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.

ADOPTION OF CASSAVA TECHNOLOGY FOR SUSTAINABLE LIVELIHOODS

A thesis presented in partial fulfilment of the requirements for the degree of Master of Applied Science in Rural Development at Massey University, New Zealand

MARY ESENAM AZILAH

2007

ABSTRACT

The RTIP was part of efforts to improve the livelihood security of resource poor farmers in Ghana. The focus of the programme included the introduction of the new cassava varieties, that have the potential to improve yields and consequently to improve household income levels. However, the low level of sustained adoption of the technology has raised questions relating to the project.

A single case study was used to investigate the factors that influenced farmers' reasons for adopting and continuing or discontinuing the use of the new cassava varieties. Semi-structured interviews were used in the data collection, which was conducted between May and June 2006. Farmers who had adopted or not adopted the cassava technology and key informants, including opinion leaders and agricultural extension agents, were interviewed. A qualitative data analysis procedure was used in the analysis of the information gathered.

The findings of this study revealed many interrelated factors, which influenced the initial adoption of the cassava technology and the sustained use of the new cassava varieties. The factors, which were identified as influencing the initial adoption decision of farmers, were related to the cassava technology, whilst other external factors relating to the farmers and their circumstances, in addition to situational factors and extension contacts, were found to have influenced the sustained use of the new cassava varieties. The new cassava varieties have a proven potential to improve the livelihood security of the farmers, through income generation, provided they have access to credit, processing and reliable markets. Inadequate institutional support with resources, for extension agents, influenced the effectiveness of service delivery.

The findings suggest that development interventions, intended to improve the living standards of farm households, need to consider the complex nature of the farmers' circumstances, in their planning and implementation of the projects, if the needs of the target group are to be met.

ACKNOWLEDGEMENTS

I am most grateful to Almighty God for being my fortress and shield. I thank you, Lord Jesus Christ, for the grace of wisdom and perseverance in all circumstances leading to the success of this research.

I would like to express my sincere and profound gratitude to my supervisor, Ms Janet Reid, for her invaluable support and encouragement towards the completion of this thesis. I am indebted to her and my husband for their immense support.

I am grateful to the New Zealand Government (NZDS) for the scholarship that enabled me to further my studies at Massey. I thank all the staff of the International Students Support Office, especially Sue and Sylvia for their support.

I would like to extend my gratitude to all those who have been part of the success of this project in many diverse ways. I am also grateful to the lecturers and staff of the Institute of Natural Resources, particularly Denise Stewart, Dr Terry Kelly and Dr Tanira Kingi for their support. I thank all my fellow students and friends at Massey University – Girija, Lolita, Nui, Bijaya, Jusu, Bhoj, Truyen, etc. My special thank to Mr Ernest L. Okorley and the family, and all my other friends in New Zealand and Ghana. My gratitude goes to the Hohoe District Directorate of MOFA and the Acting Director of the Extension Services Directorate – MOFA Accra, for his support during the fieldwork of this research.

I would also like to thank my siblings, parents, Auntie Grace and all family members, who have made valued contributions to my life. My final thanks go to my dear and loving husband, Mr Samuel Pious Dela Elewokor, for his priceless, emotional and spiritual support. I may not have come this far without his understanding, patience and continuous encouragement.

ABBREVIATIONS

AgSSIP - Agricultural Sub-Sector Improvement Programme

COCOBOD – Ghana Cocoa Marketing Board

FAO - Food and Agricultural Organisation

FASDEP – Food and Agriculture Sector Development Policy

GATSBY – Rice Project

GNAFF - Ghana National Association of Farmers and Fishermen

GHC – Ghana cedi

GPRS – Ghana Poverty Reduction Strategy

GTZ – German Technical Corporation

HDI – Human Development Index

IFAD - International Fund for Agricultural Development

MOFA - Ministry of Food and Agriculture

MUHEC – Massey University Human Ethics Committee

NAEP - National Agricultural Extension Project

NERICA – New Rice for Africa

NGO – Non-Governmental Organisation

NZD – New Zealand Dollar

PSI – President's Special Initiatives

RTIP - Root and Tuber Improvement Programme

UNDP – United Nations Development Programme

USAID – United States Agency for International Development

USD – United States of America Dollar

Exchange rate: 1 US Dollar = 9,622.70 Ghanaian Cedi

1 Ghanaian Cedi (GHC) = 0.0001039 US Dollar (USD)

1 New Zealand Dollar = 6,549.88 Ghanaian Cedi

1 Ghanaian Cedi (GHC) = 0.0001527 New Zealand Dollar (NZD) (Ghanaweb.com, 2007a).

Table of Contents

ABSTRACT ..... **i**
ACKNOWLEDGEMENTS ..... **iii**
ABBREVIATIONS ..... **v**
Table of Contents ..... **vii**
List of Tables ..... **ix**
List of Figures ..... **x**
Chapter One: Introduction **1**
1.1 Research Background 1
1.2 Problem Statement 7
1.3 Research Question 8
1.4 Research Objectives 8
1.5 Thesis Structure 8
Chapter Two: Literature Review **9**
2.1 Agricultural Extension 9
2.2 Agricultural Extension and Rural Development 10
2.3 Extension Process 11
2.4 Agricultural Technology Adoption 11
2.5 Factors Affecting Technology Adoption 15
2.5.1 Characteristics of Technology 16
2.5.2 Extension Service Delivery 18
2.5.3 Characteristics of Farmer Adopters 27
Personal Characteristics 27
2.6 Contributions of Technology Adoption to Adopters Livelihoods 32
2.7 Livelihood Strategies and Cassava's role in Livelihood Sustainability 35
2.8 Summary 36
Chapter Three: Research Methodology **39**
3.1 Research Design 39
3.2 Case Selection 41
3.3 Site Selection and Sampling Procedure 42
3.4 Data Collection 44
3.5 Data Analysis 46
3.6 Ethical Consideration 48
3.7 Summary 48
Chapter Four: Study Background and Case Description **49**
4.1 Research Background 49
4.2 Structural Reforms in Ghana's Extension System 49
4.3 Government's Decentralisation Policy and Extension 50
4.4 Extension Approaches and Concepts in Ghana 52
4.5 Case Description 54
4.6 The Root and Tuber Improvement Programme 60
4.6.1 Plant Material Multiplication and Distribution 61
4.7 Cassava 64
4.7.1 Origin and Propagation 64
4.7.2 Environmental Requirements 65
4.7.3 Uses of cassava 66
4.8 The New Cassava Varieties 70
4.9 Summary 72

Chapter Five: Factors Influencing the Adoption of the New Cassava Varieties 75
5.1 Characteristics of the Cassava varieties 75
5.2 Non-farm Factors 79
5.3 Farmer Characteristics 86
5.4 On-farm Factors 87
5.5 Community and Group Characteristics 89
5.6 Extension Related Factors 90
Chapter Six: Discussion 95
6.1 Agricultural Extension, Rural Development and Livelihood Improvements ..95
6.2 Factors that Influenced the Adoption of the Cassava Technology 97
6.2.1 Characteristics of the Cassava Technology 97
6.2.2 Farmer Characteristics 101
6.2.3 Role of Extension Agents 108
6.2.4 Appropriateness of the Cassava Technology 110
6.3 Summary 112
Chapter Seven: Summary and Conclusions 115
7.1 Main Research findings 115
7.2 Conclusions 117
7.3 Assessment of Research Methodology 118
7.4 Further Research 120
References: 121
Appendix 1: Interview Guide 133
Appendix 2: Ethics Approval Letter 137

List of Tables

Table 3.1: Relevant Situations for Different Research Strategies 40

Table 3.2: An example of categorising data 47

Table 4.1: Annual rainfall figures of wet days from 2005 back to 1996 56

Table 4.2: Ethnic Groups within the Hohoe District 57

Table 4.3: Varietal characteristics of the new cassava varieties 71

Table 4.4: Cyanide levels and some uses of the new cassava varieties 72

Table 5.1: Differences between the new and local cassava varieties, as identified by the Farmers contacted 77

Table 7.1: Factors that Influenced the Adoption of the New Cassava Varieties 116

List of Figures

Figure 2.1: Six main stages in the innovation development – adoption process 11
Figure 3.1: The researcher in discussion with a farmers' group 43
Figure 3.2: The Data Analysis Spiral 46
Figure 4.1: Ghana map showing the study area 55
Figure 4.2a: A cassava farm intercropped with cocoyam and oil palm 58
Figure 4.2b: A cassava farm intercropped with plantain 59
Figure 4.3: A cassava farm in Ghana 65
Figure 4.4: Gari (processed from grated cassava tubers) 66
Figure 4.5: Tapioca (processed from cassava starch) 66
Figure 4.6: Women peeling the Cassava Tubers 67
Figure 4.7: Children helping with washing of the Peeled Cassava Tubers 68
Figure 4.8: Milling of Cassava Tubers for Dough or Gari 68
Figure 4.9a: Women packing the bagged cassava paste for pressing 69
Figure 4.9b: Pressing the cassava paste 69
Figure 4.10: Bagged Cassava Dough ready for the market 70
Figure 5.1: Mucuna Flour (processed from the new cassava and Mucuna) 83
Figure 5.2: Mucuna Gari (processed from the new cassava and Mucuna) 83