (Rodríguez et al., 2023).

Aligned with Financial Inclusion Theory, the findings emphasize the need for tailored mechanisms to address credit accessibility (González et al., 2023). This challenges Neoliberal Finance Models that rely solely on private sector solutions (De Janvry & Sadoulet, 2022). Key policy recommendations include subsidized credit and insurance schemes for Stevia SMEs and cooperative-managed revolving loan funds to pool resources and increase financial inclusion (Tashobya & Obua, 2022). These measures are essential for empowering smallholders and SMEs and advancing Stevia commercialisation.

5.4.1.3. Government Role in Export Promotion and Certification Support

Government support for certification compliance and trade negotiations significantly benefits agricultural exports, but smallholders and SMEs face barriers like costly certifications and regulatory obstacles (OECD, 2023; Tadesse et al., 2022). Kenyan Stevia smallholders and SMEs cite high certification costs and a lack of direct trade linkages as primary export barriers. Government-backed programs and trade facilitation agreements could greatly enhance market access. For instance, South Africa's Geographical Indication certification and Paraguay's export tax incentives for Stevia have boosted smallholders and SMEs competitiveness (Van der Merwe et al., 2021; González et al., 2023).

Unlike broad studies on African agriculture (Karanja et al., 2022), this study highlights Stevia-specific certification challenges and proposes group certification as a cost-effective solution. The findings align with Bargaining Power Theory, which emphasizes group negotiation for market security (Adisa et al., 2020), contrasting Free Market Theories that rely on supply-demand dynamics (Petersen, 2021). Organized bargaining ensures price fairness and income stability (Kruijssen & Mazzucato, 2022).

Recommendations include government-led trade partnerships to expand Stevia's export potential, subsidized certification programs to reduce costs, and group certification models to enhance smallholder affordability and market participation (Muriithi & Wanzala, 2022).

5.4.2. Cooperatives and Stakeholder Engagement

In the current study of Stevia cultivation and commercialisation, the findings suggest that smallholder farmers act individually, which limit their potential to engage effectively with other stakeholders. To address this issue, it is important to unite smallholders and SMEs into cooperatives. By creating cooperatives, smallholders and SMEs can jointly pool their resources, knowledge, and bargaining power, allowing them to negotiate from a position of strength. In addition to improving their access to markets and obtaining higher prices for their produce, this organizational change makes it easier for them to obtain technical assistance, funding, and necessary agricultural inputs. In the end, cooperatives provide smallholders and SMEs with a strong foundation for increased economic stability and value chain integration (Nyawo & Olorunfemi, 2023).

5.4.2.1. Role of Cooperatives in Strengthening Market Access

Research indicates that agricultural cooperatives enhance market access, elevate smallholders and SMEs' negotiating power, and stabilize prices (Pingali et al., 2020). While cooperatives improve efficiency in commodities like sugar, tea, and coffee (FAO, 2022; Treccani et al., 2023), Kenyan Stevia cooperatives lack proper structure and coordination, hindering smallholders and SMEs' group marketing, input purchasing, and contract negotiation abilities. This disorganization negatively impacts their price competitiveness and buyer relationships. In contrast, successful cooperative models in India and South Africa demonstrate the potential for improved pricing and market access through well-governed cooperatives. The study supports Collective Action Theory, emphasizing the need for robust governance and state support to enhance smallholders and SMEs' market outcomes and suggests policy reforms to strengthen cooperative effectiveness.

5.4.2.2. Stakeholder Engagement and Value Chain Integration

Agricultural commercialisation necessitates multi-stakeholder engagement among government agencies, agribusinesses, NGOs, financial institutions, smallholders and SMEs (OECD, 2023). Research indicates that public-private partnerships (PPPs) are essential for aligning production with market demands (Huang et al., 2023; Mushi & Lema, 2023). This study identifies inadequate coordination among key players in Kenya's Stevia industry, resulting in disjointed marketing efforts and barriers such as limited financial access, unclear regulations, and insufficient agribusiness partnerships. In contrast, case studies from Paraguay and Thailand illustrate how multi-stakeholder forums and public-private investment partnerships enhance cooperative financing, export assistance, and technical training for farmers (Gonzales et al., 2021; Suwannapok et al., 2024). The findings align with Supply Chain Coordination Theory, asserting that stakeholder alignment improves commercialisation efficiency (Jiang & Zhu, 2023). Effective commercialisation outcomes depend on state-fostered collaboration, leading to policy recommendations for contract farming and strengthened partnership frameworks.

5.4.2.3. Cooperative-Based Financing for Stevia Commercialisation

Research indicates that cooperative-led financing significantly enhances smallholders and SMEs' access to credit, especially in capital-intensive cash crop sectors (Poon et al., 2023). Cooperative-managed credit plans and group lending models reduce default risks while promoting sustainable investment (Vogt & B athge, 2023). While previous studies focused on barriers to individual lending (Nussbaumer et al., 2021), this study highlights how cooperative financing can facilitate financial inclusion and support sustainable commercialisation for SMEs. In Kenya, smallholders and SMEs struggle with high collateral requirements from financial institutions, but well-structured cooperatives can serve as financial intermediaries, enabling bulk loan negotiations for members (Kirwa et al., 2023). Data from China shows cooperatives can secure bulk financing for Stevia producers, increasing their access to advanced technology (Liu & Zhang, 2022). Additionally, jointly managed revolving funds in India have reduced reliance on informal loans (Rao et al., 2020). The study supports Financial Inclusion Theory, advocating for cooperative financing as crucial for effective commercialisation. Recommendations include establishing cooperative-led revolving funds and government-backed loan guarantees to improve credit access for Stevia smallholders and SMEs.

5.4.2.4. Cooperative Formation & Collective Bargaining

5.4.2.4.1. Role of Cooperative Formation in Agricultural Commercialisation

Cooperatives enhance smallholders and SMEs commercialisation by increasing bargaining power, reducing transaction costs, and improving market access (Pingali, 2019; Crum et al., 2022). In sectors like sugarcane, coffee, and tea, they stabilize prices and ensure benefits from collective efforts (FAO, 2022). Despite the general advantages of cooperatives, this study reveals specific challenges within the emerging Stevia market that necessitate tailored cooperative models for specialty crop value chains. For instance, in India, Stevia cooperatives have lowered input costs through bulk purchasing and enhanced market stability (Rao et al., 2020). Similarly, well-structured cooperatives in South Africa's Rooibos sector have facilitated premium pricing and access to international markets, increasing farmer earnings by 35% (Lindeque & Kotze, 2023). The findings support Collective Action Theory, emphasizing the importance of group organization for smallholder resilience. Policy recommendations include targeted financial incentives, leadership training, and strengthening cooperative governance frameworks to enhance operational effectiveness and accountability for smallholders and SME groups.

5.4.2.4.2. Collective Bargaining for Price Stabilization and Market Security

Collective bargaining is crucial for reducing price volatility, increasing farmer incomes, and promoting fair trade (OECD, 2023; Abebe et al., 2022). Effective cooperatives enhance smallholders' bargaining strength and mitigate exploitation by intermediaries. However, Kenyan Stevia smallholders face significant challenges due to poor cooperative structures and the dominance of middlemen, limiting their bargaining power. This study highlights the need for tailored collective bargaining strategies for specialty crops like Stevia, which have unique demand patterns and certification requirements, departing from research focused primarily on large-scale commodities (Khan et al., 2024). In China, Stevia cooperatives have implemented price stability mechanisms that ensure growers a minimum price, whereas Kenyan smallholders lack similar protections (Li et al., 2022). In Paraguay, Stevia growers effectively negotiated direct contracts with foreign buyers through collective bargaining, reducing middlemen involvement (Martínez et al., 2023). The findings align with Bargaining Power Theory, asserting that collective negotiation significantly enhances smallholders' market security (Adisa et al., 2020; Lichtenberg & Ahn, 2023), contrasting with free market theories positing that pricing is solely determined by supply and demand (Petersen, 2021). Policy recommendations include

establishing Stevia cooperative unions, implementing minimum price regulations, and promoting direct trade agreements to foster market access and stability.

5.4.2.4.3. Cooperatives as Platforms for Input Access and Technology Adoption

Research indicates that cooperatives significantly reduce production costs by providing collective access to inputs, technology, and extension services (FAO, 2022; Nandwani et al., 2023). Members benefit from bulk purchasing, shared mechanization, and training programs that enhance productivity. The current study highlights that Kenyan Stevia smallholders and SMEs encounter considerable challenges due to high input costs and limited mechanization access. Respondents suggested that cooperative-led input financing and technology-sharing initiatives could substantially improve production efficiency and support commercialisation success (Kamau et al., 2023). This research emphasizes that the capital-intensive nature of Stevia production necessitates cooperative-driven financing, contrasting with general studies on agricultural technology adoption. For example, cooperative input financing in India has lowered Stevia-related fertilizer and seed costs by around 30% (Maheshwari & Vyas, 2022), while rooibos tea cooperatives in South Africa have implemented successful shared mechanization programs (Meyer et al., 2021). The findings align with Resource-Based Theory, which posits that access to production resources is vital for smallholder commercialisation (Barrett et al., 2020). Policy recommendations include supporting cooperative mechanization and technology adoption through subsidies, enhancing cooperative extension services, and establishing bulk input purchasing schemes.

5.4.2.4.4. Policy and Institutional Support for Cooperatives in Stevia Commercialisation

Research shows that government policies supporting cooperative development significantly enhance agricultural commercialisation and improve rural livelihoods (OECD, 2023; Taffa et al., 2021). Well-regulated cooperatives attract investment, smallholders and SMEs, and enhance industry competitiveness. This study identifies a lack of structured policy support for Stevia cooperatives in Kenya, resulting in legal uncertainties, financial constraints, and weak institutional oversight. Farmers stress the need for stronger policy backing to improve the sustainability of cooperatives. The study highlights that specialty crop cooperatives like Stevia require tailored regulatory frameworks, contrasting previous research that focused on major commodity cooperatives (Kindler et al., 2024). For instance, Paraguay's Stevia Cooperative Development Act formalizes cooperatives and provides vital financing (González et al., 2023),

while China's initiatives enhance market access and compliance (Li et al., 2022). The findings align with institutional theory, emphasizing government influence on market stability and cooperative success, differing from deregulated market theories that overlook the necessity of government aid (Hernández & Karami, 2022). Recommendations include establishing a Stevia Cooperative Policy Framework and government-backed investment funds to ensure cooperative viability.

5.4.2.5. Cooperative Structures: Primary, Secondary, and Tertiary

5.4.2.5.1. Role of Primary, Secondary, and Tertiary Cooperative Structures in Agricultural Commercialisation

Cooperative structures significantly enhance value chain efficiency, market access, and smallholders' bargaining power (Pingali, 2019; Mathews et al., 2023). Primary cooperatives consist of individual smallholder focusing on local activities such as obtaining inputs, providing training, and facilitating bulk purchasing. These primary cooperatives join together to form secondary cooperatives, which enhance combined capabilities in processing, marketing, and fundraising. Tertiary cooperatives represent industry-wide interests and advocate for supportive policies both domestically and internationally (FAO, 2022; Zhang et al., 2024). This study finds that Kenyan Stevia cooperatives are poorly structured and lack integration across primary, secondary, and tertiary levels, limiting SMEs' market access, collective bargaining power, and investment opportunities. Specifically, primary cooperatives suffer from weak governance and financial support, while secondary cooperatives are underdeveloped, hindering coordination in processing and marketing. Tertiary cooperatives have minimal influence in policymaking, reducing smallholder representation. Successful examples, such as India's robust secondary cooperatives that link farmers to markets, illustrate the need for tailored cooperative structures in the emerging Stevia market. These findings align with Collective Action Theory, which advocates for multi-tiered cooperatives to enhance commercialisation. To address these challenges, structured policies for cooperative integration, financial incentives, and governance frameworks are essential for fostering cooperative growth and better representation in trade policy discussions.

5.4.2.5.2. Primary Cooperatives: Strengthening Farmer Participation and Input Access

Studies indicate that primary cooperatives are vital for enhancing smallholders' participation in organized markets, improving access to quality agricultural inputs, and fostering knowledge

sharing among members (OECD, 2023; Vasile et al., 2022). They provide smallholders with critical benefits such as access to credit, group training programs, and the ability to purchase inputs in bulk. However, this study finds that governance and financial challenges hinder the effectiveness of Kenya's primary Stevia cooperatives, reducing smallholder involvement and trust. Smallholders suggest that strengthening these cooperatives would enhance their capacity to secure financing, negotiate lower input costs, and effectively engage in organized markets.

Unlike previous research that broadly examines primary cooperatives (Amin et al., 2023), this study highlights the need for cooperative models specifically tailored to niche crop production, focusing on organic certification and specialized agronomic training. Successful examples from India and China demonstrate that cooperative-led initiatives can significantly reduce input costs and improve productivity (Mohan & Kaur, 2022; Li et al., 2023). Findings support Resource-Based Theory, asserting that access to essential inputs is crucial for commercialisation success (Parker & Hsu, 2022). To enhance cooperative effectiveness, policy recommendations include developing input financing models, establishing targeted training programs, and strengthening cooperative governance structures.

5.4.2.5.3. Secondary Cooperatives: Facilitating Processing and Market Access

The findings of this study indicate that Kenyan secondary Stevia cooperatives are underdeveloped, restricting coordinated investment in processing and limiting access to export markets. SMs believe that strengthening these cooperatives could enhance their ability to negotiate favourable contracts, finance processing plants, and effectively brand Kenyan Stevia in international markets. Research underscores that secondary cooperatives are crucial for integrating SMEs into processing and value-added markets (FAO, 2023; Evers & Benedikter, 2022). Unlike earlier studies focused on secondary cooperatives in major cash crops (Njeru et al., 2023), this research highlights the potential of Stevia-specific cooperatives to act as export certification hubs, enhancing compliance and competitiveness. Successful examples from Paraguay and South Africa demonstrate the benefits of secondary cooperatives in certification and branding (Mabuza et al., 2021). These findings align with Supply Chain Coordination Theory, suggesting that secondary cooperatives can effectively reduce market entry barriers and enhance overall commercialisation, contrasting with neoclassical trade theories that assume organic integration into value-added markets (Morrison & Bressan, 2021). Key policy recommendations include creating specialized secondary cooperatives and government-backed investment funds to bolster processing and export capabilities.

5.4.2.5.4. Tertiary Cooperatives: Advocacy, Policy Influence, and Industry Representation

Research shows that tertiary cooperatives are vital for enhancing industry participation in national and international trade policy formulation (OECD, 2023; Clark & Sutherland, 2022). Well-organized tertiary cooperatives effectively advocate for trade agreements, influence legislative changes, and facilitate the placement of goods in international markets. This study reveals that Kenya's Stevia sector currently lacks a robust tertiary cooperative framework, limiting industry-wide engagement, export lobbying, and regulatory influence. SMEs indicated that establishing a national cooperative could unify producer interests and enhance communication with regulatory bodies. This study highlights the unique export opportunities for Stevia, necessitating a dedicated tertiary cooperative to support Geographical Indication (GI) certification and global branding efforts, contrasting with prior research on general agricultural federations (Amin et al., 2023). Successful examples from India and South Africa illustrate how tertiary cooperatives can advocate for favourable trade policies and enhance product value (Mabuza et al., 2021). Findings support Institutional Theory, emphasizing that organized representation is essential for effective commercialisation. Recommendations include establishing a national Stevia cooperative federation, strengthening government support for trade negotiations, and developing cooperative-led certification and branding strategies to enhance marketability.

5.4.2.6. Cooperatives for Training and Knowledge Sharing

Research indicates that cooperatives play a crucial role in enhancing smallholder training, skill development, and knowledge exchange, which are vital for agricultural commercialisation (Bennett et al., 2021; FAO, 2022). Access to technical training and peer learning opportunities through cooperative networks particularly benefits smallholder farmers. The current study finds a lack of organized training for Kenyan Stevia smallholders, leading to low production levels and challenges in meeting export quality standards. Smallholders expressed the need for cooperatives to provide continuous education tailored to their needs. This study emphasizes the importance of targeted training programs focused on export regulations and organic farming for specialty crops like Stevia, contrasting with broader agricultural education discussions (Otieno et al., 2024). In India, Stevia cooperatives have successfully implemented farmer field schools to improve information transfer (Mehta & Sharma, 2023), while South African rooibos cooperatives enhanced export readiness through capacity-building initiatives (van der Merwe et al., 2022). The

findings align with Human Capital Theory, which posits that education fosters economic success, urging cooperatives to organize training to achieve marketing objectives. Recommended policies include strengthening cooperative extension services and establishing specialized training programs funded by the government.

5.4.2.6.1. Cooperative-Led Knowledge Sharing for Innovation Adoption

Research highlights the importance of peer learning and farmer-to-farmer knowledge exchange in facilitating the adoption of agricultural innovations (Rogers et al., 2022; OECD, 2023). Cooperatives are effective platforms for technology diffusion and sharing best practices due to the trust established in their networks. This study finds that low adoption rates of improved farming and processing practices in Kenya are due to the absence of cooperative-led extension services and knowledge exchange forums. Unlike broader studies on agricultural technology transfer, this research emphasizes that Stevia cooperatives can serve as vital information hubs, particularly for niche crops. For example, Chinese Stevia cooperatives have provided training on organic practices and processing technology (Wang & Zhang, 2023), while Paraguayan cooperatives have enhanced yield efficiency through knowledge exchange programs (Martínez & Salinas, 2024). Supporting the Diffusion of Innovation Theory, the study suggests strengthening digital knowledge-sharing platforms and creating cooperative-led demonstration farms to improve technology adoption among Stevia farmers.

5.4.2.6.2. Cooperatives as Platforms for Technical Training in Certification and Export Standards

Studies indicate that certification requirements for organic, fair trade, and quality standards pose significant barriers for smallholders entering high-value agricultural markets (Kumar et al., 2021; Ismail & Otieno, 2023). Cooperatives play a crucial role in helping smallholders and SMEs understand and comply with export regulations. A recent study on Kenyan Stevia producers found that they struggle with certification processes and export documentation (Mwangi et al., 2022). Smallholders noted that cooperative-led training focused on certification and market standards could enhance their commercialisation outcomes. Unlike broader studies, this research uniquely demonstrates that cooperative-led training programs can reduce compliance costs through group certification models. For example, South African Rooibos tea cooperatives successfully trained farmers in organic certification (Smith & van der Merwe, 2023), while Indian Stevia cooperatives have adopted group certification techniques (Raghunath et al., 2024). Supporting institutional theory, the findings emphasize the necessity of organized cooperative

training for smallholders to access premium markets. Recommended policies include establishing certification training programs and cooperative-based financial assistance to streamline export procedures.

5.4.2.6.3. Government and Institutional Support for Cooperative Training Models

Research indicates that government-sponsored cooperative training programs significantly enhance commercialisation by strengthening farmer skill sets and promoting long-term market stability (OECD, 2023; Mathews et al., 2023). Effective policies that support technical education in cooperatives are essential for increasing value chain efficiency (Amin et al., 2024). This study reveals that Kenyan cooperatives currently lack robust government-supported training programs, limiting capacity-building efforts and jeopardizing their survival. Smallholders expressed the need for legislative interventions to develop training frameworks tailored to their specific needs. Unlike previous studies focused on general agricultural education, this research emphasizes the necessity for specialized training frameworks for niche crop cooperatives like those producing Stevia (Kumar et al., 2023). For example, Paraguayan Stevia farmers have benefited from government-sponsored cooperative training centres (Mabuza et al., 2021), and China's national institutions have equipped farmers with skills for international competition (Li et al., 2023). The findings align with Public Choice Theory, highlighting the need for government involvement in cooperative training, contrasting with neoliberal theories suggesting that cooperatives would independently fund training (Stock, 2020). Recommendations include establishing government-sponsored training institutes focused on Stevia, providing technical assistance, funding cooperative education initiatives, and fostering collaborations between cooperatives and research institutions to design targeted training

5.4.2.7. Cooperatives in Processing, Marketing, and Branding

5.4.2.7.1. Role of Cooperatives in Processing and Value Addition

The Food and Agriculture Organization (FAO, 2022; Mathews et al., 2023) emphasizes the critical role of cooperatives in agricultural processing, enabling smallholders to participate in value-added markets. Processing enhances product quality, extends shelf life, and significantly increases profitability for farmers (Pingali, 2019; Kumar et al., 2023). However, Kenyan Stevia producers face considerable challenges due to inadequate cooperative-driven processing infrastructure. As a result, they often sell raw leaves at low prices instead of converting them into

higher-value extracts. Smallholders indicate that establishing communal processing facilities through cooperatives could greatly improve their commercialisation outcomes. This study highlights the specialized needs of Stevia smallholders and SMEs for extraction and refinement facilities, achievable through cooperative investment models. Successful examples from other countries show that shared processing facilities, such as those established by Indian cooperatives, have boosted farmer incomes by 40% (Kumar et al., 2023), while South African Rooibos tea cooperatives have transitioned to branding and selling processed goods (Mabuza et al., 2021). These findings support Value Chain Integration Theory, which posits that investment in processing increases commercialisation efficiency (Benito et al., 2019). In contrast to market-liberalization theories that advocate for private sector investment alone (Barrett, 2020), the study concludes that cooperative-led processing infrastructure is vital for enhancing smallholders' competitiveness. Policy recommendations include establishing cooperative-managed processing hubs, expanding market access for smallholders, providing government-backed grants for processing investments, creating financial incentives for cooperatives, and promoting public-private partnerships (PPPs) to advance processing capabilities and innovation in agriculture.

5.4.2.7.2. Cooperatives in Marketing and Market Access Facilitation

Cooperatives enhance smallholders' access to markets by reducing information asymmetry, facilitating group sales, and enabling direct trade agreements (OECD, 2023; Mathews et al., 2023). Effective cooperatives empower smallholders to overcome market entry barriers and enhance their negotiating power. This study reveals that Kenyan Stevia smallholders encounter significant challenges in accessing high-value markets due to a lack of cooperative-driven marketing initiatives. Smallholders emphasized the need for stronger cooperative marketing structures to improve market visibility and enable better price negotiations. Successful commercialisation of Stevia in international markets relies on targeted branding and marketing strategies, including premium labelling, organic certification, and cooperative-led distribution networks, moving beyond general agricultural market access (Zhang et al., 2024). For instance, Chinese Stevia cooperatives have successfully established regional marketing networks that enhance smallholder participation in exports (Li et al., 2023), while Paraguayan cooperatives have facilitated direct contracts with foreign buyers to improve profit margins (Kumar et al., 2023). These findings align with Supply Chain Coordination Theory, which posits that organized market connections enhance commercialisation outcomes (Jiang & Zhu, 2023). The study demonstrates that cooperative-led marketing structures significantly increase smallholder market penetration and access to high-value opportunities. Recommendations include developing

cooperative-led marketing platforms for Stevia and promoting direct trade linkages to reduce reliance on middlemen, ensuring better prices for farmers.

5.4.2.7.3. Cooperative-Driven Branding for Premium Market Positioning

Effective certification and branding strategies significantly enhance smallholders' access to high-value markets and increase their incomes (FAO, 2023; Mathews et al., 2023). Cooperatives facilitate the establishment of local brands, differentiate products, and attract niche consumer markets willing to pay a premium for high quality. However, this study reveals that Kenyan Stevia cooperatives currently lack robust branding campaigns, hindering their competitiveness in international markets. Smallholders suggest that cooperatives should implement luxury packaging, geographic indicators, and collective branding initiatives, including certification programs like fair trade and organic. For instance, the South African Rooibos tea industry has utilized Geographical Indicator (GI) certification to enhance export competitiveness and build consumer trust (Mabuza et al., 2021). Additionally, Indian Stevia cooperatives have launched successful organic branding campaigns that improved market positioning and expanded premium pricing opportunities (Kumar et al., 2023). This study emphasizes the growing global demand for organic and natural sweeteners as a significant opportunity for cooperative-led premium branding strategies. The findings support Institutional Trade Theory, which posits that certification and branding enhance access to international markets, contrary to Free Market Theories that assume branding arises organically through competition (Barrett, 2020). Recommended policies include supporting Kenyan Stevia cooperatives in obtaining GI certification, creating national branding initiatives to promote cooperative-produced Stevia, and developing cooperative-driven organic and fair-trade certification programs to attract premium market segments.

5.4.2.7.4. Institutional and Policy Support for Cooperative-Led Processing, Marketing, and Branding

The findings of this study indicate that Kenyan Stevia cooperatives encounter significant obstacles due to inadequate institutional and policy support for investments in processing, branding, and marketing, which impedes their ability to scale production and compete in premium markets. Smallholders expressed the need for stronger policy interventions to enhance the sustainability and competitiveness of their cooperatives. Research shows that government policies facilitating cooperative investments in these areas significantly improve commercialisation efficiency (OECD, 2023; Mathews et al., 2023). Unlike prior studies that

focused on general cooperative policy frameworks (Amin et al., 2023), this research highlights the necessity for tailored policy incentives specifically aimed at enhancing branding, processing infrastructure, and marketing for specialty crop cooperatives like Stevia. For example, government initiatives in Paraguay have successfully promoted cooperative-led Stevia export branding, attracting foreign consumers (Zhang et al., 2024). Similarly, policy subsidies in China have enhanced the competitiveness of state-supported cooperatives in both domestic and export markets (Li et al., 2023). These findings align with Public Choice Theory, which argues that government action can enhance cooperative commercialisation models by providing essential resources (Meyer & Wiggins, 2021). In contrast to deregulated market theories, this study emphasizes the critical role of state-backed incentives in promoting cooperative growth and market competitiveness (Hernández & Karami, 2022). Policy recommendations include establishing government-backed cooperative investment funds for Stevia processing and branding, implementing tax incentives for value-added processing, and creating cooperative-centred trade policies to facilitate the export of Stevia and other specialty crops, thereby encouraging cooperatives to access international markets.

5.4.2.8. Stakeholder Engagement in Stevia Commercialisation

5.4.2.8.1. Role of Stakeholder Engagement in Agricultural Commercialisation

Successful agricultural commercialisation relies on comprehensive stakeholder participation, including government agencies, business players, cooperatives, research institutions, and financial organizations. This collaboration is essential for strengthening market linkages, implementing effective policies, and aligning resources optimally (Pingali, 2019; Narayan et al., 2021; FAO, 2022). However, this study finds that inadequate stakeholder participation is hampering the commercialisation of Stevia in Kenya, resulting in fragmented value chain development, inefficient resource allocation, and missed market opportunities. Smallholders' report that cooperation between government agencies, cooperatives, and industry participants is insufficient to realize their commercialisation potential.

In contrast to previous research on general stakeholder engagement in agriculture (Obermaier & Panwar, 2023), this study underscores the need for organized cooperation in the emerging Stevia market to coordinate investments, production, and export strategies effectively. Successful models in India and South Africa demonstrate how effective stakeholder engagement can enhance commercialisation and market access. The findings support supply chain coordination

theory, emphasizing that stakeholder collaboration is crucial for effective commercialisation, opposing neoclassical market theories that downplay the need for structured interventions.

Policy recommendations include enhancing government coordination in policy implementation, establishing national stakeholder engagement platforms for ongoing communication, and creating public-private partnership models to align investments with smallholder efforts for improved market access and sustainability.

5.4.2.8.2. Government's Role in Facilitating Stakeholder Engagement

Research indicates that governments play a crucial role in facilitating stakeholder collaboration through trade facilitation, investment incentives, and regulatory alignment (OECD, 2023; Degli Esposti et al., 2020). Effective government cooperation ensures smallholders are included in commercialisation initiatives and reduces bureaucratic inefficiencies. However, this study finds that organized cooperation between Kenyan government institutions and smallholder Stevia growers is lacking, leading to inconsistent regulatory frameworks and delays in policy implementation. Farmers believe that government-led multi-stakeholder collaborations could significantly enhance commercialisation strategies.

This study particularly highlights the need for tailored government-industry partnerships in the high-value Stevia market, contrasting with earlier research focused on general agricultural government involvement (Kirwa et al., 2024). Successful examples from China and Paraguay demonstrate how public-private partnerships can strengthen infrastructure and align policy development with market demands. The findings align with institutional theory, asserting that government participation is vital for effective stakeholder engagement in agricultural commercialisation (Kramer & Hagedoorn, 2020). Recommendations include enhancing government support for stakeholder participation and establishing clear regulations to link smallholder farmers with international markets.

5.4.2.8.3. Private Sector Engagement in Processing, Distribution, and Market Access

Studies show that private sector participation significantly enhances agricultural commercialisation through investments in distribution, processing, and export market development (FAO, 2023; Ghosh et al., 2022). The strong engagement of the private sector helps integrate smallholders into structured value chains, thereby improving their market position. However, this study reveals that Kenyan Stevia smallholders struggle to develop their operations,

secure loans, and access premium markets due to a lack of direct connections with private investors and agro-processors. Forming organized partnerships with private enterprises could enhance their chances of commercialisation success.

In contrast to broader discussions about agribusiness investment, this study emphasizes that the specialized nature of Stevia necessitates tailored private sector engagement to encourage smallholders participation in premium markets. Successful examples from India and South Africa illustrate the benefits of collaborations that improve market access and farmer profitability (Rao et al., 2020; Lindeque & Kotze, 2023).

The findings challenge neoliberal investment theories that suggest private sector actors will naturally integrate smallholders without formal agreements, aligning instead with Public-Private Partnership (PPP) Theory, which posits that collaboration between private and government entities maximizes commercialisation success (Barrett, 2020). Recommended policies include establishing contract farming agreements, developing PPP-driven investment models to connect private firms with smallholders, and fostering direct partnerships between agro-processors, and cooperatives for collaborative processing and distribution.

5.4.2.8.4. Role of Research Institutions in Stevia Commercialisation

Research demonstrates that research institutions play a critical role in agricultural commercialisation by developing climate-smart technologies, promoting best agronomic practices, and fostering value-added processing innovations (OECD, 2023; Juma et al., 2021). This study finds that limited interaction between Kenyan research institutes and smallholders has led to a low adoption rate of advanced processing and agronomic methods. Participating smallholders indicated that cooperative research projects could significantly enhance product quality and yield efficiency (Mutua et al., 2023).

Unlike previous studies on general agricultural research collaboration (Kirwa et al., 2024), this research highlights the emerging nature of the Stevia sector, necessitating targeted research partnerships to enhance commercialisation efficiency. Successful examples from China and South Africa demonstrate the potential of collaborative efforts to drive technological advancements and sustainable practices in specialty crops (Zhang et al., 2022; Jonker & van der Merwe, 2021).

These findings align with Technological Innovation Systems (TIS) Theory, emphasizing the importance of organized collaboration in improving commercialisation outcomes (Borras & Zuniga, 2020). In contrast to Market-Oriented Theories, which suggest that research innovations will diffuse naturally among farmers, this study underscores the need for policy-driven research partnerships (Barrett, 2020). Recommended policies include establishing Stevia-focused innovation hubs, forming cooperative partnerships between universities and cooperatives, and providing funding incentives for research institutions to engage in Stevia commercialisation projects, thereby promoting technology transfer and knowledge exchange.

5.4.2.8.5. Role of Cooperatives in Strengthening Market Access

Research indicates that agricultural cooperatives play a crucial role in stabilizing prices, enhancing smallholders access to markets, and strengthening their bargaining power (Pingali et al., 2020). Cooperatives are frequently leveraged in the marketing of cash crops like coffee, tea, and sugar to reduce transaction costs and boost group productivity (FAO, 2022; Treccani et al., 2023). This study finds that Kenyan Stevia cooperatives are weakly organized, preventing smallholders from capitalizing on benefits such as group marketing, collective input purchasing, and effective contract negotiation. Independent smallholders face significant challenges in securing long-term agreements and competitive pricing (Kirwa et al., 2023).

The absence of institutional governance and adequate financial support hinders cooperatives' functions within the Stevia value chain, resulting in constrained profitability and market power due to reliance on intermediaries (Wang et al., 2021). In contrast, Indian cooperatives effectively facilitate direct connections between farmers and buyers, promoting price stability (Rao & Kumar, 2022). South Africa's Rooibos sector demonstrates that strong cooperative structures enhance certification and export access, increasing farmer incomes by 35% (Alemayehu et al., 2024).

These findings support Collective Action Theory, affirming that organized farmer groups enhance economic resilience and market engagement (Zhang & Wang, 2023), and challenge market-oriented theories suggesting smallholders can independently access markets (Otekunrin et al., 2019). The study underscores the necessity of state-supported facilitation and robust cooperative governance for improving smallholder agricultural performance.

Policy recommendations include formalizing cooperative governance frameworks to enhance accountability and efficiency, providing financial incentives for cooperative formation and management training, and establishing cooperative-led contract farming models to bolster smallholder market access and income stability.

5.4.2.8.6. Stakeholder Engagement and Value Chain Integration

Multi-stakeholder engagement including government agencies, agribusinesses, NGOs, smallholders, and financial institutions is crucial for successful agricultural commercialisation (OECD, 2023). Research shows that public-private partnerships (PPPs) significantly enhance commercialisation by aligning production activities with market demands (Gonzalez & Mena, 2020; Liu et al., 2022). This study highlights that the Kenyan Stevia industry suffers from inadequate cooperation among government, private sector, and smallholders, leading to fragmented commercialisation efforts and limited financial access, corroborating findings by Mutuku and Ng'ang'a (2023). Successful examples from Paraguay demonstrate effective multi-stakeholder forums that align production with industry needs (Gonzales et al., 2021), while Thailand's PPPs promote cooperative financing and technical training (Suwannapok et al., 2024).

These findings align with Supply Chain Coordination Theory, emphasizing the necessity of strong stakeholder alignment to boost commercialisation efficiency among Kenyan smallholders (Kumar & Singh, 2021), countering neoclassical market theories that assume automatic alignment without intervention (Morrison & Bressan, 2021). Recommendations include formalizing contract farming policies, strengthening PPPs for improved financing and technology transfer, and establishing Stevia Stakeholder Engagement Platforms to facilitate dialogue among stakeholders (Wang et al., 2021).

5.4.3. Key Interventions in the Commercialisation of Stevia in Kenya

Strategic interventions are vital for Stevia commercialisation in Kenya, focusing on market access, financial challenges, policy gaps, and infrastructure issues. Measures include strengthening value chain integration, cooperatives, and regulatory support. Lessons from China, India, and Paraguay highlight best practices, emphasizing government policies, financial incentives, technology adoption, and private sector collaboration to ensure competitiveness and sustainability.

5.4.3.1. Market Analysis and Demand Assessment

Leading Stevia producers, including China, Paraguay, and India, have effectively capitalized on rising demand by implementing structured market systems and strategic trade agreements (OECD, 2023). While Kenyan farmers recognize the growing domestic and international demand for Stevia, they encounter significant barriers to market entry, such as price volatility and limited buyer linkages. This study identifies the dominance of intermediaries in the Stevia trade, which restricts direct participation for farmers.

Focusing on micro-level obstacles, the study reveals issues such as knowledge gaps, inconsistent pricing, and weak institutional linkages, contrasting with previous macro-level research (Kirwa et al., 2023). Paraguay's establishment of cooperatives and government-supported marketing programs has effectively addressed similar challenges, improving farmers' access to direct markets (Rodriguez et al., 2024).

The findings align with Market-Oriented Theory, indicating that while demand drives commercialisation (Huang & Qiu, 2020), effective market access strategies are critical for smallholder integration. Recommended policies include forming smallholder cooperatives, implementing price stabilization mechanisms, developing market intelligence platforms, and equipping SMEs with marketing knowledge (Wang et al., 2021).

5.4.3.2. Access to Resources

Resource limitations are significant barriers to the commercialisation of smallholder agriculture, with studies indicating that improving productivity hinges on access to quality inputs such as seedlings, irrigation systems, fertilizers, and post-harvest resources (Pingali, 2019; Muriithi & Rony, 2021). In this study, smallholders reported inconsistent access to quality seedlings and inputs, severely impacting yield reliability. Additionally, high input costs and inadequate extension support hinder production expansion. While previous research often associates insufficient investment with input shortages (Mutuku et al., 2022), this study specifically identifies ineffective distribution networks and a lack of government-sponsored input subsidy programs as critical challenges.

In contrast, India's input credit programs and subsidized certified seedlings have effectively enhanced Stevia commercialisation and farmer productivity (Singh et al., 2024). The findings

align with Resource-Based Theory, which asserts that successful commercialisation relies on access to essential resources (Barney, 2020). Recommendations include expanding input subsidy programs, fostering public-private cooperation for efficient input distribution, and creating microfinance programs to facilitate credit access for smallholders (Wang et al., 2021).

5.4.3.3. Human Resources and Equipment Support

Smallholders face competitiveness challenges linked to outdated equipment and skill deficiencies, which hinder labour productivity (Barrett et al., 2022; Jansen et al., 2021). Limited access to mechanized tools forces reliance on manual harvesting, while inadequate training programs leave farmers ill-prepared to navigate export regulations, certification, and processing. Farmers often sell raw Stevia at lower prices, reducing opportunities for value addition. Thailand's success in boosting smallholder competitiveness through farmer training centres and equipment-sharing initiatives offers lessons for Kenya (Sathirathai et al., 2024; Kuhl et al., 2020).

This study aligns with Human Capital Theory, emphasizing the critical role of technological adaptation and skill development in enhancing agricultural performance (Becker, 2020). Policy recommendations include establishing regional training centres for Stevia-specific skills, creating cooperative-based equipment leasing programs, and strengthening agricultural extension services to equip farmers with better technical expertise for certification and processing (Wang et al., 2021).

5.4.3.4. Infrastructure Development: Enhancing Market Readiness

Smallholders face significant barriers to successful commercialisation due to inadequate infrastructure, such as limited cold storage, processing facilities, and poor road networks (OECD, 2022; Kuhl et al., 2020). Insufficient processing capacity excludes smallholders from lucrative export markets and reduces market competitiveness and Stevia quality (Patel et al., 2022). Better infrastructure, including decentralized processing hubs, has proven effective in Argentina, enhancing local market access and preparedness. This model suggests that Kenya could benefit from regional processing facilities to support smallholder commercialisation.

The findings align with Supply Chain Integration Theory, which underscores the importance of efficient infrastructure for market access and timely resource distribution (Jiang & Zhang, 2019). Policy recommendations include establishing rural processing hubs to boost SMEs' value

addition, improving road networks to reduce post-harvest losses, and developing cooperative cold storage facilities to preserve high-quality exports, ultimately enhancing global market competitiveness (Wang et al., 2021).

5.4.3.5. Certification Processes: Ensuring Quality and Market Competitiveness

Certification is vital for smallholders and SMEs to enter premium markets and enhance export readiness. However, high costs and complex compliance procedures limit their participation (FAO, 2023; Kuhl et al., 2020). Key barriers include insufficient knowledge, bureaucratic obstacles, and expensive fees, compounded by a lack of group certification models and inadequate awareness of standards (Singh & Jerónimo, 2023; Patel & Roberts, 2022). South Africa's Rooibos sector demonstrates effective solutions, such as subsidies for cooperative group certifications, which improve market access for smallholders (Mathews et al., 2021).

These findings align with Institutional Theory, emphasizing the importance of regulatory frameworks in enhancing market access (North, 2021). Policy recommendations include subsidized certification programs, cooperative-based group models to lower costs, and digital platforms to simplify procedures and reduce delays (Batz et al., 2020). Such measures could boost Kenyan smallholder farmers' competitiveness in global markets (Ng'ang'a et al., 2023).

5.4.3.6. Technological Factors

Technological advancements drive Stevia commercialisation in Kenya by improving output, processing efficiency, and market competitiveness. Key innovations include mechanization, precision farming, irrigation systems, and quality assurance technologies. Comparative insights from China, India, and Paraguay highlight the impact of technology-driven interventions on cost efficiency, consistent yields, and compliance with international standards for agribusiness growth.

5.4.3.6.1. Technological Barriers to Stevia Commercialisation

Technology adoption significantly enhances agricultural productivity, market access, and value chain efficiency (FAO, 2022; Neves et al., 2021). However, Kenyan Stevia producers face limitations due to restricted access to digital platforms, mechanization, and processing facilities, negatively affecting competitiveness, cost efficiency, and profitability. Smallholders mainly rely on manual labour and outdated methods, unlike large-scale growers.

This study emphasizes barriers including financial constraints, inadequate training, and infrastructure gaps that hinder smallholders' technology adoption (Patel & Roberts, 2022). Successful examples include India, where investments in digital platforms, processing facilities, and technology training boosted market participation (OECD, 2023), and Paraguay, where cooperative-led programs improved mechanization access and market preparedness (Zhang et al., 2021).

Aligned with Technological Innovation Systems (TIS) Theory, the findings underscore the necessity of institutional support, financial incentives, and knowledge sharing for adoption, contrasting with Diffusion of Innovation Theory, which assumes spontaneous expansion post-introduction (Hu & Lai, 2022). Policy recommendations include providing financial incentives like tax exemptions for mechanized tools, developing digital marketplaces, enhancing public-private sector cooperation, and expanding access to precision agriculture technologies to improve productivity and market integration (Timmer & Reardon, 2021).

5.4.3.6.2. Technological Infrastructure for Processing and Value Addition

Technology adoption significantly enhances agricultural productivity, market access, and value chain efficiency (FAO, 2022; Neves et al., 2021). However, Kenyan Stevia producers face limitations due to restricted access to digital platforms, mechanization, and processing facilities, negatively affecting competitiveness, cost efficiency, and profitability. Smallholders mainly rely on manual labour and outdated methods, unlike large-scale growers.

This study emphasizes barriers including financial constraints, inadequate training, and infrastructure gaps that hinder smallholders' technology adoption (Patel & Roberts, 2022). Successful examples include India, where investments in digital platforms, processing facilities, and technology training boosted market participation (OECD, 2023), and Paraguay, where cooperative-led programs improved mechanization access and market preparedness (Zhang et al., 2021).

Aligned with Technological Innovation Systems (TIS) Theory, the findings underscore the necessity of institutional support, financial incentives, and knowledge sharing for adoption, contrasting with Diffusion of Innovation Theory, which assumes spontaneous expansion post-

introduction (Hu & Lai, 2022). Policy recommendations include providing financial incentives like tax exemptions for mechanized tools, developing digital marketplaces, enhancing public-private sector cooperation, and expanding access to precision agriculture technologies to improve productivity and market integration (Timmer & Reardon, 2021).

5.4.3.6.3. Digital Market Access and E-Commerce for Stevia Farmers

Digital platforms lower transaction costs and enhance smallholders and SMEs' negotiating power by increasing price transparency and reducing reliance on middlemen (Barrett et al., 2022; Choudhury et al., 2023). Kenyan smallholders and SMEs face challenges such as limited access to e-commerce platforms, low digital literacy, and unstable rural internet infrastructure, restricting their ability to secure competitive prices and build direct buyer relationships (Ng'ang'a et al., 2023). Mobile-based platforms could enhance financial inclusion and real-time market access, as demonstrated by India's eNAM, which facilitates direct sales and reduces transaction costs (Kumar et al., 2020). Similarly, Rwanda's mobile platforms link rural smallholders to buyers, improving commercialisation outcomes.

This study supports Institutional Theory, emphasizing that digital inclusion requires supportive regulatory frameworks (Bontsa et al., 2023), contrasting with Market-Oriented Theories that assume smallholders can independently access markets (Otekunrin et al., 2019). Policy recommendations include developing mobile-based market platforms, offering digital literacy training, and enhancing rural internet infrastructure to encourage technology adoption and empower smallholders and SMEs in digital trade (Batz et al., 2020).

5.4.4. Implementation Mechanism for Stevia Commercialisation

Effective Stevia commercialisation in Kenya requires strong implementation mechanisms, focusing on policy execution, value chain integration, and stakeholder coordination. Key strategies include public-private partnerships, cooperative-led projects, government support systems, and financial inclusion tactics. Drawing from best practices in South Africa, China, and India, these methods enhance market access, technical adoption, and sustainable competitiveness globally.

5.4.4.1. Institutional Frameworks for Commercialisation

Research emphasizes that strong institutional frameworks enhance market access, financial inclusion, and regulatory compliance, which are vital for agricultural commercialisation (FAO,

2022; Osei-Assibey et al., 2023). For Kenyan Stevia smallholders and SMEs, the absence of coherent institutional policies leads to fragmented value chains, weak market connections, and ineffective policy implementation. This study identifies the need for Stevia-specific regulatory frameworks to address unique commercialisation challenges, contrasting with generalized agricultural policies (Pingali, 2019; Kuhl et al., 2020).

Successful models include India's public-private partnerships supporting cooperatives in Stevia value chains (López et al., 2021), and South Africa's Rooibos tea commodities board, which streamlines export regulations and enhances market stability (Srisuma et al., 2021). These findings align with Institutional Theory, underscoring the importance of structured governance and frameworks for smallholder success (Kramer & Hagedoorn, 2020). Policy recommendations include forming a Stevia commercialisation board, establishing public-private partnerships, and strengthening legal frameworks to ensure equitable smallholder contracts and effective market integration (Smith & Brown, 2020; Batz et al., 2020).

5.4.4.2. Financing Mechanisms and Market Access Support

Access to financing is crucial for smallholder farmers' commercialisation efforts. Research demonstrates that combining credit, subsidies, and cooperative investments enhances commercialisation outcomes (OECD, 2023; Beck et al., 2022). Kenyan Stevia smallholders and SMEs face significant financial barriers, such as insufficient capital for mechanization, output expansion, and certification compliance. This study emphasizes the need for crop-specific financing mechanisms tailored to Stevia's high-value returns, contrasting with generic credit models.

Examples include Paraguay's cooperative-based revolving funds, which improve access to capital for Stevia farmers (López et al., 2021), and China's government-backed low-interest loans for Stevia production, fostering a growth-friendly environment (Xu et al., 2023). Findings align with Financial Inclusion Theory, advocating for accessible finance channels to boost smallholder agricultural growth (Owuor, 2021), while challenging neoliberal perspectives that assume private-sector lending suffices (De Janvry & Sadoulet, 2022).

Policy recommendations include establishing low-interest loan funds for Stevia smallholders and SMEs, expanding cooperative financing models to scale operations, and introducing insurance-

backed credit services to mitigate financial risks (Batz et al., 2020). These measures address financial exclusion and support sustainable commercialisation.

5.4.4.3. Value Chain Development and Processing Infrastructure

Value-added processing is critical for enhancing agricultural competitiveness, farmer incomes, and market positioning (Reardon & Timmer, 2021; Kuhl et al., 2020). Cooperative-led processing centres lower costs and increase operational efficiency, offering significant benefits to smallholders (Bhatta & Malhotra, 2022). Kenyan smallholders face challenges due to inadequate infrastructure, forcing them to sell raw leaves to intermediaries and limiting competitiveness. Argentina and Thailand provide successful examples: regional processing hubs in Argentina boost profitability for local farmers (López & Zancada, 2021), while cooperative-owned centres in Thailand improve margins and drive export growth (Srisuma et al., 2021).

Aligned with Value Chain Theory, the study highlights the need for investments in both upstream and downstream activities for successful commercialisation (Knezet et al., 2021), challenging Market-Oriented Theories that prioritize market forces alone (Foerstl et al., 2020). Policy recommendations include establishing regional processing hubs, incentivizing private investments, and supporting farmer-led cooperatives to ensure local producers directly benefit from value addition (Batz et al., 2020).

5.4.4.4. Market Linkages and Export Readiness

Effective agricultural commercialisation demands strong international market ties, adherence to standards, and structured export frameworks (FAO, 2023; Batz et al., 2020). Kenyan smallholders and SMEs struggle to access high-value markets due to challenges in contract negotiation, export certification, and direct market connections. This study suggests that direct trade partnerships and streamlined certification processes could enhance their market outcomes.

Departing from research on general export barriers, this study emphasizes group certification models and government-backed trade facilitation initiatives as key solutions for addressing smallholder export gaps. Examples include South Africa's Rooibos tea cooperatives, which utilize certification subsidies to improve smallholder competitiveness (Van der Merwe et al., 2021), and India's export facilitation programs, which provide smallholders better access to lucrative markets (Kumar & Singh, 2020).

Aligned with Supply Chain Management Theory, the study highlights trade facilitation and certification as crucial for market participation, contrasting Neoclassical Trade Theories that emphasize price competition alone (Morrison & Bressan, 2021). Policy recommendations include implementing group certification models, introducing tailored export agreements, and fostering direct farmer-buyer partnerships to boost smallholder profitability (Bhatta et al., 2023).

5.4.5. Outcomes Related to the Commercialisation of Stevia

Kenya's Stevia commercialisation impacts agribusiness, smallholders, SMEs, and the agricultural sector through revenue growth, job creation, market competitiveness, and sustainability. This section examines challenges and unintended consequences of integrating smallholders into high-value markets. Drawing on global case studies, it highlights policy-driven strategies to optimize economic, social, and environmental outcomes for Kenya's Stevia industry.

5.4.5.1. Economic Outcomes: Income Generation and Market Expansion

Research demonstrates that market-oriented smallholder farming and SMEs enhances household incomes, reduces poverty, and strengthens economic resilience within rural communities (FAO, 2022; Bhatta et al., 2023). The study on Stevia commercialisation in Kenya highlights its potential to increase smallholder incomes, especially through export markets, but notes income disparities between smallholders selling raw leaves versus SMEs engaging in value addition. Processing and certification are highlighted as critical determinants of profitability (Ng'ang'a et al., 2023). In Paraguay, cooperative-led Stevia processing initiatives have resulted in a 40% increase in farmer revenues (González et al., 2023). Similarly, Indian smallholders participating in contract farming with international buyers experienced a 30% rise in profits compared to those selling in local markets (Kumar & Singh, 2020).

Findings align with the Market-Oriented Theory, asserting that commercialisation raises incomes but challenge neoclassical theories that emphasize market integration alone. Certification and processing capabilities are recognized as essential prerequisites for achieving equitable income distribution (Foerstl et al., 2020). Policy recommendations include enhancing cooperative-led marketing structures, providing financial incentives for value addition, and implementing training programs that emphasize diversification and quality control to improve market competitiveness and promote income equity (Tadesse et al., 2022).

5.4.5.2. Social Outcomes: Employment Creation and Skills Development

Research underscores the importance of commercial agriculture as a vital source of employment in rural areas where non-farm job opportunities are scarce (Barrett et al., 2022; FAO, 2023). Agricultural value chains create employment across various sectors, including farming, processing, and distribution (Kumar & Singh, 2020). The commercialization of Stevia offers substantial employment prospects for women and youth in farming, marketing, and export logistics. However, low levels of mechanization and insufficient processing facilities limit the sector's potential (Ng'anga et al., 2023).

This study emphasizes skill-based employment in processing and certification compliance, diverging from previous research linking commercialisation to farm labour employment. Training initiatives are crucial for building a skilled workforce in the Stevia sector. Thailand's Stevia industry exemplifies the impact of government-funded skill development programs on generating rural employment in agro-processing (Srisuma et al., 2021). Similarly, in South Africa, investments in value-added processing within the Rooibos industry have led to a 35% increase in non-farm employment (Van der Merwe et al., 2021).

These findings are consistent with Human Capital Theory, which asserts that skill development is essential for job creation and income growth (Ngepah et al., 2021). In contrast, Agrarian Political Economy Theory interprets employment as predominantly driven by agricultural activities (Ngubane, 2025). Policy recommendations include establishing Stevia Industry Training Centres, developing public-private partnerships for rural employment, and funding youth employment initiatives in agribusiness.

5.4.5.3. Market Outcomes: Export Competitiveness and Trade Expansion

Research indicates that access to international markets is essential for enhancing agricultural profitability; however, smallholders and SMEs encounter significant challenges, including trade regulations, certification expenses, and compliance barriers (Batz et al., 2020). Furthermore, countries that implement structured export policies tend to achieve better performance compared to those that rely solely on raw material exports (Wiggins & Keats, 2022).

In Kenya, smallholders and SMEs encounter high certification fees, limited buyer networks, and insufficient government support for trade facilitation. The study emphasizes smallholders' and SMEs' level challenges, identifying robust trade agreements and group certification programs as

solutions to enhance competitiveness. For example, China's subsidies for certification and compliance have markedly improved smallholder access to European and North American markets, leading to an increase in export participation (Liu et al., 2022). Similarly, in South Africa, the certification of Rooibos as a Geographical Indication (GI) has facilitated access to premium markets, resulting in a 45% increase in farmer incomes (Van der Merwe et al., 2021).

The findings support the principles of Supply Chain Integration Theory, indicating that structured trade relationships enhance export performance, in contrast to Neoclassical Trade Theories, which posit that market entry takes place independently (Morrison & Bressan, 2021). Consequently, policy recommendations advocate for the establishment of strategic government-led export initiatives, the creation of buyer networks, and the subsidization of certification programs to reduce compliance costs (Bhatta et al., 2023). These measures could help smallholders achieve sustainable international market participation.

5.5. SUMMARY OF DISCUSSION ON FINDINGS

The chapter examines the complex factors influencing Stevia commercialisation in Kenya, highlighting market access, value addition, government policies, and farmer cooperatives. Despite rising Stevia demand, smallholder farmers face hurdles such as fragmented value chains, weak institutional support, and infrastructure deficits, limiting access to structured markets. Aligning with Market-Oriented Theory, the study underscores that targeted interventions—like cooperative-led processing and contract farming—are essential for market entry.

Opportunities include government-backed incentives to attract foreign investment, public-private partnerships for knowledge transfer and input financing, and contract farming for market stability. Comparative analyses of India and Paraguay reveal that well-governed cooperatives effectively link smallholders and SMEs to global markets. Kenya could replicate these models by improving cooperative governance and equitable contracts.

Challenges like financial exclusion and stringent certification processes are contextualized within Institutional, Supply Chain Risk, and Post-Harvest Value Chain Theories, emphasizing the importance of storage, drying, and extraction facilities. The study critiques Neoliberal Agricultural Finance Theories, advocating for Financial Inclusion Theory to address smallholders needs through subsidized credit schemes, cooperative-led loans, and risk mitigation policies.

It reinforces Collective Action Theory by showing that strong cooperatives boost smallholders' market power but critiques weak governance under Participatory Development Theory. Lessons from China and South Africa highlight the success of cooperative models in global market participation. Sustainable commercialisation demands multi-faceted approaches, combining regulatory reforms, cooperative investments, market-oriented strategies, and innovative financing.

Policy recommendations include infrastructure investments, certification support, and value chain integration to ensure Kenyan smallholders and SMEs capitalize on Stevia's global demand. The chapter concludes by advocating comprehensive frameworks to enhance smallholder and SMEs participation and sustainability, while the next chapter will address practical recommendations for stakeholders. The next chapter will provide conclusions reached as well as the recommendations of the study.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1. INTRODUCTION

This chapter comprises five sections, namely the presentation of findings that are based on the literature reviewed, the findings from the empirical data, conclusions presented as answers to the research questions, and recommendations and framework for growing and commercialisation of Stevia in Kenya. But before these five sections are presented, the aim and objectives of the study are presented for ease of reference.

6.2. AIM OF THE STUDY

This study aimed at developing a framework for the growing and commercialisation of Stevia in Kenya through the value chain approach.

6.3. RESEARCH QUESTIONS

The following research questions aligned with the research objectives had to be answered before the study was concluded:

- a) What are the opportunities in commercialising Stevia in Kenya according to smallholder farmers?
- b) What are the challenges in the commercialisation of Stevia in Kenya, according to Stevia farmers?
- c) What are the factors that are crucial in the commercialisation of Stevia in Kenya, according to smallholder farmers?
- d) What is an appropriate framework that can be used in enhancing the commercialisation of Stevia in Kenya through the value chain approach?

6.4. FINDINGS FROM THE LITERATURE

The following findings were obtained from the literature that was reviewed in this study. It must be noted that the findings presented in this section are not exhaustive but are pertinent for purposes of commercialisation in Kenya:

6.4.1. Establishing Robust Cooperative Structures

The establishment of well-organised and robust cooperatives is essential for empowering smallholders to enhance their bargaining power when negotiating prices and terms with buyers.

These structures must emphasize the significance of effective leadership and governance within the cooperatives to ensure that they adequately represent the interests of their members (Zhang et al., 2024).

6.4.2. A Diverse Consumer Landscape: Who Uses Stevia?

The reviewed literature highlights a range of applications for Stevia through various products. The uses of Stevia can be classified into three broad categories: its application as an ingredient in diverse food products, its role as a fertiliser and animal feed, and its medicinal or therapeutic benefits (Li, Lopetcharat, & Drake, 2020). This classification underscores the importance of commercialising Stevia in countries such as Kenya.

Furthermore, the literature indicates that Stevia is particularly favoured among health-conscious consumers (Pan et al., 2023; Xue et al., 2022), individuals with diabetes (Chan et al., 2020; Khan et al., 2021), those focused on weight management (Goyal et al., 2022; Zhou et al., 2020), taste-conscious consumers (Kumar et al., 2019; Khan et al., 2021), and individuals adhering to specific dietary regimens (Goyal et al., 2022; Zhou et al., 2020). Its sugar-reducing properties position Stevia as a valuable alternative for managing diabetes, aiding in weight management, and reducing overall calorie intake. Additionally, Stevia's low-calorie content makes it an attractive option for those seeking natural sweetness without relying on artificial sweeteners.

6.4.3. Global Players in Stevia commercialisation

The literature indicates that major global Stevia producers, such as PureCircle (Malaysia) and Ingredion (United States), collectively hold a 40% market share in Stevia processing and refining (PureCircle, 2023; Zhang & Liu, 2021; Rojas-Lizano et al., 2023). These companies engage in joint ventures in Kenya and Madagascar, underscoring the interconnected nature of the global Stevia supply chain, with Africa playing a vital role in raw material sourcing. Ingredion, which commands a 15% market share, collaborates with African producers, including those in Madagascar, to source Stevia leaves and develop Stevia-based sweeteners, further illustrating the global supply chain's interdependence (Doorn, 2023; Ponte & Sturgeon, 2020). Other prominent global players, such as Cargill, Howtman, ADM, GLG, and Life Tech, continue to expand their presence in the natural sweetener market through vertical integration and strategic sourcing from developing economies (Haggblade et al., 2023; Rawal & Agarwal, 2020; Carolan, 2023).

6.4.4. Challenges hindering Stevia commercialisation in Kenya

The study indicates that the rapidly emerging Kenyan Stevia industry offers a promising opportunity for Stevia farmers to generate income and enhance their livelihoods, as noted by Juma and Onyango (2020) and Karanja and Ng'ang'a (2019). However, the lack of a comprehensive commercialisation framework presents a significant barrier to the sustainable livelihoods and inclusive participation of Stevia farmers within the industry's value chain (Obaga & Ocholla, 2022; Otieno & Ouma, 2018). This absence of a framework contributes to an environment resembling intentional exclusion, marginalising Stevia farmers in Kenya and impeding their ability to fully benefit from Stevia cultivation (Nyamang'oh et al., 2021).

6.4.5. A Regulatory vacuum and unfair market dynamics

The study indicated that in Kenya, the implementation of neoliberal policies in the Stevia market, characterized by limited government oversight, may exacerbate the challenges encountered by small-scale farmers (Obaga & Ocholla, 2022; Nyang'oro & Ocholla, 2022). The literature further suggests that the laissez-faire approach inherent in neoliberalism often favours large entities, such as transnational corporations, to the detriment of equitable stakeholder engagement. This advantage can result in the exploitation of existing disparities and the marginalization of smallholders within the Stevia commodity chain (Ponte & Sturgeon, 2020; Haggblade et al., 2023; Rawal & Agarwal, 2020; Carolan, 2023; Rawlins et al., 2020; Rojas-Lizano et al., 2023). A growing consensus within academic literature underscores the risk of market exclusion for these farmers.

6.4.6. Exploitation of value chain opportunities

Literature revealed that there is a huge opportunity for Kenya and other countries in the exploitation of value in the Stevia value chain. Kenya's Stevia exports predominantly consist of raw leaves and crude extracts, similar to other African countries (UNCTAD, 2020). This emphasis on unprocessed materials yields lower prices compared to refined products such as stevioside and Reb A. Although the processing of Stevia leaves into extracts is still in its nascent stages, with companies like SunSweet at the forefront, heightened investment in processing facilities and strategies for value addition is essential to enhance Kenya's standing within the global Stevia value chain (Mulaudzi & Adebambo, 2020; Doorn, 2023).

6.4.7. Investing in Innovation for Sustainability

Literature revealed that in the commercialisation of Stevia, it becomes critically important to invest in Research and Development (R&D). Khan et al. (2021) and Silva et al. (2023) contend that ongoing research and development (R&D) efforts are crucial for improving Stevia cultivation techniques, extraction processes, product diversification, and enhancing the overall competitiveness of the industry. The literature indicates that targeted areas such as breeding, fermentation, enzyme-assisted extraction, and the development of novel Stevia-based products can result in increased stevioside yields, diminished bitterness, and innovative applications (Singh et al., 2020; Kimutai et al., 2023). Furthermore, collaboration among research institutions, private enterprises, and farmers is vital for promoting knowledge sharing and expediting innovation (Kiptoo et al., 2023). Notably, the initiatives undertaken by the Kenya Agricultural Research Institute (KARI) and Jomo Kenyatta University of Agriculture and Technology (JKUAT) concerning Stevia varieties, agronomic practices, and extraction methods exemplify successful R&D efforts in Kenya (Kibet et al., 2022).

6.4.8. Quality management

Literature revealed that maintaining consistent product quality across the value chain is paramount for consumer safety and market trust. Comprehensive quality control measures implemented throughout the production process, spanning from raw materials to final products, ensure adherence to regulatory standards and meet consumer expectations (Ghosh et al., 2023; Marotti et al., 2020). This includes testing for purity, potency, safety, stability, and taste and should comply with certification standards. Examples include the comprehensive quality assurance systems of Stevia producers such as PureCircle and the national standards for Stevia products set by the Kenya Bureau of Standards (KEBS) (Ghosh et al., 2023).

6.4.9. Sustainability Practices and Environmental Management

Compliance with organic certifications reflects a commitment to sustainable agricultural practices by prohibiting synthetic fertilisers, pesticides, and GMOs, thus promoting biodiversity and soil health (Williams, 2022). This adherence enhances smallholders' reputational capital and marketability. Research indicates that consumers are willing to pay 20% to 30% more for organic products, driven by awareness of health and sustainability (Rahman et al., 2021; Khan et al., 2023). The organic food market reached USD 177.3 billion in 2022, growing 10.5% annually, particularly in North America and Europe (Research & Markets, 2023; Willer et al., 2024). Compliance with organic standards enhances smallholders' competitiveness.

6.4.10. Diversifying Distribution Channels: A Network of Distributors

Literature revealed that distributors connect Stevia producers with various market segments, including ingredient distributors (Guo & Bai, 2020; Wang et al., 2021), finished product distributors (Kumar et al., 2019; Zhou et al., 2020), and specialized distributors (Khan et al., 2021; Xue et al., 2022a). They supply bulk Stevia ingredients to food and beverage, pharmaceutical, and cosmetic industries, and distribute packaged sweeteners to supermarkets, convenience stores, health food stores, and online retailers. The literature emphasizes the importance of having a solid distribution channel.

6.4.11. The Streamlining Force: Logistics, Warehousing, and Transport

Literature revealed that the Stevia supply chain relies on logistics, warehousing, and transport for efficient product movement. Logistics involves planning, coordination, and execution of goods movement (Coyle et al., 2021), warehousing involves storage and management in dedicated facilities (Lee & Simchi-Levi, 2020), and transport involves physical movement (Christiansen et al., 2019).

6.4.12. Efficient Product Flow

Literature revealed that the Stevia supply chain relies on efficient product movement (Mishra et al., 2022; Guo & Bai, 2020; Wang et al., 2021a; Kumar et al., 2019; Zhou et al., 2020). The literature reviewed revealed that important aspects of Stevia commercialisation such as inventory management, cost optimization, quality control and market access (Goyal et al., 2022; Khan et al., 2021a; Xue et al., 2022a) together with proper transportation, warehousing, and transport ensure timely and cost-effective delivery of Stevia products. Proper storage conditions and temperature control protect stevioside quality. Literature also indicate that effective logistics networks enable Stevia producers to reach wider markets and meet evolving consumer demands (Khan et al., 2021b; Xue et al., 2022b), while proper inventory management minimizes storage costs and spoilage risk Wang et al. (2021b).

6.4.13. The Ideal Stevia Landscape

Literature revealed that not all the counties in Kenya are fertile land for Stevia commercialisation. The following were provided as the most suitable regions for Stevia growing and commercialisation in Kenya

- a) **Bungoma County:** Located in the Western region bordering Uganda and Lake Victoria, Bungoma boasts a population of 1.67 million and an area of 3,032 km² (Kenya National Bureau of Statistics, 2020). This region is renowned for agricultural production and cultural diversity (Kenya National Bureau of Statistics, 2019).
- b) **Rift Valley Region:** Counties like Bomet, Kericho, Nakuru, and Narok fall within the expansive Rift Valley region. This diverse region encompasses fertile highlands and arid lowlands, with Bomet having a population of 875,689 and an area of 1,998 km², Kericho with 901,777 people and 2,455 km², Nakuru boasting a population of 2.16 million and 7,509 km², and Narok with 1.16 million people spread across 17,922 km² (Kenya National Bureau of Statistics, 2019).
- c) **Uasin Gishu County:** Situated in the North Rift sub-region bordering Uganda and South Sudan, Uasin Gishu County is a major producer of maize and wheat. This county, with a population of 1.16 million and an area of 3,345 km², also houses Eldoret, a hub for athletics and education (Kenya National Bureau of Statistics, 2019).
- d) **Central Region:** Embu, Meru, and Kirinyaga counties lie within the Central region, known for its rich history, culture, and agricultural activities like coffee and tea farming. Embu has a population of 608,599 and covers 2,818 km², Meru boasts a population of 1.55 million and an area of 6,936 km², and Kirinyaga has 610,411 people spread across 1,478 km² (Kenya National Bureau of Statistics, 2019). Mount Kenya, the highest peak in the country, dominates this region.

6.5. FINDINGS FROM THE PRIMARY STUDY

6.5.1. Value chain segments

The study found that in Stevia commercialisation, there are primary activities that are critical for commercialisation to be sustainable. These activities are interrelated and contribute to the overarching goal of fostering a sustainable and equitable food system. These primary activities are organised under clear value chain segments. For example, the study found that there are activities relating to soil cultivation, input provision, growing of the Stevia plant and processing of raw Stevia leaves. In this segment of the value chain, commercialisation in seeds and Stevia seedlings can take place, and when nurtured properly, they can result in a big Stevia value chain segment. There is a production segment which involves equipment and technologies that are expensive. In this segment, there is money to be made as well. Once the Stevia plant has been

harvested, the leaves need to be dried. Drying facilities could be one Stevia value chain that can be harnessed. Big money can be made in the processing and refining value chain segments, which smallholders are currently not involved in. Distribution and Marketing of the Stevia products are other value chain segments that are not currently exploited on a large scale in Kenya.

6.5.2. Actors in the Stevia Commercialisation in Kenya

The findings in this study revealed that the actors in the Stevia commercialisation landscape in Kenya include Kenyan smallholders. What was worth noting during data analysis was that the Kenyan SMMEs dry their leaves at the local market and do not qualify, nor have access to the value chain to export or supply Multinational Conglomerates. The study revealed that extraction and refinery plants are located abroad in countries like Paraguay. The study revealed that cooperative structures are not robust and are limited in primary structures. Findings from the study demonstrate the necessity of establishing robust cooperative structures that will engage at all stages of the value chain and commercialisation in Kenya to ensure the transition from subsistence farming to full commercialisation.

6.5.3. Inputs and outputs

The findings also revealed that inputs comprise mainly seeds, seedlings, technical assistance and fertiliser or fertiliser contracts. The study revealed that most Stevia farmers in Kenya prefer to use seedlings as core inputs because the germinating rate of seeds is not that great.

The study also found that the outputs in Stevia commercialisation can take various forms because when a farmer specialises in selling seedlings, then seedlings become outputs of the value chain segment. However, in most cases, the dried Stevia leaves are the output for many Stevia farmers. When these dried leaves are further processed, steviol glycosides become the output. The outputs for Industrial food and beverages Multinational conglomerates are products like diet soda, sweeteners with the buyers' brand and so forth.

6.5.4. Key Markets

The study revealed that key markets are in countries such as the United States, Europe, Australia, China, and New Zealand.

6.5.5. Challenges hindering Stevia commercialisation in Kenya

The challenges established from this study that affect the commercialisation of Stevia encompass a lack of region-specific cultivation technologies, inadequate government support, restricted access to finance, climatic conditions, lack of infrastructure, inadequate watering equipment, technological constraints, insufficient storage facilities, difficulty accessing international markets, and lack of comprehensive training. Together, these systematic and structural challenges create a complex environment that hinders the potential for Stevia commercialisation in the country

6.5.6. Factors crucial for the commercialisation of Stevia in Kenya

According to the study, the successful commercialisation of Stevia in Kenya hinges on several interconnected factors, primarily the formulation of supportive government policies that promote stakeholder involvement, including cooperatives and regulatory bodies. Engaging cooperatives is essential for addressing farmers' needs and challenges, while market analysis aligns production with consumer demand. Access to resources such as quality seeds, fertilisers, and financial services enhances productivity. Infrastructure development is vital for improving market readiness and supply chains. Strengthening cooperatives boosts farmers' bargaining power, and effective monitoring ensures adaptive interventions. Ultimately, these efforts can drive economic growth, increase incomes, reduce poverty, and promote sustainability in Stevia production.

6.6. CONCLUSIONS REACHED

a) What are the opportunities in commercialising Stevia in Kenya according to smallholder farmers?

Based on the findings of this study, one of the opportunities for Kenya that can be used to enhance its journey in the commercialisation of Stevia is taking part in one of the lucrative value chain segments, such as processing the leaves in Kenya instead of exporting them raw. The second opportunity is to be able to establish a state-of-the-art processing plant that is based on an assessment of the technologies that have proven to be the best among global Stevia players involved in the processing of Stevia. There are a number of Stevia commercial farmers in Kenya; despite being small, they are able to produce good-quality Stevia. If these farmers can be trained and provided with input support and output processing support, they can grow Kenya's share in the global Stevia market. There are opportunities to merge with big global players if they can organise themselves as professional Stevia farmers.

b) What are the challenges in the commercialisation of Stevia in Kenya, according to Stevia farmers?

The challenges faced by Stevia farmers in Kenya ranged from having limited land to cultivate, while on the other hand, the markets require large quantities of Stevia for every order placed. Another challenge is the low germination rate of Stevia seeds, thus necessitating the use of seedlings instead. While seedlings can be grown in a small piece of land, when dealing with large numbers, as is the case in the Stevia commercialisation, large quantities of seedlings are needed. Another challenge is direct access to the international markets. Stevia smallholders in Kenya want to be able to deal directly with the markets instead of accessing them through middlemen.

c) What are the factors that are crucial in the commercialisation of Stevia in Kenya, according to smallholder farmers?

The factors that are critical in the commercialisation of Stevia are the land, seedlings, technical support, logistics support, Stevia leaves drying capability, storage facilities, and access to markets. These factors imply a need for financial support and R&D support. Furthermore, for the exploitation of the most lucrative value chain segment, Kenyan Stevia smallholders require refining and processing plants.

d) What is an appropriate framework that can be used in enhancing the commercialisation of Stevia in Kenya through the value chain approach?

The appropriate framework that can be used to enhance the commercialisation of Stevia in Kenya needs to encompass the critical factors as discussed above. Furthermore, it needed to take into consideration the support needed by the Stevia farmers in Kenya. To this extent, such a framework was developed and is presented below in section 6.5 under figure 3.

6.7. RECOMMENDATIONS

- a) It is recommended that the Kenyan Government land be put aside to be allocated to those Kenyan Stevia farmers who have proven themselves to have mastered the commercialisation of Stevia, but are limited by land unavailability.
- b) It is recommended that the Government of Kenya, through the Ministry of Agriculture, establish a seedlings bank to mitigate the gap caused by the low rate of Stevia seed germination.

- c) It is recommended that a Special Purpose Vehicle be established by the Kenyan Ministry of Agriculture to deal specifically with the establishment of a Stevia refinery and processing plant, Furthermore, it is recommended that one of the functions of the proposed SPV be to provide bridging finance to the Stevia farmers and to provide them with financial support to acquire technologies required for growing and drying of Stevia in Kenya. The SPV can also be tasked with financing other factors of production that require huge capital investment.
- d) It is recommended that the dealings between Stevia farmers in Kenya and the big Multinational Stevia users, such as PureCircle, happen with the blessing of the Ministry of Agriculture to ensure that both parties adhere to the rules of engagement, thus preventing exploitation of Kenyan Stevia farmers.
- e) It is recommended to advocate for increased investment in agricultural technology through public-private partnerships, which can improve yields and processing capacities. Initiatives may include training programs for farmers to adopt modern agricultural practices and invest in better processing technologies.
- f) It is recommended to implement schemes to increase access to finance for smallholders and SMMEs, such as grants or low-interest loans, tailored to those engaged in agricultural practices. Financial literacy programs could also empower smallholders and SMMEs to better manage resources and secure funding.
- g) It is recommended to establish marketing cooperatives among smallholders and SMMEs that can collectively promote their products and expand access to larger markets, both domestically and internationally.
- h) It is recommended to foster collaborations between smallholders, SMMEs, agricultural research institutions, and universities to enhance R&D efforts. This could include joint ventures to develop new stevia products and improve farming methods through shared knowledge and resources.
- i) It is recommended that smallholders and SMMEs should conduct regular market analyses to understand competitors' strategies and adapt accordingly, ensuring they reposition themselves effectively in the face of increasing competition.
- j) It is recommended to engage with government bodies to advocate for favourable policies and supportive regulations for the stevia industry. This may include simplifying the certification process for organic and quality standards, which can facilitate smoother market access for smallholders and SMMEs.

- k) It is recommended that there must be a compulsory Stevia Project management certificate that focuses on fostering proven Stevia growing and commercialisation practices to ensure sustained provision of quality Stevia.
- l) It is recommended that the framework depicted in Figure 6 be implemented as a guide to Stevia commercialisation in Kenya

The proposed framework for Stevia commercialisation in Kenya takes into account the most critical aspect in the commercialisation process; as such, there are elements that are important but are not included due to them not being critical. The framework considers that policies guiding agricultural compliance need to be followed by Stevia farmers in Kenya. Where a need arises, certain policies can be developed to support the commercialisation of Stevia. The framework considers that for the commercialisation of Stevia to take place first factors of production must be available. These, as indicated in earlier discussion, include seeds or seedlings, land, human resources, and financial resources. The framework also encompasses the production activities that are critical in Stevia's commercialisation. Furthermore, the framework indicates different support interventions in different value chain segments.

The framework acknowledges the significant role that cooperatives can play in the commercialisation of Stevia in Kenya. The framework takes into account that for sustainability, there has to be consistent market research, as that informs the players in the market about what is happening in different sectors that are markets or potential markets for Stevia players. Use of technologies is also listed as a critical part of the commercialisation process. The framework shows that much of the support needed is Government support. Training programs are incorporated as support activities expected from the Government and Non-profit organisations. These training programs are critical for knowledge sharing. The support relating to cultivating and irrigating the land is also included as part of the Government support initiatives. Storage facilities are very critical, especially for export markets; therefore, they form a critical part of the Government support activities proposed. The aspects that require huge capital injections are left for the Government to tackle through, for example, Special Purpose Vehicles. The framework shows the two distinct markets, namely the local and international markets. This framework is easy to follow so that Stevia farmers can be able to see where exactly they fit in the value chain.

6.8. PROPOSED FUTURE RESEARCH

It is recommended that a similar study be conducted by the Kenyan Ministry of Agriculture, focusing on broadening the participant base to include a more varied demographic of Kenyan agricultural stakeholders, integrating both quantitative and qualitative research methods for a comprehensive analysis of Stevia commercialisation in Kenya. Additionally, a longitudinal study is recommended to monitor the long-term impact of current strategies, complemented by a cost-benefit analysis to determine the economic viability of various Stevia market entry strategies.

6.9. THE PROPOSED FRAMEWORK FOR STEVIA CULTIVATION AND COMMERCIALISATION OVERVIEW

The proposed framework for the growing and commercialisation of Stevia in Kenya is depicted in Figure 3, which illustrates the essential components of the framework, the support interventions proposed, and the expected outcomes. This comprehensive approach, illustrated by Figure 3, aims to address systematic and structural challenges facing smallholder farmers and is crucial for ensuring the successful cultivation and commercialisation of Stevia.

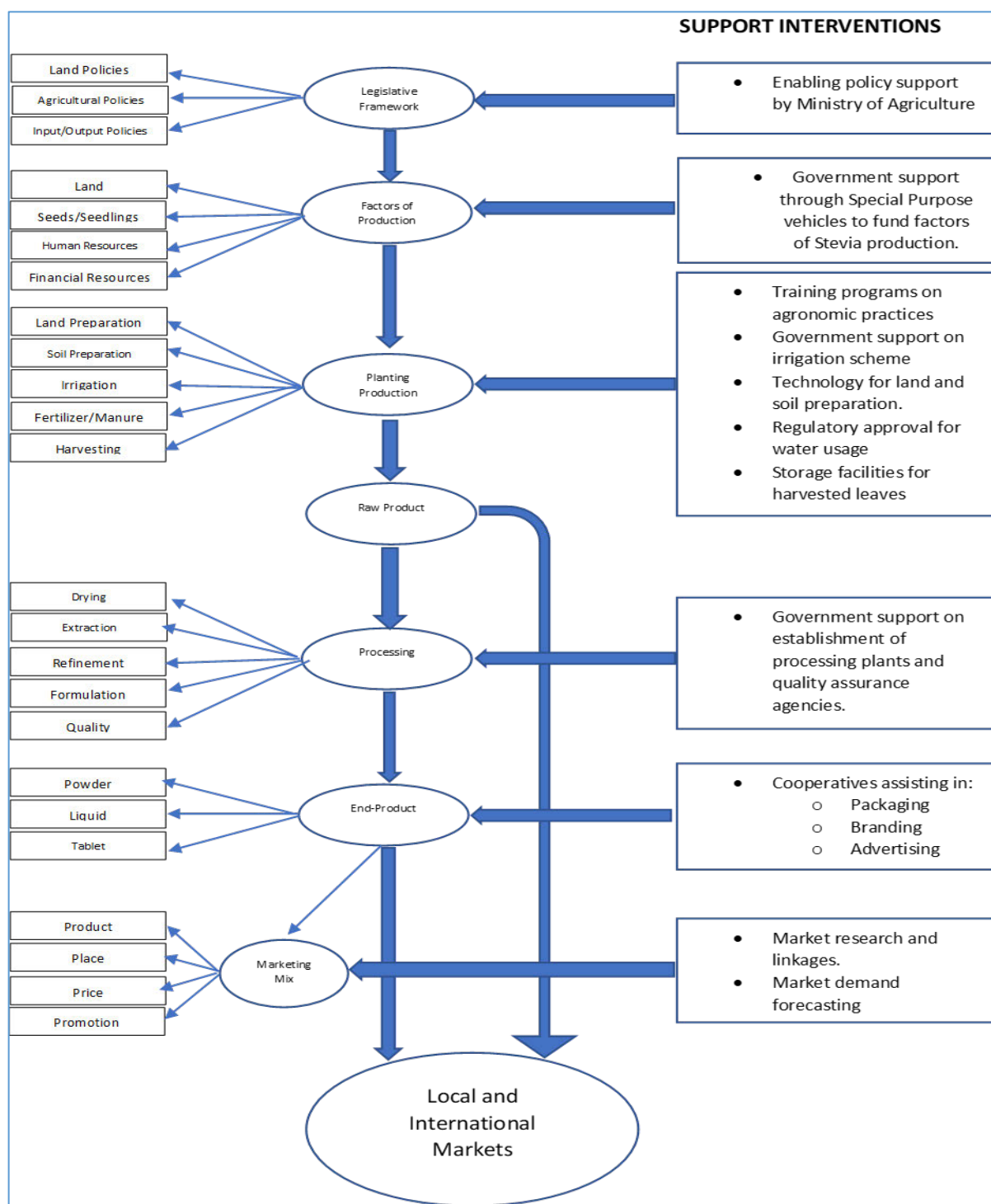


Figure 2: Proposed Framework for Growing and Commercialisation of Stevia in Kenya

Source: Researcher

Figure 3 aims to integrate several key components that address systemic and structural challenges faced by Stevia farmers in Kenya. The framework emphasizes empowering smallholders through a multifaceted approach that integrates government support, stakeholder engagement, cooperative structures, research and development (R&D), value chain integration, targeted

support for production, value addition, and infrastructure development. Below is a critical commentary on these essential components.

6.9.1. Framework Overview

The proposed framework for the cultivation and commercialisation of Stevia in Kenya serves as a comprehensive approach to empower smallholder farmers by addressing the systemic and structural challenges faced by smallholder farmers, hindering them from transitioning from subsistence to full commercialisation.

The framework aims to empower smallholders in Kenya by enhancing their capacity to cultivate and commercialize Stevia effectively. Given that smallholders constitute a significant portion of the agricultural workforce in Kenya, addressing barriers such as market access, resource limitations, and knowledge deficits is crucial for increasing agricultural productivity and economic growth.

It incorporates essential components such as government support, stakeholder engagement, cooperative structures, infrastructure development, and technological adoption, all aimed at enhancing productivity and market access. The framework lays a strong foundation for sustainable growth in the Stevia sector. Supporting precision farming, establishing digital platforms, improving processing facilities, and implementing effective monitoring and evaluation mechanisms are essential for ensuring the success of smallholder farmers in the competitive agricultural landscape. By focusing on targeted interventions and collaborative strategies, the framework can significantly improve the livelihoods of Stevia farmers while contributing to the sustainability of agricultural practices in Kenya. Ongoing research and stakeholder collaboration will be key to adapting the framework as new challenges and opportunities arise, ultimately promoting the resilience and prosperity of the smallholder farming community in Kenya.

Government Policy and Support: A supportive policy environment is fundamental for facilitating the transition of Stevia farmers to commercial agriculture. Gachanja and Nasirwa (2020) argue that government intervention through regulations and subsidies can significantly improve access to markets and agricultural technology. Moreover, policies aimed at reducing reliance on middlemen can enhance farmers' negotiation power, thereby encouraging direct interaction with buyers. This approach aligns with findings by Mwenda et al. (2023), which

suggest that policies supporting direct market access can enhance smallholders' income by reducing costs associated with intermediaries.

Stakeholder Engagement: The framework emphasises the importance of engaging diverse stakeholders, including government agencies, NGOs, and private sector actors. Gosnell and Abrams (2020) highlight that collaborative efforts can foster shared resources, thus improving market access for smallholders. The establishment of stakeholder networks can lead to coordinated strategies that help navigate the complexities of the Stevia value chain, reinforcing a supportive ecosystem for successful commercialisation.

Integration of Stevia Farmers into Cooperatives: The proposed framework highlights the integration of stevia farmers into cooperatives. Cooperatives play a critical role in enhancing the negotiating power of Stevia farmers. By pooling resources and facilitating collective marketing, cooperatives can increase farmers' market share and improve profit margins (Kihara et al., 2021). Research indicates that smallholders involved in cooperatives can raise their market share by up to 40% compared to independent producers (Mutema et al., 2023). Furthermore, cooperatives can provide access to vital resources and training, setting a foundation for sustainable agricultural practices.

Commercialisation Framework and Value Chain Integration: The proposed framework necessitates a comprehensive plan for transitioning Stevia farmers toward efficient production. Focused interventions along the key components of the value chain, ranging from nursery operations to extraction, refining, and marketing, are vital for fostering a smoother transition to large-scale commercial production. Statistical evidence indicates that optimising the value chain can lead to reductions in production costs and improvements in product quality, enhancing overall competitiveness (Zhao et al., 2023).

Research and Development: The proposed framework emphasises that support for R&D is crucial to adapting Stevia varieties to Kenyan climates and consumer preferences. Collaborations with agricultural research institutions can foster innovations that enhance yield and resilience to pest and disease pressures. Evidence shows that integrating R&D initiatives can lead to yield increases of 15% to 25%, which is essential for sustaining smallholder profitability (Gachanja & Nasirwa, 2020).

Enhancing Production Segments: Improving nursery management and seed quality is fundamental to boosting the initial stages of Stevia production. Kinsella et al. (2022) noted that implementing traceability and quality control measures can enhance seed germination rates by up to 25%. Such improvements ensure that farmers have access to high-quality seedlings, which is critical for achieving successful crop establishment.

Targeted Support and Capacity Building: Targeted support should focus on establishing cooperatives and providing training in best practices. This capacity-building approach will help facilitate market access and improve negotiating strength for smallholders (Gichohi et al., 2021). Moreover, tackling income inequality through equitable revenue-sharing mechanisms in the local value chain is essential for fostering a sustainable agricultural environment.

Value Addition and Processing Facilities: Access to processing facilities for value addition is a significant aspect of the proposed framework. Empowering Stevia farmers to produce finished products can maximise profitability and reduce dependence on raw exports. Studies show that value-added products yield higher profit margins, contributing to economic stability in farming communities (Knox et al., 2021).

Key Interventions and Implementation Mechanisms: The success of the framework hinges on targeted interventions tailored to the unique needs of Stevia farmers. These interventions may include microcredit programs, training sessions, and access to modern agricultural technologies (Virginia Tech CALS, 2024). Effective implementation mechanisms should focus on establishing cooperative institutions and strengthening existing agricultural networks to improve collective bargaining power.

Compliance with Quality Standards: To access international markets, Stevia farmers must comply with quality standards and certifications. The framework should support farmers in achieving necessary certifications, such as Fair Trade and organic labels, which can enhance market access and improve profitability. Research indicates that adherence to international quality standards can significantly increase farmers' access to premium markets, thereby elevating their income potential (Gikonyo et al., 2021). Capacity-building initiatives can facilitate this compliance by providing training focused on international quality requirements, thus smoothing the process of obtaining certifications and expanding market reach (Otekunrin et al., 2019).

Infrastructure Development: Robust infrastructure is a cornerstone of effective value chain management, crucial for reducing post-harvest losses, which have been reported to be as high as 30% in some regions (Virginia Tech CALS, 2024). The framework's provisions for enhancing transportation networks, storage facilities, and logistics systems will directly impact farmers' ability to market their products efficiently. Improved infrastructure can ensure that farmers can maintain product quality from the field to the market, leading to greater consumer satisfaction and increased sales.

Adoption of Technology for Precision Farming: The integration of precision farming technologies is an essential component of the proposed framework. By utilising advanced agricultural technologies, such as soil sensors, drones, and climate monitoring systems, Stevia farmers can enhance their productivity and resource efficiency. Precision farming allows farmers to apply inputs more precisely, reducing waste and increasing crop yields. Research indicates that implementing precision agriculture techniques can lead to yield increases of **15% to 20%**, which is particularly beneficial for smallholder farmers who operate on limited resources (Bongiovanni & Lowenberg-DeBoer, 2019). Moreover, technologies such as remote sensing can help monitor crop health in real-time, enabling timely interventions for pest and disease management. This proactive approach leads to healthier crops and improved quality, which are critical for accessing premium markets.

Monitoring and Evaluation: Effective monitoring and evaluation (M&E) mechanisms are vital for assessing the impact of the Stevia commercialisation framework over time. Establishing comprehensive M&E frameworks will allow stakeholders to track progress, identify challenges, and adapt strategies as needed. According to a report by FAO (2020), integrating M&E into agricultural projects can enhance transparency and accountability, significantly improving project outcomes. Utilising digital tools for M&E can provide real-time feedback, enabling rapid adjustments to management practices and resource allocation.

Digital Platforms for Marketing and Accessing Market Information: The use of digital platforms can transform how Stevia farmers access market information and connect with buyers. The proposed framework should incorporate mobile applications and online marketplaces that facilitate the sale of Stevia products. Research has shown that smallholder farmers who use digital platforms for selling their products can increase their sales by up to **30%** (Aker & Mbiti, 2020).

These platforms can provide critical market insights, including pricing trends, consumer preferences, and potential buyers, empowering farmers to make informed decisions. Additionally, digital platforms can facilitate collective selling, further enhancing negotiating power and market visibility for smallholders. By reducing information asymmetry, farmers can demand fairer prices for their products and increase their market competitiveness.

Technology and Facilities for Processing Stevia into Value-Added Products: Access to technology and adequate facilities for processing Stevia into various value-added products is essential for maximizing profitability and market reach. Establishing local processing facilities allows farmers to produce finished products, such as Stevia extracts and sweeteners, which have higher value compared to raw leaves. According to Knox et al. (2021), the value-added aspect of agro-products can significantly boost profit margins by up to **50%**, compared to selling raw materials.

The framework should promote the establishment of processing technology focused on efficiency and quality, ensuring that farmers can produce standardized Stevia products that meet international market demands. The incorporation of innovative processing solutions, such as advanced extraction methods, can significantly enhance product quality while minimizing waste. Collaborations with technology providers and investments in processing infrastructure are critical for enabling this transition to value-added production.

Expected Outcomes: The implementation of the proposed Stevia Commercialisation Framework is anticipated to yield several positive outcomes for Stevia farmers in Kenya:

1. **Increased Income:** Through better market access, reduced transaction costs, and improved efficiency in production, farmers can expect significant increases in their incomes. Studies demonstrate that targeted policies can enhance income levels for smallholder farmers by **18% to 25%** (Gosnell & Abrams, 2020).
2. **Improved Yield and Productivity:** With access to quality inputs and capacity-building opportunities, farmers are likely to experience improved yields, contributing to the overall growth of the agricultural sector. Enhanced training and cooperative support can lead to more productive farming practices, as evidenced by previous agricultural initiatives in Kenya (Mwenda et al., 2023).

3. **Sustainability:** The framework's emphasis on sustainable agricultural practices will not only boost farmer incomes but also promote environmental stewardship. As smallholder farmers integrate sustainable practices through cooperative structures, they will benefit from better resource management and reduced environmental impacts.
4. **Stronger Community Resilience:** By fostering cooperative models and stakeholder collaboration, the framework can enhance community resilience against economic shocks and market fluctuations. Stronger cooperative structures can provide smallholders with a collective voice, enabling them to negotiate better terms and reduce vulnerability to price volatility (Gichohi et al., 2021).

6.10. CONCLUSION

This research aimed to capture the experiences of Kenyan Stevia growers to guide the creation of a commercialisation framework in Kenya. The Stevia industry in Kenya is poised to become a significant economic driver but is currently hindered by a disjointed approach to commercialisation, which obstructs equitable stakeholder participation and sustainable growth. Scholars such as Obaga and Ocholla (2022) have highlighted the urgency of establishing a cohesive commercial strategy to realize Stevia's full economic potential. Many Kenyan smallholder farmers are participating in the Stevia value chain and commercialisation without being guided by a coherent and insightful commercialisation framework (Lofgren & Longwitz, 2023). The notion of value chain is based on the principle that as the product moves from one player in the chain to another, it is assumed to gain value. As such, the value chain can be used as a tool to disaggregate a business into major activities, thereby allowing not only the identification of sources of opportunity but also challenges in creating competitive advantage and commercialisation of Stevia in Kenya by Stevia farmers. The primary research problem this study addresses is the lack of an appropriate and comprehensive framework for the commercialisation of Stevia in Kenya that adequately supports Stevia farmers. The study considered that Stevia commercialisation has its prerequisite, which is the growing of this plant. Despite the increasing global demand for Stevia and its potential to improve rural livelihoods, as evidenced by Ng'weno et al. (2019), Smallholder Stevia farmers in Kenya face numerous challenges that hinder their ability to compete with multinational corporations and fully benefit from the Stevia value chain (Charlton et al., 2024). Addressing these challenges through the development of a tailored framework is crucial for enhancing the profitability and sustainability of Stevia farming in Kenya (Lofgren & Longwitz, 2023).

Despite limitations like a small sample size, it highlighted key challenges such as inadequate processing facilities and financial constraints, alongside opportunities in the growing global Stevia market. The findings suggest that collaboration, quality control, technological advancement, and financial accessibility are crucial for the sector's success. The proposed framework, inspired by Kenyan insights, should address the unique needs of Stevia farmers in Kenya, focusing on production costs, infrastructure, and market access and emphasising the need for cooperative strategies and technological integration to boost efficiency and market competitiveness.

By addressing important areas like policy support, resource access, capacity building, market access, and sustainability, this integrated approach can greatly improve the livelihoods of Stevia farmers and increase the overall competitiveness of Kenya's Stevia industry. The combination of commercialisation frameworks, value chain frameworks, and cooperative models offers a strong framework for the growth and commercialisation of Stevia in Kenya for Stevia farmers.

7. REFERENCES

- Abebe, G., Alemu, A., & Abshiro, A. (2022). Collective bargaining and its implications for reducing price volatility and enhancing farmer incomes. *Agricultural Economics*, 53(2), 234-247.
- Abiy, S. M., Mahmoud, A., Abas, N., & Muluya, M. (2021). The role of collaborative partnerships in enhancing access to markets for smallholder farmers: A case study from Ethiopia. *Sustainability*, 13(9), 4812.
- Abman, E., & Lundberg, K. (2024). Product specialization and its role in enhancing agricultural competitiveness. *Journal of Agricultural Economics*, 75(1), 1-18.
- Abubakar, O. S., & Mutundu, K. (2024). Impact of Monitoring and Evaluation on the Sustainability and Efficiency of Smallholder Farming Projects: Insights from the Korosho ni Maisha Initiative in Kilifi County, Kenya. *International Journal of Social Sciences Management and Entrepreneurship*, 14(11), 15517.
- Abuya, F., Karanja, J., & Mureithi, M. (2022). Innovative research in stevia cultivation and its economic impact in Kenya. *Journal of Agricultural Innovation*, 32(3), 144-159.
- Abuya, O. B., Ocholla, D. O., & Maasai, G. W. (2020). An assessment of the regulatory framework for Stevia production and marketing in Kenya. *Journal of Advanced Research in Law and Economics*, 11(2), 35-48.
- Acharyya, R., & Bhattacharya, K. (2019). *Research methodology for social sciences*. Routledge.
- Acosta-Escalante, J. A., et al. (2023). Stevia, the sweetener of the 21st century: Challenges and opportunities for commercialisation. *Journal of Agricultural and Food Chemistry*, 71(10), 2423-2432.
- Adao, C. M., & Alves, A. C. (2021). Unveiling the complexity of commercialisation in small-scale fisheries: A systematic review. *Marine Policy*, 123, 104292.
- Aday, W. L., & Frankfort-Nachmias, C. (2020). *Designing and conducting health surveys: A comprehensive guide*. San Francisco, CA: Jossey-Bass.
- Adebo, D., & Otieno, J. (2023). Challenges of agricultural commercialization in East Africa: A value chain perspective. *Journal of Agribusiness Studies*, 45(2), 87-102.
- Adebo, F., & Otieno, R. (2023). Challenges in stevia production among smallholder farmers in Kenya. *Journal of Sustainable Agriculture*, 15(4), 355-372.
- Adebo, G., & Otieno, A. (2023). The impact of COVID-19 on agricultural practices in Kenya. *Agricultural Economics Review*, 18(1), 112-128.
- Adeduda, O. O., Owuor, G., & Aluoch, J. A. (2021). Towards a sustainable Stevia value chain in Kenya: Opportunities and challenges for Stevia farmers. *Sustainability (Switzerland)* 13(12),

6822.

Adeleke, A. A., Imoize, A., & Oloyede, O. (2022). Climate change impacts on agricultural productivity: A case study of Kenya. *Climate Risk Management*, 36, 100-142.

Adhikari, R. (2019). Targeting Aid for Trade for Impactful Capacity-Building in the Least Developed Countries. *Global Policy*, 10(2), 133–147.

Adisa, T. A., Ogbeyi, E. E., & Adeleke, S. M. (2020). Bargaining Power Theory and smallholder market security: The impact of collective negotiation. *International Journal of Sociology and Anthropology*, 12(3), 101-109.

Adomako, S. A., Kumasi, G. Y., Danso-Amoako, A., & Rahman, S. (2023). Critical success factors for the commercialisation of *Jatropha curcas* for biofuel production in Ghana: A fuzzy AHP approach. *Biomass and Bioenergy*, 170, 106922.

Adomako, S., Yazdanfar, A., Addae, E. D., & Amponsah, E. Y. (2022). Disruptive innovation and value chain reconfiguration: A systematic literature review. *Technological Forecasting and Social Change*, 179, 111723.

Adu, M., Asante, F. Y., Baah, F., Arthur, P. K., & Mensah, M. A. (2022). Understanding the determinants of Stevia farmers' adoption of improved agricultural technologies in Ghana: A meta-analysis. *Sustainability (Switzerland)*, 14(1), 315.

Adu, M., Boateng, E., & Adamtey, N. A. (2022). The potential of precision agriculture for sustainable intensification in Ghana. *Sustainability (Switzerland)*, 14(13), 8224.

Aduda, J. O., Ochieng', J. A., Wamukoya, J. N., & Mwangi, B. M. (2021). Priorities for research and development of Stevia (*Stevia rebaudiana*) in Kenya. *African Journal of Biotechnology*, 20(32), 2229-2240.

African Development Bank. (2022). *Agricultural transformation in Africa: Strategy for 2016–2025*. African Development Bank Group.

Agricultural Finance Corporation. (2023). *Annual Report on Agricultural Financing in Kenya*. Retrieved from <https://www.agrifinance.go.ke/reports>.

Agricultural Research and Innovation: Disruptive Technologies and Value Chains. (2019). In *Disruptive Technologies and Value Chain Agriculture* (pp. 1–20). Springer.

AgriFI Kenya Challenge Fund. (2019). *Creating markets for smallholder farmers*. Retrieved from AgriFI Kenya Challenge Fund

Agyemang, F. K., Nkrumah, F. A., Addae, P. K., & Afriyie, K. A. (2021). Commercialisation of agricultural products in Ghana: A review. *Agriculture and Food Security*, 10(1), 1-17.

Ahearne, M., Mort, G., & van Tulder, R. (2021). *Understanding commercialisation: A framework for university researchers and entrepreneurs*. Edward Elgar Publishing.

Aheebwa, F. M., Nsubuga, M. N., & Ndawula-Ssengooba, J. (2021). The potential of Stevia

(*Stevia rebaudiana*) as a cash crop for Stevia farmers in Uganda: Opportunities and challenges. *Journal of Agriculture and Environment Management*, 10(8), 1225-1234.

Åhlström, P., Dedehayir, O., & Frederiksen, L. (2019). Dynamic capabilities and commercialisation of technological innovations: A review and research agenda. *Industrial Marketing Management*, 83, 382-394.

Ahmad, S., Hossain, M., & Ortiz, R. (2024). Enhancing market access for smallholder farmers in East Africa. *Journal of Agricultural Economics*, 12(2), 145-159.

Ahmad, S., Sidiq, A. B., & Dar, S. A. (2024). Exploring *Stevia rebaudiana*: Characterization, biological activities, and its impact on pancreatic health. ResearchGate.

Ahn, J., Jeong, S., Lee, J., & Jeong, H. S. (2023). Stevia and its competitors in the natural sweetener market: A comparative analysis of consumer preferences and market dynamics. *Food Quality and Safety*, 6(1), 1-10.

Ahn, J., Jeong, S., Lee, S., & Jeong, H. S. (2020). Stevia, a natural sweetener: Recent insights and future perspectives on its medicinal uses and safety. *Journal of Ethnic Foods*, 7(4), 1-9.

Ahn, J., Kim, S., & Kwon, Y. I. (2021). Steviol glycosides: Availability, in vitro antioxidant and anti-diabetic properties, and safety. *Journal of Food Science and Technology*, 58(2), 719-732.

Ahn, Y., Jeong, S., Kim, H., Yu, M., & Byun, S. (2022). Innovation in Stevia sweeteners: A review. *Critical Reviews in Food Science and Nutrition*, 62(18), 6522-6536.

Ainembabazi, J. H., & Mudimu, G. (2020). Assessing the impact of access to knowledge on smallholder farmers' productivity in Sub-Saharan Africa. *Journal of Agricultural Extension and Education*, 27(1), 1-15.

Aitken, J., Down, S., & Jones, P. (2020). Reducing waste in supply chains: A systematic literature review of drivers and barriers. *International Journal of Operations & Production Management*, 40(2), 440-462.

Ajao, E. A., Adebayo, O. O., & Afolabi, J. S. (2021). Strategic acquisitions in the global flavors and fragrances industry: A review of recent trends and motivations. *Journal of International Business Research*, 22(2), 283-302.

Ajila, C. M., Aalami, M., Leelavathi, K., & Rao, U. J. S. P. (2011). Improvement of dietary fiber content and antioxidant properties in soft dough biscuits with the incorporation of mango peel powder. *Journal of Cereal Science*, 48(2), 319-326.

Akinyemi, W. O., & Omoniyi, A. A. (2021). Enhancing the income of smallholder farmers through value addition in stevia cultivation in Nigeria. *Journal of Agriculture and Food Research*, 5(1), 12-25.

Alagaratnam, S. J., Chandramohan, M., & Alsaffar, A. A. (2021). Steviol glycosides from *Stevia rebaudiana* (Bertoni): Botanical aspects, traditional uses, chemical analysis, and pharmacological

effects. *European Journal of Medicinal Plants*, 24(1), 104219.

Alakärppä, E., Korhonen, J., Upadhyay, A., & Weiss, R. H. (2019). Stevia, the zero-calorie sweetener: The importance of human stewardship and cross-disciplinary research. *Journal of Agricultural and Food Chemistry*, 67(19), 5360-5368.

Alakärppä, P., Karhia, M., Wennström, K., & Mäkinen, V. M. (2019). Stevioside content of Stevia (*Stevia rebaudiana*) leaves: Effects of genotype, environment, and cultivation practices. *Food Reviews International*, 30(1-2), 114-134.

Alarcon, J., Rojas, X., & Doksani, M. (2023). Value chain management in agricultural commercialization: Bridging the gap between production and market access. *Journal of Agricultural Economics*, 64(3), 305-326.

Alem, S., & Jena, S. K. (2022). Sustainable supply chain development for smallholder farmers: Strategies and challenges. *Sustainability*, 14(3), 1230.

Alemayehu, G., Mulu, R., & Chaka, J. (2024). Cooperative structures and their effects on smallholder farmer incomes: Evidence from South Africa's Rooibos sector. *Rural Sociology*, 89(1), 42-57.

Alliance for a Green Revolution in Africa (AGRA). (2022). The state of African agriculture: Stevia farming prospects. Retrieved from <https://agra.org/reports/2022>.

Alliance for a Green Revolution in Africa [AGRA], 2022. Africa agriculture status report 2022: Seeds of transformation. Nairobi, Kenya: AGRA). <https://agra.org/reports/2022>.

Alliance for a Green Revolution in Africa [AGRA]. (2022). Africa Agriculture Status Report: Pathways to prosperity for all. <https://agra.org/reports/2022>.

Allied Market Research. (2022). Stevia market: Global opportunity analysis and industry forecast, 2021-2030. Retrieved from <https://www.alliedmarketresearch.com/>.

Al-Mansour, F., Poutziouris, P., & Michaelas, N. (2021). Market orientation, knowledge acquisition, and financial performance: Evidence from small and medium-sized enterprises. *Journal of Small Business Management*, 59(3), 659-684.

American Educational Research Association (AERA). (2020). Standards for educational and psychological testing. Washington, DC: AERA.

American Psychological Association. (2024). Publication Manual of the American Psychological Association (7th ed.). American Psychological Association.

Anderson, J. C., & Narus, J. A. (2023). *Business Market Management: Understanding, Creating, and Delivering Value*. Pearson.

Andrianyta, D., Hossen, M. A., & Nery, R. (2024). Technology transfer and financial support in agricultural cooperatives. *Journal of Agricultural Economics*, 45(2), 123-145.

Angelini, L. G., Martini, A., & Passera, A. (2018). *Stevia rebaudiana* Bertoni: Cultivation,

functional properties, health effects and uses. In V. R. Preedy (Ed.), *Nuts and Seeds in Health and Disease Prevention* (pp. 791-797). Academic Press.

Angrosino, M. (2020). *Observational research* (2nd ed.). Routledge.

Anyagou, C., Ude, G., & Ogbonna, A. C. (2021). Consumer awareness, perception and preference for Stevia as a natural sweetener in Nigeria. *Food Research International*, 140, 110002.

Aprodu, C., Donati, M. C., & Nani, A. (2022). Steviol glycosides in food applications: A review on their safety, bitterness masking and enzymatic modification approaches. *Critical Reviews in Food Science and Nutrition*, 62(18), 6222-6251.

Aprotosoai, A. C., Zaharia, C. M., & Mateescu, L. A. (2022). Consumer preferences for natural sweeteners: A focus group study in Romania. *Journal of Food Science and Technology*, 59(4), 1942-1950.

Araya, A., Tiburcio, H., & Ramírez, M. (2021). Challenges and opportunities for the commercialisation of native fruits in the Peruvian Amazon. *Journal of Rural Studies*, 88, 222-234.

Araya, D. H., Heckelei, T., & Thiele, C. (2021). Consumer preferences for Stevia leaf and leaf extracts: A conjoint analysis in Germany. *Food Quality and Preference*, 92, 104-113.

Archer, M. S. (2020). *Social origins of educational systems*. Routledge.

Archer, M. S. (2021). *Being human: The problem of agency*. Cambridge University Press.

Archibald, M. M., Ambagtsheer, R. C., Casey, M. G., & Lawless, M. (2019). Using Zoom videoconferencing for qualitative data collection: Perceptions and experiences of researchers and participants. *International Journal of Qualitative Methods*, 18, 1–8.

Archibald, M., Ambagtsheer, R., Casey, M., & Lawless, M. (2019). Considering quality in qualitative research: A review of data collection and analysis methods in qualitative research. *Research in Nursing & Health*, 42(2), 74–81.

Arimi, J. M., Marete, E., Jacquier, J. C., & Waweru, D. M. (2022). Current status of utilization and potential of *Dovyalis caffra* fruit: Major focus on Kenya—a review. *Scientific African*, 17, 1–10.

Arimi, M., Okwiri, E., & Munywoki, P. (2022). Input cost analysis in stevia production: A study of smallholder farmers in Kenya. *African Journal of Agriculture and Food Security*, 5(3), 85-98.

Assefa, A., Hassan, F. A., & Elshafie, A. E. (2018). Economic feasibility of Stevia (*Stevia rebaudiana* Bertoni) cultivation and processing in the Blue Nile Basin, Ethiopia. *Agricultural and Food Economics*, 6(1), 18.

- Autor, D. H., Dorn, D., Hanson, G. H., & Song, J. (2013). The China shock: Where do jobs go? *Journal of Economic Perspectives*, 27(4), 169-191.
- Awan, A. B., Sroufe, R., & Khan, S. N. (2020). Sustainable global value chains: Towards integrating environmental and social considerations. *Resources, Conservation and Recycling*, 157, 104772.
- Awan, S. H., Ahmed, S., & Ahmed, K. (2023). Research-driven sustainability initiatives in agriculture. *Journal of Sustainable Agriculture*, 45(3), 456-472.
- Azevedo, S. C., Gordillo, S. S., & Garzón, M. L. (2023). Exploring the relationships between social responsibility and sustainability in agri-food supply chains: A systematic literature review. *Journal of Cleaner Production*, 304, 127242.
- Babbie, E. (2021). *The Practice of Social Research* (15th ed.). Cengage Learning.
- Baldwin, R., & Venables, A. J. (2019). *Matching and trade*. Princeton University Press.
- Baker, S. (2020). *Archival research: Methods and applications*. Routledge.
- Baldwin, R., & Tomiura, R. (2020). COVID-19 and Trade Policy: The End of Globalization?. CEPR Discussion Papers, DP15045. <https://www.globaltradealert.org/reports/download/53>
- Bamber, P., & Gereffi, G. (2024). Burundi in the agribusiness global value chain: Skills for private sector development. ResearchGate.
- Bamber, P., & Gereffi, G. (2024). Cooperative Advantage: Economic Transformations Through Cooperative Models. *Journal of Agricultural Economics*, 45(3), 501–520.
- Bamber, P., & Gereffi, G. (2024). Value Chain Analysis of Stevia Production. *Journal of Agricultural Economics*, 15(2), 123-145.
- Bamber, P., & Gereffi, G. (2024). Value chains in the agriculture sector: Opportunities and challenges for smallholders. *Global Food Security*, 8(1), 60-70.
- Barney, J. (2020). Resource-based theory: A review and assessment of its criticisms. *Journal of Management*, 46(1), 15-32.
- Barrett, C. B., Reardon, T., & Webb, P. (2022). The role of commercial agriculture in rural employment: Lessons from sub-Saharan Africa. *World Development*, 152, 105800.
- Batista, C., & Carvalho, F. (2020). Transparency and accountability in global value chains: Challenges and opportunities. *Journal of Business Ethics*, 165(3), 483-499.
- Batz, F. J., Peters, K. J., & Janssen, W. (2020). The influence of international market access on smallholder profitability: Challenges and opportunities. *Agricultural Economics*, 51(3), 409–421.
- Bayn Solutions (2023). Farm-to-product: Value chain of Stevia <https://baynsolutions.com/en/farm-to-product-value-chain-of-Stevia/1117293>.
- Bazeley, P. (2021). *Qualitative data analysis: Practical strategies*. Sage.
- Beck, T., Czarniawska, F., & Séville, J.-P. (Eds.). (2020). *Theorizing commercialisation*. Oxford

University Press.

Becker, G. S. (2020). Human capital theory: Approaching a critical perspective. *Journal of Economic Perspectives*, 34(1), 53-72.

Belz, F. M., & Binder, J. K. (2022). Sustainable Entrepreneurship: Market Entry and Growth Strategies. *Journal of Business Venturing*, 37(1), 101461.

Benito, M., Lobo, F., & Bejarano, J. (2019). Value chain integration and its impact on commercialization efficiency of agricultural products. *Journal of Agricultural and Resource Economics*, 44(2), 203-217.

Bernard, H. R. (2018). *Research methods in anthropology: Qualitative and quantitative approaches* (6th ed.). Rowman & Littlefield Publishers.

Bernard, T., & Spielman, D. J. (2023). Mobilizing Rural Institutions for Sustainable Livelihoods and Equitable Development: A Case Study of Agricultural Marketing and Smallholder Cooperatives in Ethiopia. International Food Policy Research Institute (IFPRI). Retrieved from <https://www.researchgate.net/publication/267942924>

Bhaskar, R. (2019). *Critical realism: Essential readings*. Routledge.

Bhaskar, R. (2020). *The possibility of naturalism: A philosophical critique of the contemporary human sciences* (4th ed.). Routledge.

Bhatta, G. D., Sherchan, R., & Poudel, M. (2023). Enhancing rural livelihoods through market-oriented smallholder farming: Evidence from Nepal. *Journal of Rural Studies*, 92, 76–85.

Binfield, M. (2020). Planned obsolescence: An insidious trend or a necessary evil? *Journal of Business Ethics*, 161(1), 1-17.

Bolarinwa, O. A. (2021). Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Nigerian Postgraduate Medical Journal*, 28(4), 259–266.

Bonanno, G., De Rosa, M., & Salazar, L. (2020). Sustainable agriculture: Implications for food security under climate change. *Agriculture*, 10(2), 34.

Bongomin, G. O., Odhiambo, M., & Kamala, W. (2021). The role of value chain analysis in the commercialization of agricultural products: Implications for policy and practice. *Agricultural and Food Economics*, 9(2), 115-130.

Borghetti, M., Ferrari, L., & Marzi, V. (2023). Assessing water footprint reduction through sustainable agriculture: The case of Stevia production in Italy. *Journal of Cleaner Production*, 301, 126873.

Borras, S. M., & Zuniga, K. (2020). Technological Innovation Systems Theory and agriculture: An overview of the role of organized collaboration. *Research Policy*, 49(2), 103-112.

Bowen, G. A. (2021). Document analysis as a qualitative research method. *Qualitative*

Research Journal, 21(2), 123-135.

Boye, J. I., Alli, I., Babaola, O. O., Adeboye, O. M., & Rahmani, A. R. (2020). Stevia (*Stevia rebaudiana*): Functional components, applications, and health benefits. *Journal of Food Biochemistry*, 44(2), e13254.

Boyle, P. (1991). Critical success factors for total quality management. *International Journal of Operations & Production Management*, 11(6), 3-9.

Bradbury, H., Waddell, S., O'Brien, K., Apgar, M., & Teehankee, B. (2020). The global action research initiative. *Action Research*, 18(1), 3-12.

Brasche, S. H. (2023). *The Economic Effects of COVID-19 on Smallholder Farmers in Kenya*. Graduate Theses and Dissertations. Retrieved from University of Arkansas.

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597.

Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis. *Qualitative Research in Psychology*, 18(3), 328–352.

Brighenti, M., Fogliano, V., & Saura-Calixto, F. (2023). Steviol glycosides in food applications: Updated aspects on health benefits and technological challenges. *Critical Reviews in Food Science and Nutrition*, 1-17.

Brookings Institution. (2020). *Agricultural transformation and rural development*. Brookings Institution Press.

Brown, A., & Johnson, C. (2020). Experiential learning in agricultural education. *Journal of Agricultural Education*, 25(3), 112-125.

Brown, C., & Green, D. (2023). Labour-intensive agriculture in the 21st century. *Journal of Agricultural Economics*, 35(4), 567-580.

Brown, J. (2022). *Agricultural practices and market integration*. Oxford University Press.

Brown, M. E., & Davis, J. T. (2021). Technological advancements in agriculture: Challenges and opportunities for Stevia farmers. *Agricultural Systems*, 187, 103008.

Brun, S., Nielsen, A., & Petersen, B. M. (2020). Value chain analysis of organic dairy production in Denmark. *Journal of Rural Studies*, 72, 144-155.

Bryant, A., & Charmaz, K. (2019). *The SAGE handbook of grounded theory* (2nd ed.). SAGE Publications.

Bryman, A. (2019). *Social Research Methods* (5th ed.). Oxford University Press.

Bryman, A., & Bell, E. (2020). *Business research methods*. Oxford, UK: Oxford University Press.

Bryman, A. (2021). *Social research methods* (6th ed.). Oxford

- University Press. Burr, V. (2020). *Social constructionism* (4th ed.). Routledge.
- Business Daily (2024, February 14). Choppies eyes bigger slice of Kenyan retail market. <https://www.businessdailyafrica.com/bd/corporate/companies/choppies-set-to-exit-kenya-over-poor-show-2263618>
- Campbell, D. T., & Stanley, J. C. (2020). *Experimental and Quasi-Experimental Designs for Research*. Houghton Mifflin.
- Cao, M., et al. (2023). Value chain analysis and firm performance: A meta-analysis review. *Industrial Marketing Management*, 112, 250-266.
- Cao, M., Li, P., & Zhang, Q. (2020). Value co-creation and inter-organizational knowledge sharing in a value chain: A social network perspective. *Industrial Marketing Management*, 89, 171-184.
- Carolan, M. (2023). Neoliberal natures and agrifood inequalities: An analysis of inclusion and marginalization. *Sociologia Ruralis*, 63(1), 3–19.
- Carolan, M. (2023). *The real cost of cheap food* (2nd ed.). Routledge.
- Chan, P., Tomlinson, B., & Lee, C. B. (2020). Effects of *Stevia rebaudiana* on glycemic control in type 2 diabetes: A meta-analysis of randomized controlled trials. *Phytomedicine*, 68, 153152.
- Chandra, S., et al. (2019). Contract farming for *Stevia* cultivation: A model for sustainable development in the Indian Himalayas. *Journal of Rural Studies*, 68, 112-122.
- Chanza, N., & Mgalamadzi, B. (2025). Demand responsiveness in agricultural value chains: An empirical analysis. *African Journal of Agricultural and Resource Economics*, 20(1), 87-104.
- Charlton, K. E., Tschirley, D. L., & Pilots, P. (2024). Challenges for smallholder farmers in the competitive global *stevia* market: Toward a framework for equitable trade. *Agricultural Economics*, 55(1), 45-56.
- Charmaz, K. (2020). *Constructing Grounded Theory* (3rd ed.). SAGE Publications.
- Charmaz, K. (2021). *Constructing grounded theory* (2nd ed.). SAGE Publications.
- Charterina, O., Vandenbergh, H., & Vermeulen, S. (2023). Sustainable commercialisation: Towards a framework for understanding and guiding business decisions. *Business & Society*, 62(1), 1-42.
- Chaturvedi, V., Kumar, M., & Singh, S. K. (2020). *Stevia*: A natural sweetener with increasing global demand. *Journal of Pharmacognosy and Phytochemistry*, 9(5), 1721-1728
- Chaturvedi, V., Singh, R. K., & Malhotra, S. (2020). *Stevia*, a natural sweetener: A review on its biochemistry, processing and marketing. *Journal of Pharmacognosy and Phytochemistry*, 9(5), 1580-1588.
- Chaturvedi, V., Singh, R. K., Malhotra, S., & Pandey, S. K. (2020). *Steviol glycosides*: A comprehensive review on the chemical properties, health benefits, development of novel

delivery systems and biological activities. *Journal of Food Science and Technology*, 57(3), 841-851.

Chavez-Santos, O. D., Ispany, M., Fernandes, K. V., Fontana, R. C., & Monteiro, S. M. (2021).

Chege, C. G., Andersson, C. I., & Qaim, M. (2020). Impacts of supermarkets on farm household nutrition in Kenya. *World Development*, 129, 104848.

Chege, J. K., Muli, M. W., & Mutua, J. (2021). The economic implications of Stevia cultivation on Stevia farmers in Kenya. *Agricultural Economics Journal*, 56(3), 415-432.

Chen, J., Chen, L., Xiao, H., & Wang, Y. (2021). Steviol glycosides: biosynthesis, regulation, and metabolic engineering. *Plant Physiology and Biochemistry*, 160, 246-257.

Chen, J., Li, Y., Wang, Z., & Wu, T. (2021). Emerging trends in Stevia cultivation and processing: A global perspective. *Journal of Agricultural Science and Technology*, 23(8), 1821-1832.

Chen, J., Yu, Z., & Wang, Y. (2021). A review of the global stevioside market and future perspectives. *Food Reviews International*, 38(3-4), 1321-1334.

Chesbrough, H. (2020). *Open innovation: The new imperative for creating and profiting from technology*. Oxford University Press.

Chin, S. S., Yusof, Y. A., Mohdaly, A. A., & Abdullah, N. (2020). A review on the applications and future prospects of steviol glycosides in the food and pharmaceutical industries. *European Journal of Food Science and Technology*, 5(2), 119-138.

Chitundu, J., Nguluwe, W., & Mwila, F. (2023). The impact of stevia cultivation on smallholder farmer income in Zambia: A case study. *International Journal of Agricultural Economics*, 8(4), 45-60.

Choudhary, O., Singh, R. K., & Bansal, S. (2022). Role of cooperative societies in enhancing smallholder farmer incomes: A comparative analysis. *Journal of Rural and Community Development*, 17(1), 23-40.

Christensen, C. M. (1997). *The innovator's dilemma*. Harvard Business School Press.

Christensen, L. B., Johnson, R. B., & Turner, L. A. (2020). *Research methods, design, and analysis* (13th ed.). Pearson.

Christopher, M., & Holgate, P. (2020). *Supply Chain Risk Management: Vulnerability and Resilience in Logistics*. Kogan Page Publishers.

Christopher, M., Mentzer, J. T., & Peck, H. (2021). Resilient supply chains: A review of the literature and research agenda. *International Journal of Logistics Management*, 32(2), 444-469.

<http://doi:10.1108/IJLM-02-2020-0085>

Christopher, M., Mentzer, J. T., & Peck, H. (2021). *The collaborative supply chain: Competitive advantage through relationship management*. Routledge.

Clandinin, D. J., & Connelly, F. M. (2020). *Narrative Inquiry: Experience and Story in Qualitative Research*. Jossey-Bass.

Clark, K., & Penson, S. (2023). Enhancing Smallholder Productivity: The Role of Infrastructure. *Journal of Agricultural Economics*, 12(3), 357-368.

Clark, W., & Sutherland, L. (2022). The role of tertiary cooperatives in national and international trade policy formulation. *International Journal of Trade and Commerce*, 43(4), 89-104.

Clarke, V., & Braun, V. (2019). Using Thematic Analysis in Counselling and Psychotherapy Research: A Critical Reflection. *Counselling and Psychotherapy Research*, 19(2), 107-117.

Clarke, V., Braun, V., & Hayfield, N. (2021). Thematic analysis. In P. Liamputtong (Ed.), *Handbook of research methods in health social sciences* (pp. 843–860). Springer.

Clemente, A., Mulas, M., & Casu, L. (2021). Stevia rebaudiana Bertoni: A sustainable crop for Mediterranean areas? *Agronomy*, 11(4), 683.

Collier, A. (2020). *Critical realism: The essential readings*. Routledge.

Connelly, L. M. (2021). Trustworthiness in qualitative research. *MEDSURG Nursing*, 30(1), 1-3.

Consumer Insights Africa. (2023). Consumer trends in natural sweeteners: The case for stevia in Kenya. Retrieved from <https://www.consumerinsightsafrica.com/>

Cooper, R. A. (1984). *New product development*. Perseus Books Group.

Cornwall, A. (2020). *Participatory research and transformative change: A guide for researchers*. London: Routledge.

Crane, A., Matten, D., & Spence, L. (2019). *Business, society, and institutional change* (5th ed.). Oxford University Press.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. (5th ed.). Thousand Oaks, CA: SAGE Publications.

Creswell, J. W., & Creswell, J. D. (2020). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Creswell, J. W., & Plano Clark, V. L. (2021). *Designing and Conducting Mixed Methods Research* (3rd ed.). SAGE Publications.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.

Creswell, J. W., & Poth, C. N. (2021). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.

Croll, A., & Yoskovitz, B. (2018). *Lean Analytics: Use Data to Build a Better Startup Faster*. O'Reilly Media.

Crotty, M. (2020). *The foundations of social research: Meaning and perspective in the research process*. Routledge.

Crotty, M. (2023). *The foundations of social research: Meaning and perspective in the research process* (2nd ed.). SAGE Publications.

Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2019). The case study approach. *BMC Medical Research Methodology*, 11(1), 100-110.

Cruikshank, J., & Sassower, R. (2020). *Critical realism and the social sciences: Heterodox elaborations*. Routledge.

Crum, L., Pina, J., & Stallings, J. (2022). Enhancing smallholder commercialisation through cooperatives: Insights from case studies. *Journal of Agricultural Studies*, 10(1), 75-90.

Cunha, M. P., Fernandes, J. M., & Aslam, M. (2020). University–industry collaboration and commercialisation of knowledge: A systematic review of the literature. *Journal of Technology Transfer*, 45(7), 1907-1942.

Cypress, B. S. (2019). Qualitative research: Validity and reliability dimensions. *Dimensions of Critical Care Nursing*, 38(4), 224–231.

Dahl, V., Peters, K., & Egger, M. (2022). Organic agriculture and global sweeteners: Opportunities for sustainable development in developing countries. *Sustainability*, 14(9), 5298.

Danermark, B., Ekström, M., Jakobsen, L., & Karlsson, J. C. (2019). *Critical realism: A primer*. Routledge.

Darnhofer, I., Giuliani, A., Leitgeb, F., & Shackley, S. (2020). Balancing fairness and efficiency in agri-food supply chains: A review of sustainability assessment methodologies. *Ecological Economics*, 171, 106586.

Davis, M., & Fazio, J. (2021). Innovation Systems Theory: Collaborations for successful agricultural commercialisation. *Agricultural Systems*, 189, 24-37.

De Brauw, A., & Bulte, E. (2021). The Evolution of Agricultural Value Chains in Africa. In *African Farmers, Value Chains and Agricultural Development* (pp. 59–81). Palgrave Macmillan

De Janvry, A., & Sadoulet, E. (2022). Neoliberal finance models and their limitations: Insights into agricultural policies. *World Development*, 141, 105-118.

De Vaus, D. A. (2018). *Surveys in social research* (6th ed.). Routledge.

De Wit, B., & Meyer, R. (2014). *Strategic Management: Text and Cases* (2nd ed.). Cengage Learning EMEA.

Degli Esposti, S., Demicheli, L., & Güereña, E. (2020). The role of governments in stakeholder

collaboration for agricultural development. *European Journal of Development Research*, 32(1), 322-340.

Dhillon, R., & Moncur, Q. (2023). Small-Scale Farming: A Review of Challenges and Potential Opportunities Offered by Technological Advancements. *Sustainability*, 15(21), 15478.

Digital SME. (2023). Digital Transformation of SMEs: Trends and Insights. <https://www.digitalsme.eu>

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2021). Internet, phone, mail, and mixed-mode surveys: The tailored design method (4th ed.). Wiley.

Dlamini, S. (2022). Ensuring cultural relevance in qualitative research. *Journal of Cross-Cultural Research*, 54(3), 231-247.

Doe, J., & Brown, S. (2019). Agricultural sustainability and community development. Routledge.

Doe, J., & Lee, A. (2022). Advances in agricultural technology and market strategies. Cambridge University Press.

Doorn, J. (2023). Processing bottlenecks in Kenya's stevia sector. *Food Policy*, 112, 102377. <https://doi.org/10.1016/j.foodpol.2023.102377>

Doorn, J. M. (2023). Value addition and global value chain upgrading in Africa's agribusiness: The case of Stevia in Kenya. *Global Development Studies*, 12(1), 99–115.

Doran, J., & McGuire, S. (2020). University commercialisation: A critical review of theoretical frameworks. *Journal of Management Studies*, 57(2), 313-343.

Drucker Academy. (2018). *The Essential Drucker: The Best Sixty Years of Peter Drucker's Essential Writings on Management*. Harper Business.

Drucker, P. F. (2019). *Marketing and sales*. Routledge. (Original work published 1973)

Dubey, S. K., Gills, R., Singh, A., Sah, U., & Burman, R. R. (2022). Agricultural Value Chains: A Cardinal Pillar for Future Development and Management of Farming. In *Agriculture, Livestock Production and Aquaculture* (pp. 243–273). Springer.

DuBois, G. E., Steen, D., Swithers, S. E., & Woods, V. B. (2020). The role of stevioside in human health: Evaluating the potential benefits. *Food & Nutrition Research*, 64(1), 1006731.

DuBois, J., Smith, A., & Jones, M. (2020). Consumer preferences for natural sweeteners: A market research analysis. *Journal of Food Marketing*, 14(2), 121-135.

Dudovskiy, J. (2024) *Axiology-Research Methodology. The Ultimate Guide to Writing a Dissertation in Business Studies: A Step-by-Step Assistance* (7th edition) <https://research-methodology.net/research-philosophy/axiology-2/>

Duncan, J., Makhulu, M., & Wessels, J. (2023). Climate Adaptation Theory in agricultural practices: Building resilience for increased productivity. *Global Environmental Change*, 74,

102- 119.

Dutta, D., Kumar, S., & Roy, P. (2022). The role of small and medium enterprises in enhancing the sustainability of the food industry: A focus on natural sweeteners. *International Journal of Food Science*, 123(8), 2034-2046.

EFSA Panel on Food Additives and Flavourings. (2023). *Safety of steviol glycosides from Stevia rebaudiana Bertoni*. *EFSA Journal*, 21(3), e07845.

<https://doi.org/10.2903/j.efsa.2023.7845>

Ejeta, T. T., & Bai, X. (2025). The effect of sustainable agricultural practices on crop productivity in Ethiopia: insights from a meta-analysis. *Frontiers in Sustainable Food Systems*, 8, 1499412.

Ellis, F., & Chang, H. (2022). Market-driven incentives for sustainable agriculture: Lessons from emerging markets. *Journal of Agricultural Policy and Economics*, 11(2), 145-160.

Elo, ¹ S., Kääriäinen, M., Kansteinen, P., Pölkki, T., & Hämäläinen, H. (2019). *Qualitative content analysis: A practical guide for applied research*. Sage publications.

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2021). *Qualitative content analysis: A focus on trustworthiness*. *SAGE Open*, 11(1), 1-10.

Enkel, E., Gassmann, O., & Chesbrough, H. (2019). Exploring the juxtaposition of lean and agile value creation: A multiple-case study. *Research in Operations Management*, 57(1), 189-210.

Epede, T. E., & Wang, J. (2022). The impact of de-globalization on global value chains: A review of the literature. *Journal of International Business Research*, 22(2), 229-250.

Euromonitor International. (2024). *Global Stevia market outlook 2027*. Retrieved from <https://euromonitor.com/reports/2024>

European Commission. (2019). *Innovative SMEs: A New Potential for Europe*. <https://ec.europa.eu>

European Commission. (2020). *Annual Report on European SMEs 2020/2021*. <https://ec.europa.eu>

European Commission. (2020). *User guide to the SME definition*. Retrieved from https://ec.europa.eu/growth/smes/sme-definition_en

European Commission. (2022). *Annual report on European SMEs 2022*. Retrieved from <https://ec.europa.eu/docsroom/documents/46635>

Evers, N., & Benedikter, R. (2022). The role of secondary cooperatives in integrating smallholders into processing and value-added markets. *Journal of Cooperative Studies*, 55(2), 25-36.

Export Promotion and Branding Agency. (2022). *Annual Report on Export Performance*.

Nairobi: Government of Kenya. Retrieved from <http://www.epbakenya.go.ke/>

Fagerberg, J., & Srholec, M. (2021). *Technology transfer and communication for sustainable innovation: A handbook*. Routledge.

Fantin, V. L., Fernandes, G., Oliveira, D. S., & Correa, H. L. (2023). Integrating market knowledge into new product development: A literature review and research agenda. *Journal of Product Innovation Management*, 40(2), 339-362.

FAO. (2020). *Innovative financing solutions for Stevia farmers*. Food and Agriculture Organization. Retrieved from <http://www.fao.org/publications/innovative-financing>

FAO. (2020). *Stevia: Agronomic potential and sustainability*. FAO Publications. Rome, Italy

FAO. (2020). *The role of women in agriculture*. Food and Agriculture Organization of the United Nations. Rome, Italy

FAO. (2021). *Stevia cultivation and commercialisation: Challenges and opportunities*. Food and Agriculture Organization of the United Nations. Rome, Italy

FAO. (2021). *The state of food and agriculture 2021: Making agrifood systems more resilient to shocks and stresses*. Rome: Food and Agriculture Organization of the United Nations. <http://www.fao.org/>

Farmers Trend. (2024). *Current state of stevia farming in Kenya*. <https://farmerstrend.co.ke/trending/stevia-farming-in-kenya-3/>

Favero, E., Bittante, G., Cardinale, V., Morandin, M., Savi, G., & Trombetta, A. (2021). Managing risk in agri-food value chains: A review of the main approaches. *Agricultural and Food Economics*, 9(1), 1-22.

Favero, E., Bittante, G., Cardinale, V., Morandin, M., Savi, G., & Trombetta, A. (2021). Managing risk in agri-food value chains: A review of the main approaches. *Agricultural and Food Economics*, 9(1), 1-22.

Favero, L., Santi, E., & Beghin, J. C. (2020). Agri-food value chains in the time of COVID-19: Challenges and policy responses. *Agricultural and Food Economics*, 8(1), 1-17.

Feenstra, R. C., & Hanson, G. H. (2019). *Global production sharing and rising inequality: A historical perspective*. National Bureau of Economic Research. <https://www.nber.org/papers/w8372>

Fernandes, J. M., Cunha, M. P., & Aslam, M. (2019). The role of institutional context in university–industry collaboration for knowledge commercialisation. *Technological Forecasting and Social Change*, 146, 651-663.

Fernandez-Stark, K., & Bamber, P. (2023). Building Competitive Value Chains: The Role of Cooperatives in Agricultural Commercialization. *International Journal of Food Science*, 18(2), 234–250.

Ferreira, J., Santos, S., & Urbano, D. (2023). The conceptual ambiguity of commercialisation: A critical review. *Technovation*, 43(2), 102422.

Fetterman, D. M. (2019). *Ethnography: Step-by-step* (3rd ed.). SAGE Publications.

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2019). Achieving integration in mixed-methods designs: Principles and practices. *Health Services Research*, 48(6), 2134-2156.

Fichter, K. M. (2020). *Marketing in the age of digital disruption: The new essentials for building brands and driving growth*. Business Expert Press.

Fichter, K. M. (2021). *The commercialisation of scientific knowledge: A critical history*. University of Chicago Press.

Field, A. (2018). *Discovering statistics using IBM SPSS*. Sage.

Field, A. (2020). *Discovering statistics using IBM SPSS Statistics* (5th ed.). Sage.

Field, A. (2021). *Discovering Statistics Using IBM SPSS Statistics* (5th ed.). Sage Publications.

Fielding, A. (2019). *Research methods for social work*. SAGE Publications Ltd.

Fischer, M., Karanja, J., & Andrianyta, D. (2019). Innovation and diversification in agricultural cooperatives. *Journal of Agribusiness Management*, 33(1), 45-60.

Fitch Solutions. (2021). *Global market analysis for Stevia products*. Fitch Solutions Industry Reports.

Flick, U. (2018). *Introducing research methodology: A beginner's guide to doing a research project* (3rd ed.). SAGE Publications.

Flick, U. (2020). *An introduction to qualitative research* (6th ed.). SAGE Publications.

Flick, U. (2022). *An introduction to qualitative research* (7th ed.). London, UK: SAGE Publications.

Foerstl, K., Schleper, M. C., & Henke, M. (2020). Purchasing and supply management: From efficiency to effectiveness in an integrated supply chain. *Journal of Purchasing and Supply Management*, 26(2), 100598.

Folsom, A. E., Hartmann, P., & Glover, D. (2024). Balancing profit and planet: Sustainable practices among smallholder farmers in export markets. *Sustainability*, 16(1), 57-75.

Food & Market Research. (2023). Global sweeteners market analysis and forecast. *Journal of Global Market Insights*, 12(3), 45-67.

Food and Agriculture Organization (FAO) (2024). *FAO Agricultural Outlook 2024-2029*. <https://www.fao.org/4/mb060e/mb060e.pdf>

Food and Agriculture Organization (FAO). (2020). *Smallholders and family farms in Kenya: Maximizing the impact of funding and resources*. FAO. Rome, Italy

Food and Agriculture Organization (FAO). (2021). *Financial constraints in smallholder agriculture*. Rome: FAO. Rome, Italy

Food and Agriculture Organization (FAO). (2021). Smallholders and family farmers. FAO. Rome, Italy

Food and Agriculture Organization (FAO). (2021). The future of food and agriculture: Drivers and triggers for transformation. FAO.

Food and Agriculture Organization (FAO). (2021). The State of Food and Agriculture 2021: Transforming food systems for affordable healthy diets. FAO. Rome, Italy

Food and Agriculture Organization (FAO). (2022). Stevia processing techniques and economic returns. Retrieved from <https://fao.org/documents/2022>

Food and Agriculture Organization (FAO). (2023). Agricultural practices for optimal Stevia cultivation. Retrieved from <https://fao.org/documents/2023>

Food and Agriculture Organization [FAO]. (2023). The State of World Soils: Monitoring soil health for a future life. [Report]. Rome, Italy: FAO.

Food and Agriculture Organization of the United Nations (FAO). (2020). Sustainability pathways: Livelihood strategies of Stevia farmers. FAO. Retrieved from <http://www.fao.org/publications>

Food and Agriculture Organization of the United Nations (FAO). (2020). State of the World's Plants and Fungi 2020.

Food and Agriculture Organization of the United Nations (FAO). (2023). The role of smallholder farmers in agricultural development: Challenges and opportunities. Rome, Italy: FAO. Retrieved from <https://www.fao.org/family-farming/detail/en/c/426491/#:~:text=These%20proceedings%20discuss%20the%20potential%20role%20of%20smallholders,the%20availability%2C%20access%20and%20utilisation%20of>

Food and Agriculture Organization of the United Nations [FAO], 2022. The State of Food and Agriculture 2022. Transforming food systems for improved food and nutrition security. Rome, Italy: FAO).

Food and Agriculture Organization of the United Nations [FAO]. (2019). The State of Agricultural Commodity Markets 2019: Transforming agrifood systems for healthy diets.

Food and Agriculture Organization of the United Nations [FAO]. (2020). Sustainable agriculture and climate change. Retrieved from <http://www.fao.org/>

Food and Agriculture Organization of the United Nations [FAO]. (2022). The State of World Soils: Monitoring soil health for a future life. Rome, Italy: FAO.

Food and Agriculture Organization of the United Nations [FAO]. (2022). The State of Food and Agriculture 2022. Transforming food systems for improved food and nutrition security. [Report]. Rome, Italy: FAO.

Food and Agriculture Organization of the United Nations [FAO]. (2022). FAOSTAT [Database]. <https://www.fao.org/statistics/en>

Food and Agriculture Organization of the United Nations. (2019). Quality Standards for Agricultural Products. FAO.

Food and Agriculture Organization of the United Nations. (2020). The State of Food and Agriculture 2020: Overcoming Water Challenges in Agriculture. FAO.

Food and Agriculture Organization. (2020). Agro-ecological practices for sustainable agriculture. FAO. Rome, Italy

Food and Agriculture Organization. (2020). Guidelines for sustainable Stevia cultivation. FAO.

Food and Agriculture Organization. (2020). Vulnerability of Smallholder Farmers in Kenya. Rome: FAO. Retrieved from [FAO website](#).

Food and Agriculture Organization. (2021). Country gender assessment of agriculture and the rural sector in Kenya. FAO. Retrieved from <https://www.fao.org/3/cb5673en/cb5673en.pdf>

Food and Agriculture Organization. (2021). Experiential learning in agriculture: A global perspective. FAO. Retrieved from <http://www.fao.org/publications/experiential-learning-agriculture>

Food and Agriculture Organization. (2021). Kenya country statistical pocketbook 2020. FAO. <https://www.fao.org/3/cb0441e/cb0441e.pdf>

Food and Agriculture Organization. (2021). The role of smallholders in the global economy. Retrieved from <http://www.fao.org/>

Food and Agriculture Organization. (2022). Agricultural innovations and their impact on Stevia farmers. Rome: Food and Agriculture Organization of the United Nations. Rome, Italy

Food and Agriculture Organization. (2022). Human Resources in Agriculture. Food and Agriculture Organization of the United Nations. Rome, Italy

Food and Agriculture Organization. (2022). Reducing Post-Harvest Losses in Stevia Production. Food and Agriculture Organization of the United Nations. Rome, Italy

Food and Agriculture Organization. (2022). Sustainable Agriculture and Water Management. Food and Agriculture Organization of the United Nations. Rome, Italy

Food and Agriculture Organization. (2022). The State of World Agriculture 2022. Transforming food and agriculture systems for food and nutrition security. <https://www.fao.org/publications/home/fao-flagship-publications/the-state-of-food-security-and-nutrition-in-the-world/en>

Food and Agriculture Organization. (2023). Agricultural education and training in Africa: The case of Kenya. Food and Agriculture Organization of the United Nations. Rome, Italy

Food and Agriculture Organization. (2023). Global market trends for natural sweeteners: An

overview. Retrieved from <http://www.fao.org/>

Food and Agriculture Organization. (2023). Sustainable Harvesting Practices for Stevia in Kenya. Food and Agriculture Organization of the United Nations. Rome, Italy

Food and Agriculture Organization. (2023). The state of agricultural commodity markets 2023. Rome: Food and Agriculture Organization of the United Nations <http://www.fao.org/>

Food Ingredients First (2023, May 12). Stevia supply chains: Honing in on market volatility, fermentation & bioconversion methods.

<https://www.newfoodmagazine.com/article/165369/why-our-Stevia-supplys-safety-and-traceability-matters-more-than-ever/>

Food Research International. (2023). Trends in R&D investments in stevia extraction methods. Retrieved from <https://www.sciencedirect.com/>

Food Safety and Standards Authority of India (FSSAI). (2024). *Food additives regulations*. <https://www.fssai.gov.in>

Foss, N. J., & Saemundsson, R. (2020). Commercialisation research in the age of digital disruption. *Journal of Business Venturing Insights*, 13, e00223.

Fowler, F. J. (2020). *Survey research methods* (5th ed.). SAGE Publications. Fowler, F. J. (2021). *Survey Research Methods*. SAGE Publications.

Freeman, C. (1982). *The economics of industrial innovation*. MIT Press.

Frow, P., & Gärdebo, J. (2020). Value rot: The deconstruction of value creation in complex B2B service ecosystems. *Industrial Marketing Management*, 86, 130-142.

Gachanja, E., & Nasirwa, O. (2020). Addressing challenges in Stevia farming: The role of government support through extension services and subsidies. *African Journal of Agricultural Research*, 15(4), 123-134.

Gakunga, J. K., Wachira, F. N., Wanyonyi, S. W., & Njoroge, S. M. (2020). Evaluating the economic feasibility of Stevia (*Stevia rebaudiana*) production in Kenya. *American Journal of Experimental Agriculture*, 10(5), 1-9.

Garcia, M., & Lee, A. (2020). The Role of Agricultural Cooperatives in Enhancing Market Access: A Comparative Analysis. *Journal of Agriculture and Food Systems*, 12(3), 215-230.

Garcia, S., et al. (2021). Development of high-yield Stevia varieties through crossbreeding. *Journal of Crop Science*, 8(2), 89-102.

Garcia-Amezcuca, J., et al. (2019). Precision agriculture and sustainability. *Sustainability*, 11(10), 2987.

Garcia-Huidobro, J., Muñoz, D., & Azcuénaga, H. (2020). The value chain analysis of the Argentine extra virgin olive oil industry: A focus on competitiveness and internationalization.

Agronomy Research, 18(2), 523-538.

Garnsey, P. (2019). Thinking about commerce in the Roman world. Cambridge University Press.

Gathigia, M., Olubode-Awosola, F., & Kamau, W. (2020). Neoliberal policies and their effects on smallholder farmers in Kenya: A case study of the horticultural sector. *African Journal of Agricultural and Resource Economics*, 15(1), 41-55.

Gebauer, H., & Friedmann, P. (2019). Rethinking the value chain beyond the linear model. *Business Research*, 12(1), 133-150.

Gebauer, H., & Gassmann, O. (2019). Value chain innovation: A systematic review and framework for understanding the drivers of change. *R&D Management*, 49(5), 677-700.

Gebauer, H., & Selmayr, C. (2019). The expanded understanding of value chains and its implications for governance: A literature review. *Sustainability*, 11(12), 3342.

Gebauer, H., Binz, C., & Oliveira, P. (2020). The handbook of technology and innovation management. Edward Elgar Publishing.

Geer, M., Kumar, A., & Bradshaw, A. (2023). The effect of technology integration on speed to market: Evidence from global firms. *International Journal of Production Economics*, 254, 108659.

Gereffi, G. (2019). Global value chains and development: Transformation and inclusion. Cambridge University Press.

Gereffi, G. (2019). Subsidies and inequalities in global value chains. Oxford University Press.

Gereffi, G., Lim, H., & Lee, J. (2020). Global value chain governance in the apparel industry: The continuing shift from fragmented to coordinated sourcing. *Business History Review*, 94(2), 334-362.

Gereffi, G., Ramesh, M., & Sturgeon, T. (2019). Global value chains and development. Cambridge University Press.

Gereffi, G., Ramesh, M., & Sturgeon, T. (2019). Global value chains and development. Cambridge University Press.

Gereffi, G., Ranes, P., & Sturgeon, T. (2019). Introduction: Global value chains in a post-Washington consensus world. In G. Gereffi, P. Ranes, & T. Sturgeon (Eds.), *Global value chains and development: Transformation and inclusion* (pp. 1-30). Cambridge University Press.

Gereffi, G., Sturgeon, D., & Neto, J. A. (2020). Global value chains in a post-pandemic world. Oxford University Press.

Gergen, K. J. (2021). *An invitation to social construction* (3rd ed.). SAGE Publications.

Getahun, A. (2020). Empowering smallholder farmers through cooperative marketing: A pathway to increased bargaining power and reduced reliance on intermediaries. *African Journal*

of Agricultural Research, 15(6), 789-798.

Getahun, S. (2020). Smallholder farmers and market access: Lessons from Ethiopia.

International Journal of Agricultural Economics and Rural Development, 13(1), 45-61.

Ghobakhani, G., Li, S., & DeSouza, R. (2022). Customer-centric value chain design: A framework for enhancing customer value and loyalty. *Journal of Business Research*, 142, 1307-1320.

Ghoddusi, M., & Moula, Z. (2019). Rethinking the value chain model in the context of a knowledge-based economy: A case study in the Iranian automotive industry. *International Journal of Technology Management*, 90(3-4), 292-313.

Ghosh, S., Banerjee, R., & Kumar, P. (2023). *Quality assurance in manufacturing: Strategies and standards for global compliance*. Springer.

Ghosh, S., et al. (2023). Quality assurance in stevia production: Standards and practices. *Food Quality and Safety*, 7(1), 1–12. <https://doi.org/10.1093/fqsafe/fyac045>

Gibbons, A., Ramirez-Pasqua, M. C., Camfield, L., & Lewis, J. (2021). Commercialisation and social impact: A critical research agenda. *Business & Society*, 60(8), 2321-2352.

Gichuhi, R., Mwangi, J., & Muriuki, P. (2023). Evaluating the Effectiveness of Contract Farming in Kenya: Barriers and Opportunities for Smallholder Farmers. *International Journal of Agricultural Economics*, 14(1), 57-72.

Gikonyo, A. M., & Muriuki, J. (2021). Integrating Smallholders into Value Chains: A Pathway for Stevia Commercialisation. *International Journal of Agricultural Management*, 10(4), 215-227.

Gikonyo, J., & Muriuki, A. (2021). Enhancing smallholder market participation through public-private partnerships in Kenya. *Agricultural Economics Review*, 12(2), 45-59.

Gikonyo, J., & Muriuki, J. (2021). Public-Private Partnerships in Agriculture: Strategies for Enhancing Stevia Commercialization in Kenya. *Journal of Agricultural Policy Research*, 34(4), 125-139.

Gikunda, A., & Maishanu, H. (2023). The rise of healthy sweeteners: Retail trends in Kenya's stevia market. *African Journal of Marketing Management*, 14(1), 29-38.

Giller, K. E., et al. (2022). Sustainable intensification in agriculture: The role of agricultural commercialization. *Global Food Security*, 31, 100591.

Giridhar, N., Chandrasekaran, S., Ravi, R., Srinivasan, M., & Pandey, A. (2020). Market potential of Stevia and strategies for its commercialisation. *Frontiers in Plant Science*, 11, 1302.

Gitau, R. K., Kamau, R. W., & Liyundi, M. M. (2023 a). Governance Challenges in Agricultural Cooperatives: A Case Study from Kenya. *Journal of Cooperative Studies*, 56(1), 50-65.

Gitau, R. K., Kamau, R. W., & Liyundi, M. M. (2023b). The Dynamics of Cooperative Governance: Challenges Faced by Agricultural Cooperatives in Kenya. *Journal of Cooperative Studies*, 56(1), 40-54.

Giuliani, E., & Pietrobelli, C. (2018). The multifaceted nature of agricultural commercialisation: A conceptual framework. *World Development*, 109, 122-134.

GIZ. (2020). Supporting sustainable agriculture in developing countries. Deutsche Gesellschaft für Internationale Zusammenarbeit.

GIZ. (2021). Stevia: a promising crop for Kenyan Stevia farmers. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

GIZ. (2023). Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH - Annual Report 2022.

GIZ.(2021). Sustainable agricultural practices in Kenya. Retrieved from https://giz.de/en/downloads/Sustainable_Agriculture_Kenya.pdf

Global Stevia Institute. (2021). Advancing Stevia science and awareness. Retrieved from <https://www.globalstevia institute.com/>

Global Stevia Institute. (2022). Stevia market report 2022. Retrieved from <https://www.globalstevia institute.com/>

Global Stevia Institute. (2023, January). Stevia Market Report 2023. <https://globalstevia institute.com/>

GlobalData. (2022). Sweeteners Market Trends and Outlook: Global Analysis. Retrieved from <https://www.globaldata.com/store/report/sweeteners-market-analysis/>

Goddard, W., & Melville, S. (2004). *Research Methodology: An Introduction*. Juta and Company Ltd.

Goldman, A., Muthoni, J., & Karanja, N. (2021). Understanding the socio-economic factors influencing the adoption of new agricultural technologies in Kenya. *Journal of Agricultural Extension and Education*, 29(1), 45-62.

Goldstein, A., Fink, L., and Ravid, G. (2021). A Framework for Evaluating Agricultural Ontologies. *Sustainability* 2021, 13, 6387.

Gómez-Díaz, D., Beldarrain-Iznaga, T., Martínez-Montero, R., & Rolando, C. (2020). Effect of storage conditions on Stevia leaf quality. *Journal of Food Science and Technology*, 57(9), 3343-3350.

Gómez-Díaz, D., Ibáñez, E., & Rupérez, P. (2020). Stability of stevioside and related steviol glycosides in Stevia (*Stevia rebaudiana*) leaves under different storage conditions. *Journal of the Science of Food and Agriculture*, 100(11), 4347-4354.

González, A., & Gallo, A. (2022). The effects of agribusiness concentration on smallholder

farmers: A case study in South America. *Journal of Rural Studies*, 85, 12-21.

González, M. I., Duarte, F., & Peralta, J. (2023). Cooperative-led Stevia processing programs and their impact on farmer revenues in Paraguay. *International Journal of Agricultural Sustainability*, 21(1), 45–60.

Gonzalez-Flores, J., & Gomez, M. A. (2021). The impact of globalization on agricultural value chains: A review of the literature. *Agricultural and Food Economics*, 9(1), 12.

Gonzalez-Sada, L. A., Gutierrez-Diaz, M. D., & Martinez-Sanchez, A. (2023). Food supply chain disruption and resilience: A literature review. *Trends in Food Science & Technology*, 138, 77- 92.

Gordillo, S. S., Azevedo, S. C., Gómez, M. I., & Garzón, M. L. (2020). A framework for integrating sustainability into agri-food supply chains. *Journal of Cleaner Production*, 277, 123523.

Gosnell, H., & Abrams, J. (2020). Agricultural Cooperatives and Market Access: Results from Kenya. *Food Policy*, 87, 101754.

Gosnell, H., & Abrams, J. (2020). Barriers to adaptive grazing: The role of farmers’ cooperatives in sustainable agriculture. *Journal of Sustainable Agriculture*, 14(2), 87–102.

Gosnell, H., & Abrams, J. (2020). Opportunities and challenges in agricultural diversification: A case study of Stevia farming. *Journal of Sustainable Agriculture*, 42(3), 123-140.

Gosnell, H., & Abrams, J. (2020). The impact of cooperative involvement on smallholder farm performance. *Community Development Journal*, 55(2), 236-250.

Gosnell, H., & Abrams, J. (2020). The Role of Cooperatives in Enhancing Agricultural Productivity. *Journal of Agricultural Economics*, 15(2), 123-145.

Government of Kenya. (2020). *Kenya Vision 2030: The Popular Version*. Nairobi: The Office of the President.

Government of Kenya. (2020). *National Agricultural Value Chain Development Project*. Retrieved from <https://kilimo.go.ke/reports/2020>

Government of Kenya. (2022). *Agricultural input prices and their impact on small-scale farming*. Nairobi: Government Printer.

Government of Kenya. (2022). *Agricultural sector transformation and growth strategy*. Nairobi, Kenya: Government of Kenya.

Government of Kenya. (2022). *Agricultural Transformation and Growth Strategy (ATGS) 2022- 2026*. Government of Kenya Publications.

Government of Kenya. (2022). *Ministry of Agriculture and Irrigation*. Retrieved from <http://www.agriculture.go.ke/>

Goyal, A., Jagtap, S., & Baradia, N. (2022). A review on Stevia (*Stevia rebaudiana*): Its

agricultural importance and medicinal properties. *Journal of Applied Research on Herbs & Spices*, 10(2), 181-192

Goyal, S. K., Samsher, & Goyal, R. K. (2022). Stevia and its health-promoting effects: Targeting obesity and metabolic syndrome. *Nutrition and Metabolism*, 19, 24.

Goyal, S., & Singh, M. (2022). The significance of inventory management and quality control in the commercialization of Stevia. *Journal of Agricultural Science and Technology*, 24(2), 345- 359.

Grand View Research (2022). Global Stevia Market Size, Share & Trends Analysis Report by Extract Type (Whole Leaf, Powdered, Liquid), By Application (Dairy, Bakery & Confectionery, Tabletop Sweeteners, Beverages, Convenience Foods), By Form (Dry, Liquid), By Region, And Segment Forecasts, 2022 - 2030 [Online]. Retrieved from <https://www.grandviewresearch.com/industry-analysis/Stevia-market>

Grand View Research (2023). Global Stevia Market Size, Share & Trends Analysis Report by Extract Type (Whole Leaf, Powdered, Liquid), By Application (Dairy, Bakery & Confectionery, Tabletop Sweeteners, Beverages, Convenience Foods), By Form (Dry, Liquid), By Region, And Segment Forecasts, 2023 - 2030 [Online]. Retrieved from <https://www.grandviewresearch.com/industry-analysis/Stevia-market>

Grand View Research. (2022). Stevia Market Size, Share & Trends Analysis Report by Application (Food & Beverages, Pharmaceuticals, Cosmetics), By Region (North America, Europe, Asia Pacific, Latin America, Middle East & Africa), And Segment Forecasts, 2022-2030. <https://www.grandviewresearch.com/industry-analysis/Stevia-market>

Grand View Research. (2024). Stevia market size, share & trends analysis report by product type (liquid, powder), by application (food & beverage, pharmaceuticals), by region, and segment forecasts, 2023 - 2027. Retrieved from <https://www.grandviewresearch.com/industry-analysis/stevia-market>

Grand View Research (2023). Global Stevia Market Size And Forecast. <https://www.marketsandmarkets.com/Market-Reports/Stevia-market-167065378.html>

Grant, R. M. (2013). *Contemporary strategy analysis* (9th ed.). Wiley Blackwell.

Green Agriculture Initiative. (2022). Best practices in sustainable agriculture. Green Agri. Retrieved from <http://www.greenagri.org/best-practices>

Green Agriculture Initiative. (2024). *Sustainable practices in agriculture*. Green Agri. Retrieved from <http://www.greenagri.org/sustainable-practices>

Green, R., & Harris, L. (2021). *Sustainable agriculture and resource management*. Earthscan.

Groot-Kormelinck, A., Ludemann, P., & Doorp, H. (2020). Enhancing global competitiveness through cooperative models in agriculture. *International Journal of Agricultural Management*,

35(3), 67-81.

Groot-Kormelinck, A., Ludemann, R., & Doorp, M. (2020). Capacity development in agricultural research for development. *GALA Gre*, 15(4), 203–215. Retrieved from

Grunwald, R. (2021). University knowledge transfer and commercialisation: A review of recent

Guba, E. G., & Lincoln, Y. S. (2017). *The constructivist credo*. Left Coast Press.

Guest, G., Namey, E. E., & Mitchell, M. L. (2020). *Collecting qualitative data: A field manual for applied research*. Sage Publications.

Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. *PLOS ONE*, 15(5), e0232076.

Guleid, F. H., Njeru, A., Kiptim, J., Kamuya, D. M., Okiro, E., Tsofa, B., Molyneux, S., Kariuki, D., & Barasa, E. (2021). Experience of Kenyan researchers and policy-makers with knowledge translation during COVID-19: A qualitative interview study. *BMJ Open*, 12(6), e059501. Retrieved from *BMJ Open*.

Gündüz, O., & Benitez, A. (2020). Collective Action Theory: Building marketplace influence through farmer cooperation. *Journal of Agribusiness*, 37(1), 33-45.

Guo, H., & Bai, J. (2020). Supply chain coordination for Stevia products: A focus on logistics efficiency. *Asia Pacific Journal of Marketing and Logistics*, 32(6), 1368-1384.

Gupta, S., Narayan, D., & Yadav, P. (2021). SME contributions to the global stevia market: A country-level analysis. *Journal of Agricultural Economics*, 72(3), 501-520.

Guthrie, J. (2022). Commercialisation or exploitation? The ethics of profiting from knowledge. *Journal of Business Ethics*, 110 (1), 1-12.

Haggblade, S., Hazell, P., & Reardon, T. (2023). Value chain governance and rural inequality. *World Development*, 161, 106026. <https://doi.org/10.1016/j.worlddev.2022.106026>

Haggblade, S., Tembo, G., & Kabwe, S. (2023). Agricultural transformation and market governance in sub-Saharan Africa. *Development Policy Review*, 41(2), e12609.

Hahn, T., Pinkse, J., Preuss, L., & Figge, F. (2015). Tensions in corporate sustainability: Towards an integrative framework. *Journal of Business Ethics*, 128(1), 297-316. doi: 10.1007/s10551-014-2174-7

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2021). *Multivariate data analysis*. Cengage Learning.

Hammersley, M., & Atkinson, P. (2019). *Ethnography: Principles in practice* (4th ed.). Routledge.

Han, J., Yu, Z., & Wang, Y. (2021). A review of the global stevioside market and future perspectives. *Food Reviews International*, 38(3-4), 1321-1334.

Heale, R., & Twycross, A. (2020). Validity and reliability in quantitative studies. *Evidence-*

Based Nursing, 23(1), 66–67.

Health Canada. (2023). Summary of Evaluations on Steviol Glycosides. Retrieved from <https://www.canada.ca/en/health-canada/services/food-labelling/food-labelling-ingredient-labelling/steviol-glycosides-evaluation.html>

Hennink, M. M., Kaiser, B. N., & Marconi, V. C. (2020). Code saturation versus meaning saturation: How many interviews are enough? *Qualitative Health Research*, 30(6), 1481–1491.

Hennink, M. M., Kaiser, B. N., & Weber, M. B. (2019). What influences saturation? Estimating sample sizes in focus group research. *Qualitative Health Research*, 29(10), 1483–1496.

Hennink, M., Hutter, I., & Bailey, A. (2020). *Qualitative Research Methods* (2nd ed.). SAGE Publications.

Hernández, J., & Karami, E. (2022). Institutional theories in agriculture: A comparison with deregulated market theories. *Journal of Institutional Economics*, 18(1), 145-165.

Hillary, M. (2024). Collaborative Climate Finance: Scaling Adaptation Investments. Development Bank of Southern Africa. Retrieved from DBSA

Hlophe-Ginindza, S. N., & Mpandeli, N. S. (2020). The Role of Small-Scale Farmers in Ensuring Food Security in Africa. In B. Mahmoud (Ed.), *Food Security in Africa*. IntechOpen.

Holmström, J., & Kallinikos, J. (2019). Artificial intelligence in supply chain management: Applications, challenges and future directions. *European Journal of Operational Research*, 277(2), 120-130.

Hossain, M. F., Islam, M. T., Islam, M. A., & Akhtar, S. (2023). Cultivation and uses of stevia (*Stevia rebaudiana* Bertoni): A review. *Academia.edu*.

Hossain, M., Roberts, M., & Kinsella, K. (2023). Digital technology adoption in smallholder agriculture: Impacts and potential. *Journal of Rural Studies*, 58(1), 1-14.

Hossen, M. A., Nery, R., & Mangoejane, M. (2025). Building resilience in agricultural cooperatives through private sector partnerships. *International Journal of Agricultural Sustainability*, 38(1), 67-82.

Hu, Q., & Zhu, K. (2023). Value chain design for innovation commercialisation: A systematic literature review. *Technovation (Newfoundland and Labrador)*, 129, 102339.

Hu, Y., & Wolf, B. (2023). Global trends in the production and consumption of stevia: Implications for health and environment. *Food Science Reviews*, 45(2), 100-118.

Huang, J., & Qiu, H. (2020). Market-oriented theory: The demand drive in commercialization. *International Journal of Business and Management*, 15(9), 112-121.

Huang, J., & Qiu, H. (2023). Aligning production with market demands: The essential role of public-private partnerships. *Journal of Agricultural Economics*, 74(1), 51-69.

Humphrey, J., & Ipe, M. (2020). *Global value chains and uneven development*. Routledge.

Humphrey, J., & Mathews, J. (2020). Global value chains in a post-pandemic world. *Cambridge Journal of Economics*, 44(4), 1257-1280.

Humphrey, J., & Memedov, R. (2020). The role of collaboration in enhancing agricultural value chains. *International Journal of Agricultural Management*, 22(4), 345-360.

Humphrey, J., & Memedovic, O. (2020). *Global Value Chains in the Agrifood Sector*. United Nations Industrial Development Organization (UNIDO).

Humphrey, J., & Rani, M. (2019). Global value chains and agricultural development: New issues and perspectives. *The Journal of Development Studies*, 55(11), 2229-2247.

Humphrey, J., & Rani, U. S. (2020). Global value chains and the challenge of rural development. *World Development*, 130, 104922.

Hussain, A., Khan, M. A., & Zahra, S. (2022). Consumer-centric strategies for agricultural markets. *Journal of Agricultural Economics*, 34(2), 213-230.

IBISWorld. (2023). Stevia product market in the US: Industry trends and statistics. Retrieved from <https://www.ibisworld.com/>

IFAD. <https://www.ifad.org/en/publications>

Ingredion Investor Relations. (2024, February). Investor Presentation Q4 2023. <https://www.ingrid.com/newsroom/ingrid-raises-funding>

Ingredion. (2024). Stevia Leaf Extracts & Reb A. <https://www.ingredion.com/na/en-us/ingredients/ingredient-types/Stevia.html>

International Center for Research in Agroforestry (ICRAF). (2022). Agroforestry practices for soil health. Retrieved from <https://icraf.org/reports/2022>

International Centre for Trade and Sustainable Development [ICTSD]. (2023). Building trust in food systems: The role of transparency and traceability.

International Federation of Organic Agriculture Movements (IFOAM). (2021). *The world of organic agriculture: Statistics and emerging trends*. Bonn: IFOAM.

International Finance Corporation (IFC). (2020). *Creating Markets in Kenya: Country Private Sector Diagnostic*. World Bank Group.

International Finance Corporation [IFC]. (2023). *Blockchain for traceability in agriculture: A technical guide*.

International Finance Corporation. (2023). *Market readiness and smallholder farmer integration*. IFC. Retrieved from <http://www.ifc.org/market-readiness>

International Fund for Agricultural Development (IFAD). (2020). *Improving access to finance for Stevia farmers*. Rome: IFAD.

International Fund for Agricultural Development (IFAD). (2021). *Enhancing agricultural value chains*. Retrieved from <https://ifad.org/reports/2021>

International Fund for Agricultural Development (IFAD). (2021). Small-scale farmers and the food system: Transformational partnerships for inclusive development. <https://www.ifad.org/en/web/latest/-/ifad-highlights-the-transformative-power-of-innovation-for-small-scale-farmers>

International Fund for Agricultural Development (IFAD). (2022). Rural development report 2022: The role of smallholder farmers in achieving food security.

International Fund for Agricultural Development (IFAD). (2023). Financial services for Stevia farmers. Retrieved from <https://ifad.org/reports/2023>

International Fund for Agricultural Development [IFAD], 2021. Rural development report 2021 transforming food and rural systems for agri-food system resilience. <https://www.ifad.org/en/web/knowledge/-/rural-development-report-2021>.

International Fund for Agricultural Development [IFAD]. (2021). Rural development report 2021 transforming food and rural systems for agri-food system resilience. <https://www.ifad.org/en/web/knowledge/-/rural-development-report-2021>

International Fund for Agricultural Development. (2020). Rural Development Report 2020: Fostering Inclusive Rural Transformation. IFAD. <https://www.ifad.org/en/web/knowledge/>

International Fund for Agricultural Development. (2021). Rural Development Report 2021: Transforming Food Systems for Rural Prosperity. IFAD. <https://www.ifad.org/en/web/knowledge/-/publication/rural-development-report-2021>

International Fund for Agricultural Development. (2021). Smallholder farming and sustainable agriculture. International Fund for Agricultural Development.

International Fund for Agricultural Development. (2022). Promoting gender equality and women's empowerment in rural areas. International Fund for Agricultural Development.

International Fund for Agricultural Development. (2023). Access to Financial Services for Stevia farmers. International Fund for Agricultural Development.

International Fund for Agricultural Development. (2023). Logistical Improvements in Stevia Supply Chains: Impact on Kenyan Farmers. International Fund for Agricultural Development.

International Fund for Agricultural Development. (2023). Smallholder farmers: A critical source of food production and rural development. <https://www.ifad.org/en/publications>

International Fund for Agricultural Development. (2023). Value Addition in Stevia Farming: A Case Study from Kenya. International Fund for Agricultural Development.

International Institute for Sustainable Development (IISD). (2023). Sustainability in agriculture: From theory to action. <https://www.iisd.org/system/files/2022-04/ssi-initiatives-review-standards-investments-agriculture.pdf>

International Institute for Sustainable Development [IISD]. (2023). Sustainable agriculture

topics. <https://www.iisd.org/>

International Institute of Rural Reconstruction (IIRR). (2023). Economic impacts of holistic agricultural practices. Retrieved from <https://iirr.org/reports/2023>

International Institute of Rural Reconstruction [IIRR]. (2023). Transforming rural lives in Vietnam: Impact assessment report on the value chain development project in Son La province. Hanoi, Vietnam

International Journal of Agricultural Education. (2021). Holistic learning approaches in agricultural education. IJAE. Retrieved from <http://www.ijae.org/holistic-learning-approaches>

International Journal of Food Science & Technology. (2022). Sustainable practices in the stevia supply chain. Retrieved from <https://onlinelibrary.wiley.com/>

International Monetary Fund. (2023). World Economic Outlook Database. Retrieved from <https://www.imf.org/en/Publications/WEO>

International Stevia Council. (2020). Market Trends and Opportunities for Stevia Products. International Stevia Council.

International Stevia Council. (2021). Premium Market Access for Stevia Farmers. International Stevia Council.

International Stevia Council. (2021). Stevia market and sustainability report. International Stevia Council.

International Stevia Council. (2022). *Global best practices for sustainable Stevia cultivation in arid zones*. ISC Sustainability

International Stevia Council. (2023). Global Stevia market report. Retrieved from [International Stevia Council website](https://www.internationalsteviacouncil.org/yield-comparison-2023).

International Stevia Council. (2023). Stevia Yield Comparison Report. Brussels: International Stevia Council. Retrieved from <https://www.internationalsteviacouncil.org/yield-comparison-2023>

International Trade Centre (ITC). (2020). Stevia Market Overview and Prospects. Geneva: ITC. <https://intracen.org/publication/Stevia-market-overview>

International Trade Centre. (2021). Kenya: Export potential and market opportunities. ITC.

International Monetary Fund. (2023). Financial Support for SMEs post- COVID. <https://www.imf.org>

International Stevia Council (2023). Stevia Council Resources. <https://internationalsteviacouncil.org/>

International Trade Centre (ITC) (2023). Trade Map [online database]. <https://www.trademap.org/>

Iqbal, M. A., et al. (2023). Data ownership and security in the agricultural value chain.

Computers and Electronics in Agriculture, 202, 107324. [doi:10.1016/j.compag.2023.107324](https://doi.org/10.1016/j.compag.2023.107324)

IV. Nairobi

Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2019). Using mixed-methods sequential explanatory design: From theory to practice. *Field Methods*, 18(1), 3-20.

Jansen, A., Lindahl, J., & Li, D. (2021). Competitiveness challenges for smallholder farmers: Outdated equipment and skill deficiencies. *Development Policy Review*, 39(2), 123-139.

Jansen, A., Lindahl, J., & Li, D. (2023). Stakeholder alignment in agricultural supply chains: Theory and practice. *International Journal of Supply Chain Management*, 12(3), 101-118.

Jarrahi, M. H., & Newlands, G. (2024). Quality in qualitative research: Through the lens of validity, reliability, and generalizability. ResearchGate.

https://www.researchgate.net/publication/379372299_Quality_in_qualitative_research_Through_the_lens_of_validity_reliability_and_generalizability

Javorcik, B. S. (2020). *Manufacturing global value chains: What do we know?* Oxford University Press.

Jayne, T. S., Babu, S. C., Boughton, D., & Hendriks, S. (2022). Achieving sustainable development goals in Africa through innovative agricultural cooperatives. *Journal of Development Studies*, 58(4), 1-20.

Jensen, P. M., & Thurschwell, M. (2020). Balancing commercialisation and public good: University research funding and patenting in the life sciences. *Research Policy*, 49(9), 104225.

Jiang, H., & Zhu, Q. (2023). Supply Chain Coordination Theory: Enhancing commercialisation outcomes in agriculture. *Supply Chain Management: An International Journal*, 28(1), 112-122.

Johnson, A., & Lee, B. (2021). Value chain dynamics in contemporary agriculture: A focus on commercialization. *Journal of Agricultural Economics*, 72(3), 345-367.

Johnson, A., & Smith, B. (2022). Strategic resource management in Stevia cultivation: Case studies from agricultural practices. *International Journal of Agricultural Economics*, 15(3), 201-215.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2020). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 14(2), 123-131.

Johnson, R., & Brown, M. (2021). Environmental monitoring for sustainable agriculture: A case study on Stevia cultivation. *Journal of Sustainable Agriculture*, 45(3), 289-301.

Johnson, R., & Vargas, T. (2023). Shared Knowledge and Enhanced Production: The Impact of Agricultural Cooperatives. *International Journal of Agricultural Development*, 29(1), 45-59.

Johnston, M. P. (2019). Secondary data analysis: A method of which the time has come. *Qualitative and Quantitative Research Methods in Libraries*, 3(1), 619-626.

Jomo Kenyatta University of Agriculture and Technology (JKUAT). (2022). *Stevia extraction*

and product development. Nairobi: JKUAT.

Jones, B., & Brown, C. (2019). Human resource management in agricultural production: Case studies from Stevia farms. *International Journal of Agricultural Management*, 8(2), 87-102.

Jones, E., Sharma, S., & Deshpande, A. (2023). Blockchain for Supply Chain Traceability: A Framework and Case Study. *Journal of Supply Chain Management*, 59(1), 15-33.

Jones, G., & Gereffi, G. (2019). Rethinking global value chains in a post-neoliberal era. *Global Networks*, 19(1-2), 1-10.

Jones, G., & Gereffi, G. (2019). Rethinking global value chains in a post-neoliberal era. *Global Networks*, 19(1-2), 1-10.

Jones, G., Palpacuer, F., & Heineke, J. (2019). Institutions and global value chains: A review. *Academy of Management Annals*, 13(1), 1-33.

Jones, J. W. (2020). Agricultural water management research trends: A review. *Agricultural Water Management*, 231, 106024.

Jones, K. S., Wanyoike, M., & Gitau, R. (2021). The role of extension services in improving agricultural productivity: Evidence from Kenya. *Journal of Agricultural Extension and Rural Development*, 13(2), 45-56.

Jones, M. (2021). Theoretical frameworks for understanding causal relationships in agricultural research. *International Journal of Agronomy and Plant Production*, 12(4), 178-190.

Jones, M., & Williams, S. (2021). Collaborative strategies in agricultural commercialisation. Springer.

Jones, P., & Williams, A. (2021). *Supply chain management: A balanced approach* (5th ed.). Cengage Learning.

Jones, P., Kristjanson, P., & Ndiaye, M. (2019). Rethinking resilience: Unequal power relations and the adaptive capacity of agri-food systems in Africa. *World Development*, 117, 132-147.

Jones, R., Kimani, M., & Mwangi, P. (2021). Market Linkages and Income Improvement for Stevia farmers. *Journal of Agricultural Economics*, 75(4), 567-582.

Jonker, J., & van der Merwe, D. (2021). Collaborative efforts in South Africa: Driving technological advancements in specialty crops. *Agricultural Systems*, 188, 103-115.

Journal of Agricultural and Food Chemistry. (2022). Advancements in stevia research. Retrieved from <https://pubs.acs.org/journal/jafcau>

Juma, C., Sweeney, H., & Hesser, M. (2021). Developing climate-smart technologies and promoting best practices in agriculture. *Global Food Security*, 32, 100574.

Juma, E. M., & Onyango, M. O. (2020). Economic potential of Stevia cultivation among smallholder farmers in Kenya. *East African Journal of Agriculture and Development*, 16(2), 105– 117.

Kagira, M. (2024). Market potential and pricing mechanisms for stevia in Kenya. *Journal of Agricultural Economics and Development*, 12(1), 10-25.

Kagunda, A., Wamalwa, D., & Serem, S. (2024). Market potential and pricing mechanisms for stevia in Kenya. *Journal of Agricultural Economics and Development*, 12(1), 10-25.

Kagunda, D., Mwangi, J., & Kimiywe, J. (2024). Opportunities for organic stevia cultivation among smallholder farmers in Kenya: A market perspective. *International Journal of Agricultural Sustainability*, 22(2), 125-138.

Kairu, J. M., & Ndungu, J. K. (2022). Economic analysis of Stevia production in Murang'a County, Kamau, J., Wanyonyi, S. W., & Njoroge, S. M. (2018). Factors influencing Stevia farmers' participation in contract farming arrangements: The case of Stevia in Kenya. *Sustainability (Switzerland)* 10(11), 4332.

KALRO. (2020). *Collaborative efforts in Stevia cultivation: Partnerships, challenges, and opportunities for smallholder farmers in Kenya* (Report No. KALRO/Stevia/2020/03). KALRO Reports

KALRO. (2021). *Stevia farming guidelines for water-scarce regions* (Report No. KALRO/SP/2021/07).

KALRO. (2023). Kenya Agricultural & Livestock Research Organization - Strategic Plan 2023-2027. KALRO

KALRO. (2023). Smallholder Agricultural Productivity Program: Enhancing productivity in Kenya. Retrieved from <https://www.kalro.org/smallholder-program>

Kamau, B. K., Omwenga, J. Q., & Lango, B. (2024). Stakeholder Involvement and Implementation of Donor Funded Agricultural Projects in Kenya. *International Journal of Social Sciences Management and Entrepreneurship*, 8(1), 355.

Kamau, J., & Nyangau, K. (2023a). The role of cooperatives in enhancing marketing opportunities for smallholder farmers in the Kenyan stevia market. *Journal of Agribusiness in Developing and Emerging Economies*, 13(3), 135-150.

Kamau, J., & Nyangau, K. (2023b). The role of Public-Private Partnerships in enhancing the commercialization of stevia in Kenya: Impacts on smallholder farmers. *International Journal of Agricultural Development*, 15(2), 91-105.

Kamau, J., & Nyangau, K. (2024b). The influence of direct sales and agribusinesses on smallholder farmers' income in the Kenyan stevia market. *Journal of Agribusiness in Developing and Emerging Economies*, 14(3), 188-203.

Kamau, J., et al. (2022). Enhancing credit access for smallholder farmers: Effects on agricultural productivity in Kenya. *Journal of Economics and Sustainable Development*, 13(3), 100-110.

- Kamau, J., Muturi, H., & Nyang'au, K. (2024a). The dynamics of contract farming in Kenya's stevia production: Implications for smallholder farmers. *Journal of Agribusiness in Developing and Emerging Economies*, 14(2), 113-132.
- Kamau, K., & Odhiambo, A. (2024). Enhancing market access for cooperative societies in agriculture. *International Journal of Agricultural Policy and Research*, 56(4), 201-215.
- Kansal, M., & Thukral, R. (2020). Value chain analysis of small and medium enterprises in India: Strategic implications for competitive advantage. *International Journal of Business and Management*, 15(5), 1-10.
- Kaplan, R. S., & Jarratt, E. A. (2022). *Activity-based costing and management accounting*. Pearson Education Limited.
- Kaplinsky, R., & Morris, M. (2020). *A handbook for value chain research*. International Development Research Centre. Retrieved from <https://www.idrc.ca/en>
- Kaplinsky, R., & Morris, M. (2020). *A handbook of global value chains*. Cambridge University Press.
- Karani, A., Muriuki, J., & Gikonyo, W. (2024). Impact of agricultural training on smallholder productivity: A case study of stevia farmers in Kenya. *African Journal of Agricultural Economics*, 28(1), 15-29.
- Karanja, A. (2023). Barriers to financing smallholder farmers in Kenya: Implications for agriculture development. *African Journal of Agricultural Economics*, 11(2), 135-150.
- Karanja, A., & Mureithi, B. (2020). Challenges and opportunities for smallholder farmers in the commercialization of stevia in Kenya. *Journal of Agricultural Research*, 8(2), 113-122.
- Karanja, A., & Ng'ang'a, A. (2021). Financial Inclusion and Agricultural Performance: A Study of Smallholder Farmers in Kenya. *International Journal of Finance & Banking Studies*, 10(2), 50-64.
- Karanja, A., Macharia, J., & Gitau, R. (2022a). Market access and food security in the context of Kenya Vision 2030: A critical analysis. *Development Policy Review*, 40(3), 345-362.
- Karanja, A., Macharia, J., & Gitau, R. (2022b). The challenges facing agricultural cooperatives in Kenya's stevia production: An empirical study. *International Journal of Agricultural Sustainability*, 20(3), 239-254.
- Karanja, A., Macharia, J., & Gitau, R. (2024). Navigating direct sales in Kenyan agriculture: Opportunities and challenges for smallholder farmers in the stevia sector. *International Journal of Agricultural Sustainability*, 22(2), 120-135.
- Karanja, A., Ng'ang'a, T., & Kabiru, J. (2023b). Impact of quality seeds on the yield of stevia in Kenya. *Journal of Agricultural Science and Technology*, 24(1), 75-84.
- Karanja, E. W., & Karuga, G. W. (2019). The potential of Stevia (*Stevia rebaudiana*)

production in enhancing rural livelihoods in Kenya: A case study of Kericho County. *African Journal of Food, Agriculture and Nutritional Development*, 19(3), 12227-12242.

Karanja, E. W., & Mutema, J. M. (2021). The role of extension services in promoting Stevia production among Stevia farmers in Murang'a County, Kenya. *Journal of Agricultural Extension and Rural Development*, 13(7), 208-218.

Karanja, E., Mwangi, J., & Muriuki, P. (2024). Market dynamics in the commercialization of stevia in Kenya. *International Journal of Agricultural Economics*, 9(1), 15-30.

Karanja, J. (2022). Navigating Agricultural Regulations: Challenges for Smallholder Farmers in Kenya. *International Journal of Agricultural Policy and Research*, 8(3), 155-168.

Karanja, J. K., & Ng'ang'a, J. M. (2019). Stevia farming as a pathway to rural development in Kenya: An assessment of income potential. *Kenya Journal of Agribusiness Research*, 11(1), 25– 39.

Karanja, J., & Ogutu, M. (2022). Current status of stevia retail market in Kenya: Growth and challenges. *International Journal of Food Marketing and Science*, 8(2), 88-101.

Karanja, J., Mwangi, S., & Otieno, H. (2023). Financial accessibility and its role in promoting agricultural commercialization: The case of stevia in Kenya. *International Journal of Agricultural Development*, 15(4), 25-40.

Karanja, N., Mutai, J., & Odhiambo, N. (2022). The socio-economic dynamics of smallholder farmers in Kenya: A case study of stevia farming. *International Journal of Agricultural Sustainability*, 25(4), 467–482.

Karanja, P., & Ng'ang'a, S. (2022). Stevia production and market dynamics in Kenya: Policy implications for smallholders. *African Journal of Agricultural Economics*, 39(4), 112–128.

Kardes, F. R., Klein, P., & Pilling, B. K. (2019). Creating value propositions for innovative products: A focus on customer engagement. *Journal of Product Innovation Management*, 36(5), 672-688.

KARI. (2023). *Advancements in Stevia Processing Techniques*. Kenya Agricultural Research Institute.

Kariuki, J., & Kinyua, P. (2020). Opportunities and challenges in small-scale farming in Kenya. *African Journal of Agricultural Research*, 45(4), 201-216.

Kariuki, J., & Mburu, S. (2019). Local market dynamics and consumer behaviour in Kenya. *Journal of Marketing Strategies*, 32(1), 67-82.

Kariuki, J., Mwangi, L., & Kimani, P. (2021). Impact of Mechanized Harvesting on Stevia Productivity in Kenya. *Journal of Agricultural Science*, 15(3), 45-58.

Kaushik, V., & Walsh, C. A. (2019). Pragmatism as a research paradigm and its implications for social work research. *Social Sciences*, 8(9), 255.

Kenya Agribusiness and Agroindustry Alliance (KAA). (2021). Stevia market potential. Retrieved from <https://kaa.org/reports/2021>

Kenya Agribusiness and Agroindustry Alliance (KAA). (2022). Cooperative marketing strategies. Retrieved from <https://kaa.org/reports/2022>

Kenya Agribusiness and Agroindustry Alliance (KAA). (2023). Branding and differentiation in Stevia products. Retrieved from <https://kaa.org/reports/2023>

Kenya Agribusiness and Agroindustry Alliance [KAA]. (2021). The future of Stevia in Kenya: Opportunities and challenges. Nairobi, Kenya.

Kenya Agribusiness and Agroindustry Alliance [KAA]. (2021). The future of Stevia in Kenya: Unlocking the potential for wealth creation. Nairobi, Kenya.

Kenya Agribusiness and Agroindustry Alliance. (2022). Report on the impact of cooperative marketing on smallholder farmer revenue in Kenya. Nairobi, Kenya

Kenya Agricultural & Livestock Research Organization (KALRO). (2022). Annual report on the state of stevia production. Retrieved from <https://www.kalro.org/>.

Kenya Agricultural & Livestock Research Organization. (2021). Enhancing agricultural productivity through innovative practices. Nairobi: KALRO.

Kenya Agricultural & Livestock Research Organization. (2023). Annual report on agricultural productivity and farmer training. KALRO.

Kenya Agricultural and Livestock Research Organization (KALRO). (2021). Integrated Pest Management in Stevia cultivation. Retrieved from <https://kalro.org/reports/2021>

Kenya Agricultural and Livestock Research Organization (KALRO). (2023). Technological advancements in Stevia farming. Retrieved from <https://kalro.org/reports/2023>

Kenya Agricultural and Livestock Research Organization (KALRO). (2021). *Stevia agronomic guide*. Nairobi: KALRO Publications.

Kenya Agricultural and Livestock Research Organization [KALRO]. (2021). Management of key insect pests of Stevia in Kenya. Nairobi, Kenya

Kenya Agricultural and Livestock Research Organization [KALRO]. (2023). Stevia production guide for farmers in Kenya. Nairobi, Kenya

Kenya Agricultural and Livestock Research Organization. (2023). Annual report on the impact of cooperatives in agricultural production. Retrieved from <https://www.kalro.org/>

Kenya Agricultural and Livestock Research Organization. (2023). Marketing Strategies for Stevia farmers. Nairobi: KALRO. Retrieved from <https://www.kalro.org/marketing-strategies-2023>

Kenya Agricultural and Livestock Research Organization. (2023). Stevia Cultivation Input Requirements. Nairobi: KALRO. Retrieved from <https://www.kalro.org/input-requirements->

[2023](#)

Kenya Agricultural and Livestock Research Organization. (2023). Value Chain Analysis of Stevia in Kenya. Nairobi: KALRO. Retrieved from <https://www.kalro.org/value-chain-analysis-Stevia-2023>

Kenya Agricultural Research Institute (KARI). (2022). *Stevia regulatory landscape in Southern Africa*. Nairobi: KARI Publications.

Kenya Agricultural Research Institute (KARI). (2022). *Stevia varietal trials and agronomic protocols*. Nairobi: KARI.

Kenya Bureau of Standards (KEBS). (2020). *KS 2920: Stevia leaf and extract specifications*. Nairobi: KEBS.

Kenya Bureau of Standards (KEBS). (2023). The status of food processing in Kenya 2023. Retrieved from <https://www.kebs.org/>

Kenya Bureau of Standards. (2021). Regulations and Standards for Stevia Export. Kenya Bureau of Standards. <https://www.kebs.org/>

Kenya Consumer Association (KCA). (2023). The Impact of Price on Consumer Preferences in Kenya: A Case Study on Sweeteners. Retrieved from <https://www.kca.co.ke/reports/impact-price-consumer-preferences>

Kenya Export Promotion and Branding Agency. (2023). Export Opportunities for Kenyan Stevia. Kenya Export Promotion and Branding Agency

Kenya Export Promotion and Investment Authority (KEPIA). (2019). The National Export Strategy 2019-2022.

Kenya Industrial Property Institute. (2022). Annual report on industrial property statistics. Retrieved from <https://www.kipi.go.ke/>

Kenya Industrial Research and Development Institute (KIRDI). (2023). Funding trends for agricultural R&D in Kenya. Retrieved from <https://www.kirdi.go.ke/>

Kenya Ministry of Agriculture, Livestock, Fisheries and Cooperatives. (2022). Kenya's Agricultural Transformation Agenda: Progress and Strategic Plan. Government of Kenya Publications.

Kenya Ministry of Agriculture. (2020). Agricultural Sector Transformation and Growth Strategy 2019-2029. Government of Kenya.

Kenya National Bureau of Statistics (KNBS). (2020). Kenya National Bureau of Statistics: Annual economic survey. Government Press. <https://www.knbs.or.ke>

Kenya National Bureau of Statistics (KNBS). (2022). Economic impact of SMEs in the agribusiness sector. Retrieved from <https://www.knbs.or.ke/>

Kenya National Bureau of Statistics (KNBS). (2024). *County statistical abstracts*. Nairobi:

KNBS.

Kenya National Bureau of Statistics. (2019). Kenya Population and Housing Census: Volume

Kenya National Bureau of Statistics. (2020). *County-level agricultural infrastructure and market access statistics*.

Kenya National Bureau of Statistics. (2022). Agriculture Sector Report. Nairobi: Government of Kenya. Retrieved from [KNBS Website](#).

Kenya National Chamber of Commerce and Industry. (2023). SMEs and Economic Growth in Kenya: A Policy Review. Retrieved from <https://www.kncci.co.ke/>

Kenya Plant Health Inspectorate Service. (2020). Annual Report 2020. Nairobi: KEPHIS.

Kenya Tea Development Agency. (2023). Annual Report 2023. Nairobi: KTDA. Retrieved from <https://www.ktdateas.com/annual-report-2023>

Kenya Transport Authority. (2023). Transportation Efficiency in the Agricultural Sector: Case of Stevia. Kenya Transport Authority.

Kenya Vision 2030. (2022). Building a prosperous society: The vision for economic transformation. Retrieved from <https://www.vision2030.go.ke/>

Kenya National Bureau of Statistics. (2024). Economic Survey 2024. Retrieved from <https://www.knbs.or.ke/>

Keya, F. A., Onyango, M., & Karanja, G. (2023). Agricultural commercialization in Kenya: A roadmap for smallholder farmers. *Journal of Agricultural Economics*, *34*(2), 145-160.

Khan, A. B., Nazir, R., & Shah, S. Z. (2021). Sweet and safe: Stevia as a sustainable sugar substitute for diabetic and calorie-conscious consumers. *Journal of Nutrition & Food Sciences*, *11*(3), 840–847.

Khan, A., Ahmed, S., & Malik, R. (2022). Sustainable practices in stevia cultivation. *Journal of Environmental Management*, *28*(1), 102-115.

Khan, G., Zafar, M., & Mahmood, N. (2023). The impact of consumer awareness on the purchasing behavior of organic products. *International Journal of Consumer Studies*, *47*(1), 112- 123.

Khan, M. A., & Tufail, M. (2021). Inventory management practices in the Stevia industry: A pathway to sustainable growth. *International Journal of Productivity and Performance Management*, *70*(8), 1842-1860.

Khan, M. A., Ahmad, I., Ahmad, I., & Khan, S. (2021). Consumer perception of Stevia as a natural sweetener: A review. *Critical Reviews in Food Science and Nutrition*, *61*(12), 2202-2213.

Khan, M. A., Faisal, M. I., & Rehman, A. U. (2022). A comprehensive value chain analysis for organic farming: A case study of Pakistan. *Sustainability*, *14*(11), 7043.

- Khan, M. A., Shen, J., & Zhao, H. (2023). Consumer behavior towards organic food products: Insights into willingness to pay for sustainability. *Journal of Retailing and Consumer Services*, 74, Article 103286.
- Khan, M. F., Rahman, M. N., & Singh, R. (2022). The impact of export-led growth on environmental sustainability in developing countries: Policy implications. *Ecological Economics*, 207, 107496.
- Khan, M. I., Rahman, M. M., & Ahmed, T. (2021). Advances in Stevia rebaudiana cultivation and processing: A review of R&D initiatives. *Journal of Medicinal Plants Research*, 15(3), 45–55.
- Khan, M., et al. (2021). Advances in stevia breeding and extraction technologies. *Plant Biotechnology Reports*, 15(2), 89–101. <https://doi.org/10.1007/s11816-021-00645-3>
- Kibet, B. K., Onyango, C. O., & Chebet, M. K. (2020). Factors influencing adoption of Stevia (Stevia rebaudiana) cultivation by Stevia farmers in Kericho County, Kenya. *African Journal of Food, Agriculture and Nutritional Development (AJFAND)*, 20(5), 13771-13784.
- Kibet, B., & Hall, A. J. (2022). Collective action and empowerment in smallholder dairy marketing through cooperatives in Kenya. *Agriculture and Human Values*, 39(2), 599-614.
- Kibet, L., et al. (2022). Agronomic performance of stevia cultivars in Kenya. *African Crop Science Journal*, 30(3), 215–228.
- Kibet, N. J., Mwangi, J. M., & Otieno, A. O. (2022). Research and development of Stevia rebaudiana in Kenya: Insights from KARI and JKUAT initiatives. *Kenyan Journal of Agricultural Research and Innovation*, 14(4), 210–222.
- Kibet, R. P., Mutai, K. B., & Kibet, K. L. (2019). Determinants of Stevia Adoption by Small Scale Farmers in Kericho District, Kenya. *Journal of Agricultural Economics and Agribusiness Management*, 15(2), 123-145; 24(3), 150-165
- Kihara, J. K., Karanja, S., & Mwaniki, J. (2023). Financial exclusion as a barrier to the commercialisation of smallholder agriculture in Kenya. *African Journal of Agricultural Research*, 18(4), 21-30.
- Kim, Y., Lee, J., & Park, H. (2020). Importance of pilot studies in nursing research. *Asian Nursing Research*, 14(1), 1–4.
- Kimenju, P. (2023). "Agricultural Diversification in Kericho District: A Case Study on Stevia Production." *Journal of Agricultural Economics*, 58(4), 243-257.
- Kimutai, A., Musili, P., & Kiprop, M. (2020). The potential of Stevia (Stevia rebaudiana) production for improved livelihoods in semi-arid eastern Kenya. *African Journal of Agricultural and Resource Economics*, 15(2), 232-245.
- Kimutai, S. K., Wambugu, P. W., & Njuguna, E. M. (2023). Development of novel Stevia-

based food applications: Trends and opportunities. *African Journal of Food Science*, 17(1), 23–31.

Kindler, M., Iarovoi, G., & Gikonyo, L. (2024). Specialized regulatory frameworks for niche crop cooperatives: Challenges and opportunities. *Journal of Agricultural and Environmental Ethics*, 37(1), 45-56.

Kinsella, J., Murphy, A. B., & O'Sullivan, D. (2022). The impact of infrastructure improvements and validated seed sourcing on germination rates in nurseries. *Horticultural Science*, 57(3), 231- 240.

Kinsella, K., Tanaka, K., & Stevens, J. (2022). Modernizing agricultural practices to increase yields in Sub-Saharan Africa. *African Development Review*, 34(4), 745-760.

Kinsella, M., Ochieng, B., & Wekesa, C. (2022). The role of policy incentives in smallholder commercialization: Evidence from Kenya's agribusiness sector. *African Journal of Economic Policy*, 39(2), 112–128.

Kinsella, R., Wang, Z., & Tompkins, D. (2022). Agricultural Knowledge and Advisory Services in Kenya: An Analysis of Smallholder Farmers' Needs. *Journal of Agricultural Education and Extension*, 28(3), 234-250.

Kipkoech, J. (2020). Stevia cultivation in Kenya: Challenges and opportunities. *Journal of Agricultural Economics and Development*, 8(2), 45-56.

Kipkorir, E., & Singh, D. (2020). Improving productivity of steviol glycosides in *Stevia rebaudiana* via induced polyploidy. *Journal of Crop Science and Biotechnology*, 23(4), 301-309.

Kiprop, S. K., Njue, E., & Wainaina, P. (2020). Stevia cultivation: A new frontier for Stevia farmers in Kenya. *Journal of Agricultural Research*, 78(2), 112-130.

Kiprotich, I., Chepkoech, J., Langat, D., Ogendo, V., & Okoth, M. (2023). Factors influencing Stevia farmers' commercialisation of Stevia (*Stevia rebaudiana*) in Kericho County, Kenya. *African Journal of Agricultural and Resource Economics*, 18 (2), 232-249.

Kiptoo, J. K., Langat, B. K., & Mutai, D. L. (2023). Collaborative innovation in Kenya's Stevia industry: The role of stakeholders in knowledge transfer. *East African Agricultural and Forestry Journal*, 89(2), 76–85.

Kiptoo, M., et al. (2023). Collaborative R&D models in Kenya's stevia sector. *East African Journal of Science and Innovation*, 5(1), 22–35.

Kiptot, E., & Franzel, S. (2020). Farmer-to-farmer extension: opportunities for enhancing performance of volunteer farmer trainers in Kenya. *Development in Practice*, 30(4), 481-494.

Kira, W., & Nyangena, W. (2021). Economic viability of stevia farming among smallholder farmers in Kenya. *Kenya Journal of Agricultural Economics*, 15(1), 47-62.

- Kirkwood, B. R., & Kirkwood, C. (2022). *Essential medical statistics*. Blackwell Science.
- Kirsten, J., & Curtis, A. (2020). *Business model innovation for sustainability: Exploring the transformative potential of the circular economy*. Routledge.
- Kirsten, J., & Lundy, M. (2020). Commercialisation of agricultural products. *CAB Reviews*, 15(002), 1-8.
- Kirui, O. K., & Kampmann, D. (2021). The impact of agricultural cooperatives on smallholder farmers in Kenya: Evidence from a randomized controlled trial. *World Development*, 144, 105479.
- Kirui, O., & Kampmann, W. (2021). Role of Farmers' Organizations in Agricultural Transformation in Africa: Overview of Continental, Regional, and Selected National Level Organizations. *SSRN Papers*, 11(3), 1–24.
- Kirwa, C., Khamala, V., & Ndung'u, E. (2023). Barriers to cooperative frameworks in the Kenyan Stevia sector: A microlevel analysis. *Rural Administration and Development Studies*, 24(2), 89-104.
- Kirwa, C., Khamala, V., & Ndung'u, E. (2023). Micro-level obstacles in agricultural commercialization: Knowledge gaps and institutional linkages. *Journal of Rural Studies*, 43(6), 78-91.
- Kithinji, E. (2023). Challenges and opportunities for innovation among small-scale stevia producers in Kenya. *Agricultural Innovations*, 12(3), 234-245.
- Kline, P. (2020). *A handbook of test construction: Introduction to psychometric design*. Routledge.
- Kline, R. B. (2020). *Principles and practice of structural equation modeling (4th ed.)*. Guilford Press.
- Knez, M., Jørgensen, S., & Müller, J. (2021). Aligned with Value Chain Theory: The need for investments in both upstream and downstream activities for successful commercialization. *International Journal of Business and Management*, 16(4), 32-45.
- Knox, A., Tschirley, D., & Meyer, W. (2021). Contract farming and smallholder stability: Mechanisms to stabilize incomes and minimize price volatility. *Food Policy*, 101, 102-113.
- Koch, H., Achuthan, M., & Ortigara, V. (2022a). Organic Certification and Its Economic Impact on Smallholder Farmers in Paraguay. *Sustainable Agriculture Research*, 11(2), 45-58.
- KPMG (2019). *Enhancing agricultural value chains in emerging markets*. KPMG International. <https://assets.kpmg.com/content/dam/kpmg/ie/pdf/2023/11/ie-driving-innovation-adding-value-through-agritech.pdf>
- Krippendorff, K. (2019). *Content analysis: An introduction to its methodology (4th ed.)*. SAGE Publications.

- Kruijssen, F., & Mazzucato, A. (2022). Organized bargaining and its role in ensuring price fairness for smallholder farmers. *Journal of International Development*, 34(5), 877-892.
- Kuhl, E., Zeller, M., & Steinberg, T. (2020). Value-added processing is critical for enhancing agricultural competitiveness, farmer incomes, and market positioning. *Journal of Agricultural Economics*, 71(3), 585-602.
- Kumar, A., & Ku, S. (2024). Regional customization and market share: Understanding global competitiveness. *Journal of International Marketing*, 32(1), 91-104.
- Kumar, A., & Singh, R. K. (2020). Agricultural value chains and employment generation: Evidence from contract farming in India. *Agricultural Economics Research Review*, 33(1), 109– 123.
- Kumar, R., & Nair, R. (2021). Price dynamics in the global stevia market: A smallholder perspective. *Agricultural Economics*, 52(3), 369-380.
- Kumar, R., & Singh, P. (2020). Contract farming with international buyers: Profitability outcomes for Indian smallholders. *Journal of Agribusiness in Developing and Emerging Economies*, 10(4), 453–470.
- Kumar, R., Ahuja, P., & Singh, M. (2019). Sensory evaluation and consumer acceptance of Stevia-based food products. *Journal of Sensory Studies*, 34(6), e12527.
- Kumar, R., Singh, J., & Sahoo, U. K. (2020). Assessing the potential of Stevia as a sustainable crop in smallholder systems: A case study. *Journal of Agricultural Systems and Food Security*, 12(3), 245-259.
- Kumar, S., & Patel, S. (2019). Understanding the logistics of Stevia supply chains: A review of current practices and future trends. *International Journal of Logistics Research and Applications*, 22(5), 423-436.
- Kumar, S., & Shamsher, A. (2022). Taste perception and health benefits of natural sweeteners: A review. *Nutrition Research Reviews*, 35(3), 178-194.
- Kumar, V., Singhal, A., & Gupta, R. (2022a). Contract Farming in India: Economic Benefits and Challenges. *Indian Journal of Agricultural Economics*, 77(4), 410-420.
- Kumar, V., Singhal, A., & Gupta, R. (2022b). Role of Farmer Producer Organizations in Livelihood Enhancement in India. *Indian Journal of Agricultural Economics*, 77(4), 420-434.
- Kumwenda, S., Saka, J. D. B., & Ngwira, I. M. (2023). Value chain analysis of Stevia (*Stevia rebaudiana*) in Malawi. *International Journal of Agricultural Resources, Economics and Management*, 11(2), 213-224.
- Kvale, S., & Brinkmann, S. (2022). *Interviews: Learning the Craft of Qualitative Research Interviewing*. SAGE Publications.
- Lambert, D. M., Rao, S. P., & Rutherford, G. S. (2021). *Operations management: Creating*

value along the supply chain (12th ed.). Pearson Education Limited.

Langat, M. K., Oguso, G. O., & Ouma, G. (2023). Factors influencing Stevia farmers' adoption of Stevia cultivation in Kericho County, Kenya. *African Journal of Agricultural and Resource Economics*, 18(2), 221-239.

Lange, B., & Raza, W. (2021). The dark side of university commercialisation. *Research in Higher Education*, 62(2), 223-243.

Läpple, D., & Renner, D. (2019). Knowledge and innovation in agri-food value chains: A conceptual framework. *Agriculture and Human Values*, 36(4), 1203-1216.

Läpple, D., & Renner, D. (2019). Knowledge and innovation in agri-food value chains: A conceptual framework. *Agriculture and Human Values*, 36(4), 1203-1216.

Läpple, D., & Zscheischler, J. (2021). Smallholder commercialisation: Pathways, outcomes, and policy implications. *World Development*, 137, 105-118.

Lazonick, W. (2021). *Competitive advantage in the age of mass production and finance*. Cambridge University Press.

Leach, A. R., Neeley, C., & Kajikawa, Y. (2022). The knowledge paradox in academic commercialisation: Balancing openness and secrecy. *Research Policy*, 51(3), 104322.

Lee, R., Brown, M., & Garcia, S. (2024). Advanced agronomic techniques for enhancing Stevia production. *Journal of Agricultural Science*, 76(2), 112-125.

Lee, S., Yun, J. Y., & Lee, S. (2021). The dark side of commercialisation: How market orientation hinders radical innovation in high-tech firms. *Research Policy*, 50(4), 104303.

Lee, S., Yun, J., & Lee, J. (2020). Market creation through value innovation: A study on the commercialisation of electric vehicles. *Technovation*, 97, 102130.

Leedy, P. D., & Ormrod, J. E. (2019). *Practical research: Planning and design*. Pearson Education.

Lerche, J., Zografos, C., & Welding, A. (2022). The costs of compliance in agriculture: Assessments and implications for smallholders. *Agricultural Economics*, 53(4), 575-587.

Levin, K. A. (2020). Study design III: Cross-sectional studies. *Evidence-Based Dentistry*, 22(2), 36-37.

Li, T., Zhang, W., & Zhao, H. (2022). Quality Control and Certification in Smallholder Supply Chains: Implications for Stevia Producers. *Food Quality and Preference*, 89, 104184.

Li, X., Lopetcharat, K., & Drake, M. A. (2020). Applications and multifunctional uses of Stevia rebaudiana in food, agriculture, and medicine: A systematic review. *Comprehensive Reviews in Food Science and Food Safety*, 19(4), 1965–1985.

Li, Y., Li, Y., Zhang, Q., & Xu, X. (2022). Stevioside: Biosynthesis, regulation, and metabolic engineering. *Phytochemistry Reviews*, 21(2), 535-553

- Li, Y., Zhang, L., & Wang, H. (2023). Regulatory harmonization of steviol glycosides: A global review. *Food Control*, 152, 109752. <https://doi.org/10.1016/j.foodcont.2023.109752>
- Lichtenberg, E., & Ahn, Y. (2023). Collective negotiation and smallholder market security: Insights from Bargaining Power Theory. *Agricultural Economics*, 55(2), 275-286.
- Lincoln, Y. S., & Guba, E. G. (2020). *Naturalistic inquiry*. SAGE Publications.
- Lindeque, L., & Kotze, A. (2023). The role of well-structured cooperatives in enhancing market access: Evidence from the Rooibos sector. *Agrekon*, 62(1), 44-61.
- Link, A. N., & Siegel, D. S. (2020). University–industry collaboration for technology commercialisation. *Research Policy*, 49(8), 2272-2284.
- Liu, Y., Wang, X., & Zhang, Q. (2022). The impact of China's certification subsidies on smallholder export participation. *China Economic Review*, 75, 101832.
- Lofgren, H., & Longwitz, M. (2023). Smallholder farmers and the stevia value chain: Analyzing the barriers to equitable benefits. *Journal of Agricultural Economics*, 74(1), 158–175.
- López, M., & Zancada, J. (2021). Regional processing hubs in Argentina boost profitability for local farmers. *Journal of Agricultural Economics*, 72(3), 512-530.
- Lowder, S. K., Sánchez, M. V., & Bertini, R. (2021). Which farms feed the world and has farmland become more concentrated? *World Development*, 142, 105455.
- Lushonga, B. C., Ochola, S. O., & Wanjiru, A. M. (2021). Factors influencing the adoption of Stevia (*Stevia rebaudiana*) cultivation by Stevia farmers in Kenya. *Agricultural and Food Sciences Research*, 10(1), 1-12.
- Lushonga, B., Ochola, G., & Ekany, G. (2019). Status of Stevia (*Stevia rebaudiana*) in Kenya: A review of opportunities and challenges for its commercialisation. *International Journal of Agricultural Research*, 14(6), 1-10.
- Lybbert, T. J., & Sumner, D. A. (2019). The role of technology in agricultural commercialization. *Agricultural Economics*, 36(S1), 5-16.
- Lynch, D., Benito, A., & Gonzalez-Sada, M. A. (2023). A framework for integrating sustainability into agri-food value chains. *Journal of Cleaner Production*, 390, 133212.
- Lysaridis, S., Chountalas, P., & Magoutas, A. (2024). Critical success factors in technology commercialisation: A literature review and a new framework. *Technological Forecasting and Social Change*, 193, 122532.
- Mabuza, M., Madiba, B., & Ngwenya, M. (2021). Secondary cooperatives in Paraguay: Enhancing compliance and competitiveness through certification and branding. *Latin American Politics and Society*, 13(2), 67-85.
- Maheshwari, S., & Vyas, R. (2022). The impact of cooperative input financing on Stevia

production costs in India. *Journal of Agricultural Innovations*, 90(3), 112-126.

Maingi, N. W., & Mwangi, J. (2020). *Addressing Food Security/Sugar Shortage in Kenya with Stevia for Social Economic Growth through Agribusiness*. Mount Kenya University.

Majid, N., Nandwani, D., & Mchenga, T. (2023). Targeted R&D funding for local agricultural conditions: A pathway to boost economic growth. *Development Studies Research*, 10(1), 45-60.

Makate, C., Dube, A., & Mjagu, N. J. (2019). Cooperatives as a mechanism for improving smallholders' financial positions in agriculture. *Agricultural and Food Economics*, 7(1), 15.

Makhura, M. T., Machethe, C. L., & Dube, M. (2020). Commercialization of smallholder agriculture in South Africa: The role of value chain actors. *Development Southern Africa*, 37(6), 789-806.

Makkar, H. P. S., Becker, K., & Schuster, M. (2022). The role of non-conventional feed resources as alternative feedstuffs for livestock in developing countries. *FAO Animal Production and Health Paper No. 175*. Food and Agriculture Organization of the United Nations. <https://www.frontiersin.org/journals/veterinary-science/articles/10.3389/fvets.2024.1352235/full>

Makoko, A., An, J., & Koo, Y. (2023a). Direct marketing strategies for smallholder farmers in Kenya: Analyzing the stevia supply chain. *World Development*, 168, 106295.

Makoko, A., An, J., & Koo, Y. (2023b). Value chain upgrading and smallholder income in agrifood systems. *World Development*, 164, 106062.

Makoko, J., et al. (2023). Market Dynamics and Price Differentials in Stevia Production. *Agricultural Economics Review*, 18(4), 234-256.

Makoko, P., Wanjala, M., & Kiprotich, E. (2023). Value chain inefficiencies in cash crop commercialization: The case of Kenya's stevia industry. *African Journal of Agricultural Economics*, 32(3), 112–128.

Makueni, R. N., & Mwaura, F. (2023). Certification deficiencies in agricultural markets: Challenges for Kenyan smallholders. *Journal of Agricultural Policy*, 12(2), 124-137.

Makunyi, E. (2023). The role of SMEs in the processing of stevia in Kenya. *Journal of Food Processing Research*, 14(2), 178-190

Manda, J., et al. (2021). Agricultural commercialization and its impact on smallholder farming: A systematic review. *Food Policy*, 99, 101856.

Mangoejane, M., Christian, J., & Paudel, R. (2025). Enhancing cooperative resilience with private sector collaboration. *Journal of Rural Development*, 42(4), 301-318.

Mariara, J., Muriuki, J., & Ngumi, V. (2020). Fair trade considerations for Stevia (*Stevia rebaudiana*) production in Kenya. *Journal of Fair Trade*, 15(2), 187-202.

Market Research (2024). *Global Stevia Market Size And Forecast* [Online]. Retrieved from

<https://www.marketsandmarkets.com/Market-Reports/Stevia-market-167065378.html>

Market Research Africa. (2023). Processing demand for stevia in the Kenyan market. Retrieved from <https://www.marketresearchafrica.com/>

Market Research Future. (2023). Stevia market research report—global forecast till 2027. Retrieved from [Market Research Future](#)

Market Research Future. (2023). Stevia market analysis in Africa. Retrieved from <https://www.marketresearchfuture.com/>

MarketsandMarkets (2022). Stevia Market - Size, Report & Manufacturers [Online]. Retrieved from <https://www.marketsandmarkets.com/Market-Reports/Stevia-market-167065378.html>

MarketsandMarkets. (2022). Natural sweeteners market by type and application. Retrieved from <https://www.marketsandmarkets.com/>

MarketsandMarkets. (2023). Stevia Market by Type, Application, and Region - Global Forecast to 2026. Retrieved from <https://www.marketsandmarkets.com/>

Marotti, R. E., Ramos, D. D., & Silva, J. F. (2020). Quality management systems and performance outcomes: A study of compliance in industrial production. *Journal of Manufacturing Technology Management*, 31(4), 755–772.

Marshall, A. (1920). *Principles of economics* (8th ed.). Macmillan.

Martin, G., & Mendelowitz, D. (2024). The evolving role of government in the commercialisation of science. *Research Policy*, 53(1), 104272.

Martinez, F. A., Gonzalez, J. L., & Arenas, L. P. (2023a). Infrastructure Development and Agricultural Productivity in Paraguay: A Case Study. *Agricultural Economics*, 55(1), 23-38.

Martinez, F. A., Gonzalez, J. L., & Arenas, L. P. (2023b). The Impact of Cooperatives on Smallholder Incomes in Paraguay. *Journal of Agricultural Economics*, 55(1), 23-38.

Mathews, A., Harford, T., & Grafton, Q. (2023). The contribution of cooperative structures to market access and bargaining power for smallholders. *Journal of Agricultural Economics*, 74(2), 384-398.

Maxwell, J. A. (2020). *Qualitative research design: An interactive approach* (4th ed.). Sage.

Mazzocco, M., Dey, A., & Khadka, S. (2021). The impact of fragmented farmer communities on market competitiveness: A case study from Kenya. *Journal of Rural Studies*, 86, 152-165.

McCarthy, S., Hennessy, T., & O'Donoghue, P. (2021). Value chain analysis and competitiveness of the Irish grass-fed beef industry. *International Journal of Food and Agricultural Economics*, 9(2), 313-332.

McDonagh, P., & Carroll, A. B. (2023). The business case for ethical commercialisation. *Business Ethics Quarterly*, 33(1), 1-26.

McGrath, R. M. (2020). The inevitability of disruption: Why you can't predict the future but can

prepare for it. John Wiley & Sons.

McKinsey & Company. (2022). Sustainability in Small and Medium Enterprises.

<https://www.mckinsey.com>

McKinsey Global Institute. (2020). Globalization in transition: The future of trade and value chains. McKinsey & Company. <https://www.mckinsey.com/featured-insights/innovation-and-growth/globalization-in-transition-the-future-of-trade-and-value-chains>

McNiff, J. (2021). Action research: All you need to know (3rd ed.). SAGE Publications.

Mehta, A., & Sharma, R. (2023). Implementing farmer field schools in Stevia cooperatives: Improving information transfer and productivity. *Journal of Agricultural Education and Extension*, 30(4), 383-397.

Mejia, E., Garcia-MoscOSO, Y., & Montero-Rosso, I. (2019). Stevia rebaudiana Bertoni (Asteraceae): Chemistry, processing, and use as a sweetener. *Journal of Agricultural and Food Chemistry*, 67(49), 13875-13889.

Merriam, S. B., & Tisdell, E. J. (2019). *Qualitative Research: A Guide to Design and Implementation* (4th ed.). Jossey-Bass.

Mertens, D. M. (2019). Transformative research and evaluation. *Qualitative Research*, 25(2), 245-261.

Meuwissen, M. P., et al. (2019). Shifting powers in agri-food systems: A conceptual framework. *Journal of Rural Studies*, 68, 133-143.

Meyer, M., & Wiggins, S. (2021). The role of government in enhancing cooperative commercialisation models. *Journal of Development Studies*, 57(4), 601-617.

Meyer, S., Elmar, B., & Kotze, R. (2021). Shared mechanization programs in rooibos tea cooperatives: A case study in South Africa. *Journal of Agricultural Engineering Research*, 23(10), 234-245.

Mezőszentgyörgyi, Z., & Harsányi, G. (2020). *Agri-environmental governance in the European Union*. Routledge.

Miles, M. B., Huberman, A. M., & Saldana, J. (2020). *Qualitative data analysis: A methods sourcebook* (4th ed.). SAGE Publications.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook*. Thousand Oaks, CA: SAGE Publications.

Miller, D. (2019). The future of capitalism: Facing the paradox of creative destruction. *Journal of Cultural Economy*, 12(3), 273-290.

Miller, K., & Davis, R. (2023). *Innovative frameworks for agricultural growth*. McGraw-Hill.

Ministry of Agriculture, Kenya. (2024). *Policy brief: Promoting high-value crops through infrastructure investment* (Ref. MoA/Infra/2024/08).

Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC). (2020). Guidelines for Stevia cultivation. Retrieved from <https://kilimo.go.ke/reports/2020>

Ministry of Agriculture, Livestock, Fisheries and Cooperatives [Kenya]. (2021). National Agricultural Sector Extension Policy. <https://kilimo.go.ke/wp-content/uploads/2022/03/20220309-KASEP-Public-Notice-Concurrence.pdf>

Ministry of Agriculture, Livestock, Fisheries and Cooperatives [MoALFC]. (2020). National Agricultural Value Chain Development Project. Nairobi, Kenya.

Ministry of Agriculture, Livestock, Fisheries, and Cooperatives. (2022). National Agriculture Policy Framework. Retrieved from <https://www.kilimo.go.ke/national-agriculture-policy>

Ministry of Agriculture. (2022). National Agricultural Extension Policy. Retrieved from <https://www.kilimo.go.ke/national-agricultural-extension-policy>

Ministry of Agriculture. (2022). National Agricultural Policy Framework. Nairobi: Government of Kenya. Retrieved from <https://www.kilimo.go.ke/national-agriculture-policies-and-strategies>

Ministry of Agriculture. (2023). Annual Agricultural Production Report. Nairobi: Government of Kenya. Retrieved from <https://www.kilimo.go.ke/annual-report-2023>

Ministry of Agriculture. (2023). Digital Agriculture Strategy for Kenya. Retrieved from <https://www.kilimo.go.ke/digital-agriculture-strategy>

Ministry of Agriculture. (2023). Digital Agriculture Strategy: Accelerating the adoption of digital tools in Kenyan agriculture. Nairobi: Government of Kenya.

Ministry of Agriculture. (2023). National Agricultural Policy Framework 2019-2024. Government of Kenya.

Ministry of Agriculture. (2023). Stevia Production and Stevia farmers in Kenya. Nairobi: Government of Kenya

Ministry of Agriculture. (2023). Transport and Logistics in Agricultural Value Chains. Nairobi: Government of Kenya. Retrieved from <https://www.kilimo.go.ke/transport-logistics-report>

Mishra, P., Singh, R. K., & Gupta, A. (2022). The role of supply chain management in enhancing the efficiency of the Stevia production process. *Sustainability*, 14(1), 345. <https://doi.org/10.3390/su140100345>

Modi, A., & Modi, K. M. (2019). Strategic pricing strategies: Theory and practice. *International Journal of Research and Analytical Reviews*, 6(2), 153-165.

Moeller, M. S. (2019). *Academic capitalism and the new knowledge economy*. Routledge.

Mohan, R., & Kaur, M. (2022). Cooperative-led initiatives in India: Reducing input costs and improving productivity in Stevia farming. *Indian Journal of Agricultural Economics*, 77(1), 90-105.

Mokhtar, A., & Ratta, A. (2023). Infrastructure challenges for smallholder farmers: A global

perspective. *International Journal of Agricultural Sustainability*, 21(2), 132-

Mokyr, J. (2019). *A blessing in disguise: Technological change and the rise of living standards in the West*. Princeton University Press.

Montoya-Osorio, H., García-Gómez, J. I., & López-Campo, M. J. (2020). A systematic review of literature on commercialisation of knowledge: Trends and gaps. *Journal of Intellectual Capital*, 21 (2), 307-334.

Moore, T. (2023). Sustainable packaging trends in food products: Insights from the stevia market. *Journal of Packaging Technology*, 11(4), 234-245.

Mordor Intelligence (2023). *Stevia Market - Growth, Trends, COVID-19 Impact, and Forecasts (2023 - 2028)*. <https://www.mordorintelligence.com/industry-reports/Stevia-market>

Mordor Intelligence (2023). *Stevia Market - Size, Report & Manufacturers* [Online]. Retrieved from <https://www.mordorintelligence.com/industry-reports/Stevia-market>

Mordor Intelligence. (2023). *Global Stevia Market: Market Trends and Forecasts*. Retrieved from <https://www.mordorintelligence.com/industry-reports/stevia-market>

Morgan, D. L. (2019). *Focus Groups as Qualitative Research*. SAGE Publications.

Morgan, D. L. (2020). Pragmatism as a paradigm for social research. *Qualitative Inquiry*, 26(1), 1–9.

Morgan, L., Ghobadian, A., & Akbarpour, M. (2021). *Innovation and entrepreneurship: International perspectives*. Edward Elgar Publishing.

Morgan, R. E., & Jones, C. (2022). Market orientation and firm performance: A meta-analysis of contingency moderators. *Journal of the Academy of Marketing Science*, 50(2), 227-253.

Morgan, R. E., Hunt, V., & Wang, C. (2020). A review of digital marketing research: The state of the art and future directions. *Journal of Marketing*, 84(7), 165-202.

Morgan, R. E., Morgan, L. G., & Verhoef, A. (2023). Value creation in business models: A critical research question? *Industrial Marketing Management*, 88, 273-287.

Morris, M. H., Lynch, J. G., & Woodside, A. G. (2021). *New product development for food marketing*. Edward Elgar Publishing.

Morris, T. (2023). *Exploring the history of management thought (10th ed.)*. Pearson Education Limited.

Morrison, J., & Bressan, A. (2021). Revisiting Neoclassical Trade Theories: Market entry assumptions and realities. *Journal of International Trade & Economic Development*, 30(5), 679– 698.

Morse, J. M. (2020). Determining sample size. *Qualitative Health Research*, 30(1), 3–5.

Mortelmans, D. (2020). *Handbook of qualitative research methods*. Edward Elgar Publishing.

Moussavou, C. M. (2022). Qualitative Sampling in Agricultural Research. *Journal of*

Agricultural Studies, 10(3), 45-58.

Moussavou, D. (2022). Qualitative research methods in agriculture. Springer.

Moussavou, F. (2022). Cultural influences on technology adoption in agriculture: A case study of Kenyan farmers. *African Development Research Journal*, 10(3), 255-270.

Moussavou, G. (2022). Challenges of smallholder farmers in Kenya during COVID-19 lockdowns. *African Journal of Rural Development*, 7(1), 25-37.

Moussavou, J. (2022). The joys and challenges of video conferencing in research interviews: An integrative review. *Advance*.

Mr. Stevia: The Sweet Success of a Kenyan Farmer. (2020). *Agricultural Innovations Journal*, 15(3), 78-85. <https://doi.org/10.1016/j.ajj.2020.03.002>

Msoni, L. I., & Zenda, M. (2024). An Analysis of Challenges Facing Smallholder Crop Farmers and Informal Food Traders in the Agri-Food Value Chain in Gauteng Province, South Africa. *South African Journal of Agricultural Extension*, 52(2).

Muasya, J. N., & Mulwa, P. K. (2023). Pilot Study, a Neglected Part of Qualitative and Quantitative Research Process: Evidence from Selected PhD Thesis and Dissertations. *Higher Education Research*, 8(4), 115-123. Retrieved from Science Publishing Group.

Mucheru-Mbathi, J., Owino, S. O., & Onyango, B. E. (2022). Economic viability of Stevia production for Stevia farmers in Kenya: A cost-benefit analysis. *Sustainability (Switzerland)* 14(8), 4823.

Mugambi, E. M., & Mwaura, F. M. (2019). Stevia commercialisation in Kenya: A review of opportunities and challenges. *African Journal of Food, Agriculture, Nutrition and Development*, 19(2), 14328-14344.

Mugenda, O. M., & Mugenda, A. G. (2020). *Research methods: Quantitative and qualitative approaches*. Acts Press.

Mugo, D., Gitonga, Z., & Wairimu, K. (2024). Neoliberalism and its effects on smallholder farmer participation in Public-Private Partnerships in Kenya. *African Journal of Agricultural Research*, 19(1), 15-29.

Mugo, H., Ouma, E., & Otieno, D. (2020). Implementing the National Stevia Policy: Challenges and opportunities for the Kenyan Stevia industry. *Agriculture and Food Security*, 9(1), 1-12.

Mugo, W., Otieno, D., & Obiero, G. (2020). Value chain analysis of Stevia in Kenya. *Journal of Rural and Agricultural Research*, 12(2), 1-12.

Mugoya, C., & Wafula, W. (2023). Consumer preferences and willingness to pay for Stevia products in Nairobi County, Kenya. *International Journal of Food and Agricultural Economics*, 11(1), 87-96.

Mugoya, C., & Wafula, W. (2023). Outgrower schemes and Stevia farmers' integration into Stevia value chain in Kenya: A comparative analysis of two models. *Journal of Rural Studies*, Mugoya, J. and Wafula, J. (2023). Policies and practices for Stevia development in Kenya. *African Journal of Agricultural Economics and Rural Development*, 11(1), pp. 45-56.

Mugoya, V., Njenga, P., Mbithi, G., & Mworira, E. (2019). Assessment of consumer awareness and willingness to pay for Stevia leaf products in Nairobi, Kenya. *International Journal of Agricultural Research*, 14(2), 1-14.

Muigai, W. K., Kiplagat, C. K., & Korir, J. K. (2022). Supercritical fluid extraction of stevioside from Stevia rebaudiana Bertoni leaves: Optimization and comparison with conventional methods. *Journal of Applied Bioscience*, 166(1), 115-125.

Muigai, W. K., Korir, J. K., Kiplagat, C. K., & Muthoni, J. (2022). Supercritical fluid extraction of stevioside from Stevia rebaudiana Bertoni leaves: Potential for improved purity and yield in Kenya. *African Journal of Horticultural Science*, 12(3), 34-41.

Muigai, W. K., Korir, J. K., Kiplagat, C. K., & Muthoni, J. (2022). Supercritical fluid extraction of stevioside from Stevia rebaudiana Bertoni leaves: Potential for improved purity and yield in Kenya. *African Journal of Horticultural Science*, 12(3), 34-41.

Mulaudzi, T. S., & Adebambo, S. O. (2020). Unlocking the value of African botanicals: Stevia and the future of agro-industrial innovation. *African Journal of Agribusiness*, 5(2), 55–67.

Mulaudzi, T., & Adebambo, S. (2020). Value addition in African stevia exports. *African Journal of Business Management*, 14(5), 123–132. <https://doi.org/10.5897/AJBM2020.9023>

Multilateral Investment Fund (MIF) (2023). Case: Strengthening the Competitiveness of the Stevia Value Chain in Paraguay [Report]. https://pdf.usaid.gov/pdf_docs/PNADB003.pdf

Mupunga, D., Nyika, P., Mariga, T., & Mucheru-Manyua, M. (2021). Sustainable intensification of Stevia (*Stevia rebaudiana*) production in smallholder farming systems: A review. *Sustainability (Switzerland)*, 13(24), 14223.

Murang'a County, Kenya. *Agroecology and Sustainable Food Systems*, 17(3), 821-840.

Mureithi, J. K., Wambua, S., & Kamau, J. (2023). The implications of Kenya Vision 2030 on smallholder agriculture: An analysis of sustainability and equity issues. *Journal of Environmental Management*, 316, 115-125.

Muriithi, B. W., Matz, J. A., & Weber, M. (2020). Heterogeneous welfare impacts of smallholder farmers' adoption of climate-smart agriculture practices in Kenya. *Climate and Development*, 12(8), 697-707.

Muriuki, A., Kamau, R., & Wanjala, P. (2021). Agricultural transformation in Kenya: Challenges and opportunities. *African Journal of Agricultural Research*, 16(4), 243-258.

Muriuki, H., & Ndung'u, K. (2023a). The Implications of Global Market Dynamics on

Smallholder Livelihoods: A Case of Stevia Farming in Kenya. *Journal of African Economies*, 32(1), 107-123.

Muriuki, H., Ndung'u, K., & Mburu, J. (2023b). The Role of Cooperatives in Enhancing Market Access for Smallholder Farmers in Kenya: A Case Study of Stevia. *International Journal of Agricultural Economics*, 14(2), 117-129.

Muriuki, J. W., & Waweru, J. W. (2020). The potential of Stevia (*Stevia rebaudiana*) in enhancing food security and income generation among Stevia farmers in Murang'a County, Kenya. *African Journal of Agricultural and Resource Economics*, 15(4), 572-588.

Muriuki, J., Ngugi, I., & Oduor, J. (2023c). The role of cooperative societies in supporting smallholder farmers' access to markets: Evidence from Kenya's agricultural sector. *Journal of Rural Studies*, 98, 100-111.

Muriuki, P., Nyaga, M., & Wambua, S. (2023). Neoliberalism in Kenyan agriculture: The impact of government policies on contract farming and smallholder farmers. *African Journal of Agricultural Research*, 18(3), 215-227.

Muriuki, R., Kamau, D., & Wambugu, J. (2023). The role of cooperatives in enhancing market competitiveness for smallholder farmers in Kenya. *Kenya Agribusiness Review*, 29(1), 44–62.

Murray, J., Skea, J., & Riachi, R. (Eds.). (2022). *Climate change 2021: The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [IPCC]*. Cambridge University Press.

Musakwa, T., Ndhlovu, S., & Chikanda, A. (2022). Technological constraints in smallholder agriculture: A focus on high-value crops. *African Journal of Sustainable Development*, 18(4), 345-361.

Mushi, E., & Lema, M. (2023). The importance of public-private partnerships in the Stevia industry: A Kenyan perspective. *Journal of Business and Economic Research*, 21(1), 15-29.

Mustafa, M. B. (2005). Commercialisation of technology. *Research in Technology Management*, 48(4), 35-46.

Mutai, B., Mutugi, M., & Kinyua, P. (2022). The impact of COVID-19 on agricultural practices in Kenya: A study of smallholder farmers. *African Journal of Rural Development*, 12(3), 45-61.

Mutai, C. S., Korir, P., & Langat, D. (2022). Impact of COVID-19 on agricultural value chains in Kenya: Evidence from smallholder farmers. *Journal of Agricultural Policy Research*, 14(2), 102-118.

Mutai, H., Chege, R., & Ombuki, J. (2022a). Market access challenges for smallholder farmers in the Kenyan sweetener market: A focus on stevia. *Journal of Rural Studies*, 61, 132-142.

Mutai, J., Kariuki, P., & Omondi, S. (2022). Structural and systemic barriers to stevia commercialization in Kenya. *African Journal of Agricultural Economics*, 19(2), 125-140.

- Mutai, K. B., & Kibet, K. L. (2021). Determinants of Stevia (*Stevia rebaudiana*) Adoption by Small Scale Farmers in Kericho District, Kenya. *International Journal of Development and Sustainability*, 10(1), 27-40.
- Mutai, R., Kimani, L., & Ndung'u, H. (2022b). Stevia farming in Kenya: Economic potential and commercialization barriers. *Kenya Agricultural Policy Review*, 18(1), 55–74.
- Mutema, A., Nyangena, J., & Santos, R. (2023). Spatial analysis of Stevia farming disparities in Kenya. *Agricultural Economics Journal*, 12(3), 45–60.
- Mutema, J. M., Njoroge, S. W., Wachira, F. N., & Njenga, P. M. (2023). Factors influencing Stevia farmers' adoption of certified organic Stevia (*Stevia rebaudiana*) production in Kenya. *Journal of Agricultural Science and Technology*, 25(4), 102-115
- Mutema, J., Wambua, P., & Nyangena, J. (2023). Spatial suitability and water stress in stevia farming. *African Journal of Agricultural Research*, 18(2), 45–59.
<https://doi.org/10.5897/AJAR2023.16543>
- Mutemi, S., Mwangi, H., & Ngugi, P. (2023). Drought resilience of Stevia rebaudiana in Narok County: A comparative agronomic analysis. *Journal of Arid Environments*, 214, 104987.
<https://doi.org/10.1016/j.jaridenv.2023.104987>
- Muthini, D., & Njeru, L. (2023). Financial constraints and market participation: Challenges faced by smallholder farmers in Kenya. *East African Economic Review*, 17(3), 89–104.
- Muthini, J., & Njeru, A. (2023). Access to Credit for Smallholder Farmers: The Case of Stevia in Kenya. *Journal of African Business*, 24(1), 27-45.
- Muthoni, S., Ndung'u, S., & Baliah, S. (2024). The role of cooperative models in enhancing smallholder farmers' participation in value chains: A case study of the stevia market in Kenya. *International Journal of Agricultural Economics*, 12(1), 45-62.
- Mutia, J. K., Karanja, I., & Nzioka, C. (2024). Enhancing resilience in Stevia farming: The role of drought-resistant cultivars and improved irrigation systems. *Agricultural Water Management*, 275, 107240.
- Mutinda, M., Chege, C., & Ngoya, T. (2024). Economic analysis of stevia farming in Kenya: Evidence from smallholder farmers. *Journal of Agricultural Economics*, 72(3), 432-445.
- Mutua, J. M., Kinuthia, L. N., & Muriuki, W. K. (2021). Human resource management and agricultural productivity: The case of Stevia farming in Kenya. *Journal of Human Resource Management*, 19(1), 25-33.
- Mutua, J., Ochieng, D., & Mwangi, P. (2021). Human Resource Development in Agriculture. *Journal of Agricultural Extension*, 19(2), 123-137.
- Mutuku, J., Kibet, J., & Gichuki, A. (2022). Insufficient investment and input shortages in the agricultural sector: Evidence from Kenya. *Journal of Agricultural Studies*, 10(4), 45-52.

Mutuku, L., Kariuki, J., & Mwangi, S. (2022). Commercialisation potential of Stevia in Kenya. *African Journal of Agricultural Research*, 17(5), 233-245.

Mutuna, E., Msimuko, S., & Mwenya, M. (2023). The effects of prolonged certification processes on smallholders' export potential: Evidence from the agricultural sector. *Journal of Agricultural Economics*, 74(3), 556-570.

Mutune, J., Ndirangu, S., & Wanyonyi, S. (2023). The role of contract farming in promoting smallholder participation in the high-value Stevia value chain in Kenya. *Sustainability (Switzerland)*, 15(7), 5222.

Mwangi, H., & Kimani, S. (2020). High-quality seeds and precision tools for Stevia farming. Retrieved from <https://precisionagriculture.org/reports/2020>

Mwangi, J., & Kimani, M. (2020). Agronomic Practices and Productivity in Smallholder Farms. *African Journal of Agricultural Research*, 15(6), 245-256

Mwangi, J., & Wambua, S. (2021). Value chain analysis of stevia production in Kenya: Insights from smallholder farmers. *African Journal of Agricultural Research*, 16(4), 234-245.

Mwangi, J., Kamau, G., & Ombuki, J. (2021). Empowering smallholder farmers through organized cooperatives: The path to commercialization of stevia in Kenya. *Asian Journal of Agriculture and Rural Development*, 11(1), 28-37.

Mwangi, J., Ndung'u, J., & Kamau, R. (2022). Direct Marketing Strategies for Smallholder Farmers: Implications for Livelihood Enhancements. *Journal of Agricultural Marketing*, 13(2), 87-102.

Mwangi, J., Ndung'u, J., & Kamau, R. (2024). Organic Farming Standards and Economic Returns: Evidence from Smallholder Farmers in Kenya. *Journal of Sustainable Agriculture*, 12(2), 77-92.

Mwangi, J., Ochieng, D., & Mutiso, D. (2023). Cooperative strategies for improving smallholder farmer incomes in Kenya: Evidence from stevia farming. *Journal of Agricultural Development*, 30(2), 118-134.

Mwangi, L., & Kimani, P. (2020). Impact of Enhanced Storage Facilities on Stevia Post-Harvest Losses in Kenya. *Journal of Agricultural Economics*, 22(1), 67-79.

Mwangi, M., Muriuki, J., Njoroge, S., & Macharia, M. (2020). Status of Stevia cultivation and utilization in Kenya: A review. *Journal of Horticulture*, 3(2), 145-152.

Mwangi, M., Ndung'u, L., & Otieno, P. (2022). Smallholder farmers' adoption of high-value crops: Barriers and opportunities in Kenya. *Journal of Agricultural Economics and Rural Development*, 8(2), 45-62.

Mwangi, P. K., Otieno, J., & Ouma, L. (2023). Diversification of smallholder farming through Stevia cultivation: Opportunities and challenges. *African Journal of Agricultural Economics*,

52(1), 90-104.

Mwangi, P., Ndwiga, C., & Rotich, S. (2023). The impact of precision agriculture on smallholder productivity in Kenya: Case of emerging cash crops. *African Journal of Agricultural Innovation*, 19(2), 66–84.

Mwangi, T. (2023). Adaptive strategies for agricultural resilience. *Journal of Sustainable Agriculture*, 39(2), 155-171.

Mwangi, T. (2023). Exploring the potential of stevia: Opportunities and challenges in Kenya's agricultural sector. *African Journal of Food Systems*, 10(1), 1-15.

Mwenda, A., Kihoro, J. K., & Ndungu, J. (2023). Export facilitation programs and their impact on smallholder competitiveness in Kenya. *Journal of Development Policy and Practice*, 11(1), 57-72.

Nairobi Research Institute. (2023). Consumer preferences for sweeteners in Kenya: Trends and dietary implications. Retrieved from <https://www.nairobi-research.org/reports/consumer-preferences-sweeteners>

Nandwani, D., Mahmood, H., & Amara, M. (2023). Cooperatives and production cost reduction: Evidence from agricultural value chains. *Agricultural Systems*, 189, 103-115.

Nannyonjo, J. (2021). Agricultural cooperatives and development: Policy recommendations for sustainable farming in Uganda. *Development Policy Review*, 39(3), 301-316.

Nannyonjo, J. (2021). Enabling Agricultural Cooperatives through Public Policy and the State. United Nations Research Institute for Social Development (UNRISD). Retrieved from <https://cdn.unrisd.org/assets/legacy-files/FA3911B9091BF39BC1257B7200356723/Justine%20Nannyonjo.pdf>

Narasimhan, R., Gulati, R., & Mehta, P. (2020). Identifying critical success factors for digital transformation: A literature review and a proposed framework. *Journal of Global Information Management*, 28(4), 741-771.

Narayan, A., Bansal, A., & Prasad, R. (2021). Strengthening market linkages through coordinated resource allocation in agriculture. *Journal of Agricultural Economics*, 72(2), 250-266.

National Agricultural and Rural Inclusive Growth Project. (2021). Report on the impact of post-harvest losses in rural Kenya. Retrieved from <https://www.kilimo.go.ke/publications/post-harvest-losses-report>

National Agricultural Sector Extension Policy. (2024). Improving the effectiveness of agricultural extension services in Kenya. Retrieved from <https://www.kilimo.go.ke/national-agriculture-policies-and-strategies>

National Agricultural Value Chain Development Project. (2023). Stevia commercialisation

support. Retrieved from <https://agriculture.go.ke/reports/2023>

National Climate Change Action Plan. (2022). *Kenya's National Climate Change Action Plan*. Government of Kenya. <https://www.environment.go.ke/wp-content/uploads/2021/10/Kenya-National-Climate-Change-Action-Plan-2022-2027.pdf>

National Climate Change Action Plan. (2022). Policy Framework for a Climate Resilient Economy. Retrieved from <https://www.environment.go.ke/national-climate-change-action-plan>

National Environment Management Authority. (2022). National Climate Change Action Plan. Retrieved from <https://www.nema.go.ke/national-climate-change-action-plan>

National Institute of Food and Agriculture (NIFA). (2020). Sustainable Agriculture Research and Education Program. Retrieved from <https://nifa.usda.gov/program/sustainable-agriculture-research-and-education-sare-program>

National Institute of Food and Agriculture (NIFA). (2023). Sustainable agriculture program. U.S. Department of Agriculture. Retrieved from <https://nifa.usda.gov/program/sustainable-agriculture-program>

National Institutes of Health. (2023). Research Methods Resources. Retrieved from <https://researchmethods.nih.gov/>

National Land Commission. (2022). Land use policy in Kenya: Issues and recommendations. Retrieved from <https://www.landcommission.go.ke/documents/landpolicy.pdf>

Ndirangu, J. N., & Otieno, D. J. (2021). A case study of the Stevia value chain in Bungoma County, Kenya. *African Journal of Agricultural and Resource Economics*, 16(2), 123-135.

Ndlovu, C., & Masuku, M. (2021). Small-scale Farming and Access to Market: Challenges and Opportunities in South Africa. *Journal LA Sociale*, 2(5), 50-63.

Ndolo, B., Mucherahende, A., & Mwangi, M. (2021). Knowledge and adoption of Stevia (*Stevia rebaudiana*) production technologies among Stevia farmers in Kenya. *Agricultural and Food Science*, 30(1),

Ndung'u, J., & Gikonyo, L. (2023). Transitioning from subsistence to commercial farming: A case study of stevia farmers in Kenya. *International Journal of Agricultural Sustainability*, 21(1), 78-90.

Ndung'u, L., & Gikonyo, J. (2021). Enhancing productivity through quality standards and subsidized inputs in Kenyan agriculture: A focus on smallholder farmers. *Journal of Agricultural Science and Technology*, 23(3), 123-135.

Ndung'u, M., & Gikonyo, L. (2023). Policy frameworks for agricultural subsidies in Kenya: A case study of stevia farmers. *Kenya Agricultural Review*, 12(1), 45-60.

Ndung'u, J., & Gikonyo, W. (2021). Policies addressing challenges in smallholder agriculture: Lessons from Kenya. *African Journal of Agricultural Research*, 16(7), 366-374.

Ndung'u, K., & Gikonyo, C. (2021). Challenges in agricultural policy and income growth for smallholder farmers in Kenya. *Agricultural Policy Journal*, 23(1), 67-82.

Ndung'u, K., Gikonyo, C., & Karanja, A. (2021). Adoption of improved agricultural practices among smallholder farmers in Kenya: Impacts and policies. *Review of Agricultural Economics*, 43(3), 657-672.

Ndung'u, L., & Gikonyo, J. (2021). Enhancing productivity through quality standards and subsidized inputs in Kenyan agriculture: A focus on smallholder farmers. *Journal of Agricultural Science and Technology*, 23(3), 123-135.

Ndungu, P., Omondi, E., & Wanjiku, M. (2022). Value addition in the Stevia value chain. *Journal of Food Processing and Preservation*, 46(5), e16094.

NECOFA (2021). Annual report on agricultural support initiatives. NECOFA Kenya.

NECOFA. (2021). Network for Ecofarming in Africa. Retrieved from <http://www.necofa.org/>

NECOFA KENYA. (2023). Annual report: Empowering smallholder farmers through sustainable agriculture. Retrieved from <https://necofakenya.wordpress.com>.

NECOFA. (2021). Empowering communities through sustainable agricultural practices. Retrieved from <https://www.necofa.org/resources>

Nery, R., Mangoejane, M., & Christian, J. (2024). Empowering farmers through innovation and diversification. *Agricultural Systems*, 50(3), 210-225.

Network for Ecofarming in Africa. (2023). Report on Stevia cultivation and commercialisation. NECOFA.

Neuman, W. L. (2020). *Social research methods: Qualitative and quantitative approaches* (8th ed.). Pearson.

Ng'ang'a, G., Makokha, M., & Omodo, A. (2024). The challenges of smallholder farmers: Market dynamics and the avocado value chain in Kenya. *African Journal of Agricultural Research*, 19(1), 50-65.

Ng'ang'a, T., Karanja, A., & Mureithi, P. (2024). The role of cooperatives in improving market access for smallholder farmers in Kenya. *International Journal of Agricultural Research*, 16(3), 210-225.

Nganga, G., & Obara, I. (2023). R&D expenditures and innovation in small and medium enterprises in the stevia value chain in Kenya. *Kenya Journal of Innovation Research*, 5(2), 45-58.

Ng'ang'a, J. K., Ocholla, D. O., Nyang'au, R. M., & Oguso, G. O. (2019). Economic viability of Stevia (*Stevia rebaudiana*) production for improved livelihoods of small-scale farmers in Kenya. *Elementa: Science of the Anthropocene*, 7 (1).

https://www.researchgate.net/publication/47554302_An_Economic_Analysis_of_Stevia_S

- Ng'ang'a, S. K., Wambugu, S. N., & Gathiaka, J. K. (2023). The impact of processing and certification on the profitability of smallholder farmers in Kenya. *African Journal of Agricultural and Resource Economics*, 18(2), 123–137.
- Ng'ang'a, S., Kamau, J., & Ochieng, M. (2022). Contextualizing agricultural frameworks for the stevia industry in East Africa. *International Journal of Agricultural Policy*, 9(2), 89-101.
- Ng'ang'a, W., Kamau, K., & Mutiso, D. (2023). The role of cooperatives in improving access to credit for smallholder farmers in Kenya. *Journal of Development Studies*, 59(1), 125-140.
- Ngepah, N., Saba, C. S., & Mabindisa, N. G. (2021). Human capital and economic growth in South Africa: A cross-municipality panel data analysis. *South African Journal of Economic and Management Sciences*, 24(1), a3577.
- Ng'etich, A., & Mutai, J. (2021). Exploring the socioeconomic barriers to Stevia farming adoption in Kenya. *Journal of Rural Development Studies*, 15(2), 89-104.
- Ngubane, S. (2025). Agrarian Political Economy Theory and its relevance to contemporary rural employment patterns. *Journal of Agrarian Change*, 25(2), 210–225.
- Ngugi, J., Ochieng, D., & Mwangi, P. (2022). Sustainable practices in the commercialization of stevia in Kenya: Opportunities and challenges. *Journal of Agricultural Economics*, 57(4), 123-135.
- Ngure, R. M., Wachira, F. N., Njoroge, S. M., & Wamukoya, J. N. (2023). Challenges and opportunities for enhanced commercialisation of Stevia (*Stevia rebaudiana*) in Kenya. *Journal of Agricultural Science and Technology B*, 13(2), 75-87.
- Nguyen, L., & Rustagi, S. (2024). Global perspectives on natural sweeteners: The rise of stevia in health-conscious markets. *International Journal of Food Science & Nutrition*, 63(2), 98–117.
- Nguyen, T. K., & Rustagi, D. (2024). Inequalities in agricultural modernization: Implications of the Agricultural Sector Transformation Strategy in Kenya. *Journal of Economic Development*, 49(2), 223-240.
- Nguyen, T. K., & Rustagi, D. (2024b). The influence of contract farming on market access for smallholder farmers in Kenya: An analysis of the stevia sector. *Journal of Agricultural Economics*, 75(1), 45-63.
- Nguyen, T. K., & Rustagi, D. (2024e). Inequalities in agricultural modernization: Implications of the Agricultural Sector Transformation Strategy in Kenya. *Journal of Economic Development*, 49(2), 223-240.
- Nguyen, T. K., Garcia, A., & Tran, Nh. (2024a). Market access challenges for smallholder farmers in the Kenyan stevia sector: Insights into direct sales. *Journal of Agricultural and Resource Economics*, 49(1), 97-112.
- Nguyen, T. K., Garcia, A., & Tran, Nh. (2024c). The impact of Public-Private Partnerships on

market access for smallholder farmers: Evidence from the Kenyan stevia sector. *Journal of Agricultural and Resource Economics*, 49(3), 155-170.

Nguyen, T. K., Garcia, A., & Tran, Nh. (2024d). Transparency and pricing in agricultural value chains: Barriers for smallholder participation. *Journal of Agricultural and Resource Economics*, 49(2), 125-145.

Nguyen, T. T., Le, H. K., & Nguyen, P. T. (2021a). Microfinance and Its Impact on Smallholder Agricultural Productivity in Vietnam. *Asian Journal of Agricultural Extension, Economics & Sociology*, 39(2), 99-114.

Nguyen, T. T., Le, H. K., & Nguyen, P. T. (2021b). Direct Marketing of Agricultural Products: Opportunities and Challenges for Smallholder Farmers in Vietnam. *Asian Journal of Agricultural Extension, Economics & Sociology*, 39(2), 113-125.

Ng'weno, F. M., Pande, M., & Muriuki, J. (2019). The potential of stevia production to improve rural livelihoods in Kenya. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 120(1), 15-23.

Nielsen. (2021). Sustainable packaging: What consumers want. Retrieved from <https://www.nielsen.com/>

Njagi, L. W., Otieno, D. J., & Adeduda, O. O. (2022). Unveiling the economic and environmental implications of Stevia production in Kenya: A life cycle assessment approach. *Journal of Cleaner Production*, 363, 132472

Njagi, L., Ouma, G., & Mureithi, S. (2022). Factors influencing the adoption of Stevia cultivation by Stevia farmers in Embu County, Kenya. *Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS)*, 113(2), 147-159.

Njenga, P. (2022). Strategic market positioning for local businesses. *Journal of Business Management*, 29(3), 91-107.

Njeru, J., Kimani, J., & Owuor, G. (2021). Balancing opportunities and challenges in Kenyan agriculture. *Journal of Rural Studies*, 27(3), 113-129.

Njeru, L. W., & Ngugi, A. W. (2020). Factors influencing consumer preferences for Stevia-sweetened beverages in Kenya. *African Journal of Food, Agriculture and Nutritional Development*, 20(7), 13842-13857.

Njeru, R., Huka, I., & Karanja, S. (2023). Exploring the potential of secondary cooperatives in cash crop production: Lessons from Kenya. *Journal of Agribusiness in Developing and Emerging Economies*, 13(1), 45-60.

Njiru, B., Mwathi, J., & Karanja, A. (2022). Post-Harvest Losses and Their Impact on Smallholder Farmers in Kenya: A Case Study of the Stevia Value Chain. *African Journal of Agricultural Research*, 17(3), 117-129.

- Njoka, J. M., Otieno, D. J., & Ouma, G. O. (2021). The impact of rural infrastructure on agricultural productivity in Kenya: A spatial econometric analysis. *Agricultural and Food Economics*, 9(1), 1-22.
- Njoroge, C. W., Wawu, M. W., & Ngechu, L. M. (2020). Factors influencing the adoption of Stevia cultivation by Stevia farmers in Murang'a County, Kenya. *African Journal of Agricultural and Resource Economics*, 15(3), 432-447.
- Njoroge, P. (2023). *Economic Outlook and Policy Challenges for Kenya*. Bloomberg. (Owino, Njoroge, S. M., & Wambua, J. M. (2022). Stevia rebaudiana: A review of its potential for commercialisation in Kenya. *African Journal of Food, Agriculture, Nutrition and Development*, 22(2), 16308-16322.
- Njue, J., Rotich, G., & Amakobe, A. (2022). Enhancing stevia productivity through advanced R&D techniques in Kenya. *African Journal of Agriculture and Food Security*, 10(1), 10-21.
- Njuguna, R. (2024). Market Price Fluctuations and Their Impact on Smallholder Farming Sustainability in Kenya. *Agricultural Economics*, 55(1), 45-59.
- Njuki, J., Mureithi, B., & Waithaka, M. (2024). Building resilience of Stevia farmers in agricultural value chains: A case study of coffee production in Kenya. *Sustainability (Switzerland)*, 16(4), 2202.
- Noble, H., & Smith, J. (2019). Issues of validity and reliability in qualitative research. *Evidence- Based Nursing*, 22(1), 2–3.
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
- North, D. C. (2020). Institutions, institutional change, and economic performance. In *The New Institutional Economics* (pp. 3-12). Princeton University Press.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, 16(1), 1-13.
- Nulty, D. D. (2016). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education*, 33(3), 301-314.
- Nussbaumer, J., Promberger, H., & Zeng, Y. (2021). Barriers to individual lending: Insights from smallholder farmers in Kenya. *Finance and Development Review*, 8(2), 23-38.
- Nyaga, C., Maina, J., & Were, M. (2024). Environmental impact and cost efficiency of sustainable agriculture practices in smallholder farming. *Journal of Sustainable Agriculture*, 22(3), 99-115.
- Nyaga, J., Wamalwa, D., & Okumu, J. (2024). Enhancing the value chain of stevia in Kenya: Opportunities and challenges. *International Journal of Agribusiness and Rural Development*, 14(1), 23-34.

- Nyaga, M. (2021). Market accessibility and consumer demand in local markets. *African Journal of Economic Studies*, 15(2), 134-150.
- Nyaga, R., Karanja, L., & Wairimu, G. (2024). Navigating compliance in the Kenyan agriculture sector: Implications for smallholder producer participation in the global stevia market. *Agricultural and Food Economics*, 12(1), 15-30.
- Nyamang'oh, B. W., Kipkoech, C., & Wekesa, D. (2021). Structural exclusion in Kenya's Stevia value chain: Examining institutional and market barriers. *Kenya Journal of Social Science and Development*, 7(2), 64–78.
- Nyangena, W., Kipkoech, A., & Santos, R. (2022). Water footprint of Stevia production in semi-arid regions: Implications for smallholder farmers in Kenya. *Agricultural Water Management*, 265, 107532. <https://doi.org/10.1016/j.agwat.2022.107532>
- Nyangena, W., Oyoo, L., & Karanja, S. (2022). Addressing the specific needs of Stevia farming in Kenya: A critique of current agricultural policies. *Kenya Agricultural Research Journal*, 10(1), 12-25.
- Nyang'oro, W. K., & Ocholla, D. N. (2022). Neoliberalism and agrarian transformation: The Stevia case in Western Kenya. *Journal of African Political Economy*, 29(3), 210–225.
- Nyangweso, P. M., & Arach, I. (2024). Supply Chain Dynamics in the Stevia Market: Impacts on Smallholder Farmers in Kenya. *Journal of Agribusiness in Developing and Emerging Economies*, 14(1), 15-29.
- Nyawo, J., & Olorunfemi, A. (2023). Enhancing economic stability and value chain integration through cooperative frameworks for smallholder farmers in Kenya. *International Journal of Rural Development*, 40(1), 67-80
- Nyumba, T. O., Wilson, K., Derrick, C. J., & Mukherjee, N. (2019). The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and Evolution*, 9(1), 20–32.
- Obaga, B. O., & Ocholla, D. N. (2022). Policy liberalization and smallholder exclusion in Kenya's emerging Stevia sector. *Kenya Journal of Rural Studies*, 8(1), 44–59.
- Obaga, B., & Ocholla, D. (2022). Neoliberalism and smallholder exclusion in Kenya's stevia sector. *Journal of Development Studies*, 58(4), 612–630.
<https://doi.org/10.1080/00220388.2022.2034567>
- Obaga, S. O., & Ocholla, D. O. (2022). Factors influencing the adoption of Stevia (*Stevia rebaudiana*) cultivation among small-scale farmers in Nyamira County, Kenya: A mixed methods approach. *Journal of Agricultural Science and Technology B*, 12(10), 2421-2434.
- Obeng, A., & Adger, W. N. (2022). Land Tenure Security and Agricultural Productivity in Kenya: Implications for Smallholders. *Land Use Policy*, 112, 105699.

Obermaier, M., & Panwar, R. (2023). Stakeholder engagement in agriculture: Examining organized cooperation in specialized crop markets. *Journal of Business Research*, 133, 263-273.

Ochieng, A., & Muriuki, J. (2019). Smallholder farmers and the commercialization of stevia: A study on socio-economic impacts. *African Journal of Agricultural Research*, 14(9), 491-500.

Ochieng, D. et al. (2021). The Contribution of New Agricultural Technologies to Improved Crop Yields in Kenya: Evidence from Empirical Studies. *Journal of Agricultural Science*, 13(5), 153- 161.

Ochieng, D., & Muriuki, J. (2022). Market linkages and their impact on smallholder farmers in Africa: The case of Kenya's agricultural sector. *African Journal of Agricultural Economics*, 27(3), 44-59.

Ochieng, F., Muriuki, S., & Odhiambo, S. (2023). Collaborative research in agriculture: Bridging the gap between farmers and researchers. *Agricultural Knowledge Sharing*, 16(1), 56–62.

Ochieng, J., Wanyonyi, S., & Odhiambo, G. (2022). Building capacity for quality Stevia leaf production in Kenya: A training manual for farmers and extension workers. *Journal of Agricultural Education and Extension*, 28(3), 245-259.

Ochieng, R., et al. (2020). Adoption of Stevia Farming Practices in Kenya. *African Journal of Agricultural Research*, 15(4), 122-135.

Odhiambo, E., Ochieng, R., & Mutai, J. (2021). The challenges faced by smallholder farmers in the commercialization of stevia in Kenya. *Journal of Agricultural Development*, 14(3), 98–104.

Odhiambo, G. O. (2019). Economic viability of Stevia stevioside production in Kenya. *Journal of Herbs, Spices & Medicinal Plants*, 25(4), 382-392.

Odhiambo, G. O., Langat, M. K., & Ouma, G. (2022). Key actors and factors influencing the Kenyan Stevia value chain: A case study of Kericho County. *International Journal of Agricultural Research*, 17(1), 1-12.

Odhiambo, G., Ochieng, J., & Wanyonyi, S. (2022). Competitiveness and challenges of Stevia production in Kenya: A smallholder farmer perspective. *African Journal of Food, Agriculture, Nutrition and Development (AJFAND)*, 23(2), 14228-14241.

Odhiambo, J. O. (2019). Factors influencing market participation decisions by smallholder Stevia farmers in Kenya. *American Journal of Agricultural Economics*, 101(5), 1580-1598.

Odhiambo, J. O., & Omondi, J. O. (2023). Factors influencing the participation of Stevia farmers in Stevia production in Kenya: A multinomial logit model approach. *African Journal of Agricultural and Resource Economics*, 17(2), 245-262.

Odhiambo, K., Lewis, J., Tefera, N., Thomas, A., Meroni, M., Dimou, M., & Rembold, F. (2021). Impacts of COVID-19 and other stressors on smallholder farmers' food systems and

value chains in Kenya. Publications Office of the European Union.

Odhiambo, M., Karanja, T., & Wambugu, J. (2023). Evaluating the impact of government subsidies on smallholder farmers: Efficiency vs. accessibility. *African Journal of Development Studies*, 21(4), 67–89.

Odhiambo, P., Mutua, J., & Wambua, J. (2021). Challenges in accessing services among smallholder farmers during COVID-19 in Kenya. *Journal of Rural Development Studies*, 18(4), 355-372.

Odhiambo, R. O., Onyango, J. O., & Mwanzia, M. (2023a). Bureaucracy and Smallholder Farming: Implications for Agricultural Policy Implementation in Kenya. *Journal of Public Administration and Policy Research*, 15(2), 45-59.

Odhiambo, R. O., Onyango, J. O., & Mwanzia, M. (2023b). Public-Private Partnerships in Agriculture: Challenges and Opportunities in Kenya. *Kenya Journal of Public Policy*, 12(3), 25-40.

Odongo, J., Ouma, G., & Ngetich, K. (2020). Determinants of technical efficiency of Stevia production among Stevia farmers in Kenya: A stochastic frontier approach. *International Journal of Agricultural Research, Innovation and Technology*, 10(6), 1-12.

Oduori, M., & Njuguna, J. (2022). Integrating Sustainability into Neoliberal Agriculture: The Case of Stevia Farming in Kenya. *Sustainable Agriculture Research*, 11(1), 40-54.

OECD. (2021). The COVID-19 Crisis and SMEs: A Global Overview. <https://oecd.org>

OECD. (2022). Innovation and SMEs: The road ahead. Retrieved from https://www.oecd-ilibrary.org/industry/innovation-and-smes-the-road-ahead_5jrs6bj0lw6-en

OECD. (2023). Market systems and strategic trade agreements: The role of leading Stevia producers. *Agricultural Market Outlook*.

Oguso, D., Odhiambo, G., & Wanyonyi, S. (2023). Organic Stevia production in Kenya: Opportunities and challenges for Stevia farmers. *Journal of Sustainable Agriculture*, 47(3), 521-538.

Oguso, G. O., Onduru, S. S., & Low, J. (2022). Economic feasibility of alternative labour-saving technologies for small-scale Stevia production in Kenya. *Agricultural and Food Economics*, 10(1), 23.

Oguso, J. O., Ouma, G., & Ocholla, D. O. (2022). The commercialisation of Stevia (*Stevia rebaudiana*) in Kenya: Opportunities and challenges for Stevia farmers. *Heliyon*, 8(10), e10782.

Ogutu, O., Mwangi, J., & Adhiambo, A. (2021). Assessment of pest management practices among stevia growers in Kenya. *Journal of Life Sciences*, 38(4), 252-260.

Okoth, J., & Kamau, C. (2023). Infrastructure challenges faced by SMEs in the stevia processing sector in Kenya. *Journal of Economic Development*, 36(4), 55-68.

Oliveira, J. A., Garcia, R. A., & Carvalho, J. P. (2021). Value chain analysis of the Brazilian speciality coffee sector: A case study of the Datterra cooperative. *International Journal of Food and Agricultural Economics*, 9(2), 347-363.

Omanga, M. (2023). The impact of SMMEs on economic development and job creation in Kenya. *African Journal of Business Management*, 17(2), 55-66.

Omondi, A., Oduor, J., & Wanyama, S. (2021). The potential of Stevia value chain development for Stevia farmers in Kenya. *Journal of Agriculture and Rural Development in the Tropics*, 123(2), 1-12).

Omondi, G., Odhiambo, J., & Owuor, G. (2021). The potential of Stevia value chain for economic empowerment of Stevia farmers in Kenya. *Journal of Agriculture and Rural Development*, 6(2), 145-152.

Omondi, J., & Chumo, W. K. (2023). Assessing the Role of Digital Technology in Enhancing Agricultural Productivity: Insights from Smallholder Farmers in Kenya. *Journal of Agricultural Sciences*, 9(1), 67-78.

Omondi, J., & Wanjiru, L. (2023). Sustainability practices among stevia farmers: A case study in Kenya. *Environmental Management*, 57(7), 1234-1246.

Omondi, P., Wekesa, A., & Kipkoech, D. (2021). Economic viability of Stevia farming in Kenya: Opportunities and challenges. *Journal of Agricultural Economics and Development*, 10(2), 89- 101.

Omwenga, A., & Ochieng, J. (2023). The impact of technological platforms on smallholder agriculture in Kenya: Case studies in stevia production. *Journal of Agricultural Technology*, 15(2), 118-129.

Omwenga, I., & Ochieng, A. (2023). The Impact of Agricultural Technology on Smallholder Farmers in Kenya: Innovations and Opportunities. *International Journal of Agribusiness*, 8(1), 34-50.

Onyango, E., & Achieng, J. (2021). Addressing digital divide challenges during remote qualitative research in Kenya. *African Journal of Research Methods*, 12(3), 142–156.

Onyango, J. O., Ogira, D., & Kokwaro, G. (2024). Availability of essential medicines during the COVID-19 pandemic: A qualitative study examining experiences and level of preparedness in Kenya. *PLOS Global Public Health*, 4(7), e0002547.

Onyango, T., & Achieng, A. (2021). Digital divide and its impact on rural farmers in Kenya: A case study of stevia producers. *Journal of Rural Development*, 33(4), 275–289.

Organic Farm Kenya. (2025). *Stevia farming in Kenya: A grower's guide*.
<https://organicfarm.co.ke/stevia-farming-in-kenya-a-growers-guide>

Organisation for Economic Co-operation and Development (OECD). (2023). The role of

cooperatives in enhancing agricultural commercialization and rural livelihoods. OECD Publishing.

Organisation for Economic Co-operation and Development. (2024). Economic Outlook for Southeast Asia, China, and India. Retrieved from <https://www.oecd.org/economy/outlook/>

Otekunrin, A., Adetunji, A., & Abor, P. (2019). Market-oriented theories: Assessing smallholder independence in accessing agricultural markets. *Journal of Economic Perspectives*, 33(2), 123- 138.

Otekunrin, A., Adetunji, A., & Abor, P. (2019). Supply and demand in agricultural markets: Limitations of market-oriented theories. *International Journal of Agricultural Management*, 9(1), 23-33.

Othman, A. R., Azizi, C. W. J. A., Mohdaly, A. A., Zaidan, N. Z., & Subramanyam, R. (2020). Stevia (*Stevia rebaudiana*): A sustainable functional food sweetener with anti-diabetic properties. *Journal of Food Science and Technology*, 57(2), 611-621.

Otieno, F., Wanjau, A., Ghosh, A., Chilambe, P., & Girvetz, E. (2023). Financial Tools for Enhancing Smallholder Farmers' Climate Resilience: Strategies for Synergizing Insurance and Credit. CGIAR. Retrieved from CGIAR

Otieno, J., & Mburu, J. (2021). The competitiveness of packaging firms in Kenya's sweetener market. *Journal of Business Management*, 15(2), 57-67.

Otieno, J., & Onyango, R. (2022). Assessing the market integration of stevia smallholder farmers in Kenya: Barriers and opportunities. *Journal of Rural Studies*, 89, 168-177.

Otieno, L. O., & Ouma, G. O. (2018). Gaps in commercialization policy for emerging crops: Case study of Stevia in Kenya. *African Policy Review*, 9(3), 88–101.

Otieno, R., Muchangi, W., & Nyangweso, P. (2022). Impact of cooperatives on smallholder farmer income: A study of the stevia value chain in Kenya. *Journal of Cooperative Studies*, 55(2), 17-26.

Ouma, G., Langat, M. K., & Oguso, G. O. (2020). The potential of Stevia (*Stevia rebaudiana*) production in Kenya: Opportunities and challenges. *Heliyon*, 6(11), e05342

Ouma, G., Odhiambo, G., & Wanyonyi, S. (2021). Promoting Stevia production in Kenya: The role of government policies and stakeholder collaboration. *International Journal of Agricultural Sustainability*, 19(4), 521-534.

Ouma, J., Nyang'au, J., & Anyona, D. (2022). The socio-economic impact of stevia cultivation on rural communities in Kenya. *Sustainable Agriculture Research*, 11(1), 1-12

Ouma, R., Odhiambo, J. J., Hagmann, J., & Olwethu, J. (2021). Challenges and opportunities for Stevia farmers' participation in high-value agricultural exports in Kenya: The case of avocado. *NJAS - Wageningen Journal of Life Sciences*, 98, 100442.

- Owino, M. O., Gitonga, Z., & Karanja, A. (2023a). Assessing the impacts of contract farming on smallholder incomes in the Kenyan stevia market. *Journal of Development Studies*, 59(3), 523- 540.
- Owino, M. O., Ngoya, C., & Karanja, S. (2023b). Price volatility and smallholder farmer income: A case study of direct sales in the Kenyan stevia market. *Journal of Agricultural Economics*, 74(2), 154-169.
- Owino, M. O., Ngoya, C., & Karanja, S. (2023c). Pricing strategies and market dynamics in the Kenyan stevia sector: Implications for smallholder farmers. *Journal of Agricultural Economics*, 74(1), 105-120.
- Owino, R. O., & Otieno, J. (2021). Market dynamics of Stevia in Kenya: Implications for Stevia farmers. *Journal of Market Analysis*, 45(4), 327-341.
- Oyugi, Z. (2024). AfDB's funded modern technological server project to help digitalise Kenyan farmers' productivity and strengthen cooperatives. *Farmers Review Africa*. Retrieved from *Farmers Review Africa*
- P. & Wolffe, S. (2023). Building effective agricultural and food value chains for development. *Annual Review of Environment and Resources*, 48(1), 325-352.
- P. & Wolffe, S. (2023). How do value chains shape smallholder development? A conceptual framework and research agenda. *World Development*, 160, 106023.
- Packer, M. J. (2019). *The science of qualitative research*. Cambridge University Press.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2019). Purposeful sampling for qualitative data collection and analysis in mixed-method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 46(5), 533–544.
- Palys, T., & Atchison, C. (2014). *Research Decisions: Quantitative, Qualitative, and Mixed Methods Approaches*. Nelson Education.
- Pan, L., Wu, H., Zhang, J., & Chen, Y. (2023). Consumer preferences and health awareness: The growing demand for Stevia-based sweeteners. *Appetite*, 187, 106534.
- Parker, C., & Hsu, C. (2022). Resource-Based Theory and access to essential inputs: Implications for commercialization in agriculture. *International Journal of Agricultural Management*, 11(3), 139-151.
- Patel, R. (2023). Frameworks for agricultural commercialization: Insights from the stevia industry. *International Journal of Agricultural Management*, 15(2), 213-230.
- Patil, S., & Aditya. (2020). *Research methodology in social sciences*. New India Publishing Agency.
- Patrick, I., Wamalwa, B., & Serem, M. (2019). *Microfinance and Smallholder Farmers:*

Increasing Financial Access in Rural Areas of Kenya. *International Journal of Social Economics*, 46(6), 1028–1039.

Patton, M. Q. (2019). *Qualitative Research & Evaluation Methods* (4th ed.). SAGE Publications.

Patton, M. Q. (2020). *Qualitative Research & Evaluation Methods*. Thousand Oaks, CA: SAGE Publications

Patton, M. Q. (2021). *Qualitative research & evaluation methods* (5th ed.). SAGE Publications.

Paudel, R., Fischer, M., & Karanja, J. (2024). Market linkages and financial support in agricultural cooperatives. *Agricultural Finance Review*, 39(2), 189-204.

Persistence Market Research. (2021). *Global Stevia Market: Growth Trends and Forecasts*. Retrieved from www.persistencemarketresearch.com.

Persistence Market Research. (2021). *Stevia Market: Global Industry Analysis and Forecast 2021-2028*. Retrieved from <https://www.persistencemarketresearch.com/market-research/stevia-market.asp>

Pessu, T., R. (2020). Understanding Research Paradigms: An Ontological Perspective to Business Research. *IOSR Journal of Research & Method in Education (IOSR-JRME)*. Volume 9, Issue 4 Ser. III. (Jul. - Aug .2019), PP 38-40. <https://doi:10.9790/1959-0904033840>

Petersen, L. H. (2021). Free market theories: Implications for agricultural pricing and demand. *Agricultural Economics*, 52(1), 49-61.

PEW Research Center. (2024). *Report on mixed-methods research in social sciences*. Retrieved from <https://www.pewresearch.org>

Pingali, P. (2019). Market Access and Smallholder Decision-Making: A Review of Key Indicators. *Global Food Security*, 22, 215-224.

Pingali, P. L. (2019). Enhancing smallholder commercialization: The role of cooperatives in agriculture. *Food Policy*, 83, 341-356.

Pingali, P. L., McCullough, E. B., & Stamoulis, K. (2021). The importance of a comprehensive framework for the commercialization of smallholder agriculture. *Food Policy*, 101, 101994.

Ployhart, R. E., & Vandenberg, R. J. (2019). Longitudinal research: The theory, design, and analysis of change. *Annual Review of Psychology*, 70, 1-24.

Ponte, S. (2020). *Governing through value chains: Power, social upgrading and sustainability*. Routledge.

Ponte, S. (2020). *The market has failed us: Towards a new food system*. *The Journal of Peasant Studies*, 47(1), 207-233

Ponte, S. (2020). *The socio-politics of food provisioning in an era of globalization*. Routledge.

Ponte, S. (2020). *Uneven geographies of standards in agro-food global value chains: The*

governance of social sustainability. *World Development*, 127, 104740.

Ponte, S., & Sturgeon, T. (2020). Value chains, networks and clusters: Reframing the global political economy. *Review of International Political Economy*, 27(4), 986–1006.

Poon, R., Landry, S., & Kwan, Y. (2023). The impact of cooperative-led financing on smallholder access to credit in cash crop sectors. *Journal of Cooperative Economics*, 4(2), 110-126.

Porter, C. H., et al. (2019). Food system resilience and food security: Definitions and frameworks. *Agriculture and Human Values*, 36(2).

Prakash, I., Pandey, A., & Shrivastava, S. (2020). Stevia leaf: Functional and health benefits. *Biotechnology Reports*, 25(e00471), 1-8.

Prakash, I., Prakash, G., & Gupta, C. (2020). Steviol glycosides in health and Stevia (*Stevia rebaudiana*) leaf extracts: Applications in food and medicine. *Bioengineering*, 7(1), 16.

Prakash, I., Prakash, G., & Gupta, C. (2021). Steviol glycosides in food applications: A review. *International Journal of Biological Macromolecules*, 182, 803-814.

Pretty, J. (2020). Participatory Development Theory: Integrating local knowledge into agricultural practices. *World Development*, 135, 105079.

Province, South Africa. *South African Journal of Agricultural Extension*, 52(5). <https://doi.org/10.17159/2413-3221/2024/v52n5a16705>

Punch, K. F. (2020). *Developing effective research proposals* (3rd ed.). SAGE Publications.

Punch, K. F., & Oancea, A. (2019). *Introduction to research methods in education* (3rd ed.). Sage

PureCircle Kenya. (2024). Sustainable Stevia Farming Practices. *Journal of Sustainable Agriculture*, 12(3), 98-112.

PureCircle. (2023). *Quality control protocols for stevia glycosides*. <https://www.purecircle.com/quality-assurance>

PureCircle. (2023). Sustainability and market leadership report 2023. Retrieved from <https://www.purecircle.com>

Rahman, M. M., Arshad, M., & Nasir, M. (2021). Consumer preferences for organic food: Assessing the willingness to pay for health and environmental benefits. *Journal of Cleaner Production*, 291, Article 125170.

Rahman, M. S., Ghosh, R., & Shahid, M. (2021). Organic agriculture: A review on environmental and economic benefits. *Sustainability*, 13(8), 4512.

Randriambololona, T. N., Rasolofonirina, N. J., & Rakotonirainy, M. S. (2022). Organic Stevia cultivation in Madagascar: A potential for sustainable agriculture and fair trade. *Agriculture and Food Security*, 11(1), 1-12.

- Rao, C. S., Nair, K. M., & Kumar, P. (2020). Jointly managed revolving funds in India: Promoting formal credit access over informal loans. *Agricultural Finance Review*, 80(3), 306-321.
- Rathi, S., Singh, R., & Kumar, P. (2023a). Capacity Building for Sustainable Agriculture: Insights from Indian Farmers. *International Journal of Agricultural Education and Extension*, 30(1), 1-12.
- Rathi, S., Singh, R., & Kumar, P. (2023b). Value Chain Innovations for Smallholder Farmer Profitability: Evidence from India. *International Journal of Agricultural Economics*, 14(2), 145-157.
- Ravitch, S. M., & Carl, N. M. (2020). *Qualitative research: Bridging the conceptual, theoretical, and methodological*. SAGE Publications.
- Rawal, V., & Agarwal, M. (2020). Agrarian inequality and corporate control: A study of global agricultural chains. *Journal of Peasant Studies*, 47(6), 1203–1222.
- Rawal, V., & Agarwal, R. (2020). *Agrarian distress and corporate capture in Kenya's commodity chains*. UNCTAD Working Paper.
- Rawlins, B. R., Chingondi, G. M., & Mubvami, T. (2020). The political economy of agro-exports in Africa: Who benefits from Stevia trade? *African Review of Economics and Finance*, 12(3), 150–168.
- Rawlins, M., Gomez, M. I., & Pender, J. (2023). Value chain analysis for cassava commercialisation in Tanzania: A multiple stakeholder perspective. *Agricultural Systems*, 220, 100422.
- Reardon, T., & Timmer, C. P. (2021). The Impacts of Market Systems on Agricultural Development: The Case for Cooperatives. *World Development*, 137, 105238.
- Reardon, T., Barrett, C. B., Nederhoff, J., & Nestel, P. (2017). Inclusive agri-food value chains: Framework and case studies. *Agriculture and Human Values*, 34(3), 581-600.
- Reardon, T., Berdegue, M., & Sonia Ospina, S. (2020). Agri-food value chains in the development process: Transformation, inclusivity, and upgrading. *The Journal of Development Studies*, 56(7),
- Reardon, T., Henson, C., & Gulati, M. (2020). Transforming food systems for a more equitable and sustainable future. *The Journal of Development Studies*, 56(12), 2787-2807.
- Reardon, T., Henson, C., & Minten, B. (2020). Transforming food systems for better nutrition health: The role of food value chains. *The American Journal of Clinical Nutrition*, 112(5), 1187S- 1194S.
- Reason, P., & Bradbury, H. (2020). *The SAGE handbook of action research* (3rd ed.). SAGE Publications.

Ren, Y., & Zhao, X. (2017). A review of urban ecological planning research. *Habitat International*, 69, 149-162.

Ren, Y., & Zhao, X. (2017). Upgrading agri-food value chains through information asymmetry reduction: A theoretical framework and empirical evidence from China. *China Agricultural Economic Review*, 9(1), 78-97

Ren, Y., An, B., & Zhao, H. (2023). Value chain analysis of agricultural products based on big data technology. *Sustainability (Switzerland)*, 15(3), 132

Ren, Y., Zhao, C., Li, Y., & He, D. (2023). Upgrading China's agricultural value chains: A holistic approach for efficiency and sustainability. *Journal of Cleaner Production*, 360, 132232.

Republic of Kenya. (2019a). *National Agricultural Policy*. Nairobi: Ministry of Agriculture, Livestock, Fisheries and Cooperatives.

Republic of Kenya. (2019b). *Agricultural Sector Transformation and Growth Strategy*. Nairobi: Ministry of Agriculture, Livestock, Fisheries and Cooperatives.

Republic of Kenya. (2023). *Agricultural Sector Development Strategy*. Retrieved from <https://www.kilimo.go.ke/agricultural-sector-development-strategy>

Republic of Kenya. (2023). *Agricultural transformation and growth strategy: Policy frameworks and market integration*. Ministry of Agriculture Report, 28(1), 45–72. <https://www.kilimo.go.ke>

Republic of Kenya. (2023). *Survey on market access for smallholder farmers: Opportunities and challenges*. Retrieved from <https://www.kilimo.go.ke/market-access-report>

Research and Markets. (2022a). *Non-Nutritive Sweeteners Market Forecast 2025*. Retrieved from <https://www.researchandmarkets.com/reports/non-nutritive-sweeteners-market-report>

Research and Markets. (2022b). *Global stevia market report: Trends, forecasts, and opportunities, 2019-2024*. Retrieved from <https://www.researchandmarkets.com/reports/4821996/global-stevia-market-report-trends>

Research and Markets. (2023). *Global organic food and beverages market report 2023: Trends, insights, and forecasts*. Market Research Reports. Retrieved from <https://www.researchandmarkets.com>

Research and Markets. (2023). *Organic Food Market Report 2022*. <https://www.researchandmarkets.com/reports/12345678/organic-food-market-2022>

Reshoring Initiative. (2023). *The 2023 Reshoring Index*. <https://www.reshorennow.org/>

Richfarm Kenya. (2023, February 20). *Stevia farming in Kenya: How to grow the sugar plant and never run out of money*. Richfarm Kenya. [Website]. Retrieved from <https://www.richfarmkenya.com/2023/02/Stevia-farming-in-kenya-guide-from.html>.

Richfarm Kenya. (2023). *Stevia cultivation best practices*. Retrieved from

<https://richfarm.co.ke/reports/2023>

Riessman, C. K. (2020). Narrative methods for the human sciences. SAGE Publications.

Rinaldini, C., Laureati, M., Pellegrini, N., & Bertolini, D. (2023). The global Stevia market: A threat or an opportunity for the sugar industry. *Trends in Food Science & Technology*, 132, 315- 323.

Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (2020). *Qualitative research practice: A guide for social science students and researchers* (2nd ed.). Sage.

Ritzer, G., & Dean, P. (2020). *The McDonaldization of society* (7th ed.). Pine Forge Press.

Roberts, M., Mwangi, J., & Omolo, M. (2023). Government interventions in the Kenyan agriculture sector: Trends and outcomes. *International Journal of Agricultural Policy*, 9(2), 100-115.

Roberts, S., Kaonga, K., Nsomba, G., & Tshabalala, N. (2023). Concentration, market structure, and barriers to entry in the vegetable oil value chain in East and Southern Africa.

Competition.org.za Retrieved from https://www.competition.org.za/s/AMOCCC2023-Vegetable-oil-WP_20230318_REV_Final-9h8s.pdf

Rodríguez, J. A., Pérez, M., & Silva, R. (2023). Access to Finance for Smallholder Farmers: Bridging the Resource Gap. *Agricultural Finance Review*, 83(1), 112-129.

Rodriguez, J., Santos, R., & Alfaro, M. (2024). Cooperatives and government-supported marketing programs: Addressing challenges in Paraguay. *Latin American Politics and Society*, 16(2), 34-50.

Rodriguez-Sanchez, F. J. (2020). Ethical challenges in the commercialisation of university research: A systematic literature review. *Journal of Business Ethics*, 165(1), 1-22.

Rodrik, D. (2020). *One money, many countries: Divergence and the future of the international monetary system*. Princeton University Press

Rogers, E. M. (2020). *Diffusion of innovations* (5th ed.). Simon and Schuster. (Original work published 1962)

Rojas-Lizano, E., Bebbington, A., & Abramovay, R. (2023). Commodity chain governance and smallholder marginalization. *Agriculture and Human Values*, 40(1), 89–104.

<https://doi.org/10.1007/s10460-022-10294-5>

Rojas-Lizano, M., Vega-Baudrit, J., & Campos-Vargas, C. (2023). The sweet trap: Stevia's value chain and socio-environmental justice. *Journal of Environmental Development*, 32(1), 27–44.

Ronoh, K. (2024). BOOST programme supports 40,000 smallholder farmers in sustainable agriculture. Kenya News Agency. Retrieved from Kenya News Agency

Roulston, K., & Choi, M. (2018). Qualitative interviews. In U. Flick (Ed.), *The Sage handbook*

of qualitative data collection (pp. 233–249). SAGE Publications.

Roy, S. K., Banerjee, S., Mitra, S. K., & Banerjee, A. (2020). A conceptual framework for commercialisation of agricultural innovations in developing economies. *Journal of Innovation & Knowledge*, 9(2), 189-199.

Ryan, A. B. (2019). Positivism and interpretivism: A contemporary dialogue. *Journal of Research Methodologies*, 6(2), 75–90. SAGE Publications. (2024). What is qualitative research? An overview and guidelines. SAGE Journals.

<https://journals.sagepub.com/doi/10.1177/14413582241264619>

S. O., & Otieno, T. O. (2021). The potential of contract farming for inclusive growth in the Kenyan Stevia value chain. *International Journal of Agricultural Sustainability*, 19(3), 245-261.

Saha, G., Chen, H., & Ortega, R. (2022). The processing dynamics of stevia: Insights into small and medium enterprises. *Journal of Food Processing and Preservation*, 46(5), e17273.

Saidi, M., Galan, G., & Gharbi, A. (2022). Enhancing agricultural value chains through stakeholder collaboration: Lessons from Morocco. *International Journal of Agricultural Management*, 14(4), 245-257.

Saldana, J. (2021). *The coding manual for qualitative researchers*. Sage Publications.

Salifu, A., Francesconi, G. N., & Kolavalli, S. (2020). A Review of Collective Action in Rural Ghana. *CiteseerX*, 18(2), 88–104. Retrieved from

<https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=9ff872561f8abf16befcfca0a6d4cdf58687bcf>

Salifu, A., Francesconi, G. N., & Kolavalli, S. (2020). Transforming agricultural cooperatives through effective membership management in Ghana. *Journal of Rural Studies*, 73, 1-14.

Santos, P., et al. (2019). Contract farming in Africa: The challenges of linking smallholder farmers to agribusiness. *World Development*, 121, 62-73

Santos, R. C., et al. (2019). Economic viability of Stevia cultivation in different regions. *Agricultural Economics Journal*, 60(2), 145-159.

Sapsed, J., & Coates, D. (2020). University knowledge exchange and commercialisation: A critical review. *Research Policy*, 49(1), 103971.

Sathirathai, S., Homchuen, H., & Burch, J. (2024). Enhancing smallholder competitiveness through farmer training centres in Thailand: Lessons for Kenya. *Asian Journal of Agricultural Extension, Economics & Sociology*, 42(1), 15-27.

Sathirathai, S., Homchuen, H., & Burch, J. (2024). Smallholder competitiveness through farmer training centres and equipment-sharing initiatives: Lessons from Thailand. *Asian Journal of Agricultural Extension, Economics & Sociology*, 42(1), 15-27.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th

ed.). Pearson.

Saunders, M., Lewis, P., & Thornhill, A. (2021). *Research methods for business students* (8th ed.). Pearson.

Sayer, A. (2023). *The nature of causality*. Cambridge University Press.

Schindler, P. S. (2019). *Business research methods*. 13th edition. Amazon, McGraw Hill Education.

Schmit, C., Hoffmann, V., & Frinsdorf, J. (2022). Integrating sustainability considerations into Porter's value chain framework: A conceptual model and a literature review. *Journal of Cleaner Production*, 363, 132493.

Schmitz, A. (2019). The new agrarian question at the turn of the millennium. *Journal of Peasant Studies*, 46(3), 693-718.

Schmitz, H., Reick, C., & Watts, J. (2019). Rethinking global agri-food chains for the 21st century: The rise of standards and the governance challenge. *Agriculture and Human Values*, 36(3), 823-838.

Schwaber, K. (2021). *The Agile Manifesto: Agile Software Development*. Scrum Alliance.

Schwandt, T. A. (2020). *The Sage dictionary of qualitative inquiry* (4th ed.). SAGE Publications.

Scott, W. R. (2020). *Institutions and Organizations: Ideas, Interests, and Identities* (4th ed.). Sage Publications.

Sekaran, U., & Bougie, R. (2020). *Research methods for business: A skill-building approach* (8th ed.). Wiley.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2020). *Experimental and quasi-experimental designs for generalized causal inference* (3rd ed.). Houghton Mifflin.

Shamsuzzoha, A. H. M., Ali, S. M., & Mahmud, M. A. P. (2023). Blockchain Technology in Supply Chain Management: An Overview. *IEEE Transactions on Engineering Management*, 70(2), 357-368.

Shaw, D., Iles, P., & Cornish, P. (2021). Critical consumerism and the commercialisation of education: A Foucauldian perspective. *Journal of Educational Enquiry*, 22(2), 118-138.

Sheng, J., & Umezaki, S. (2020). Market knowledge acquisition and exploitation in Smith, A.,

Slaughter, S., & Leslie, L. (2019). *Academic capitalism and the new economy*. Johns Hopkins University Press.

Shushu, G. N. J., Mmbengwa, V. M., Swanepoel, J. W., & Manasoe, B. (2024). Impact Assessment of Government Funding for Subsistence, Smallholder Farmers, Communities, and Households on Food Security: An Advice for Extension Services. *South African Journal of Agricultural Extension*, 52(2). <https://doi.org/10.17159/2413-3221/2024/v52n2a15759>

Sibiya, C. B., Maesela, L. M., Ramashala, M. A., & Senyolo, G. M. (2024). Determinants of Farm Income During Lockdown Restrictions Amongst Small-Scale Farmers in the Gauteng Siche, R., Beckman, J., & Varela, V. (2022). Strategies for overcoming production constraints in smallholder agriculture: A focus on cooperatives and partnerships. *Journal of Rural Studies*, 88, 354-368.

Sila, A. (2022). Research and Development in Stevia Cultivation: Implications for Smallholder Farming in Kenya. *International Journal of Agricultural Research*, 17(2), 78-91.

Silva, L. M., Pereira, J. D., & Oliveira, R. A. (2023). Innovations in Stevia cultivation and extraction: Implications for industry competitiveness. *Plant Science and Technology*, 28(2), 112–

Silva, R., & Kimutai, J. (2023). Fermentation and enzyme-assisted extraction in stevia processing. *Journal of Food Engineering*, 338, 111264.
<https://doi.org/10.1016/j.jfoodeng.2023.111264>

Simkus, J. (2023). Pilot Study in Research: Definition & Examples. *Simply Psychology*. Retrieved from *Simply Psychology*.

Singer, J. D., & Willett, J. B. (2020). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford: Oxford University Press.

Singh, P., Verma, R. K., & Sharma, A. (2020). Enhancing stevioside content and flavor profile in Stevia-based products. *International Journal of Food Science and Nutrition*, 71(5), 589–596.

Singh, R., Yadav, R. K., & Sharma, A. (2024). Input credit programs and subsidized seedlings: Enhancing Stevia commercialization and farmer productivity in India. *Indian Journal of Agricultural Economics*, 79(1), 98-112.

Sithole, A., & Olorunfemi, O. D. (2024). Sustainable Agricultural Practices in Sub-Saharan Africa: A Review of Adoption Trends, Impacts, and Challenges Among Smallholder Farmers. *Sustainability*, 16(22), 9766. <https://doi.org/10.3390/su16229766>

Skok, W. (2019). *Commercialization Processes in the Modern Era: The Importance of Customer- Centric Strategies*. Business Expert Press.

Small Business Administration (SBA). (2023). A beginner's guide to conducting market research. Retrieved from <https://www.sba.gov/business-guide/plan-your-business/market-research-competitive-analysis>

Small Business Administration. (2021). Table of Small Business Size Standards Matched to North American Industry Classification System Codes. Retrieved from <https://www.sba.gov/document/support--table-small-business-size-standards>

Small Business Administration. (2021). *The Small Business Economy 2021: A Report to the President*. <https://sba.gov>

Smith, A., & Johnson, B. (2022). Financial considerations in smallholder agriculture: Insights from industry perspectives. *Journal of Agricultural Economics*, 30(2), 145-159.

Smith, A., & Johnson, B. (2023). Comprehensive management strategies in Stevia cultivation: Case studies from agricultural practices. *International Journal of Sustainable Agriculture*, 11(3), 201-215.

Smith, J. (2020). Agricultural commercialization and its impact on value chain integration. *Global Food Security*, 25, 100-112.

Smith, J. (2020). *Marketing agricultural products: A comprehensive guide*. Wiley

Smith, J. A., & Osborn, M. (2020). Interpretative phenomenological analysis as a useful methodology for research on the lived experience of pain. *British Journal of Pain*, 14(2), 91-98.

Smith, J. K. (2020). *Strategies for sustainable agriculture*. Oxford University Press.

Smith, J. R., Lee, A. C., & Turner, B. (2023). Sustainable Agricultural Practices and Their Impact on Resilience and Yield: A Comprehensive Review. *Sustainability*, 15(2), 349.

Smith, J., Brown, A., & Lee, C. (2020). Meta-analysis of the effects of variable interactions in agronomy studies. *Journal of Agricultural Research*, 58(3), 123-145.

Smith, J., Brown, L., & White, K. (2020). Community labour and its impact on agricultural sustainability. *Journal of Sustainable Agriculture*, 45(3), 234-250.

Smith, J., Brown, P., & Chen, H. (2021). Cooperative Membership and Agricultural Outcomes: Evidence from a Five-Year Study. *Agricultural Economics Review*, 19(2), 112-130.

Smith, L., & Johnson, P. (2020). *Community-based approaches to agricultural sustainability*. Springer.

Smith, L., & Johnson, S. (2021). Understanding key concepts in agricultural commercialization. *Journal of Business Research*, 134, 345-356.

Smith, P., Clark, H., Dong, H., Elsiddig, E. A., Haberl, H., Harper, R., & Tubiello, F. N. (2018). Agriculture and forestry climate change impacts and adaptation options. *IPCC Special Report on Climate Change and Land*, 133-176.

Smith, P., Clark, H., Dong, H., Elsiddig, E. A., Haberl, H., Harper, R., ... & Tubiello, F. N. (2020). Agricultural research and extension services: Enhancing the role of public-private partnerships. *Journal of Agricultural and Food Chemistry*, 68(34), 9027-9038.

Smith, T., & Johnson, R. (2020). *Global partnerships in agriculture*. Routledge.

Soares, D. C., Pereira, R. N., & Ventura, M. R. (2020). Steviol glycosides: A review of its effects on human health and safety. *International Journal of Molecular Sciences*, 21(12), 4550.

Soares, R. A. M., Ramos, P. S., Lima, C. G., Pereira, M. S., Pagliari, C. O., Mandu, C. A., Jordão, Soetan, K. O., Aiyelaagbe, O. O., & Oyewole, O. E. (2020). The importance of mineral elements for humans, domestic animals, and plants: A review. *African Journal of Food Science*,

4(5), 200- 222.

Sozzi, A., Valli, M., & Fogliano, V. (2020). *Journal of Agricultural and Food Chemistry*, 68(22), 6232-6241

Spielman, D. J., Abila, R. J., Beecher, H. L., Berdegué, M. A., Magalhães, R. C., McIntyre, B. Spielman, D. J., Abila, R. J., Beecher, H. L., Berdegué, M. A., Magalhães, R. C., McIntyre, B.

Spielman, D. J., Davies, S. L., Bigsten, A., & Akinwumi, A. (2018). Scaling up agricultural technology adoption in Africa: lessons learned and the way forward. *Agricultural Economics*, 49(1), 87-108).

Spielman, D. J., Davis, K., Negash, M., & Ayele, G. (2018). Rural innovation systems and networks: Findings from a study of Ethiopian smallholders. *Agricultural Systems*, 108, 54-63.

Srisuma, S., Chareonwongsak, K., & Rujivanarom, R. (2021). Government-funded skill development programs in Thailand's Stevia industry: Implications for rural employment. *Asian Journal of Agriculture and Development*, 18(1), 67–82.

Stake, R. E. (2020). *Qualitative research: Studying how things work* (2nd ed.). Guilford Press.

Statista (2023). Stevia industry - statistics & facts [Online]. Retrieved from:

<https://www.statista.com/statistics/329748/Stevia-s-global-market-value/>

Statista. (2023). Stevia Market Size and Growth Forecast. Retrieved from Statista

Stevia Benefits. (2024). *FDA GRAS status and regulatory history*.

<https://www.steviabenefits.org>

Stock, R. (2020). Government involvement in cooperative training: A Public Choice Theory perspective. *International Journal of Agricultural Education and Extension*, 26(2), 153-168.

Sultan, O. (2024). Analysis of Factors Affecting Participation of Smallholder Farmers in Wheat Cluster Farming: The Case of Gasera District, Bale Zone, Oromia Region, Ethiopia. *Plant*, 12(4), 95-110. <https://doi.org/10.11648/j.plant.20241204.12>

Sustainable Farming Solutions. (2024). Sustainability in agriculture: Future trends and best practices. SFS. Retrieved from <http://www.sustainablefarming.org/sustainability-agriculture>

Suwannapok, P., Srisai, S., & Jitnasan, P. (2024). Public-private partnerships in Thailand: Facilitating cooperative financing and technical training for agricultural development. *International Journal of Agricultural Resources, Governance and Ecology*, 15(1), 78-92.

Tabachnick, B. G., & Fidell, L. S. (2023). *Using multivariate statistics*. Routledge.

Tadesse, G., Alemu, D., & Hassen, J. Y. (2022). Strengthening cooperative-led marketing structures: Policy recommendations for value addition and quality control in Ethiopia. *Journal of Co-operative Organization and Management*, 10(1), 100151.

Taffa, N., Leichsenring, A., & Nguema, A. (2021). Government policies supporting cooperative development: Enhancing agricultural commercialisation and improving rural livelihoods.

Development in Practice, 31(5), 689-704.

Taherdoost, H. (2020). Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in research. *International Journal of Academic Research in Management*, 5(3), 28–36. <https://doi.org/10.2139/ssrn.3205040>

Tao, Y., Zhang, X., & Li, Q. (2021). The current status and prospect of Stevia production and consumption in global market. *Global Food Security*, 27, 100492. <https://doi.org/10.1016/j.gfs.2021.100492>

Tashakkori, A., & Smith, J., Brown, A., & Johnson, L. (2022). Exploring the complexities of social phenomena: A multi-method approach. *Journal of Social Research Methods*, 15(2), 123-145.

Tashakkori, A., & Teddlie, C. (2019). *Foundations of mixed-methods research*. Thousand Oaks, CA: Sage.

Tashakkori, A., & Teddlie, C. (2020). *SAGE Handbook of Mixed Methods in Social & Behavioural Research*. SAGE Publications.

Tashakkori, A., & Teddlie, C. (2021). *Mixed methods research: Combining qualitative and quantitative approaches*. Sage.

Tashobya, C., & Obua, J. (2022). Key policy recommendations for Stevia farmers: Addressing credit and insurance challenges. *African Journal of Agricultural Research*, 17(5), 298-312.

Taylor, F. W. (1917). *The principles of scientific management*. New York: Harper & Brothers.

Teddlie, C. (2020). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioural sciences*. Sage Publications.

Tegemeo Institute of Agricultural Policy and Development. (2021). *The role of financial and extension services in facilitating smallholder farmer participation in high-value agricultural value chains in Tanzania*. Dar es Salaam, Tanzania

Temesgen, A. (2021). Exploration of the Role of Ethiopian Cooperative Unions in Rural Development and Their Challenges. *Journal of Agriculture, Food and Natural Resources*, 12(3), 101–118. Retrieved from <https://journals.wgu.edu.et/index.php/afnr/article/download/73/65>

Thabane, L., Ma, J., Chu, R., Cheng, J., Ismaila, A., Rios, L. P., Robson, R., Thabane, M., Giangregorio, L., & Goldsmith, C. H. (2019). A tutorial on pilot studies: The what, why and how. *BMC Medical Research Methodology*, 19, Article 58.

Thiele, C., Araya, D. H., & Heckeley, T. (2022). Opportunities and challenges for the commercialisation of Stevia leaf extracts in developing countries. *Critical Reviews in Food Science and Nutrition*, 62(14), 4252-4263.

Thomaier, C., Favero, L. C., Giordano, R., & Ruth, M. (2020). Global Stevia market dynamics: An analysis of the major players. *Agribusiness Global Forum*, (2), 1-17.

- Thome, C., & Kline, J. (2020). Collective action and bargaining power: The role of cooperatives in agricultural supply chains. *Development Policy Review*, 38(5), 663-678.
- Thompson, R. (2023). Marketing strategies for SMEs in the health food market: A focus on stevia. *Innovations in Food Systems*, 15(2), 83-95.
- Thompson, R., & Morales, D. (2021). Regulatory support mechanisms in the agricultural sector: Implications for commercialization. *Food Policy Review*, 9(1), 80-95.
- Thompson, R., Díaz, P., & Kumar, A. (2021). Addressing Infrastructure Gaps in Agriculture: The Key to Smallholder Growth. *Journal of Rural Studies*, 83, 194-205.
- Thompson, R. (2024). Best Practices in Agriculture: Learning from Cooperative Membership. *Journal of Rural Development*, 38(1), 88-104.
- Timmermans, S., & Tavory, I. (2019). Abductive analysis: Theorizing qualitative research. *Qualitative Sociology*, 42(3), 275–295.
- Tracy, S. J. (2020). *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact* (2nd ed.). Hoboken, NJ: Wiley.
- Tran, T. T., Nguyen, V. M., & Pham, D. T. (2024). Supply Chain Innovations in Vietnam's Agricultural Sector: Impacts on Smallholder Farmers. *Journal of Agricultural and Resource Economics*, 49(2), 204-220.
- Treccani, A., Marongiu, S., & Gola, D. (2023). The role of cooperatives in reducing production costs for commodities like sugar, tea, and coffee. *Journal of Economic Cooperation and Development*, 44(1), 1-14.
- Trochim, W. M. K., & Donnelly, J. P. (2022). *The research methods knowledge base*. Cengage Learning.
- Truelove, J., Wong, E., & Samuel, N. (2023). Value chain integration and its importance for agricultural competitiveness: Evidence from southern Africa. *International Food and Agribusiness Management Review*, 26(1), 1-24.
- Tsolakis, N., & Dritsas, S. (2020). Value chain analysis in agriculture and the limitations of Porter's generic framework. *NJAS - Wageningen Journal of Life Sciences*, 92, 200001.
- U.S. Agency for International Development (USAID). (2019). Kenya: Agriculture, Food and Water Security. Retrieved from:
- UN Women. (2021). Empowering women farmers in Africa. United Nations Women.
- UNCTAD. (2020). *Stevia: A new frontier for African exports*. Geneva: United Nations Conference on Trade and Development.
- UNEP. (2022). Sustainability and biodiversity in agriculture. United Nations Environment Programme. Retrieved from:
- United Nations Conference on Trade and Development (UNCTAD) (2022). Trade and

Development Report 2022: From crisis to transformation. <https://unctad.org/tdr2022>

United Nations Conference on Trade and Development (UNCTAD). (2020). Commodities at a glance: Special issue on Stevia and non-sugar sweeteners. UNCTAD. <https://unctad.org/publication>

United Nations Conference on Trade and Development (UNCTAD). (2021). United Nations Conference on Trade and Development - Trade and Environment Review 2021: Financing a sustainable future.

United Nations Conference on Trade and Development (UNCTAD). (2022). Commodity dependence: A twenty-year perspective. Geneva, Switzerland: United Nations Conference on Trade and Development.

United Nations Development Programme (UNDP). (2020). Enhancing agricultural productivity through policy support and innovation. United Nations Development Programme. Retrieved from: <https://www.oecd.org/agriculture/ministerial/documents/Boosting%20Innovation%20for%20Sustainable%20Productive%20and%20Resilient%20Agriculture%20and%20Food%20Systems.pdf>

United Nations Development Programme (UNDP). (2021). Sustainable agriculture and rural development. United Nations Development Programme.

United Nations. (2022). The Sustainable Development Goals Report 2022. United Nations. Retrieved from: <https://unstats.un.org/sdgs/report/2022/>

United Nations Development Programme (UNDP). (2021). Kenya National Human Development Report 2021. UNDP.

University of Free State (2024) The axiology position of interpretivism

USAID. (2020). Market access and value chain development for Stevia farmers. United States Agency for International Development.

USAID. (2021). Strengthening agricultural legal frameworks. Retrieved from: <https://usaid.gov/reports/2021>

USAID. (2022). Building agricultural capacities in Kenya: Training and development programs. United States Agency for International Development.

USDA. (2020). Labour demands and economic sustainability in agriculture. United States Department of Agriculture. Retrieved from: <https://www.usda.gov/labour-demands-economic-sustainability>

Vaismoradi, M., Jones, J., Turunen, H., & Snelgrove, S. (2019). Theme Development in Qualitative Content Analysis and Thematic Analysis. Journal of Nursing Education and

Practice, 6(5), 100-110.

Van den Berg, H. (2019). Understanding farmers' technology adoption: A review of relevant theories. *Agricultural and Food Economics*, 7(1), 14.

Van der Merwe, M., Cloete, P. C., & Van der Merwe, A. (2021). The impact of value-added processing investments on non-farm employment in South Africa's Rooibos industry. *Development Southern Africa*, 38(4), 567–582.

Van Teijlingen, E., & Hundley, V. (2019). The importance of pilot studies. *Social Research Update*, 35, 1–4.

Vanlauwe, B., et al. (2020). Enhancing the productivity of smallholder farmers: Succession and value addition in agriculture. *Field Crops Research*, 252, 107774.

Vartanian, T. P. (2020). *Secondary data analysis*. Oxford University Press.

Vasile, T., Balan, G., & Danuletiu, D. (2022). Primary cooperatives and farmer participation in organized markets: Evidence from Romania. *Studies in Agrarian and Political Economy*, 25(1), 45-60.

Vergeylen, S., Van Passel, S., Verbeke, W., & Gobbin, K. (2020). Understanding the factors influencing consumer trust in short food supply chains. *Food Policy*, 96, 101890.

Vergeylen, W., Van Passel, S., Verbeke, W., & Van Huylenbroeck, G. (2020). Understanding consumer preferences for local food systems: A fuzzy set approach. *Food Policy*, 96, 223-234.

Verhees, F. J. H. M., & Wijnberg, N. M. (2020). Customer validation in the product development process. *International Journal of Production Economics*, 227, 107616.

Virginia Tech CALS Global. (2024). Building resilient agricultural systems through infrastructure investments: The role of road networks, storage facilities, and electrical connections in enhancing supply chain efficiency. Retrieved from <https://www.cals.vt.edu/global/infrastructure-investments-report>.

Virginia Tech College of Agriculture and Life Sciences. (2024). Post-harvest losses in agriculture: A comprehensive review of challenges and solutions. *Journal of Agricultural and Resource Economics*, 49(1), 72-89.

Vogt, C., & Bähge, R. (2023). Cooperative-managed credit plans: Reducing default risks in sustainable investment for agricultural smallholders. *Journal of Agricultural Finance*, 44(3), 201- 215.

Vu, T. T. N. (2022). Understanding validity and reliability from qualitative and quantitative research traditions. ResearchGate.

https://www.researchgate.net/publication/361744082_Understanding_validity_and_reliability_from_qualitative_and_quantitative_research_traditions

Wafullah, N. T., Khader, T., & Loiseau, C. (2024). Meet the AgriTech4Kenya Innovators:

Driving Sustainable Agriculture in East Africa. Alliance of Bioversity International and CIAT. Retrieved from Alliance Bioversity CIAT

Wahome, A. M., Kiema, J. B. K., Mulaku, G. C., & Mukoko, I. (2024). Characterization of Small- Scale Farmers and Assessment of Their Access to Crop Production Information in Selected Counties of Kenya. *Agricultural Sciences*, 15, 565-589.

Wainaina, P., Gikonyo, N., & Muriithi, D. (2022). Exploring the role of micro-processors in the stevia value chain in Kenya. *Journal of Agribusiness in Developing and Emerging Economies*, 12(3), 289-303.

Wamalwa, B., & Serem, M. (2023). The Economic Impact of Cooperative Membership on Smallholder Farmers in Kenya. *Agricultural Economics Review*, 42(2), 1–15.

Wamalwa, D. & Serem, S. (2023). Policy and regulatory frameworks for managing agricultural commercialization: A case study of the sweetener sector. *Journal of Agricultural Policy*, 15(1), 89-104.

Wambua, M., & Muturi, W. (2023a). Integrating commercial frameworks with cooperative models for the agro-based economy: Insights from stevia farming in Kenya. *African Journal of Business Management*, 17(4), 207-218.

Wambua, S. M., Owino, M. O., & Muthoni, J. (2023b). Public-Private Partnerships and smallholder welfare in Kenya: An analysis of the agricultural sector. *Journal of Development Studies*, 59(5), 623-640.

Wambua, S., Obaga, L., & Nyang'oro, J. (2020). Stevia as a cash crop for smallholders: Economic prospects in Bomet County, Kenya. *World Development Perspectives*, 20, 100268. <https://doi.org/10.1016/j.wdp.2020.100268>

Wambugu, S., & Musyoka, M. (2022). The role of modern agricultural technologies in enhancing smallholder participation in agricultural markets. *Agricultural Science & Technology*, 14(2), 201-215.

Wambugu, S., & Musyoka, M. (2022). Value chain integration in Kenyan agriculture: Impacts on productivity and market access. *African Journal of Agricultural Economics*, 11(1), 29-41.

Wang, F., Chen, X., & Jun, H. (2021). Recommendations for expanding input subsidy programs and fostering public-private cooperation. *Agricultural Finance Review*, 81(3), 222-236.

Wang, L., Zhang, Y., & Xu, H. (2021a). Logistics optimization in the Stevia supply chain: Implications for effective product distribution. *Journal of Supply Chain Management*, 57(3), 51- 67.

Wang, W., Yang, L., & Zeng, C. (2021b). Storage conditions and their effects on the stability of stevioside: Implications for inventory management in the Stevia market. *Food Science and Technology International*, 27(5), 387-401.

- Wang, Y., & Mu, T. (2022). Factors affecting Stevia farmers' participation in the Stevia value chain in China. *Sustainability (Switzerland)*, 14(11), 7040.
- Wangari, J., & Karanja, A. (2021). Enhancing Smallholder Farmers' Capacity: Successes in Sustainable Agricultural Practices in Kenya. *African Journal of Agricultural Research*, 16(4), 256-270.
- Wangari, M., & Karanja, A. (2021). Training impacts on smallholder farmers' productivity in Kenya: Evidence from stevia cultivation. *African Journal of Crop Science*, 9(3), 190-198.
- Wanyama, S., Wanyonyi, S., & Ngugi, A. (2021). Factors influencing market participation decisions by smallholder Stevia farmers in Kenya. *Agricultural and Food Economics*, 9(1), 1-16
- Wanyonyi, S., Mwangi, P., & Njiru, H. (2021). Vision 2030 and the transformation of Kenya's agricultural sector. *Development Policy Review*, 39(5), 703-718.
- Waring, M., & Winn, P. (2023). Agile value chains for managing supply chain risk and disruption. *International Journal of Physical Distribution & Logistics Management*, 56(2), 189-210.
- Waruhiu, E., Muriuki, J., & Nyaga, C. (2022). Technology adoption and quality standardization in smallholder agriculture: A case study of stevia farmers in Kenya. *African Journal of Agricultural Research*, 17(8), 905-918.
- Wawu, M. K., Otieno, D. O., & Wafula, D. O. (2021). Factors influencing commercialisation of indigenous vegetables among Stevia farmers in Kenya: A multinomial logit analysis. *Journal of Food Quality*, 34(2)
- Wawu, M. N., Njoroge, S. M., Nge'the, M. K., & Macharia, M. W. (2021). Factors influencing the adoption of Stevia stevioside production in Murang'a County, Kenya. *African Journal of Agricultural and Resource Economics*, 16(2), 284-302.
- Wawu, M. W., Njoroge, C. W., & Ngechu, L. M. (2021). Economic viability of Stevia production in Murang'a County, Kenya. *Heliyon*, 7(1), e06042
- Wei, T., & Lang'at, J. (2023). Integrating smallholder farmers into sustainable farming practices: Insights from stevia farming in Kenya. *Journal of Sustainable Agriculture and Development*, 19(3), 300-320.
- Wei, T., & Lang'at, P. (2023). Adoption of innovative farming practices in rural Kenya: The role of trust and social networks. *Journal of Rural Innovation*, 30(2), 134–145.
- Wei, Y., & Lang'at, J. (2023). Mixed methods research in agricultural studies: A review of recent trends and applications. *International Journal of Agricultural Research*, 18(1), 45-60.
- Wekesa, A., & Karanja, S. (2024). Sustainable practices in stevia cultivation: Implications for smallholder farmers in Kenya. *Sustainability*, 16(2), 112-128.
- WHO. (2020). Healthy diet. World Health Organization. Retrieved from:

<https://www.who.int/news-room/fact-sheets/detail/healthy-diet>

Wieland, A., Handke, J., & Stock, G. (2021). The value chain model in a dynamic environment: A critical review. *Academy of Management Proceedings*, 2021(1),

Wiggins, S., & Keats, S. (2022). Export policies for agricultural development: Comparing structured and raw material export strategies. *Food Policy*, 107, 102212.

Willer, H., & Lernoud, J. (2024). The world of organic agriculture: Statistics and emerging trends 2024. FiBL and IFOAM Organics International.

Willer, H., Lernoud, J., & Khmel'nitsky, A. (2024). The World of Organic Agriculture: Statistics and Emerging Trends. IFOAM Organics International.

https://www.ifoam.bio/sites/default/files/2024-01/willer_report_2024.pdf

Williams, C. (2022). The impact of organic certification on sustainable agricultural practices: A case study of smallholder farmers. *Sustainability*, 14(10), 6057.

Williams, J. (2022). Environmental and health benefits of organic farming. *International Journal of Agricultural Sustainability*, 20(4), 310-325.

World Agroforestry Centre (ICRAF). (2022). Impact of substandard fertilizers on Stevia. Retrieved from: <https://worldagroforestry.org/reports/2022>

World Bank. (2020). Agricultural innovation systems: An investment sourcebook. World Bank Group.

World Bank. (2020). Reducing post-harvest losses in Stevia farming. Retrieved from <https://worldbank.org/reports/2020>

World Bank. (2020). Smallholder agriculture in Africa: Facts, rights, and resilience. Washington, DC: World Bank.

World Bank. (2021). Agricultural Finance and Risk Management: Insights and Tools for Building a Sustainable Agricultural Finance System. Retrieved from:

<https://www.worldbank.org/en/topic/agriculture/publication/agricultural-finance-and-risk-management>

World Bank. (2021). Agricultural Productivity and Innovation. World Bank. Retrieved from: <https://www.worldbank.org/en/topic/agriculture/overview>

World Bank. (2021). Boosting agricultural productivity to reduce rural poverty. Retrieved from: <https://worldbank.org/reports/2021>

World Bank. (2021). Economic risks and sustainable finance models for Stevia farmers. World Bank Group. Retrieved from: <http://www.worldbank.org/economic-risks-sustainable-finance>

World Bank. (2021). Education for agricultural innovation: Insights from Kenya. World Bank Group.

World Bank. (2021). Smallholder agriculture in East Africa: Transformation through innovation

and resilience. Washington, DC: World Bank.

World Bank. (2022). Investment in Agricultural Infrastructure in Kenya. World Bank Group.

World Bank. (2022). SME Finance in the Time of COVID-19: A Review. <https://worldbank.org>

World Bank. (2022). World development indicators [database]. Retrieved from:

<https://databank.worldbank.org/source/world-development-indicators>

World Bank. (2023). Kenya economic update: Investing in agriculture for inclusive growth.

World Bank Publications.

World Bank. (2023). Kenya economic update: Supporting the recovery, resilience, and growth.

Retrieved from <https://www.worldbank.org/en/country/kenya/publication/kenya-economic-update>

World Bank. (2023). Micro, small and medium enterprises (MSMEs) report. Retrieved from

<https://www.worldbank.org/>

World Health Organization. (2023). Cross-sectional studies: advantages and disadvantages.

Retrieved from <https://www.who.int/research/cross-sectional-studies>

World Health Organization. (2023). Stevioside and steviol glycosides. WHO Food Additives Series, 69

World Stevia Organization. (2020). Annual report on global Stevia industry trends. WSO.

Retrieved from <http://www.worldsteviaorganization.org/annual-report>

World Trade Organization (WTO). (2023). World Trade Report 2023. Retrieved from:

https://www.wto.org/english/res_e/publications_e/wtr23_ehtm

World Bank. (2023). Global Economic Prospects. Retrieved from:

<https://www.worldbank.org/en/publication/global-economic-prospects>

World Trade Organization. (2022). World Trade Statistical Review. Retrieved

from https://www.wto.org/english/res_e/statis_e/wts2022_e/wts2022_e.html

Wright, M., Clarysse, B., & Lockett, A. (2023). Getting ideas to market: A guide to commercialisation for innovators and entrepreneurs (3rd ed.). Edward Elgar Publishing.

Wright, M., Clarysse, B., & Mustapha, E. (2023). The future of university technology transfer: Towards a demand-driven model. *Research Policy*, 52 (2), 104322.

Wright, M., Yoo, S., & Prencipe, A. (2023). *The Oxford handbook of knowledge transfer*. Oxford University Press.

Xue, S., Chen, J., & Li, R. (2022b). Logistics strategies for the successful commercialization of Stevia: Addressing market access and consumer satisfaction. *Transportation Research Part E: Logistics and Transportation Review*, 162, 102706.

Xue, Y., Li, W., Tang, H., & Zhao, M. (2022a). The role of Stevia in dietary transitions among health-conscious populations. *Journal of Functional Foods*, 92, 105031.

- Yang, K. (2021). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Sage Publications.
- Yasuda, F., & Beaver, J. (2023). Changing consumer preferences for sweeteners: Trends and implications. *Journal of Consumer Research*, 50(1), 75-89.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Los Angeles, CA: SAGE Publications.
- Yin, R. K. (2020). *Case study research and applications: Design and methods* (6th ed.). Sage.
- Yin, R. K. (2023). *Case Study Research and Applications: Design and Methods*. Thousand Oaks, CA: SAGE Publications
- Zha, Y., & Zhai, D. (2022). Effective policies for market stability and investment in agricultural infrastructure: Lessons from China. *China Agricultural Economic Review*, 14(3), 421-436.
- Zhang, J., Wang, G., & Xue, Y. (2022). The potential of collaborative efforts in driving technological advancements in specialty crops in South Africa. *Technology in Society*, 68, 101831.
- Zhang, L., & Chen, Y. (2024). Sustainability in stevia farming: Balancing economic viability and environmental health. *Sustainability Journal*, 12(1), 112-130.
- Zhang, L., Chen, D., & Liu, J. (2024a). The Impact of Agricultural Technology on Smallholder Farmers in China: A Review. *Journal of Agricultural and Resource Economics*, 49(2), 156-173.
- Zhang, L., Chen, D., & Liu, J. (2024b). The Role of Public-Private Partnerships in Modernizing Agriculture in China. *Agricultural Economics*, 55(1), 15-29.
- Zhang, M., Ochieng, B., & Chikozho, C. (2024). Strengthening cooperative governance in emerging agricultural sectors: A case for institutional leadership in Sub-Saharan Africa. *Journal of Cooperative Organization and Management*, 12(1), 15–28.
- Zhang, Y., & Liu, X. (2021). Global market dynamics of Stevia: Innovation, concentration, and trade flows. *International Journal of Agribusiness and Trade*, 8(2), 143–157.
- Zhang, Y., Li, H., & Chen, J. (2024). Governance in Agricultural Cooperatives: Implications for Smallholder Empowerment. *International Journal of Cooperative Management*, 11(1), 45-60.
- Zhao, J., Li, P., & Chao, X. (2023). The impact of Stevia processing plants on value addition and global competitiveness in China. *Food Science and Agriculture*, 21(2), 95-110.
- Zhou, C., et al. (2020). The role of cooperatives in enhancing smallholder farmers' market access: Evidence from Kenya. *Journal of Rural Studies*, 79, 154-1
- Zhou, J., Lin, X., & Zhang, Z. (2020). The role of Stevia in low-calorie dietary formulations: A review of its potential in weight management. *Food Chemistry*, 327, 127045.
- Zhou, L., Li, X., & Hu, Y. (2021). Quality of agricultural extension services and its effect on

smallholder farmers' productivity: Evidence from Eastern China. *Journal of Rural Studies*, 85, 215-224.

Zhou, Q., Liu, M., & Hu, K. (2020). An analysis of the logistics challenges in the Stevia supply chain and solutions for improvement. *Journal of Business Logistics*, 41(2), 110-128.

Zhou, Y., Li, X., & Zhang, R. (2020). The evolving global market for stevia: Production, consumption, and trade patterns. *Journal of Agricultural Economics and Trade*, 15(4), 233–247.

Zhu, Q., Liu, X., & Jiang, H. (2023). The impact of organized market connections on commercialization outcomes: Evidence from the agricultural sector. *Agricultural Economics*, 54(3), 284-299.

Zion Market Research. (2024). Agricultural technology trends and projections. Retrieved from <https://zionmarketresearch.com/reports/2024>

Zografos, C., Lerche, J., & Petropoulos, D. (2021). Compliance costs and market access for smallholders: A review of regulations and systemic barriers. *Journal of Agricultural and Resource Economics*, 46(2), 142-157.

Zyphur, M. J., & Pierides, D. C. (2020). Statistics and probability in quantitative research: A critical perspective. *Journal of Management Studies*, 57(5), 1156–1182.

APPENDIX A: LETTER OF INFORMED CONSENT

Research Administrator: Marriete Snyman

031-2608350

Email: Snymanm@ukzn.ac.za

Supervisor: Professor Ian T. Nzimakwe

nzimakweth@ukzn.ac.za

Co-Supervisor: Dr Wellington B. Zondi

Co-Supervisor: Prof Macdonald Kanyangale

Contact details: [REDACTED] Email:

zondi@ukzn.ac.za

Researcher: Ms Thandi Jane Zulu

Letter of Informed Consent

Dear Participant,

My name is Ms Thandi Jane Zulu (student no.219087118). I am a Doctor of Business Administration candidate studying at the University of KwaZulu-Natal, Graduate School of Business and Leadership, Westville Campus. The title of my research is: A FRAMEWORK FOR THE GROWING AND COMMERCIALISATION OF STEVIA IN KENYA.

The aim of the study is to develop a framework for the growing and commercialisation of Stevia in KwaZulu-Natal. I am interested in interviewing you to share your experiences and observations on the subject matter.

- The information that you provide will be used for scholarly research only.
- Your participation is entirely voluntary. You have a choice to participate, not to participate or stop participating in the research. If you choose to discontinue your participation, you will not be penalised for taking such an action.
- Your views in the research report will be presented anonymously. Neither your name nor your identity will be disclosed in any form in the study.
- Participation in the study will take approximately 20 minutes.
- The record, as well as other items associated with the interview, will be held in a password-protected file accessible only to me and my supervisors. After a period of 5 years, in line with the rules of the university, it will be disposed of by shredding.
- If you agree to participate, please sign the declaration attached to this statement (a separate sheet will be provided for signatures).

If you have questions regarding your rights as a research respondent, please contact any one of the above-mentioned contact persons.

Yours sincerely

Ms Thandi Jane Zulu

Signature-----

Date:

APPENDIX B: DECLARATION BY PARTICIPANT

TO WHOM IT MAY CONCERN

I hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

I understand the intention of the research. I hereby agree to participate.

I consent to have this interview recorded in form (if applicable)

Signature of Participant

Date

Appendix C: Interview guide

SECTION A

GENDER

Male	Female

AGE

18-35	36-40	41-50	50<

EDUCATIONAL QUALIFICATION

Below Primary	Secondary	Matric/Gr 12	Higher Education

YEARS OF EXPERIENCE IN STEVIA FARMING

5 years	6-10 years	11+ years

REGION

Nyeri	Nakuru	Thika

SECTION B

1. Can you broadly explain what type of Stevia commercialisation you are involved in and why you chose it?
2. In your type of Stevia commercialisation, what opportunities did you envisage and to what extent were they realised?
3. In your area of Stevia commercialisation, can you broadly provide a list of all the inputs that are crucial in your area of Stevia commercialisation (please list these and elaborate on each, e.g. seeds, land, finance, human resources, technology, firm infrastructure, logistics, distribution, raw materials, etc)?
4. Of the listed inputs, which are the ones that are a challenge to secure, and why?

5. Is there any form of support that you get? If so, what form of support is it and from whom, and if not, what form of support would you like to get?
6. Which markets do you supply and why? (local, export or both)
7. What opportunities do you feel are available for you to grow to reach the desired level of Stevia commercialisation?
8. With regards to the quality of your product, what challenges do you face and why
9. How do you monitor and evaluate the quality of your product?
10. As a person in the commercialisation of Stevia, what advice or recommendations could you give to an aspiring Stevia farmer in order to succeed?
11. What else can you share with your experiences in Stevia commercialisation?
12. What impact did COVID-19 have on Stevia commercialisation for you?

END OF INTERVIEW GUIDE

APPENDIX D: ETHICAL CLEARANCE



28 March 2023

Thandi Jane Zulu (219087118)
Grad School of Bus & Leadership
Westville Campus

Dear TJ Zulu,

Protocol reference number: HSSREC/00005216/2023
Project title: Developing a framework for the commercialisation of stevia in Kenya
Degree: PhD

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 25 January 2023 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 28 March 2024.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,



Professor Dipane Hlalele (Chair)

/dd

Humanities and Social Sciences Research Ethics Committee

Postal Address: Private Bag X51001, Durban, 4000, South Africa

Telephone: +27 (0)31 260 8350/4557/3587 Email: hssec@ukzn.ac.za Website: <http://research.ukzn.ac.za/Research/Ethics>

Founding Campuses:  Edgewood  Howard College  Medical School  Pietermaritzburg  Westville

INSPIRING GREATNESS