

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**EXPLORING THE OPPORTUNITIES IN THE SWEETPOTATO  
VALUE CHAIN IN DIVERSIFYING THE NIGERIAN ECONOMY**

A thesis submitted in partial fulfilment of the requirements  
for the degree of Master of AgriCommerce

at

Massey University, Palmerston North, New Zealand



**ADEBOWALE ADESINA**

**2018**

## **ABSTRACT**

Nigeria is the second largest producer of sweetpotato in the world and the largest producer in Africa. However, the total average yields of sweetpotato in Nigeria is comparatively low (2.6 tons per hectare) when compared to the rest of Africa (9.6 tons per hectare) and the world (16 tons per hectare). Furthermore, Nigeria is not ranked among the top 150 global exporters of sweetpotato, and the unavailability of markets has been reported to as one of the primary constraints to sweetpotato production in Nigeria. The aim of this study is therefore to explore the opportunities in the sweetpotato value chain that can contribute to the development of the Nigerian economy.

A structured questionnaire survey was used to obtain information from 115 farmers who were selected through non-probability convenience sampling. The findings from the structured questionnaire were complemented by an open-ended face-to-face interview. The analysis of the findings involved descriptive and inferential statistics. With the aid of the descriptive statistics, the contributing factors to the low yield of sweetpotato were identified along with the constraints to market access and market opportunities for sweetpotato nationally and internationally. The inferential analysis using the binary logistic model was used to determine the factors that had a significant influence on the yield of sweetpotato. The constraints identified that limit the production and yield of sweetpotato farmers included: inadequate market outlets to sell increased quantity of sweetpotato; high incidence of pest and diseases; scarcity of vines for planting; lack of knowledge on pest and disease management; lack of access to financial capital to buy farm inputs and carry out necessary farm activities; early spoilage of sweetpotato roots after harvest; lack of storage facilities to increase the shelf life of harvested sweetpotato; inadequate rainfall; grazing of cattle by herdsmen on sweetpotato farms; difficulty in getting farm labourers and inadequate access to farm machinery. The empirical results of the binary logistic regression indicated that farmers age, level of formal education, gender, cultivated land area, access to extension services access to market information and membership of a farmers group all had significant positive effect on the yield of sweetpotato farmers except farmers age which had a significant negative impact on the yield of farmers. Addressing the constraint to sweetpotato production and market access had the potential to increase farmers' productivity, annual income and access to the high-value market, alleviate poverty and contribute to the economic development of Nigeria.

## **DEDICATION**

I dedicate this thesis to God Almighty. His words and promises kept me going and sustained me throughout my study. To Him, be all the glory.

## **ACKNOWLEDGEMENTS**

“For I know the plans I have for you, says the Lord. They are plans for good and not for evil, to give you a future and a hope. (Jeremiah 29.11 TLB)”. My journey to New Zealand to study for the degree of Master of AgriCommerce would not be possible if not for God, the way maker, the promise keeper, the one who knows the end from the beginning. I give thanks to God who ordered my steps to New Zealand.

To the New Zealand Government, especially the Ministry of Foreign Affairs and Trade (MFAT), I say a big thank you for providing me with a platform by awarding me a full scholarship to study for the degree of Master of AgriCommerce. I am grateful to the fantastic team (Sylvia, Jamie, Logan and Saba) at the International Student Support Office at Massey University, Palmerston North Campus, you guys are the best. Thanks for the advice and support, it made my study less stressful.

To my supervisor, Associate Professor Nick Roskruge, thank you for your time, support, constructive criticism and the open-door policy. I appreciate your care and the hangi. You have worked hard to ensure I complete my study.

I would certainly not forget to thank a fantastic lecturer; Professor. Nicola Shadbolt, who taught me, inspired me, gave me an opportunity and listened to me. My special thanks also goes to Iona McCarthy, thank you for the immense support and your pleasant smile. Also, I am grateful to all my lecturers, the staff and management of the school of Agriculture and Environment.

My special thanks to all my colleagues in the Master of AgriCommerce programme especially Adjabui, Eunice, Farai, Khalid, Tshakazulu, Felix, Harumi, Kamara and Rithy. You have all contributed to the success of my study. Also, I am grateful to Emmanuel Donkor for his encouragement and assistance with the statistical data analysis. My special thanks to amazing friends, Fadzi and Ro-Ann, I appreciate your prayers, support and contributions towards the success of my studies

My profound gratitude to the Nigerian community at Palmerston North, especially to Prof and Dr (Mrs) Adeyinka for their immense contribution towards the success of my studies. To the African student club and all my friends at Massey University, I say a big thank you for the love and support. My immense gratitude to my parents, brother, sister and relatives. Thank you for your prayers, support and encouragement.

## TABLE OF CONTENTS

ABSTRACT.....	i
DEDICATION.....	ii
ACKNOWLEDGEMENTS.....	iii
TABLE OF CONTENTS.....	iv
LIST OF FIGURES .....	ixx
LIST OF TABLES.....	x
CHAPTER 1: INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem Statement.....	6
1.3 Research Questions.....	7
1.4 Research Objective .....	7
1.5 Specific Research Objectives.....	7
1.6 Organisation Of The Thesis .....	7
CHAPTER 2: LITERATURE REVIEW .....	9
2.1 Description and Definition of Key Concept .....	9
2.1.1 Value Chain Concept .....	9
2.2 Value Chain and Supply Chain.....	13
2.3 Value Chain Analysis .....	13
2.4 Constraints of Agricultural Value Chain Participation for Smallholders in Developing Countries.....	16
2.4.1 Lack of Bargaining Power .....	16
2.4.2 The Constraints of Production.....	17
2.4.3 High Cost of Transaction .....	17
2.4.4 Asymmetry or Lack of Information on Market.....	18
2.4.5 Lack of Social Capital .....	18
2.4.6 Technological Barriers .....	19

2.4.7 Regulatory Barriers .....	19
2.5 Value Chain Upgrading .....	19
2.5.1 Improving the Operational Efficiency of the Business .....	20
2.5.2 Upgrading the Linkages Within the Chain.....	21
2.5.3 Upgrading the Value Chain Governance .....	22
CHAPTER 3: THE SWEETPOTATO ECONOMY OF NIGERIA.....	24
3.1 Historical Background .....	24
3.2 Sweetpotato Cultivation in Nigeria.....	24
3.3 Sweetpotato Consumption, Utilization and Importance .....	28
3.4 Sweetpotato Trade in Nigeria .....	32
3.4.1 Prices .....	33
3.4.2 Marketing Systems.....	33
3.5 Sweetpotato Production Constrains in Nigeria .....	35
3.5.1 Pest and Disease Attacks.....	35
3.5.2 Poor Access to Extension Agents and Adoption of Improved Technologies .....	38
3.5.3 Fertilizer Application .....	39
3.5.4 Weed Control .....	39
3.5.5 Poor Storage Practices.....	40
3.5.6 Limited Access to Credit.....	40
CHAPTER 4: RESEARCH METHODOLOGY .....	42
4.1 Research Strategy.....	42
4.2 Sampling Procedure and Site Selection .....	43
4.3 Description of the Study Area.....	44
4.4 Design of Data Collection.....	46
4.4.1 Secondary Data .....	46
4.4.2 Primary Data .....	46
4.4.2.1 Questionnaires .....	46

4.5 Data Analysis .....	48
4.5.1 Binary Logistic Regression .....	49
4.6: Model Specification, Description of Variables, and Hypothesized Signs .....	52
4.6.1 Description of Independent Variables and Hypothesized Signs .....	52
4.6.1.1 Farmers Demographics .....	52
4.6.1.2 Farm and Production Characteristics .....	54
4.6.1.3 Marketing Features .....	55
4.6.1.4 Institutional Factor .....	55
4.7 Ethical Considerations .....	56
4.8 Limitation Of The Study .....	56
CHAPTER 5: DESCRIPTIVE STATISTICS OF THE DATA .....	57
5.1 Introduction .....	57
5.2 Farmer Demographics .....	57
5.2.1 Age Of Farmer .....	57
5.2.2 Gender .....	58
5.2.3 Level of Formal Education .....	58
5.2.4 Sweetpotato Farming Experience .....	59
5.2.5 Engagement in Off-Farm Employment .....	60
5.3 Farm and Production Characteristics .....	60
5.3.1 Cultivated Land Area and Land Availability .....	60
5.3.2: Planting and Harvesting Period .....	62
5.3.3 Irrigated and Rainfed Production .....	63
5.3.4 Variety of Sweetpotato Planted .....	64
5.3.5 Information Sources on Sweetpotato Varieties .....	65
5.3.6 Acquisition of Sweetpotato Vines Planted .....	66
5.3.7 Fertilizer Application .....	67
5.3.8 Pesticide and Herbicide Application .....	68



5.3.9 Fresh Root Yield .....	69
5.3.10 Hired Labour and Activities on Sweetpotato Farms .....	70
5.3.11 Constraints to the Production of Sweetpotato .....	71
5.4 Marketing of Sweetpotato .....	74
5.4.1 Marketing Channel of Sweetpotato .....	74
5.4.2 Farmers Mode of Communication with Buyers .....	75
5.4.3 Period of Payment .....	76
5.4.4: Prices of Sweetpotato Per Kilogram .....	77
5.4.5: Cost of Transporting Sweetpotato Per Kilogram .....	77
5.5: Institutional Factors .....	78
5.5.1: Access to Extension Services .....	78
5.5.2: Access to Credit .....	80
5.5.3: Access to Market Information .....	81
5.5.4: Membership of Farmers Group .....	82
5.6: Farmers Perception of Export Market .....	83
CHAPTER 6: DATA ANALYSIS AND DISCUSSION .....	86
6.1. Introduction .....	86
6.2. Factors Affecting the Yield of Sweetpotato Farmers .....	86
6.3: Discussion .....	87
6.3.1 Farmer Demographics .....	87
6.3.2. Farm and Production Characteristics .....	90
6.3.3. Marketing Features .....	91
6.3.4. Institutional Variables .....	91
CHAPTER 7: SUMMARY, CONCLUSION AND SUGGESTION FOR FUTURE RESEARCH .....	944
7.1: Summary and Conclusion .....	94
7.2 Suggestions for Future Research .....	100

REFERENCES .....	101
APPENDICES .....	120
Appendix 1: Research Questionnaire.....	120
Appendix 2: Ethics Evaluation and Approval .....	125
Appendix 3: Information Sheet for Data Collection.....	126
Appendix 4: Participant Consent Form.....	128

## LIST OF FIGURES

Figure 1.1: Nigeria Sweetpotato Production and Yield, 2000-2014.....	2
Figure 1.2: Nigeria Sweetpotato Yield Estimates, 1990-2014 .....	4
Figure 2.1: Actors and Activities in a Food value chain.....	10
Figure 2.2: Horizontal and Vertical links in a simple value chain.....	11
Figure 2.3: Basic structure of stakeholders in an agricultural value chain .....	12
Figure 2.4: Value Chain Analysis Framework .....	16
Figure 3.1: Map of Nigeria showing Agro-ecological Zones .....	26
Figure 3.2: Major Importers of sweetpotato in 2017 and their share in US dollars .....	32
Figure 3.3: Sweetpotato value chain network in Nigeria.....	34
Figure 3.4: The developmental stages of the sweetpotato weevil ( <i>Cylas puncticollis</i> ): (A) egg, (B) larva, (C) pupae, and (D) adult .....	36
Figure 3.5: Symptoms of sweetpotato weevil ( <i>Cylas puncticollis</i> ): (A, B) larvae and adult damage on tubers, (C, D) larvae damage on stems, and (E, F) adult damage on leaves .....	37
Figure 5.1: Flow of sweetpotato from the producer to the consumer .....	75

## LIST OF TABLES

Table 1.1: Top 5 Producers of Sweetpotato in the World (2010-2016).....	2
Table 1.2: Top 10 exporters of sweetpotato, 2012-2016 .....	5
Table 2.1: Potential benefits of upgrading linkages for small and medium enterprises, local communities and large firms.....	23
Table 4.1: Binary logistic regression variables.....	53
Table 5.1. Age of farmers .....	57
Table 5.2: Gender of farmers .....	58
Table 5.3: Educational level of farmers .....	59
Table 5.4: Sweetpotato farming experience.....	59
Table 5.5: Off-farm employment of farmers .....	60
Table 5.6: Cultivated sweetpotato land area .....	61
Table 5.7: Land scarcity experience .....	61
Table 5.8: Period of planting sweetpotato .....	62
Table 5.9: Period of harvesting.....	63
Table 5.10: Water dependency of farmers .....	63
Table 5.11: Varieties of sweetpotato planted.....	65
Table 5.12: Information sources on the best variety.....	65
Table 5.13: Acquisition of sweetpotato vine cuttings.....	66
Table 5.14: Source of the unpurchased vines .....	66
Table 5.15: Source of the purchased vines .....	67
Table 5.16: Application of organic fertilizer .....	67
Table 5.17: Application of inorganic fertilizer .....	68
Table 5.18: Application of pesticide.....	68
Table 5.19: Application of herbicide .....	69
Table 5.20: Yield of sweetpotato .....	69

Table 5.21: Labour hire for sweetpotato farming .....	70
Table 5.22: Activities of hired labour for sweetpotato farming.....	70
Table 5.23: Constraining factors to sweetpotato production .....	74
Table 5.24: Marketing channel of sweetpotato.....	75
Table 5.25: Farmers mode of communication with buyers .....	76
Table 5.26: Period of payment.....	77
Table 5.27: Prices of sweetpotato per Kilogram (Kg) .....	77
Table 5.28: Cost of transporting sweetpotato per kilogram (kg) .....	78
Table 5.29: Access to extension services.....	79
Table 5.30: Access to extension services.....	81
Table 5.31: Access to market information .....	82
Table 5.32: Farmers group membership .....	82
Table 5.33: Farmers group area of specialization.....	83
Table 5.34: Advantages of selling sweetpotato to export market.....	84
Table 5.35: Constraints of selling sweetpotato to the export market.....	85
Table 5.36: Perception of government roles in facilitating sweetpotato exports.....	85
Table 6.1. Determinants of the yield of sweetpotato farmers .....	88