

**ANALYSING AGRICULTURAL SCIENCE  
AND TECHNOLOGY INNOVATION  
SYSTEMS:**

**A Case Study of the Banana Sub-sector in  
Uganda**

**Co-authors:**

**Margaret Kabahenda & Monica Namumbya Kaporiri**



## ACKNOWLEDGEMENTS

This study was a collaborative effort of CTA and RUFORUM to build capacity of ACP countries to assess their Agricultural Science and Technology Innovation (ASTI) Systems. Research activities were implemented by RUFORUM and Makerere University. The administrative support provided by RUFORUM Secretariat and the Department of Food Science and Technology (Makerere University), plus the technical backstopping provided by Professor Adipala Ekwamu and Dr. Moses Osiru of RUFORUM, are highly appreciated.

Special acknowledgement is also made to all participants who participated in the inception and validation workshops. These participants provided guidance on research methodology and particularly improved our analyses of critical actors and their roles. The insightful presentations by Nodumo Dhlamini and Claire A Ntwali (RUFORUM), Dr Byarugaba Bazirake (FRAVESEMA), and Dr. S B Mukasa (Faculty of Agriculture, Makerere University) were also very informative and improved the participants understanding of the study objectives. We thank all workshop participants and presenters for their contributions to this study.

The authors also acknowledge the participation of different actors in individual interviews and group discussions, and institutions and researchers who provided documents for review. Special acknowledgement goes Mr. Peter Musisi and Robert Semakula of KASIBA Luwero, Mr. Cletie Lukusa of UCA Mbarara, and Mr. Ernest Bbongole of Mukono for mobilizing farmer groups and institutions to engage in this study. The openness and trust of farmers groups and individuals interviewed is well acknowledge because these discussions generated in-depth insights into the dynamics of the banana sub-sector and issues of concern among actors engaged in different aspects of the sub-sector.

Finally, the authors hereby inform the reader that the recommendations and contents of this report convey the views of the authors and do not in any way represent the position of Makerere University, RUFORUM, or CTA.

***A note about the authors:***

Monica Namumbya Kapiriri is a Development Facilitator, Mentor & Coach

Margaret Kabahenda (PhD) is a lecturer in the Department of Food Science and Technology, Makerere University

**Both authors contributed equally towards concept development, research implementation, and report writing.**

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS .....	i
LIST OF TABLES .....	vi
LIST OF FIGURES.....	vii
LIST OF FIGURES.....	vii
CASE STUDIES .....	viii
CASE STUDIES .....	viii
LIST OF ACRONYMS .....	ix
EXECUTIVE SUMMARY.....	xii
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 STUDIES ON ASTI SYSTEMS IN AFRICA.....	1
1.2 IMPORTANCE OF BANANA SUB-SECTOR IN UNDERSTANDING ASTI SYSTEMS IN UGANDA .....	2
1.3 STUDY OBJECTIVES.....	3
<b>2.0 DATA COLLECTION METHODS.....</b>	<b>3</b>
2.1 REVIEW AND SYNTHESIS OF AVAILABLE LITERATURE.....	4
2.2 CONSULTATIVE MEETINGS WITH STAKEHOLDERS .....	4
2.2.1 Inception Workshop.....	4
2.2.2 Results Validation Workshop.....	4
2.3 KEY INFORMANT INTERVIEWS.....	5
2.4 STRUCTURED INTERVIEWS .....	5
2.5 FIELD VISITS .....	5
2.6 FOCUS GROUP DISCUSSIONS .....	6
<b>3.0 STRUCTURE AND PERFORMANCE OF UGANDA'S AGRICULTURE     SECTOR.....</b>	<b>7</b>
3.1 STRUCTURE OF UGANDA'S AGRICULTURE SECTOR.....	7
3.1.1 Structure of National Agricultural Research System (NARS) .....	8
3.2 PERFORMANCE OF UGANDA'S AGRICULTURAL SECTOR .....	11
3.3 OVERVIEW OF UGANDA'S BANANA SUB-SECTOR.....	12
3.3.1 Trends in Banana Production in Uganda.....	13
3.3.2 Trends in Banana Exports .....	14
3.3.3 Challenges faced by the sub-sector.....	14
3.3.4 Highlights of Research to Improve Banana Production.....	17

<b>4.0</b>	<b>POLICY FRAMEWORK S THAT HAVE INFLUENCED PERFORMANCE OF BANANA SUB-SECTOR.....</b>	<b>18</b>
4.1	THE COLONIAL POLICY MOULD THAT STILL HOLDS TODAY .....	18
4.1.1	Colonial Economic Policy.....	19
4.1.2	Policies Related to Land Use .....	19
4.1.3	Colonial Transport Policy .....	20
4.2	POST-COLONIAL POLICIES AND THEIR EFFECTS ON THE BANANA SUB-SECTOR.....	20
4.2.1	Enguli (manufacturing and licensing) Act 1965 .....	20
4.2.2	Structural Adjustment Policies (SAP) of 1980s .....	20
4.2.3	Co-operative Societies Acts.....	21
4.2.4	Financial Amendment Acts.....	22
4.2.5	Poverty Eradication Action Plan (1997- 2008) .....	23
4.2.6	Plan for Modernization of Agriculture (2000 - 2008).....	23
4.2.7	National Agricultural Advisory Services Act 2001 .....	24
4.2.8	The Rural Development Strategy (RDS) of the MoFPED 2005.....	24
4.2.9	NARO Act 1992/NARS ACT 2005.....	24
4.2.10	Prosperity for All (PFA) .....	25
4.2.11	The new Development Strategy and Investment Plan -DSIP .....	25
4.2.12	Uganda National Development Plan (2010/11-2014/15).....	26
4.3	OTHER POLICY-RELATED EVENTS THAT HAVE AFFECTED THE AGRICULTURAL SECTOR .....	26
4.3.1	Expulsion of Asians in 1972 .....	26
4.3.2	Transfer of Agricultural Colleges to Education in 1998 .....	27
<b>5.0</b>	<b>KEY ACTORS IN THE BANANA SUB-SECTOR AND THEIR INNOVATION HABITS.....</b>	<b>27</b>
5.1	ENTREPRENEURS .....	28
5.1.1	Producers .....	28
5.1.2	Processors.....	35_Toc284519333
5.2	INPUT SUPPLIERS.....	43
5.2.1	Stockists.....	44
5.2.2	Suppliers of Planting Materials .....	44
	_Toc284519342 _Toc284519343 _Toc284519344 _Toc284519345	5.2.3 Manure Providers 47
5.3	KNOWLEDGE AND TECHNOLOGY GENERATORS .....	47
5.3.1	Research Institutions .....	47
5.3.2	Training Institutions .....	52
5.4	SERVICE DELIVERY AND INTERMEDIARY INSTITUTIONS.....	58

5.4.1	Public Agricultural Extension .....	58
5.4.2	National Agricultural Advisory Services (NAADS) .....	59
5.4.3	Non-governmental Organizations .....	61
5.4.4	Farmers' Associations .....	66
5.5	<b>CREDIT AND FINANCIAL INSTITUTIONS</b> .....	68
5.5.1	Microfinance Institutions (MFIs) .....	68
5.6	<b>MARKET CHAIN ACTORS</b> .....	69
5.6.1	Traders and Transporters .....	70
5.6.2	Handling and Cold Storage Providers .....	74
5.6.3	Exporters .....	74
5.7	<b>QUALITY CONTROL AND REGULATORY BODIES</b> .....	75
5.7.1	Governmental Institutions .....	76
5.7.2	Non-Governmental Regulatory Bodies .....	76
<b>6.0</b>	<b>IMPOTANCE OF ACTOR LINKAGES TO THE PERFORMANCE OF THE BANANA SUB-SECTOR</b> .....	<b>79</b>
6.1	<b>LINKAGES AMONG ENTREPRENEURS AND OTHER ACTORS</b> .....	79
6.1.1	Entrepreneurs and Input Suppliers .....	80
6.1.2	Entrepreneurs and Market Chain Actors .....	80
6.1.3	Entrepreneurs with Credit and Financial Institutions .....	81
6.1.4	Entrepreneurs with Knowledge and Technology Generators .....	81
6.1.5	Entrepreneurs and Intermediary Organizations .....	82
6.1.6	Entrepreneurs with Regulatory Bodies .....	83
6.2	<b>GENERAL LINKAGES AMONG ACTORS IN THE BANANA SUB-SECTOR</b> .....	83
<b>7.0</b>	<b>SUMMARY OF ACTOR FUNCTIONS AND PERFORMANCE OF THE BANANA SUB-SECTOR</b> .....	<b>87</b>
7.1	<b>GOVERNMENT FUNCTIONS</b> .....	87
7.1.1	Policy Making .....	87
7.1.2	Resource Allocation .....	87
7.1.3	Regulatory .....	87
7.2	<b>IMPLEMENTATION FUNCTIONS</b> .....	88
7.2.1	Financing .....	88

7.2.2 Implementing .....	89
7.2.3 Human Resources and Capacity building.....	89
7.2.4 Provision of Infrastructure .....	90
<b>8.0 STRENGTHS AND WEAKNESSES OF BANANA SUB-SECTOR.....</b>	<b>90</b>
<b>9.0 CONCLUSIONS .....</b>	<b>Error! Bookmark not defined.</b>
<b>10.0 RECOMMENDATIONS .....</b>	<b>Error! Bookmark not defined.</b>
<b>BIBLIOGRAPHY .....</b>	<b>98</b>
<b>APPENDIX 1:Engagement in Groups Improves Yields and Returns for Subsistence Farmers in Luwero .....</b>	<b>102</b>
<b>APPENDIX 2: Analysis of Functions of Actors in Banana Sub-sector.....</b>	<b>103</b>

## LIST OF TABLES

Table 1: Nutrient Requirements in some Agricultural Regions in Uganda .....	16
Table 2: History of Banana Improvement in Uganda .....	17
Table 3: Uganda's Financial Tier System.....	22
Table 4: Banana Dehydration Companies' Investments in Driers.....	36
Table 5: Banana Fiber Crafts Sold at Major Craft Centres in Kampala.....	42
Table 6: Donors and Research Partners Linked to UNBRP .....	49
Table 7: Major Institutions Involved in Regulating Movement and Trade in Agro-inputs and Products .....	77
Table 8: Strengths and Weakness of Banana Sub-sector .....	91
Table 9: Functions of Actors in Banana Sub-sector.....	103

## LIST OF FIGURES

Figure 1: Principle growing areas and banana varieties in East Africa.....	3
Figure 2: Schedule of Research Activities .....	6
Figure 3: Institutions Currently Affiliated with MAAIF .....	7
Figure 4: Macro Structure of the NARS .....	9
Figure 5: Growth of Uganda's Agriculture, Services, and Industry Sectors .....	11
Figure 6: Farming Systems in Uganda.....	12
Figure 7: Trends in Banana Production between 1997 to 2007 .....	13
Figure 8: Banana Exports Reported by UEPB (2005-2009).....	14
Figure 9: Farmers that Reported Using Agricultural Inputs in 2006 .....	17
Figure 10: Investments in Labour .....	33
Figure 11: Investment in Farm Inputs .....	34
Figure 12: Plantation Yield as a Function of Production Costs .....	34
Figure 13: Changes in Matooke Prices Along the Supply chain.....	72
Figure 14: Entrepreneurs Linking with Other Actors in Banana Sub-sector .....	79
Figure 15: Interactions between NAADS and other Intermediary Organizations .....	83
Figure 16: Summary of Linkages among Actors in Banana Sub-sector .....	83
Figure 17: Linkages of a Commercial Banana Farmer and Processor with other Actors ..	85
Figure 18: Luwero Farmers in Groups Record Changes in Banana Profitability .....	102



## CASE STUDIES

InFocus 1: Chronicle of a Salaries Worker turned Semi-Commercial Banana Farmer .....	30
InFocus 2: Profile of a Commercial Farm and Processing Firm.....	32
InFocus 3: The Presidential Initiative on Banana Industrial Development (PIBID) .....	36
InFocus 4: Wine Processing and Marketing by Tige bwa DFA .....	38
InFocus 5: Profile of a Small Scale Traditional Crafts-maker .....	42
InFocus 6: Tissue Culture Laboratory at Makerere University.....	44
InFocus 7: UNBRP's Investment in Quality of Personnel is Key to its Performance .....	48
InFocus 8: Mbarara ZARDI Engages in Banana Improvement .....	49
InFocus 9: An Educator's Perspectives on Agricultural Training at Universities .....	53
InFocus 10: Structural Transformations Affect Agricultural Training .....	55
InFocus 11: Practical Training Transforms Farmers Productivity.....	57
InFocus 12: District Production Units Contributes to Diffusion of Knowledge .....	58
InFocus 13: Capacity Building in Marketing Improves Profitability of Banana Enterprises .....	61
InFocus 14: SACU Helps Farmers Integrate Livestock in Banana Cropping Systems .....	64
InFocus 15: MBADIFA Links Farmers to Knowledge and Technologies .....	67
InFocus 16: Banana Improvement Loan Enhances Farmers' Access to Credit.....	68
InFocus 17: Banana Trading at Kisoro Market in Mbarara .....	70
InFocus 18: Dynamics of Banana Transportation.....	71
InFocus 19: Example of an Actor Engaging in Effective Interactions .....	84

## LIST OF ACRONYMS

<b>ACP</b>	Africa Caribbean and Pacific group of States
<b>AGOA</b>	Africa Growth and Opportunity Act
<b>AGT</b>	Agro Genetic Technologies
<b>APEP</b>	Agricultural Productivity Enhancement Programme (USAID)
<b>ARENET</b>	Agricultural Research and Extension Network
<b>ASARECA</b>	Association for Strengthening Agricultural Research in Eastern and Central Africa
<b>BIP</b>	Banana Improvement Product
<b>BXW/BBW</b>	Banana Xanthomonas wilt/Banana bacterial wilt
<b>CAADP</b>	Comprehensive African Agricultural Development Programme
<b>CAEC</b>	Continuing Agricultural Education Centre
<b>CARITUS</b>	Catholic agency for overseas aid and development
<b>CGIAR</b>	Consultative Group on International Agricultural Research
<b>CIAT</b>	International Center for Tropical Agriculture/ Centro Internacional de Agricultura Tropical
<b>COMESA</b>	Common Market for Eastern and Southern Africa
<b>CSO</b>	Civil Society Organisation
<b>CTA</b>	Technical Center for Agriculture and Rural Cooperation
<b>DDA</b>	Danish Design Award
<b>DFID</b>	Department for International Development (British Government)
<b>DSIP</b>	Development Strategy and Investment Plan
<b>EAC</b>	East African Community
<b>EBO</b>	Ebirungi Birug'Omututu
<b>ENHAS</b>	Entebbe Handling Airport Services
<b>EPEP</b>	Economic Policy Empowerment Program
<b>EPRC</b>	Economic Policy Research Center
<b>EU</b>	European Union
<b>FAO</b>	Food and Agricultural Organization of the UN
<b>GDP</b>	Gross Domestic Product
<b>GMO</b>	Genetically Modified Organism
<b>GSP</b>	Generalized System of Preferences,
<b>HACCP</b>	Hazard Analysis Critical Control Point
<b>IDRC</b>	International Development Research Center
<b>IITA</b>	International Institute of Tropical Agriculture,

<b>INIBAP</b>	International Network for the Improvement of Bananas and Plantains
<b>IMF</b>	International Monetary Fund
<b>IT</b>	Information Technology
<b>KARI</b>	Kawanda Agricultural Research Institute
<b>KASIBA</b>	Kasana Small business Association
<b>LEAD</b>	Leadership Development program
<b>MAAIF</b>	Ministry of Agriculture, Animal Industry and Fisheries
<b>MBADIFA</b>	Mbarara District Farmers' Association
<b>MDI</b>	Micro Deposit Institutions
<b>MFI</b>	Micro Finance Institution
<b>MoEd</b>	Ministry of Education and Sports
<b>MoFPED</b>	Ministry of Finance, Planning and Economic Development
<b>MTTI</b>	Ministry of Tourism, Trade and Industry
<b>MWE</b>	Ministry of Water and Environment
<b>NAADS</b>	National Agricultural Advisory Services
<b>NAGRIC &amp; DB</b>	National Genetic Resource
<b>NAP</b>	National Agricultural Policy,
<b>NARI</b>	National Agricultural Research Institution
<b>NARO</b>	National Research Organization
<b>NARS</b>	National Agricultural Research System
<b>NDP</b>	National Development Plan,
<b>NEPAD</b>	New Partnership for Africa's Development
<b>NGO</b>	Non-Governmental Organization
<b>NOGAMU</b>	National Organic Agricultural Movement of Uganda
<b>PAED</b>	Participatory Agro-enterprise development
<b>PARI</b>	Public Agricultural Research Institute,
<b>PEAP</b>	Poverty Eradication Action Plan
<b>PELUM</b>	Participatory Ecological Land Use Management
<b>PFA</b>	Prosperity for All
<b>PIBID</b>	Presidential Initiative on Banana Industrial Development.
<b>PMA</b>	Plan for Modernization of Agriculture
<b>PROLINNOVA</b>	Promoting Local Innovations
<b>RDS</b>	Rural Development Strategy
<b>RUFORUM</b>	Regional Universities Forum for Capacity Building in Agriculture
<b>SACCO</b>	Saving and Credit Cooperative

<b>SACU</b>	Send A Cow Uganda
<b>SATNET</b>	Sustainable Agriculture Trade Network
<b>SDIOs</b>	Service delivery and intermediary organizations
<b>UBOS</b>	Uganda Bureau of Statistics
<b>UNBS</b>	Uganda National Bureau of Standards
<b>UCA</b>	Uganda Cooperative Alliance
<b>UgOCert</b>	Uganda Organic Certification Ltd
<b>UNBRP</b>	Uganda National Banana Research Program
<b>UNBS</b>	Uganda National Bureau of statistics
<b>UNCST</b>	Uganda National Council for Science and Technology
<b>UNDP</b>	United Nations Development Programme
<b>UNEDO</b>	United Nations Economic Development Organisation
<b>UNFA</b>	Uganda National Farmers Association
<b>UNFFE</b>	Uganda National Farmers Federation
<b>UNHS</b>	Uganda National Household Survey
<b>UNRA</b>	Uganda National Road Authority
<b>URA</b>	Uganda Revenue Authority
<b>VEDCO</b>	Volunteer Efforts for Development Concern
<b>ZARDI</b>	Zonal Agricultural Research and Development Institute

## EXECUTIVE SUMMARY

### Introduction

This report provides an overview of the Agricultural Science and Technology Innovation system (ASTI) of the banana sub-sector of Uganda. The study took place between the months of May and November 2010. This study was part of the on-going effort by CTA to build the capacity of ACP countries to better analyze and understand, the strengths and weaknesses of local science, technology and innovation system in the agricultural sector, and based on this understanding to make appropriate improvements in the sector.

#### Specific objectives of the study were to:

- (i) Review policies affecting the performance of the banana sub-sector environment within which the ASTI system operates;
- (ii) Identify key actors in the banana sub sector and the nature and function of linkages among the actors;
- (iii) Assess the innovation habits, practices, competencies and performances of the key actors;
- (iv) Identify core functions essential for the proper performance of the banana sub- sector innovation system; and,
- (v) Identify the current strengths and weaknesses of the ASTI system and channels for bringing about consensus on the way to deal with the weaknesses.

The results of the study are expected to inform further research and training in agriculture, foster strategic planning and organization of the banana sub-sector, and inform interventions in the implementation of national strategies such as the new Development Strategy and Implementation Plan (DSIP) developed by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF).

### Methodology

The study employed four levels of investigation: literature review, interviews with individuals and in focus groups involving about 70 people, field visits to the districts of Kampala, Mukono, Luwero, Mbarara, and Bushenyi; and workshops (the inception and validation workshops) involving a total of over 80 participants. The most important methodological limitation was the absence of recent publications and updated data on the sub-sector and Uganda's agriculture as a whole.

### Results

With an estimated production of 10.5 million tonnes per annum, Uganda is currently the world's largest producer and consumer of cooking bananas (*matooke*). It was noted that bananas are a major staple for more than a half of Uganda's population and provide a wide range of products which contribute to food security. In addition, there are non-food banana products such as animal feeds, charcoal briskets, crafts, and construction materials that employ a wide range of actors along the value chain. Hence bananas are a major food and income security crop which has potential to contribute significantly to national development.

However, the sub-sector faces some critical challenges that affect and even threaten its survival in the country. Key among these include diseases (mostly the banana bacterial wilt and *Black sigatoka*), pests, nematodes, weevils, and soil degradation, which have greatly reduced the longevity and productivity of banana plantations, especially in the central region. Other key constraints include the limited use of improved inputs, and limited access to markets in peak production seasons. These factors constrain development of the sector and the agricultural sector as a whole.

Analysis of the national policy framework revealed no specific policies designed to support development of the banana sub-sector; however, key issues affecting the banana sub-sector were addressed by the general national policies such as Poverty Eradication Action Plan (PEAP), Plan for Modernization of Agriculture (PMA); and development strategy and investment plan (DSIP) developed by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). This study also noted that although important policy frameworks such as PEAP and PMA were meant to facilitate development of the agriculture sector, many of the policy frameworks and development strategies are not implemented. This was partly found to result from inadequacies in resource allocation (both human and financial) for the implementation and monitoring process. The problem was aggravated by actors in the agricultural system not engaging in the policy making process and having limited knowledge of policies.

Overall, this study has identified 7 broad categories of actors engaged in different functions that has contributed to the development of the banana sub-sector., namely:

- (i) **Entrepreneurs**- who utilize agricultural knowledge and technologies in production of either raw bananas or processed banana products;
- (ii) **Scientific Knowledge and Technology Generators** including public research institutions, public and non-government training institutions;
- (iii) **Service Delivery and Intermediary Organizations** who are intermediary Organizations that diffuse knowledge and technologies, links producers to knowledge and technology sources;
- (iv) **Quality Control and Regulatory Agencies** that provide guidelines, boundaries and freedoms under which other actors operate;
- (v) **Credit and Financial Institutions** that provides financial services especially saving and credit to actors;
- (vi) **Input Suppliers** that provides farm inputs; and
- (vii) **Market Chain Actors** who provide services to entrepreneurs in the market chain

In general, underperformance was noted in government functions such as policy making, resource allocation, and infrastructure development; and this underperformance was observed to stifle development of the banana sub-sector and the agricultural system as a whole. For instance, lack of irrigation technologies constrained yields while inaccessibility to electricity limited development of agro-processing industries in banana producing areas. At the implementation level, actors' performance was also constrained by limited funding, delayed or limited access to improved knowledge and technologies, limited knowledge of market requirements and access to markets. The table below summarized key factors that are influencing the performance of the banana sub-sector.

### **Strengths and Weakness of Banana Sub-sector**

<b>Strengthening factors</b>	<b>How to exploit them further</b>
+ Many actors engaged in research, production, processing, and marketing of banana crop and its by products increases employment opportunities at various levels	+ Improving linkages among actors in order to improve learning and investment practices
+ Wide range of banana varieties and products generated from bananas provide opportunities for value-addition and economic development	+ Agro-ecological matching of varieties to improve productivity
+ Political will to promote banana production and value addition as demonstrated by financial support under the Presidential Initiatives has increased funding to sub-sector	+ Improve resource allocation to entrepreneurs (farmers and processors) to help them scale up production. Research projects also need to be facilitated to scale up processing activities in banana producing areas. PIBID model provides a good example.
+ Perennial nature of crop reduces investments in plantation establishment and fosters sustainability of the sub-sector	+ Research mechanisms to sustainably engage farmers in appropriate soil management and agronomical practices
+ High biomass and nutritive value assures food security which has improved the social economic profile of crop	+ Aggressive marketing of different banana products to optimize utilization and ensure higher returns on investment in banana cultivation
<b>Weakening factors</b>	<b>How to avoid them</b>
- Perishability of banana fruit (which is the major product) limits entrepreneurs' negotiation for better prices especially during peak harvest seasons. This in turn stifles scaling up production.	- Aggressive promotion of processing especially among subsistence farmers to improve food security and returns during peak harvest seasons
- Laxed regulation of agro-input supplies (including planting material) limits farmers access to authentic agro-inputs'.	- Improve mechanisms for farmers to report culprits and get compensated in case fake products are used. A special regulatory body is needed.
- International policies such as EU increasing imports from South American countries likely to reduce quotas of banana products from Uganda	- Value addition coupled with aggressive promotion of utilization of processed products in order to widen local and regional markets for banana products

## CONCLUSIONS

In general, it can be concluded that actors in the banana subsector are actively interacting to improve their efficiency and productivity. Strong interactions exist wherever there are exchanges of knowledge, technologies or products and when actors are active in performing their functions. For example, entrepreneurs had the most frequent interactions with Service Delivery and intermediary Organizations (SDIO), input suppliers and credit and financial institutions because these actors provide goods and services needed in the entrepreneurs' production function. These kinds of strong linkages need to be supported to enhance the productivity and profitability of the banana sub-sector.

## KEY RECOMMENDATIONS FROM THE STUDY

In general, there are many areas that need improvement in order to enhance the performance of the banana sub-sector. Like other sub-sectors in the agricultural systems, all actors engaged at different levels of the banana value chains need to be supported in order to improve productivity and profitability of the sub-sector. Based on the findings from this study, it is important to improve linkages among actors and to improve infrastructure (physical and social) so as to improve the various functions performed by the diverse actors in the sub-sector. It is therefore recommended that government, through MAAIF and other responsible line ministries, should:

- (i) Improve interactions between entrepreneurs and actors engaged in research and training in order to facilitate learning and adoption of improved knowledge and technologies.
- (ii) Establish policies to improve quality of agro-inputs accessible to farmers and processors.
- (iii) Involve service providers in development and monitoring of policies at field level.
- (iv) Improve entrepreneurs' access to credit by scaling-up of targeted credit schemes such as the banana improvement loan offered by TRIAS through EBO SACCO in Mbarara.

In order to enhance interactions among actors, this study recommends a formation of a platform that can improve the networking of actors within the banana sub-sector. This proposed forum would serve as an avenue for government to intervene at various levels and also facilitate monitoring of activities within the sub-sector. Such a forum will highly improve the sub-sector if there are in-built mechanisms to change the current structures that are retarding progress. Actors that were involved in stakeholders' workshops and those interviewed in the field all advocated for a platform for 'individuals and groups in the sub-sector to air their views and receive support so as to improve their activities'.

###



## 1.0 INTRODUCTION

Science and technology development are prerequisites to economic development; however, the future of science and technological development depend on the efficiency and effectiveness of innovation systems. Science and technological advancements are especially important for agricultural development because agricultural systems are often faced with threats (such as diseases, droughts, pests and other) which require frequent innovations to adapt to and/or manage these threats. In addition to threats, unlike the industrial and service systems, agricultural systems are characterized by less predictable production, highly perishable outputs, and less control of production units (farm) and these factors make agriculture a riskier enterprise that requires science and technology to inform and improve the functioning of the system.

Modernization of agriculture requires science and technology to improve and ensure effective methods of production and management of productive resources such as land, water, and human capital. However, in developing countries, the majority of actors involved in agricultural production are usually the less educated sub-groups with less resources and hence do not invest enough in science and technology to realize improved production processes and yields. This calls for national systems to provide an enabling environment that supports science and technological innovations systems.

Due to the multifaceted nature of agricultural production systems, it is important for science and technology to address all aspects of the system. For example, a crop production system requires agricultural information technologies such as market information systems to alert farmers on prices and markets for their products as much as it needs agricultural engineering technologies (such as mechanized tools) for timely cultivation of land. When some aspects of the system are not addressed, entrepreneurs in agricultural systems are likely to experience less productivity in form of low yields, post-harvest losses during peak production seasons, and overall low returns to investments. Reduced profitability discourages investment or re-investments in agriculture and this retards agricultural development – and indeed economic development. This study was designed to characterize the functions and innovation habits of actors in the banana sub-sector in Uganda as an entry point to improve the understanding of agricultural and science and technology innovation systems in the country.

## 1.1 STUDIES ON ASTI SYSTEMS IN AFRICA

CTA in collaboration with RUFORUM engage in activities to build the capacity of Africa, Caribbean and Pacific (ACP) countries to improve understanding of their agricultural science and technology innovation (ASTI) systems. The agricultural sector being extremely diverse, CTA has supported implementation of several studies which focus on specific sub-sectors as entry points into assessing the ASTI system as a whole. Some of the studies supported by CTA have analyzed ASTI in: ( i) floriculture sub-sector in Kenya (Bolo, 2005); (ii) the aquaculture and fisheries sub-sector in Malawi (Maguza-Tembo et al 2009); and (iii) the maize sub-sector in Malawi (Safalaoh et al 2009). Hence, this paper presents the results from another CTA supported ASTI study focused on the banana sub-sector in Uganda.

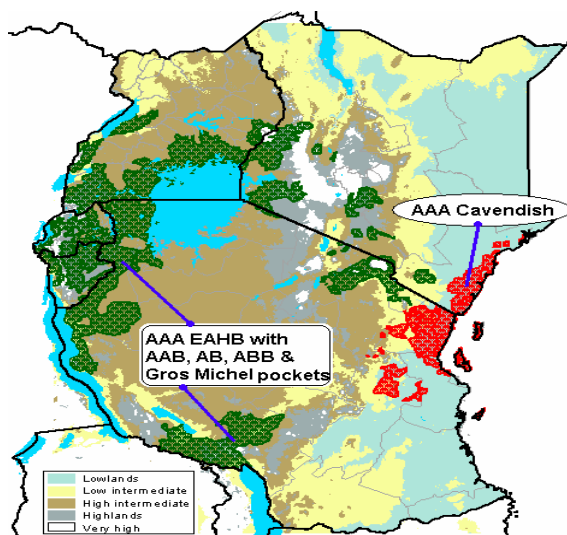
Overall, these studies have all employed the innovation systems analytical framework which involves:

- Reviewing the agricultural sector framework and policy landscape of the country being studied;
- Mapping out key actors that are involved and can contribute to innovations in the specific sub-sector;
- Understanding the learning and investment habits of actors, their competencies, and how they link with other actors in the sub-sector;
- Assessing the key functions of actors in terms of policy making and resources allocation, regulatory, financing, implementation, human resource capacity building and provision of infrastructure.
- Mapping linkages among actors with a focus on the sufficiency of these linkages to facilitate innovations and development of the sub-sector.

The next sections provide an overview of Uganda’s agricultural sector and policy framework.

## 1.2 IMPORTANCE OF BANANA SUB-SECTOR IN UNDERSTANDING ASTI SYSTEMS IN UGANDA

Worldwide, bananas are an important crop especially for tropical countries because it contributes to food security and income to a large proportion of the world population. The global annual production is estimated at 98 million tons and, of this, close to 20 million tons is produced within the east and central African region. Uganda’s annual production is estimated at 50% of East Africa’s production which puts Uganda second after India in global production of bananas. The global consumption of bananas is also highest in the East African great lakes region with an average per capita consumption estimated at 440-600 kg annually. This overall contribution to total caloric intake is high; hence, bananas make a major contribution to agricultural production and food security of Uganda. **Figure 1** below shows the traditional banana growing areas in East Africa, highlighting the dominant varieties (Smale et al, 2006).



Source: Banana production and Market access (Bagamba, 2007)

### **Figure 1: Principal growing areas and banana varieties in East Africa**

Banana crop has diverse cultivars which have been classified in many categories based on genetic characteristics and function. East African varieties (AAA-EA) have been classified into five clone sets: Beer, Musakala, Nakabululu, Nakitembe and Nfuuka (Karamura, 1999); these varieties predominate in many parts of Uganda. To improve profitability of banana production and adaptability to climatic and biotic changes, non-endemic varieties have also been introduced. Non-endemic varieties commonly cultivated in the East African region include roast bananas (AAB varieties); sweet or dessert bananas (AAA-AB); beer bananas (ABB-AB); and multiple use hybrids (AAAB-AAA) such as FHIA 1, FHIA 3, FHIA 17, and FHIA 23; and food-type (commonly called matooke) cultivars such as Mpologoma (Edmeades et al, 2006). Due to the diversity of banana crop varieties and the multiple functions of different banana fruit, the banana sub-sector is fundamental to livelihoods and development of the agricultural sector in Uganda.

## **1.3 STUDY OBJECTIVES**

**The specific objectives of the study were:**

- (i) To review policies affecting the performance of the banana sub-sector;
- (ii) To identify key actors in the banana sub-sector and the nature and function of linkages among the actors;
- (iii) To assess the innovation habits, practices, competencies and performances of the key actors;
- (iv) To identify core functions essential for the proper performance of the banana sub-sector innovation system; and,
- (v) To identify the current strengths and weaknesses of the ASTI system and channels for bringing about consensus on the way to deal with the weaknesses.

The results from this study are intended to improve understanding of the value of science and technology development in the development of the banana sub-sector. This study is also designed to inform policy and targeting of interventions in the sub-sector and in the agricultural sector as a whole.

## **2.0 DATA COLLECTION METHODS**

This study was a cross-sectional analysis of innovation habits and practices of actors engaged in banana sub-sector. Major research activities were conducted in Bushenyi and Mbarara districts in western Uganda and Mukono, Luwero, and Kampala districts in central region. Central and western Uganda were selected as the study sites because the western region is currently the major banana producing region whereas the central region used to be the largest producer but now typifies a region that has experienced gross reductions in banana production as a result of soil degradation and poor banana management practices. The central region (especially Kampala district) also hosts the majority of processing firms and commercialization activities which are linked to major innovations in the banana sub-sector.

Participatory rapid appraisal methods were employed to collect both qualitative and quantitative data from individuals and institutions engaged in different aspects of banana production, processing, and trade.

## 2.1 REVIEW AND SYNTHESIS OF AVAILABLE LITERATURE

Literature on banana research, production and trade; national policies influencing the functioning of the banana sub-sector; and international conventions and agreements related to banana trade were reviewed. Major sources of literature included Makerere University library, Economic Policy Research Centre library, reports and data sets from institutions visited, researchers, and government institutions. This process also helped in generating a list of major actors in the banana sub-sector.

## 2.2 CONSULTATIVE MEETINGS WITH STAKEHOLDERS

Two stakeholders' workshops engaged participants in discussions and interactive activities to obtain a wider view on the performance of the banana sub-sector. Efforts were made to invite representatives of all organizations engaged in different aspects of banana research, production, and trade.

### 2.2.1 INCEPTION WORKSHOP

The inception workshop was designed to inform actors about the study and to solicit their support and input into the design and execution of the study. The inception workshop was held on June 18th 2010 in the Department of Food Science and Technology Conference Hall, Makerere University. Institutions represented included Bukalasa College, VEDCO, Uganda Cooperative Alliance (UCA), AGRINET, PIBID, Makerere University Faculty of Agriculture, Envalert, Kyambogo University, FRAVESEMA, ASARECA, and RUFORUM.

The purpose of this workshop was to discuss the research plan with actors identified through key informants and review of literature, refine the research design and tools, and to sensitize stakeholders about the research activities in which they were expected to engage in. The main outputs of the workshop were the broad categorization of actors, preliminary analysis of functions and characteristics of actors in the banana sub-sector, and most importantly, contact details of key persons and institutions to be interviewed. Information generated from the inception workshop also helped in refining the research tools and selection of study sites.

### 2.2.2 Results Validation Workshop

The purpose of the second workshop was to review the findings of the study with stakeholders in order to validate the actor characteristics and functions documented in the study. This workshop was also designed to facilitate the final analysis of linkages among actors.

This workshop was held on Friday 29th of October 2010 in Senate hall, Makerere University; and over 50 participants from 20 organizations attended this workshop. Most

actors engaged in processing functions brought items for display, which included crafts, charcoal briskets, animal feeds from banana peels, paper and paper bags from banana fibre, and banana wine. In addition, researchers from Makerere University Agricultural Research Institute at Kabanyolo (MUARIK) and FREVASEMA also gave brief presentations of their research activities. All banana products that were exhibited were bought.

## 2.3 KEY INFORMANT INTERVIEWS

Key informant interviews were conducted with stakeholders along the banana products value chain in order to develop *an inventory of actors* engaged in the banana sub-sector. Key groups of people interviewed included:

- Farmers in Luwero, Mukon and Mbarara districts
- Transporters and traders at major fresh banana markets such as St Balikudembe (Owino), Nateete, Kasubi, and Kalerwe in central region, but who had strong supply linkages to production areas especially Luwero, Mukono, Masaka, Mbarara and Bushenyi.
- Banana juice and dried fruit processors in Kampala district
- Retail food outlets such as supermarkets (UCHUMI and Nakumatt)
- Researchers in academia, national research institutes such as Kawanda Agricultural Research Laboratories (KARL), and international research centers such as IITA and Bioversity.

## 2.4 STRUCTURED INTERVIEWS

Around Kampala the team interviewed researchers focusing on bananas at Kawanda Agricultural Research Laboratories (KARL), IITA, Envalert, NAADS Secretariat in Entebbe, Bioversity international, ASARECA PIBID, FRAVESEMA, researchers from academic institutions such as Makerere University's Faculty of Agriculture, banana leaves suppliers and vendors, transporters, and dealers in handcrafts.

## 2.5 FIELD VISITS

Four districts were visited to ascertain innovation habits and practices of actors engaged in banana production, processing, and trade. The four districts visited were Luwero and Mukono districts in the central Uganda and Bushenyi and Mbarara districts in the western part of the country. In Luwero the team visited Bukalasa Agricultural College, VEDCO an NGO and KASIBA one of VEDCO supported farmer Associations. Major entities visited in Mukono district were farmers plantations supported by NAADS, VEDCO and CARITUS in Kimenyedde sub-county and WAKA International Ltd a commercial banana producing and processing company. The team had also planned to visit St. Jude Training Centre in Masaka; however, it was not possible to obtain an appointment because the director and key personnel were engaged in other off-site training activities at the time of the study. Hence, information provided on St Jude Training Centre is from review of literature.

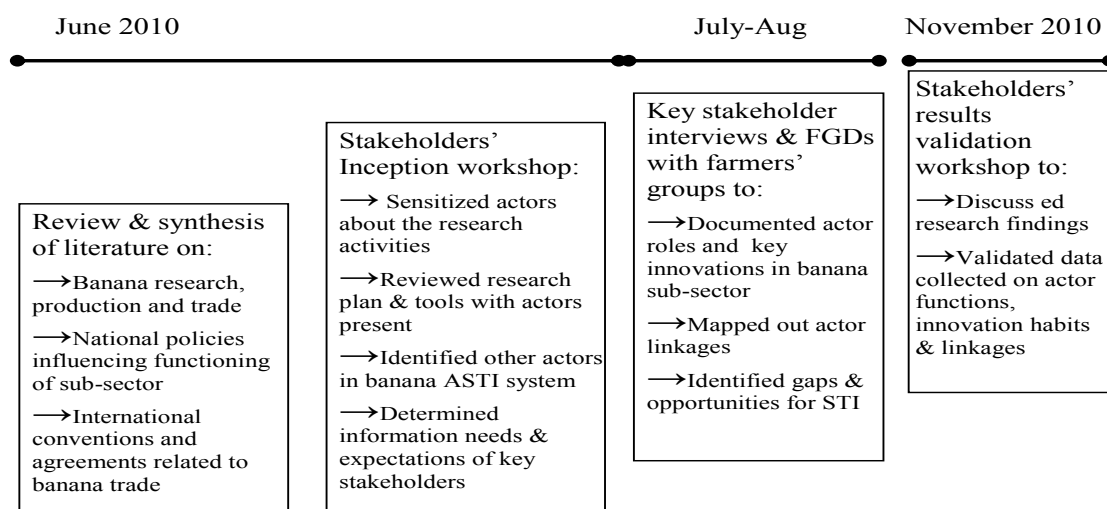
In Mbarara and Bushenyi the team visited the ZARDI Mbarara, regional germplasm research program, Mbarara district production office, FRAVESEMA processing unit at

Mbarara Industrial Park, Mbarara district farmers association (MBADIFA), Kisoro daily banana market, Technoserve, EBO SACCO, the PIBID Centre in Bushenyi, and a banana wine processing unit ran by Tigyebywa Farmers Association.

## 2.6 FOCUS GROUP DISCUSSIONS

Discussions were conducted with farmer and processor groups in Mukono (Kimenyedde), Luwero (KASIBA), Bushenyi (Tigyebywa Farmers Association) and Mbarara (Rwenhozi Twimukye Farmers' Association) to document indigenous knowledge and technologies in production, handling, processing, and trade in banana products. This aided the generation of information on gaps and opportunities for improving the performance of the banana ASTI system.

**Figure 2** below provides a summary of research activities.



**Figure 2: Schedule of Research Activities**

In Section 3 we present findings from the review of literature on the performance of Uganda's agricultural system and the banana sub-sector. Section 4 provides an overview of policies that have influenced the performance of the agriculture sector with special emphasis on the banana sub-sector. The findings on types of actors in the banana sub-sector and their innovation habits are presented in Section 5 and in Section 6 we provide our analysis of key linkages among actors in the banana sub-sector. Special attention is placed on linkages that contribute significantly to the performance of the sub-sector. To improve understanding of the performance of the banana sub-sector, Section 7 provides a discussion of how actors in the sub-sector are performing their key functions. Based on findings from this study, Section 8 provides a summary of factors that strengthen the performance of the banana sub-sector and factors that have hampered development of the sub-sector (weaknesses). Conclusions generated from this study are presented in Section 9; while in Section 10 we present key recommendations for improving the performance of actors in the banana sub-sector.

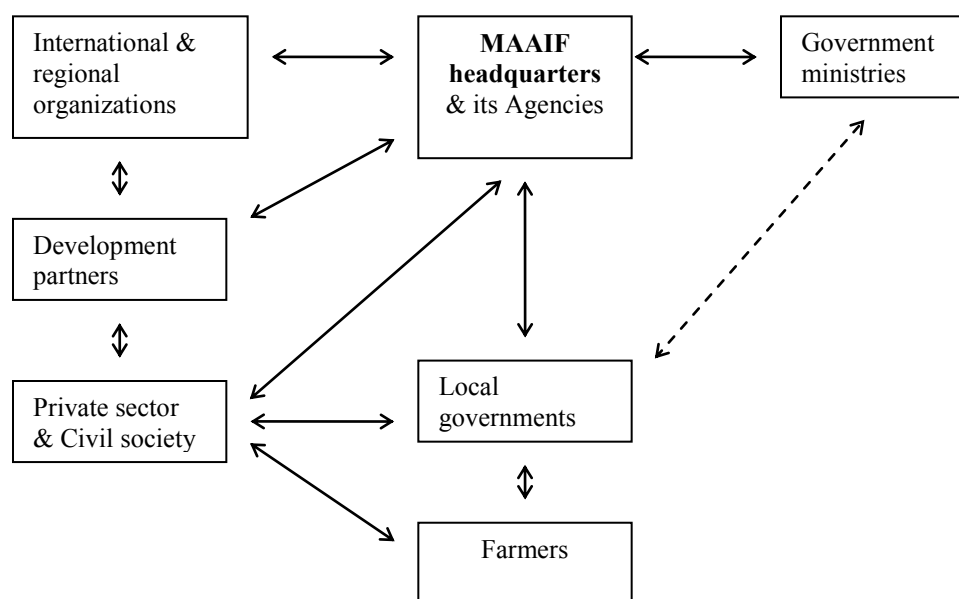
### 3.0 STRUCTURE AND PERFORMANCE OF UGANDA'S AGRICULTURE SECTOR

Agricultural science and technology innovation (ASTI) systems direct the development of the agriculture sector; however the functioning and performance of any ASTI system is also dependant on the structure of the sector. Because of this co-dependency, it is important to understand the structure and performance of the agriculture sector in order to have a better analysis of the performance of sub-sectors within the agriculture sector.

#### 3.1 STRUCTURE OF UGANDA'S AGRICULTURE SECTOR

The Ministry of Agriculture, Animal Industries and Fisheries is the apex government body in charge of activities pertaining to agriculture. In the current structure (**Figure 3**), MAAIF headquarters in Entebbe is constituted of the:

- National Agricultural Research Organization Council (NAROC)
- National Agricultural Advisory Services (NAADS)
- The Uganda Coffee Development Authority (UCDO)
- Cotton Development Organization (CDO)
- Plan for Modernisation of Agriculture (PMA) Secretariat
- Dairy Development Authority (DDA)
- National Genetic Resource Information Centre and Data Bank (NAGRIC&DB),
- Coordinating Office for Control of Trypanosomiasis (COCTU)



Source: Agriculture Sector DSIP (MAAIF, 2010)

**Figure 3: Institutions Currently Affiliated with MAAIF**

MAAIF headquarters performs the functions of policy making, setting and monitoring standards, and support services. It is the agencies listed above that engage in implementation of action plans and ensure that resources are allocated and utilized as planned.

In addition to the above agencies, MAAIF headquarters also works closely with international and regional organisations, other government ministries, development partners, private sector and civil society organizations (CSOs), and local government in planning and implementation of various agricultural programmes. As shown in **Error! Reference source not found.** above, MAAIF headquarters links with farmers mostly through local government at district, sub-county levels and through private sector and CSOs. This structure dates back to the 1998 post-constitution restructuring and has been contested by various stakeholders partly because it delinks some actors. Various initiatives have been undertaken to improve the linkages between MAAIF and other actors. Some of the documentation on processes to improve the structure and function of MAAIF include:

- Ministry of Public Services (MoPS) MAAIF Restructuring Report (GOU 2009)
- Review of the MAAIF Restructuring Report (GOU 2010)

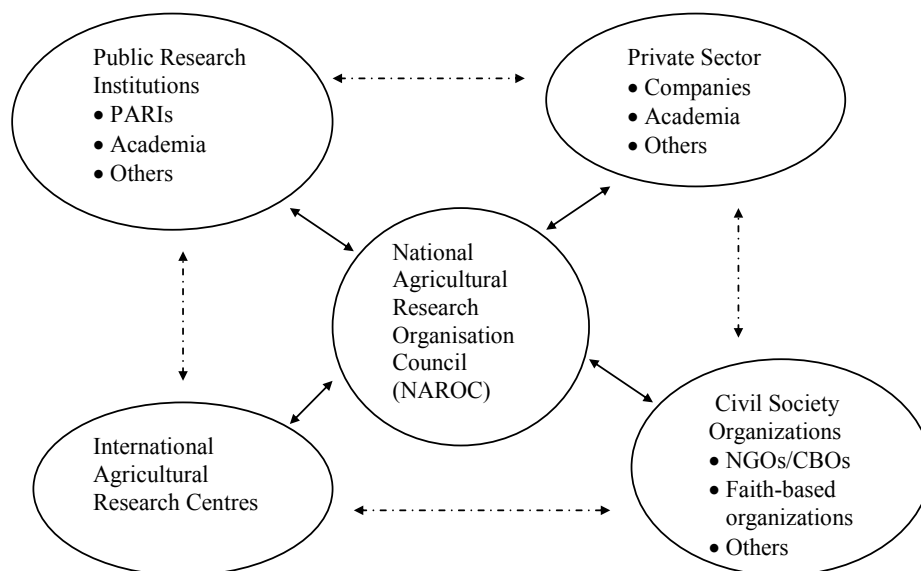
To improve the contribution of agriculture to national development, the Government of Uganda is also engaged in many processes to streamline linkages and functions of the agencies under MAAIF in order to leverage their comparative strength toward the development of agriculture. Under these processes, the national agricultural research system (NARS) was restructured in 2009 and provisions made to engage more public and private institutions in national research activities.

### **3.1.1 Structure of National Agricultural Research System (NARS)**

Uganda has a well structured NARS which has recently (2009) been restructured to improve the quality and applicability of knowledge generated from research. Under the new system (Figure 4), the National Agricultural Research Organisation Council (NAROC) serves as the umbrella agricultural research institution that coordinates national research activities.

As shown in **Figure 4**, the new NARS system encourages engagement of traditional public research institutions, academia (public and private), international research centres, private sector, plus civil society institutions such as NGOs and CBOs. The engagement of these many institutions is expected to improve efficiency and effectiveness in the conduct of research and also help address the needs of the various stakeholders. In the following sections, we present the mandate and composition of Public Agricultural Research Institutes (PARIs), National Research Institutes (NARIs), and Zonal Agricultural Research and Development Institutes (ZARDIs).





Source: [www.naro.co.ug](http://www.naro.co.ug)

**Figure 4: Macro Structure of the NARS**

### 3.1.1.1 Public Agricultural Research Institutes (PARIs)

PARIs are semi-autonomous research institutes that operate under NARO policy guidance. Each PARI's annual programme and budget are approved by NARO; however each PARI is autonomous in its programme implementation and its resource allocations and management. Based on area of coverage, PARIs are sub-divided into: National Agricultural Research Institutes (NARIs) and Zonal Agricultural Research and Development Institutes (ZARDIs).

### 3.1.1.2 National Agricultural Research Institutes (NARIs)

NARIs are mandated to carry out research of strategic nature and of national importance. As of October 2010, the NARIs on NAROs website included:

- National Crop Resources Research Institute (NACRRI) at Namulonge
- National Fisheries Resources Research Institute (NaFRRI) in Jinja
- National Forestry Resources Research Institute (NFRRI)
- National Livestock Resources Research Institute (NLRRI)
- Serere National Semi Arid Resources Research Institute
- National Agricultural Research Laboratories (NARLs) at Kawanda

Of these NARIs, the two research institutes that support banana research are NACRRI (Namulonge) and NARLs (Kawanda). NACRRI houses 7 crop research units, which include a special unit devoted to banana research. Since individual research units prioritize their research activities to meet national needs, having a special unit on bananas is expected to improve the profile of banana research in Uganda.

Unlike NACRRI, all research units at the National Agricultural Laboratories (NARLs) at Kawanda address some aspects of banana research. Kawanda was established in 1940 as an agricultural research institute. After the 2005 restructuring, the research units housed at NARLs at Kawanda include:

- Agricultural Research Information Service
- Agrometereological unit
- Appropriate technology and agricultural engineering centre
- National agricultural biotechnology laboratory
- Plant genetic resources centre
- Post harvest research
- Soils and soil research

From this study, it is noted that the restructuring of National Agricultural Research Institutes has not been fully implemented to effect the expected improvements in research processes. This is mainly being hampered by problems in relocating physical infrastructure and staff to the designated research sites. For example, at the time of this study, many of the research units that constituted the former Kawanda Agricultural Research Institute (KARI) had not relocated completely to their designated physical locations. For instance, the researchers working on banana had not moved to Namulonge citing problems of office space and laboratory facilities. This restructuring is likely to negatively affect banana research.

### 3.1.1.3 Zonal Agricultural Research and Development Institutes (ZARDIs)

ZARDIs were established to facilitate implementation of the Uganda National Agricultural Research Policy and Strategy (UNARPS). Since UNARPS seeks to improve modernization of agriculture, it was felt important to decentralize agricultural research and development efforts. In line with decentralization of research, each ZARDI is responsible for conducting adaptive research and technology dissemination to improve agricultural production in the designated agro-ecological zone. By October 2010, the 9 operational ZARDIs were:

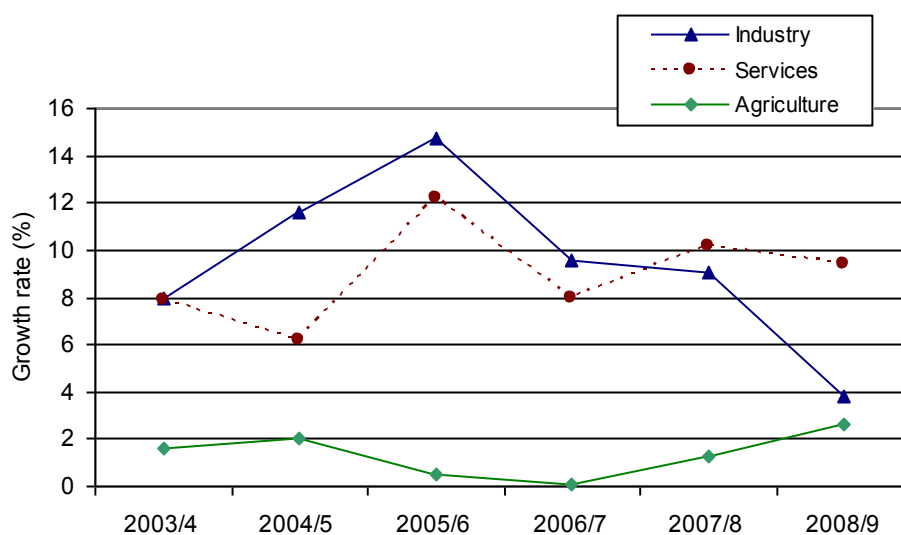
- Abii in Arua district
- Bulindi in Hoima district
- Kachwekano in Kabale district
- Mukono in Mukono district
- Mbarara (formerly Mbarara Stock Farm) in Mbarara district
- Nabuin in Moroto district
- Kyembogo in Kabarole district
- Serere in Soroti district
- Ikulwe in Iganga district

With regard to the government arm of research, the performance of the NARS is highly dependant on NAROC's ability to improve linkages among the different research units at national and regional levels. This requires NAROC to identify and promote synergies in research agendas of the various NARIs and ZARDIs.

## 3.2 PERFORMANCE OF UGANDA'S AGRICULTURAL SECTOR

Agriculture is the largest sector of Uganda's economy and is considered the backbone of Uganda's national development because it employs the largest of the working population, contributes about half of Uganda's exports by value, contributes 20% of gross domestic product (GDP). In addition, the food industry contributes to 40% of the manufacturing sector and agriculture contributes the raw materials for this industry. Employment in the agricultural sector is also estimated to have increased from 66% in 2002/03 to 73% in 2006 and further increased to 82% in 2009 which justifies the need to focus on agriculture development as a strategy for poverty reduction and national development. (UBOS 2008; DSIP 2010)

Despite its importance to economic development and heavy government investments in the sector, the growth rate of the agricultural sector has remained lower than that of industry and services sector for much of the last decade (see **Figure 5**).



Source: Adapted from the DSIP of MAAIF (MAAIF 2010)

**Figure 5: Growth of Uganda's Agriculture, Services, and Industry Sectors**

Agriculture experienced only a 1% growth rate between the financial years 2003/04 and 2008/09 while services experienced growth rates of 1.5% for the same period. Of the agriculture sub-sectors, decline in growth were reported for cash crops (-5.6%), livestock (-1.7%), and fisheries (-9.7%) while improved growth was reported for food crops (4.4%) and forestry (3.2%). The decline in cash crop production coupled with positive changes in food crop production calls for the agriculture sector to improve investments in latter. In addition, the contribution of agriculture sector to national GDP can also be improved through value addition which is currently estimated at less than 5% of total agricultural production (MAAIF 2010).

### 3.3 OVERVIEW OF UGANDA'S BANANA SUB-SECTOR

Historical accounts indicate that bananas were introduced by Arab traders in the East African region around 500 BC; however, recent discoveries (such as *matooke* phytoliths dating as far back as 5000 years) challenge the above belief (Robertshaw, 2006) and confirm that the *matooke* (AAA-EA) are endemic to the East African Highlands. There are currently an estimated over 87 endemic species in Uganda (Edmeades et al, 2006; Tushemereirwe 2003) and the Regional Banana Germplasm Collection Centre of Bioersivity in Mbarara records over 200 East African *matooke* varieties from Uganda, Tanzania, Congo, and Rwanda.

Whatever their source or time of introduction, bananas have evolved to become one of the most important food and cash crop of Uganda, and have spread to all agro-ecological zones. As shown in **Figure 6** below, bananas are widely cultivated in the southern half of Uganda with intensive cultivation in the Lake Victoria region.



Source: Adopted from Mwebaze (1999)

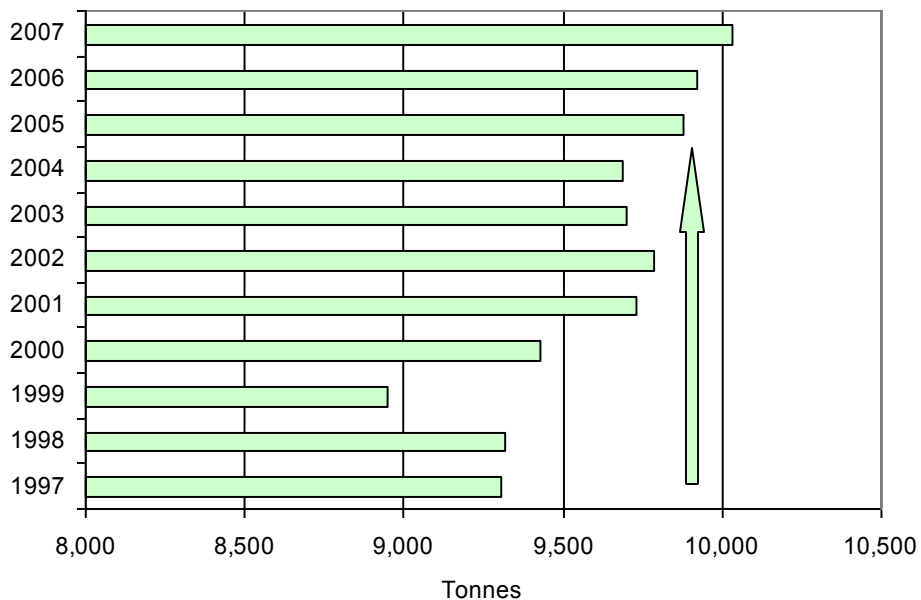
**Figure 6: Farming Systems in Uganda**

The three major types of bananas produced in Uganda (Rubaihayo, 1993) are: (i) the cooking type (locally called *matooke*) which are mainly East African highland varieties; (ii) brewing types used for juices and alcohol production; and dessert types which mostly comprise of Cavendish, Gros Micheal and apple bananas. Under each of the three broad categories of bananas, new varieties are continuously introduced to improve yield and to adapt to climatic changes and stresses effected by diseases and pests.

### 3.3.1 Trends in Banana Production in Uganda

Uganda is currently the world’s largest producer and consumer of bananas. According to FAO records, Uganda’s banana production is estimated at 10.5 million tonnes per annum; which accounts for approximately 10% of total global production (FAOSTAT, 2006). Production of cooking banana (*matooke*) is approximated at 29.5% of the world’s banana production while dessert banana production is estimated to be 0.85% of global production.

Production is mainly by smallholder farmers and the total number of plots was last estimated at 2,695,000 averaging 0.24 hectares, making bananas the most widely cultivated crop (Bagamba 2007). It is estimated is that over 16 million people in Uganda (more than half of the population) consume bananas as their major food crop. Banana is also becoming a major cash crop and is increasingly being promoted as part of export diversification initiatives. **Figure 7** below shows banana production for the period of 1997 to 2007. This high production is sustained by small-scale farmers who usually grow different types of East African highland varieties (AAA) mostly for household consumption.



Source: Data extracted from PIBID database in Bushenvi

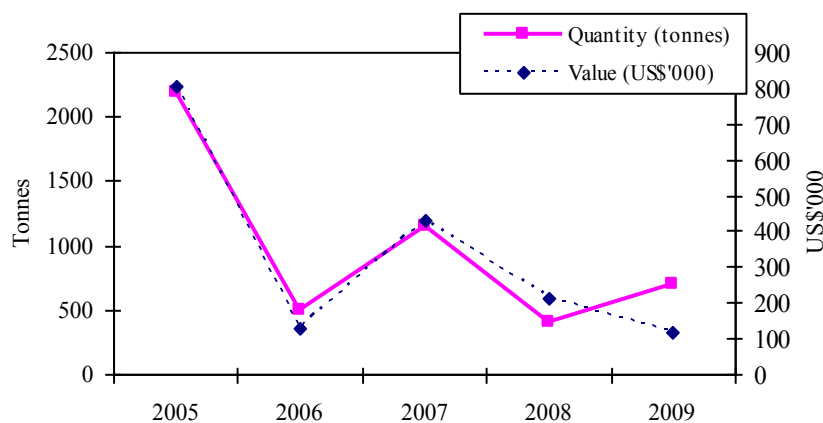
**Figure 7: Trends in Banana Production between 1997 to 2007**

As shown in **Figure 7** above, the total production of bananas has been gradually increasing (mostly as a result of increased acreage), however, there are reported declines in production of beer and cooking banana (*matooke*) types. This decline was attributed to

declines in yields from an average of 8,594 kg/ha to 1,872 kg/ha which reflects a 78% decline in *matooke* yields in a period of 5 years (MAAIF DSIP 2010). The decline in banana production in Uganda is reflected in the actual highland banana yields of 5-30 tonnes per hectare/year, that are small when compared to potential yield of 70 tons per hectare/year (van Asten et al., 2009 ). Due to the importance of banana crop to food security and livelihoods in Uganda, the decline in banana yields has been an issue of discussion among farmers and remains a focus for research.

### 3.3.2 Trends in Banana Exports

As shown in **Figure 8** statistics from the Uganda Export Promotions Board (UEPB, 2010) show that the quantity and value of banana exports from Uganda has been declining. The decline in value can be partly attributed to worldwide declines in the price of bananas (Spilsbury et al., 2002). The decline in volume is a result of reductions in exports of dessert bananas (especially apple bananas: fresh or processed into chips), and increase in exports of fresh *matooke* banana (which are bulky and yet fetch much lower returns when compared to processed dessert banana chips).



**Figure 8: Banana Exports Reported by UEPB (2005-2009)**

### 3.3.3 Challenges faced by the sub-sector

According to responses of farmers interviewed in this study, historically banana plantations used to remain productive for more than 100 years and many plantations were passed on from one generation to the next as inheritance to assure livelihood security. The longevity of banana plantations has been declining in the last 30 years and this decline is heavily attributed to biotic and abiotic factors, less investment in improved inputs, and dependency of rain-fed production.

### 3.3.3.1 Biotic and Abiotic Factors

Diseases (mostly the banana bacterial wilt and black *sigatoka*) and pests (notably nematodes and weevils) have greatly reduced the productivity and longevity of banana plantations and the impacts of these biotic factors have mostly been felt in the central region. It is currently estimated that banana diseases account for 40 to 100% yield losses while pests account for losses of up to 50%. These pests and diseases pose a major threat to food security and livelihoods since more than 75% of Ugandan farmers grow bananas. (MAAIF 2010)

On the other hand, soil degradation was identified as the main abiotic factor (Gold et al 1999; Bagamba, 2007; Van Stan, 2006) responsible for the spatial and species shift from central to west and south western regions. As a result of stresses effected by biotic and abiotic factors, the longevity of banana plantations has been declining.

Some respondents in this study attributed this to the introduction of latrines in the central regions. Before latrines were introduced, people used the “drop, cover and move away” human excreta management system in the banana plantations. Urine was freely released in banana plantations (Kapiriri,2011). According to organic farmers who are now applying cow dung and urine in much the same way, human waste could have been one of the reasons for the longevity of plantations then. No association was made then between the human excreta disposal practice and longevity of plantations, and as such farmers were not able to find an alternative early enough. The Ecological Sanitation campaign in Uganda is promoted the re-use of treated human excreta for banana production, especially urine that has been found to contain high percentages of essential nutrients: 80% nitrates; 60 – 65% phosphates and 80% potassium (Kapiriri, 2011).

### 3.3.3.2 Over-reliance on Rain-fed Agriculture

Since the banana plant is primarily composed of water, banana production requires high amounts of water to ensure good yields. However, like in other cropping systems, the majority of banana farmers depend solely on rains. This constrains both the selection of planting season and yields. To assure constant banana supply throughout the year, there is need for investment in irrigation facilities. This will not only improve crop yield but will also stagger production throughout the year such that farmers have more control of output and experience less post-harvest losses during the peak production season. At the moment, many banana farmers in Uganda cannot afford irrigation since the majority are producing on subsistence and semi-commercial basis.

### 3.3.3.3 Limited Use of Improved Inputs

Reports on yield decline in central Uganda date back from as early as 1940-1950 and were reported by Masefield in 1949 and McMaster in 1962. Actual yield decline seems to have accelerated in the 1970-1980's (Asten *et al.*, 2009). IITA and NARO carried out extensive studies on the relationship between biotic and abiotic constraints on banana production and concluded that pest and disease pressure were closely related to soil fertility and plant nutrient uptake. In trials where inputs were used, bananas were less affected by pests and diseases. Another study on factors affecting fertilizer use, the

IITA/NARO team concluded that fertilizer adoption seems particularly hampered by a) high prices, b) a perceived lack of availability of high quality fertilizer in nearby shops, and c) the belief that fertilizer spoils the soil. They further highlighted the potential danger of “blanket” fertilizer recommendations that did not take into account large regional differences in nutrient deficiencies. **Table 3** below highlights the recommended fertilizer combinations for the various banana regions, published in a flier for farmer educators and extension. Unfortunately, the absence of a formal direct link between the researchers’ new knowledge and farmers limit the access and utilization of such information by farmers, input suppliers and NAADS advisors and other service providers

According to MAAIF (2010), fertilizer usage in Uganda is estimated at an average of 1kg of nutrients per hectare; which is among the lowest in the world. Farmers in other African countries are reported to use higher levels of fertilizer. For example, fertilizer usage is estimated at 4, 6, 16, 32, and 51 kg per hectare in Mozambique, Tanzania, Malawi, Kenya, and South Africa respectively (MAAIF, 2010).

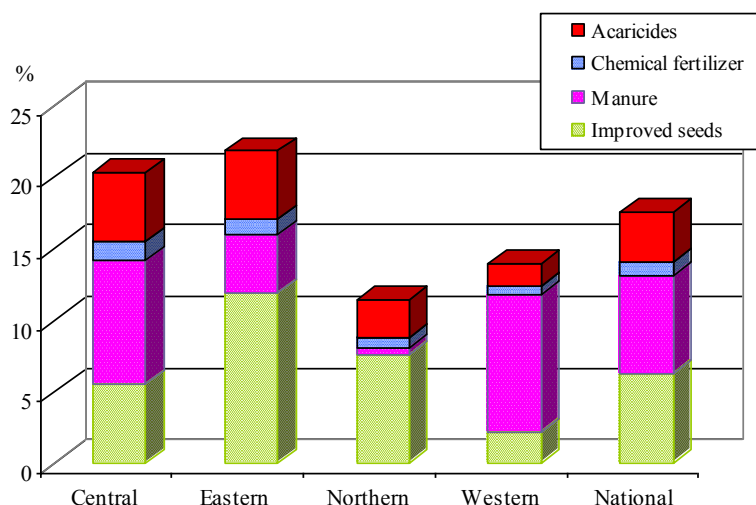
**Table 1: Nutrient Requirements in some Agricultural Regions in Uganda**

<i>Regions</i>	Wakiso, Mukono, Mpigi	Luwero	Masaka Rakai	Mbarara Ntungamo	Bushenyi	Mt. Elgon
<i>Nutrients required</i>	Phosphate (P), Pottasium (K)	Nitrogen (N)	Nitrogen (N)	Phosphate (P), Pottasium (K)	Phosphate (P), Nitrogen (N)	Magnesium (Mg)

Source: IITA/NARO

Low fertilizer and technology use have been identified as the main factor contributing to low farm productivity across agricultural crops (MAAIF, 2010). According to MAAIF (2010), on average, less than 20 percent of the farmers in Uganda were reported to use improved farm inputs. The most commonly used farm input were manure (6.8%) and improved seeds (6.3%). Despite the increased incidence of diseases and pests such as the banana bacterial wilt, and cassava wilt only 3.4% of Ugandan farmers were reported to use pesticides, herbicides, and fungicides. **Figure 9** below shows farmers’ investment in improved inputs across the four regions of Uganda.





Source: Adapted from DSIP (MAAIF, 2010)

**Figure 9: Farmers that Reported Using Agricultural Inputs in 2006**

It shows that farmers use manure much more than chemical fertilizer, but overall yields are less than the estimated potential, with bananas yielding 140% less (Table 4). This study notes that unlike Malawi that developed a specific fertilizer policy (Safalaoh et al 2009), with affirmative action to ensure that all farmers access it, Uganda does not yet have a fertilizer (organic or inorganic) policy. There are however, initiatives by NGOs and NAADS through which banana farmers' access livestock for manure production and those who apply it diligently have realized improved production.

### 3.3.4 Highlights of Research to Improve Banana Production

Uganda has been engaging in research to improve productivity and sustainability of bananas dating back to 1920. **Table 2** below highlights the evolution of research, with a focus on banana, and the main contributions of research to date.

**Table 2: History of Banana Improvement in Uganda**

Year	Activity or Programme Initiated	Institution(s) involved
1920	Germplasm collection	Kampala germplasm plantation
1940	Establish a research institute	KARI <sup>1</sup>
1989	Germplasm collection	MUARIK <sup>2</sup>
1989	Evaluation –re-established (sigatoka, fusarium wilt, yields etc)	KARI
1989	Establishment of the Uganda National Banana Research Program (UNBRP)	KARI

<sup>1</sup> Kawanda Agricultural Research Institute

<sup>2</sup> Makerere University Agricultural Research Institute at Kabanyolo

1991	Establishment of tissue culture	MUARIK
1995	Banana Micro-propagation	KARI/IITA
1995-1998	Germplasm characterisation	KARI
1996-1998	Germplasm evaluation for female and male fertility	KARI/IITA
1996	Cross Pollination	KARI/IITA
1996	Banana Embryo Culture	KARI/IITA
1998 to date	Cell culture	KARI
2000	Taxonomic & screening for conventional breeding	KARI
2002 to date	Field testing of plants from single cells (cell suspension) for true to typeness	KARI
2003	Biotechnology lab opened	KARI
2006	Started Regional Banana germplasm plantation in Mbarara	Bioversity & Mbarara ZARDI

Source: Adapted from Banana production in Uganda (Tushemereirwe, 2006)

## 4 POLICY FRAMEWORKS THAT HAVE INFLUENCED PERFORMANCE OF BANANA SUB-SECTOR

Since its independence in 1962, Uganda's policy environment was relatively constant until the 1980s. Recent changes have resulted in a number of adjustments that have had profound effects on the development of the banana sub-sector and overall national development. Perhaps most influential was the widely respected Poverty Eradication Action Plan (PEAP) considered the cornerstone of Uganda's policy framework from 1997 – 2008. This section therefore explores the historical trends that shape recent policy adjustments and their effects on the banana sub-sector and the agricultural sector in general. Major policies affecting agricultural production are also discussed in Section 4.2.

### 4.1 THE COLONIAL POLICY MOULD THAT STILL HOLDS TODAY<sup>3</sup>

The effectiveness of any policy depends greatly on the capacity of the human resource available to implement and uphold it. Lessons from industry show that the structure of any mold directly corresponds to the purpose for which the end product is design. For example, the mold for a Toyota engine specifically produces Toyota engines. As such if the product of a factory is to change, the mold must change; a new mold cast is built to produce a new product that the new purpose requires. Analysis of the evolution of policies influencing the performance of Uganda's agricultural sector show Uganda's policy framework is still molded from policies set in colonial times. Many policies still

<sup>3</sup> Wanetosi 1998 Edition

focus on development of urban centres, support reliance on traditional cash crops for income generation, and investment little in food crops production. It is the new National Development Plan (NDP) and MAAIF's Development Strategy and Investment Plan (DSIP) that seem to be moving Ugandans to engage in value addition so as to improve the productivity of the agricultural sector. This paper examines a few of these colonial policies that continue to have influence on agricultural development.

#### **4.1.1 Colonial Economic Policy**

Having lost the Americas in 1860s, Britain was not ready to invest its tax payers' resources in African states. Governors of African states were therefore encouraged to introduce "cash crops", which were to be produced in colonies as raw materials to support growing industries in Europe. According to Wanetosi (1998), the promotion of cash crops led to the destruction of the few industries that were developing such as bark cloth in Buganda, salt mining in Bunyoro, and blacksmith enterprises in many communities in Uganda – and this stifled industrial development. However, the promotion of cash crops also came along with establishment of farm institutes to train farmers how to produce the required quantities and qualities of the cash crops.

To date, Uganda and many countries in Africa continues to produce largely raw materials for Western processing industries while Europe sets the prices, quotas, and requirements for quality. Most of Uganda's agricultural exports are either raw or have undergone primary processing (drying, sorting, and cleaning) or secondary processing (dried fruits). The few finished products in agriculture include dairy products (powdered milk, yoghurt, ghee) and wines which face stiff quality competition. Commercial processing of banana is just being scaled-up under the Presidential initiatives from traditional small scale to commercial levels.

#### **4.1.2 Policies Related to Land Use**

With the introduction of cash crops, colonies were zoned into agro-ecological zones to produce specific products for specified markets. Extension and agro-input services were provided first and foremost for cash crops. Within each zone, some advisory services were provided for those food crops that were considered "staple" for each zone. Hence, land use was highly influenced by the agro-ecological zoning system. The bulk of human resource in agricultural sector was thus conditioned to focus on producing the key crops promoted in their specific zones.

Although zoning eased extension work and the provision of other public services such as roads and storage, several African food crops remained "traditional" and underdeveloped. These underutilized crops such as wild yams and African leafy vegetables are recently being recognized and are being researched at centres such as the CGIAR. Liberalization of trade and the resultant fall of the traditional cash crop prices have also compelled farmers to explore non-traditional crops for cash and this has to some extent helped diversify income sources to rural households; however, the production of these crops is still restricted by limited market access.

### 4.1.3 Colonial Transport Policy

By 1914 most railway and road networks to key production areas had been completed. Besides mining sites and lumber centres, the railway and road network concentrated on cash crop collection centers, that later developed into urban centers. The feeder roads were the responsibility of the local chiefs (sub-county) while village roads were under local elders and used to be maintained under community self-help initiatives (*Bulungi bwansi*). These roads remain unpaved to date and many of them are impassible during the rainy season.

In 2008, the road network in Uganda was estimated to be 78,100km, of which only 14% are classified as national roads, 35% local government roads and 45% community roads. The level of maintenance is less as one goes further from the centre. Only 4% of the entire road network is paved. An additional 8,000km was recently added to the responsibility of the Uganda National Roads Authority (UNRA) raising its remit to maintain 24% of the network (Ssemwanga, 2010). However, the poor road network continues to stifle agricultural productivity since agriculture activities take place in rural areas.

## 4.2 POST-COLONIAL POLICIES AND THEIR EFFECTS ON THE BANANA SUB-SECTOR

The above policy framework still holds and informs the foundation of subsequent policy evolution in Uganda. The following section outlines chronologically selected key policy changes that have impacted the banana sub-sector, positively and negatively.

### 4.2.1 *Enguli (manufacturing and licensing) Act 1965*

*Enguli* (also called *waragi*) is a distilled gin from fermented banana juice. The purpose of the Act was to reduce excessive drinking by controlling production as well as drinking time. Under this act, manufacture and trade in *Enguli* was to be done under license however many *Enguli* processors and traders were small scale entrepreneurs that were not willing to incur extra costs of paying licensing fees. This requirement for licensing further stifled value addition activities and *Waragi* has remained a black market product. The limited innovations in *Enguli* production in turn resulted in limited production of varieties of bananas used for *Nguli*. Much of the crude *Enguli* that is currently made in Uganda is processed from other products such as maize, cassava, and molasses. Hence, it can be argued that the *Enguli* Act retarded innovation and negatively affected the development of the banana sub-sector.

### 4.2.2 Structural Adjustment Policies (SAP) of 1980s

SAPs were introduced and enforced as a requirement for heavily indebted countries to access IMF/World Bank loans (Sapri, 2000), and Uganda was one of those countries that quickly complied with a number of negative consequences. For instance, the retrenchment of civil servants reduced the extension personnel, further distancing agricultural knowledge from farmers. The few remaining extension workers were each

placed in charge of a sub-county. Taking Bushenyi (one of the leading banana producing areas) which had a population of 579,137 in 1991 spread over 5 sub-counties (average 115,827 people). Using an expected 5% fertility rate, it can be crudely estimated that each extension workers supports an average of 23,165 households. As a result of the high case loads, the public extension services almost collapsed, and this greatly affected access to technical knowledge and technologies by farmers.

SAPs also resulted in the removal of government financial support and supervision to cooperatives, opened up room for exploitation by leaders who borrowed and shared large amounts of money using cooperative assets. Most of them could not pay back and several cooperatives assets were confiscated by banks. Farmers lost savings, and with it faith in cooperatives (Kapiriri, 2008). For a long time efforts to organize farmers especially men into groups run into the fear of exploitation that cash crop farmers faced with the collapsing of cooperatives in the 1980s.

Furthermore, the liberalization of trade removed the price protection by government, exposing farmers to market forces with strong influences from international trade policies. All these left a vacuum that led to the mushrooming of NGOs whose main focus in agriculture was and remains to a large extent, food security. Middlemen also emerged, ceasing the niche left behind by the collapsed cooperatives. It was through the activities of NGOs that most farmers accessed knowledge, technologies, and farm inputs. Production and productivity quickly picked up, but there was no market to match supply, leading to stagnation in production, as farmers felt cheated by middlemen. In several areas traditional cash crops were abandoned, and especially Western Uganda, bananas evolved to fill the niche of the abandoned coffee.

### **4.2.3 Co-operative Societies Acts**

Co-operatives were initiated in Uganda in 1913 as a strategy to curb exploitation of farmers by European and Asian private companies which were monopolizing marketing of cash crops). At first co-operatives were viewed by Ugandan farmers as a form of government's extension of its control to manage farmer activities and hence rapid co-operative growth was not realized until the 1959-1961 following institution of policies that improved co-operatives' autonomy. Through these cooperatives producers used to access inputs, storage, loans and markets for their crops. By 1961 there were 1662 primary co-operatives in Uganda dealing in different commodities and services such as transport and building. The combined efforts of produce, marketing, and transport cooperatives had facilitated development especially of agricultural systems. However, cooperatives lost autonomy following the 1970 Cooperative Societies Act which was designed to curb mismanagement and embezzlement by providing the Minister more power over co-operatives. The political turmoil that marred the country from late 1970s to mid 1980s left virtually all cooperatives dysfunctional (Kapiriri, 2008).

Revitalization of cooperatives was envisioned as necessary to facilitate 'sustainable, people-centred and equitable development' by the current government and thus co-operatives autonomy was reinstated through the 1991 Co-operative Societies Statute. This has facilitated the formation of cooperatives at district and parish (village) levels. By 2000, there were about 6000 cooperatives in Uganda and many of them were offering

credit and savings cooperatives which were operating under the Union of Savings and Credit Cooperatives of Uganda (UCSCU) and UCA (Jungbluth, 2002).

Despite the long existence of the cooperative movement in Uganda, the number of cooperatives offering services to farmers engaged in non-traditional cash crops such as bananas is limited. Of the existing categories of cooperatives, it is the produce, transportation, and marketing cooperatives that are closely linked to performance of the agricultural sector (Kapiriri 2008), and slowly the Saving and Credits category is also picking up in rural areas. The produce and marketing cooperatives often deal in income generating commodities such as coffee, cotton, dairy, handicrafts, and fish. Transportation cooperative societies were initially dominated by Asians until 1972 when Uganda Cooperative Transport Union (UCTU) was formed to empower national associations to compete favourably. UCTU was designed to support the movement of produce and thus enhances the marketing function of agriculture systems. In this study, only one banana transporter indicated that his business was run by a co-operative. Most banana farmers are benefiting from the SACCOs.

#### 4.2.4 Financial Amendment Acts

Liberalization of the financial sector in Uganda was part of the wide ranging adjustment program that started in 1987, in particular through policies regulating the functions of Bank of Uganda and the financial amendment Acts. The key statutes that are believed to have transformed the Uganda's financial sector were:

- The bank of Uganda Statute (1993)
- Financial Institutions Statute (1993)
- Non-performing Assets Recovery Trust Statute (1994)
- Capital Markets Statute (1996)
- Insurance Statute (1996)

The Bank of Uganda Act 1993 particularly strengthened the financial sector and encouraged competition and mobilization of domestic financial resources; which improved farmers access to capital. For example, following improved provisions in the banking industry, a total of 74 new branches were opened in 2008 and another 33 became bank branches following Equity Bank's acquisition of Uganda Microfinance Ltd. As of December 31, 2008 there were a total of 301 commercial bank branches operating across the country.

Table 3 provides a summary of the structure of the current financial tier system. Under this system, Tier 1 and 2 are government and private banks; Tier 3 –Micro Deposit Institutions; and Tier 4 are SACCOS and Village banks. Most of the SACCOs are owned by and serve farmers.

**Table 3: Uganda's Financial Tier System**

Descriptor	Tier 1	Tier 2	Tier 3	Tier 4
Regulatory instruments	Financial institutions statute 1993		MDI Act 2003	SACCOs subject to auditing & supervision by commissioner.

Numbers	15	8	3 licensed	Over 1500
Number of towns	55	18	44	70 large ones
Number of branches	182 (35%)	12 (43%)	53 (63%)	64 (70%)
Number of accounts	1,350,000	-	930,000	
Extent of serving low income markets	Target large corporations and heightened retail markets	Only one – CMFL. Targets urban economically active poor	Target economically active poor in urban, peri-urban and rural. Beginning to look up markets	Targets economically active poor in peri-urban and rural areas

Source: Making services work for the poor (2004)

#### 4.2.5 Poverty Eradication Action Plan (1997- 2008)

Uganda's agricultural sector is highly dependant on subsistence farmers but their production does not contribute significantly to their economic development. As such, rural areas continue to record high levels of poverty associated with low agricultural production. To improve the situation, the Poverty Eradication Action Plan (PEAP) was initiated in 1997 to guide sector planning through policy formulation and program implementation for poverty alleviation. PEAP ran for 10 years (1997-2008) and focused on increasing incomes of poor, improving living standards, and good governance (NAADS, 2001). This Plan guided sector planning by describing the country's macroeconomic, structural, social policies in support of growth and poverty reduction, and associated external financing needs and major sources of financing. Despite the positive attributes of the Plan, an evaluation of PEAP in 2008 revealed low investment and low productivity of the agricultural sector during the PEAP period. The current MAAIF's DSIP (Section 4.2.11) and National Development Plan (Section 4.2.12) are focused on improving investments and productivity.

#### 4.2.6 Plan for Modernization of Agriculture (2000 - 2008)

Plan for Modernization of Agriculture (PMA) was initiated to serve as the implementation plan of the PEAP for Uganda's agriculture sector. PMA was launched in 2000 to consolidate gains and work on gaps identified over the implementation period of PEAP, putting agriculture back to center stage as the development engine of Uganda. PMA is designed to eradicate poverty through transforming subsistence agriculture to commercial farming; and this is partly to be achieved through:

- Enhanced dissemination and adoption of improved farming practices and technologies
- Diversified agricultural sector with higher value products that attract higher demand
- Promotion of market-oriented agriculture (local and export) that also ensures food security in all households
- Lowering the costs of production and marketing in order to make agricultural sector competitive

Within PMA were provisions for the formation of NAADS and NARO, increased engagement of the private sector, and enhanced stakeholder consultation and participation in planning. Hence, this has increased the number of actors engaged in service delivery and agricultural research.

#### **4.2.7 National Agricultural Advisory Services Act 2001**

NAADS is one of the seven pillars of PMA, designed essentially to address issues of productivity and expansion of agriculture towards the government efforts to eradicate poverty. NAADS was envisioned to *“increase farmer access to information, knowledge and technology, through effective, efficient, sustainable and decentralized extension with increasing private sector involvement in line with government policy”*. Hence, the functions of NAADS are to:

- support the provision of advice and information services to farmers;
- support technology development and linkages with markets;
- monitor and ensure quality and appropriateness of advisory services and technologies provided;
- support private sector and farmer institution development, and to
- ensure that research and extension needs of farmers are identified.

One of the approaches being scaled out by NAADS is the enterprise selection and support initiated through the RPO/ECA of UCA. Through this approach bananas were selected in 10 of the 14 NAADS regions and by 26% of all sub-counties, which was much higher than traditional cash crops (NAADS 2009).

#### **4.2.8 The Rural Development Strategy (RDS) of the MoFPED 2005**

The RDS of the Ministry of Finance Planning and Economic Development (MoFPED) was formulated to address weaknesses in PEAP regarding: (i) Increasing farm productivity of selected commodities; (ii) increasing household output of selected agricultural products; and (iii) adding value and ensuring a stable market for agricultural products (MoFPED, 2005). All these were already under PMA but the RDS was intended to give these areas more focus. Increased investments and value addition still remain to be realized under the new NDP (2010), in the banana sub-sector these have been partially addressed by the Presidential initiatives and private companies.

#### **4.2.9 NARO Act 1992/NARS ACT 2005**

National Agricultural Research Organization (NARO) is the apex body for guidance and coordination of all agricultural research activities in the national agricultural research system in Uganda. NARO is a Public Institution established by an act of Parliament in 1992, and another enacted on 21<sup>st</sup> November 2005 to transform NARIs into NARS. The mission of NARO has always been to generate, adopt and disseminate appropriate and demand-driven technologies, knowledge and information through an effective, efficient, sustainable, decentralized and well co-ordinate agricultural research system”.

Research and technology outputs are to be adapted and disseminated through Zonal Agricultural Research and Development Institutes (ZARDI) located in each of the 12



agro-ecological zones (see Section 3.1.1.3). The Act also provided for the formation of four specified Public Agricultural Research Institutes (PARIs) and each institute is in charge of specific commodities (see Section 3.1.1.1).

One observed change that is likely to affect the banana sub-sector is that ZARDIs in non-traditional banana regions do not work on bananas. Although NGOs continue to provide services in new regions taking up bananas, there still is need for adaptive research to inform species selection by service providers.

#### **4.2.10 Prosperity for All (PFA)**

The National Resistance Movement (NRM)'s 2006 election Manifesto contains the vision of "Prosperity for all". The goal of PFA is to improve the lives of all Ugandans in all aspects including helping Ugandans to attain higher incomes, better nutrition, and improved access to services such as health, education, water, and reliable physical infrastructure. The vision as outlined in the manifesto is being pursued vigorously across the country and is embedded in the public interventions at local levels and now in the DSIP (2010). Several attempts in the past to provide people with cash have not yielded much. Under DSIP, PFA is a main result area with renewed strategies to ensure its success.

#### **4.2.11 The new Development Strategy and Investment Plan -DSIP**

DSIP is a developmental plan that 'consolidates and harmonizes all parallel policy frameworks in the agricultural sector'. Some of the challenges that informed the positioning of the DSIP included among other areas the need to:

- improve agricultural technology development,
- improve processes for agricultural technology delivery and adoption,
- address poorly functioning pest, vector and disease control,
- address degradation of land resources,
- improve agricultural financing and infrastructure (physical and social).

In this regard, DSIP is to be guided by six principles, namely:

- Pursuit of a private sector led and market-oriented economy.
- Enhanced public sector support towards value chain development of agricultural commodities in the 10 agricultural production zones identified in MAAIF's 2004 zoning strategy.
- Provision of agricultural development services to all farmer categories (small, medium, and large scale) as individuals or in groups, ensuring gender equity.
- Strengthened service delivery system to ensure continued provision of agricultural services to farmers.
- Pursuit of growth and equity in implementation of government interventions.
- Ensuring that key agricultural resources (including soils and water for agricultural production) are sustainably used and managed to support current and future generations

The government of Uganda has further committed itself to the principle of agriculture-led growth by signing the Comprehensive Africa Agriculture Development Programme (CAADP) in March 2010. Under this commitment, Uganda is to pursue a 6 percent average annual growth rate for the agricultural sector and to increase the share of the national budget allocated to the agricultural sector to reach an eventual target of 10 percent. This is expected to increase agricultural returns to the economy as well as to farmer households.

#### **4.2.12 Uganda National Development Plan (2010/11 - 2014/15)**

Under the theme of “growth, economic and socio-economic transformation for prosperity”, UNDP is a formulation of targeted interventions with a goal to attaining the national vision of transforming the country from peasant-based economy to a prosperous country within 30 years. This plan broadly outlines public interventions that can contribute to transforming Uganda’s economy to achieve prosperity. Some of the challenges that this plan addresses include:

- The limited value added exports which limits access of Uganda’s products to global markets with high value products
- Agricultural and industrial sectors that are growing at slower than desirable rate
- Limited absorption of the rapidly growing labour force by the new sectors
- Ineffective capital flow systems effected, and
- Slow accumulation of core production infrastructure such as energy and transport

Several strategies proposed require individual sectors to improve production systems to ensure optimal use of available resources including knowledge and technologies. Under this plan, the government’s commits to promoting science, technology and innovation is also well discussed with an outline of strategic areas for intervention. Bananas are among the commodities targeted for value addition and export to ‘high value markets in high income countries’ as a strategy to improve household incomes and food security NDP 2010.

### **4.3 OTHER POLICY-RELATED EVENTS THAT HAVE AFFECTED THE AGRICULTURAL SECTOR**

#### **4.3.1 Expulsion of Asians in 1972**

In attempt to implement proposals made by the 1968 Committee on “Africanization in Commerce and Industry”, Late President Idi Amin Dada to decreed the expulsion of Asians from Uganda. Although this move was an unprecedented move, it ironically transformed Ugandan’s commercial sector. Specifically, the expulsion of Asians became one of the main drivers in the commercialization of bananas (Tushemereirwe et al, 2006).

Prior to their expulsion, some urban centers in Uganda were mainly comprised of Asians. The majority of Ugandans lived in rural areas and came to urban centers for casual labor and to purchase household supplies. Rice and wheat were the main foods consumed in towns but when the Asians left, many Ugandans especially in the central region took over Asian assets or started engaging in businesses in urban areas and a considerable rural

population moved to urban centers. Most Ugandans that abandoned their rural farms and became business people did not adopt the rice and wheat diet of the Asians but retained their cultural foods. Hence, with urbanization, *Matooke* slowly emerged as a commercial food crop targeting the Ugandan urban populations. According to Sulma foods (a processing and exporter of fresh and processed bananas) it is this love for *Matooke* that has created market for fresh matooke abroad. Several export companies target the Uganda population in the Diaspora. Secondly the fall in the market prices of traditional cash crops, further encouraged farmers to invest in matooke that had a steady market locally in the growing urban centers.

### 4.3.2 Transfer of Agricultural Colleges to Education in 1998

In the implementation of PEAP/PMA, the Ministry of Education received resources to fund different projects under the ministry and government ceased this opportunity and transferred sector-based colleges to the Ministry of Education. The agricultural, forestry, fisheries, veterinary and cooperative colleges were among the college structures transferred to Ministry of Education. However, these transfers were not supported by changes in curricula to ensure that training in these college systems was linked to sector development needs. Specifically for agricultural colleges, there were no budget lines for demonstrations, college farm management, field attachments, or transportation infrastructure (bicycles and motorcycles) to facilitate outreach that was intended to link training to development realities. As a result, training became almost entirely theoretical, greatly reducing the quality of college graduates. This however, was reversed in 2010 and colleges were given back to the mother ministries.

## 5 KEY ACTORS IN THE BANANA SUB-SECTOR AND THEIR INNOVATION HABITS

Banana is a non-traditional export crop and a major staple that has traditionally been grown on a subsistence basis mostly in central, southern, and western Uganda. Key actors have been defined in this study as those entities (individuals, groups or institutions) that are actively contributing to the performance of the sub-sector. In this regard, key categories of actors in the banana sub-sector include:

- i. **Entrepreneurs:** These are actors that utilize agricultural knowledge and technologies in production of either raw bananas or processed banana products. Two categories were identified:
- ii. **Scientific knowledge and technology generators:** This category includes public and research and training institutions such as universities, colleges, and non-governmental organizations (NGOs).
- iii. **Service providers:** These are intermediary organizations that diffuse knowledge and technologies. These actors also link producers to knowledge and technology sources. In this category are NAADS, public extension, NGOs, and cooperatives.
- iv. **Quality control & regulatory bodies:** This category provides guidelines, boundaries and freedoms under which other actors operate. They include

- government ministries, local government, international treaties and conventions, and interest groups.
- v. **Credit and financial institutions:** This category facilitates the flow of capital among actors in form of savings and credit. They include banks, micro-finance institutions, cooperatives such as SACCOs, and NGOs
  - vi. **Input Suppliers:** This category includes public and private institutions that provide farm inputs under various arrangements. These actors include agro-input supply shops, firms and farms that supply planting material, and providers of manure.
  - vii. **Market chain actors:** These are actors that facilitate the sale of banana products. These include middlemen or connectors, transport agents, storage facility (cold) owners, and vendors (bulk and retail).

Details on activities, performance behaviors, and innovation habits of these actors are presented in sections below.

## 5.1 ENTREPRENEURS

Entrepreneurs utilize knowledge and technologies to improve the production and marketing functions of an agricultural sub-system. Unlike many agricultural sub-systems, the banana sub-sector is a complex sub-system that is comprised of a web of entrepreneurs performing different functions to improve production and marketing of a range of banana products. In Uganda, the mature banana fruit is the primary product derived from the banana tree but other products such as fiber and leaves are equally important as they support livelihoods of a large proportion of the Ugandan population. For the purpose of improving clarity in actor roles and performance behaviours, entrepreneurs in this study refers to individuals, groups, and firms at the supply end of inputs and banana products. Hence, key categories of entrepreneurs in the banana sub-sector include: (i) farmers (individuals and groups) producing bananas; and (ii) processors (individuals, groups, and firms) involved in processing different types of banana fruit and its by-products.

### 5.1.1 Producers

It is estimated that about 75% of the Ugandan population is engaged in cultivation of bananas (MAAIF, 2010). Banana farmers in Uganda can be grouped into three major categories, namely: subsistence, semi-commercial and commercial. The majority of banana farmers in Uganda are subsistence farmers because bananas are mostly produced for household consumption. A study by Nkwiine & Tumuhairwe (2004) in Mbarara and Bushenyi, which are two major banana producing districts, recorded 45% and 84% banana and cattle subsistence farmers' in the two districts respectively. Semi-commercial farmers were 35% in Mbarara and 10% in Bushenyi; while commercial producers were 20% and 6% in the two districts respectively. It is important to note that in the last decade, many subsistence farmers have been diverting to semi-commercial level. This is partly attributed to improvements in road network and marketing infrastructures which enables middlemen and traders to seek banana produce in remote areas.

### 5.1.1.1 Subsistence farmers

These farmers mostly produce *matooke* and dessert types for household consumption and sell limited bunches to individuals within their locality. Because of the need to satisfy their household tastes and limited access to improved planting material, subsistence farmers often use local varieties. Plantations of some subsistence farmers are old (some are >100 years) because they have been inherited from previous generations hence their productivity is low. Many newer plantations are small which also limits farmers' capacity to commercialize their banana products.

According to Nkiine and Tumuhairwe (2004), subsistence farmers hardly invest money in banana production, rely entirely on household labor (mostly provided by women and children), and as such their banana plantations are small in size, poorly managed and yield little. It is a common practice of male subsistence farmers to sell labour to the semi-commercial and commercial farmers. The majority of subsistence farmers are not in groups, they hardly seek after or utilise scientific knowledge or link up with other actors. Having said this, it was noted that subsistence farmers rely on indigenous knowledge and engage in various innovative processes to ensure sustainability of the banana crop. For example, farmers in Mukono were aware of and had devised strategies to control banana wilt before researchers could provide a viable control mechanism (Ngambeki et al., 2006). Given the fact that the majority of banana farmers in Uganda produce at subsistence level, it is such indigenous knowledge-based innovations that have assured sustained banana production, especially in central Uganda.

In general, the subsistence farmers seem less informed on ways to improve their productivity and scale up their production levels. It was noted during the field visits that although bananas are seen almost in every farm in central and western Uganda, many plantations owned by subsistence farmers were poorly managed, exhibiting no evidence of improved knowledge and technology utilization. This was not because the knowledge and technologies used by the semi-commercial and commercial farmers were inaccessible, but rather subsistence farmers had not realised the economic potential in utilizing improved knowledge and technologies. Some farmers in Bushenyi and Mbarara indicated that it was the lack of market that demotivated them from investing in maintaining their plantations. It was only respondents in Luwero that cited land tenure system as a disincentive for engaging in banana production. Squatters are often discouraged from planting bananas because banana is a perennial crop which elevates the value of the land and makes it harder for landlords to evict people from land. Consequently households without hiring or "squatting" on land in Luwero and Mukono districts had small plots which they did not consider viable for banana production.

Although the national development plans address the need to improve productivity and the profitability of agriculture (with special emphasis on women, youth, and subsistence farmers), the subsistence farmer is often marginalized at implementation stage. It was noted that programs ran by government and developmental partners focus on the 'progressive farmer', 'model farmer' or 'lead farmer' concepts, which in most communities leave out the subsistence farmer. The problem is aggravated by the fact that the 'model entrepreneurs' often end up focusing on scaling-up their enterprises and engage with the communities only as long as the implementing organizations are

monitoring the diffusion process. In this study, there were many reports where the custodians of demonstration gardens had refused to share planting materials with community members or were charging prices higher than the market rate.

To improve their access to services, access to market, and their bargaining power, many subsistence banana farmers are now forming farmers' groups. Groups seem to improve marketability of bananas and farmers returns to investment (see **Appendix 1**). The Uganda Cooperative Alliance (UCA) has played a vital role in organizing farmers into groups and this group forming process is currently being fueled by the NAADS initiative to commercialize agriculture. Under NAADS, subsistence farmers are required to form groups at parish level (notably as farmers fora) in order to access NAADS services. This process is expected to improve subsistence farmers' access to knowledge and technologies and consequently scale up their production to semi-commercial level.

### 5.1.1.2 Semi-commercial Farmers

Unlike subsistence farmers, semi-commercial farmers use both improved and local technologies to enhance production and the marketability of their produce. Semi-commercial farmers own medium sized plantations (3 – 8 acres in the Western regions. In central the acreage is less (1 – 3 acres) but intensively managed) and often practice intensive farming approaches to improve returns per unit of land cultivated. Due to the larger area cultivated or engagement in good agronomic practices, semi-commercial farmers often hire labor to supplement their household labor. To maximize productivity of their enterprises, these farmers often integrate banana cultivation with other enterprises such as livestock keeping and horticulture. It is the semi-commercial farmers that contribute to the bulk of bananas (especially *matooke*) traded on Ugandan markets.

Historically, semi-commercial farmers have emerged as a result of subsistence farmers' efforts to scale-up their production. In central Uganda, semi-commercial farmers are mostly those farmers (mostly peasants) that were cultivating bananas as a staple but since many farmers abandoned banana production, the few left have scale-up their production to meet the increased demand. Due to the high profit margin, these farmers in central region are willing to invest more in banana production.

Currently, the majority of semi-commercial farmers are retirees and salaried workers undertaking farming to supplement their income. Our investigations in Mbarara and Bushenyi district reveal that some civil servants are turning to farming to diversify their income and banana cultivation is one of the most popular enterprises among this generation of farmers. The case study of Richard (not real name) in **InFocus 1** below represents a typical semi-commercial farmer.

#### **InFocus 1: Chronicle of a Salaried Worker turned Semi-Commercial Banana Farmer**

Richard is a successful middle-aged man holding a managerial position at a head office of a successful parastatal in Mbarara. We interviewed Richard at his office and below is an excerpt from his perspective of banana farming.

*“When I was a young boy in late 1950, our food in Bushenyi was mainly millet, cassava, and potatoes. The bananas varieties we had were those for brewing. Between 1965 and 1967, Matooke came in as a food security crop. The number of farmers with matooke plantations*

*increased both in numbers and sizes. A slogan started “A male Munyankole without a banana plantation and cattle is not worthy of marriage” Bananas were for food; and cattle were for dowry and milk for children.*

*It was between 1970 and 1973 that bananas started being commercial. I remember seeing pickups collecting bunch from families in our village. At that time men used to move around their plantations mark (tie banana fiber cords around) those bunches the wives were not to touch. Those were the ones (bunches) sold for income. I learned at that time that the bananas were taken to Mbarara and Kabale. Brewing bananas disappeared.*

*The late 1970s brought in the big trucks taking bananas to Kampala. By that time matooke had taken over as one of the major cash crops. Men no longer had to mark bunches for sale because the plantations had grown and the harvest far more than families could eat. Consequently, when I completed University in the early 1980s, I had to put up a banana plantation to gain respect in the community. A respectable home must have a sizeable plantation for food and income. Mine is able to pay the workers, as well as support the livestock side.”*

When asked about the banana varieties grown in his area, Richard pointed out with pride, “...Varieties grown in Bushenyi are the traditional ones. For instance Nyeru, Enjagata, Mujura, Embururu, Mbwanzirime.”

When asked whether he had received any training on banana farming, Richard confidently replied “I have not received any formal training but have learned as I grew up, and on my own initiative. In the 1960s the agricultural farm institute at Nyaruzinga used to train farmers and in the 1970s there were competitions around good farming practices put to use. I was young but I observed; and now I practice.”

In general, semi-commercial farmers invest small amounts in a wide range of inputs to improve productivity of their enterprises. These farmers invest in both traditional and conventional inputs and chemical inputs. Most semi-commercial farmers without livestock purchase cow dung for manure and these farmers use both family and hired labour.

### 5.1.1.3 Commercial Farmers

These farmers cultivate bananas (usually in monoculture) as a cash crop. Commercial farmers are responsive to forces of demand and often purchase improved technologies such as improved varieties to improve marketability of their bananas. These farmers invest heavily in their enterprises and hence are often seeking knowledge (mostly from extension and researchers) and innovating to improve productivity so as to reduce production costs and maximize their profits. Due to the large size of plantations, commercial farmers heavily depend on hired labor. These firms often employ highly skilled personnel (including doctoral degree holders) on contractual basis to conduct research and offer advisory services. Less skilled personnel such as diploma and certificate holders are often employed mostly as farm managers to carry out day-to-day activities while a large pool of unskilled labor is also employed for manual work.

An emerging group of commercial farmers are individuals and firms that are engaging in production of dessert bananas, notably apple bananas (*Sukalindizi*), Gros Micheal (*Bogoya*), and Cavendish (*Bogoya*). These dessert bananas attract good market locally and at regional and international markets. The other groups of commercial farmers are

those producing bananas for other uses. For example, WAKA International Ltd in Mukono district is a firm that is specializing in producing FHIA for juice and wine. We interviewed one of the directors of WAKA and **InFocus 2** provides a summary of our interview.

## InFocus 2: Profile of a Commercial Farm and Processing Firm

WAKA International Ltd started growing bananas as a family business in 1989. The family had a lot of manure and ‘was advised to grow bananas since it was a high feeder’ by a family member that had a diploma in agriculture. Since banana growing was a commercial enterprise, founders of WAKA started off with high-value varieties such as *Kivuvu*, *Gonja*, and dessert types (including FHIA). Matooke varieties were grown on small scale for household consumption. In 1996 the firm received plantlets of FHIA from KARI and embarked on growing FHIA as a business (to produce juice).

WAKA International Ltd started growing bananas as a family business in 1989. The family had a lot of manure and ‘was advised to grow bananas since it was a high feeder crop’ by a family member that had a diploma in agriculture. Since banana growing was a commercial enterprise, founders of WAKA International Ltd started off with high-value varieties such as *Kivuvu*, *Gonja*, and dessert types (including FHIA). Matooke varieties were grown on small scale for household consumption. In 1996 the firm received plantlets of FHIA from KARI and embarked on growing FHIA as a business (to produce juice).

Over the years, this firm has concentrated on producing FHIA in monoculture for juice and wine production. Started off with eight acres but now banana (mostly FHIA) covers about 15 acres of the farm. FHIA was preferred because it is more tolerant to diseases and pests than other juicing varieties, is tolerant to drought, and yields more juice. At the time of the study, owners were installing pipes for drip irrigation to improve productivity. Manure especially from poultry is also used to improve soil fertility. The new and rehabilitated plantation was also intercropped with soybean (a high-value crop) to improve soil fertility. To maximize land use, the owners were planning to continue intercropping banana with legumes for at least 1 year

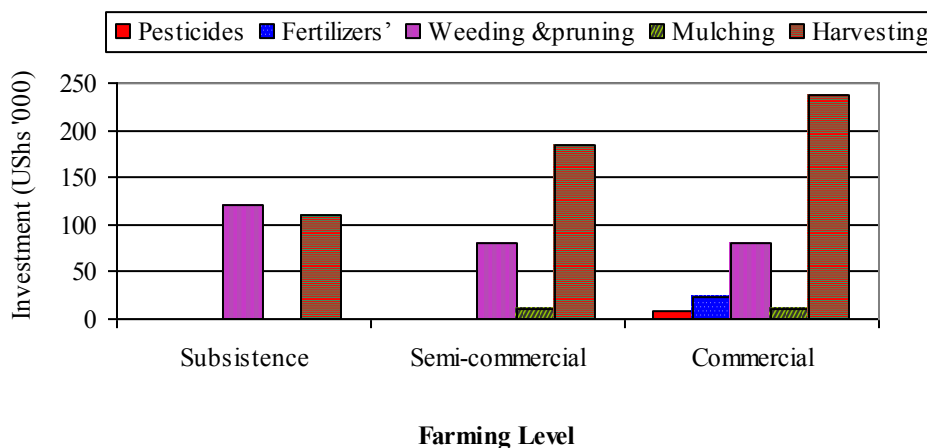
Because of engaging in good agronomic practices, WAKA farm has achieved the status of a ‘model farm and firm; and this has attracted attention of both local and international visitors such AWARD participants. This has improved the visibility of the enterprise and benefits the firm since it is free advertising. As of October 2010, WAKA International Ltd was a well established banana juice and wine processing firm employing 50 full-time staff

### **Challenges**

Since the farm is located in an area with low banana production, owners of WAKA farm have in the past experienced high losses of bananas due to thefts. To curb the thefts, the owners had to construct a chain link perimeter fence to cover the 15 acre farm. According to the owners, before constructing the fence the firm would only harvest about 35 bunches per month. With fencing and improvement of the plantation, now about 200 bunches are harvested per month and production is projected to improve to 320 bunches per month. At this level of production, in one year the firm expects to recover 40% of the fencing expenses with proceeds generated from only one acre of FHIA

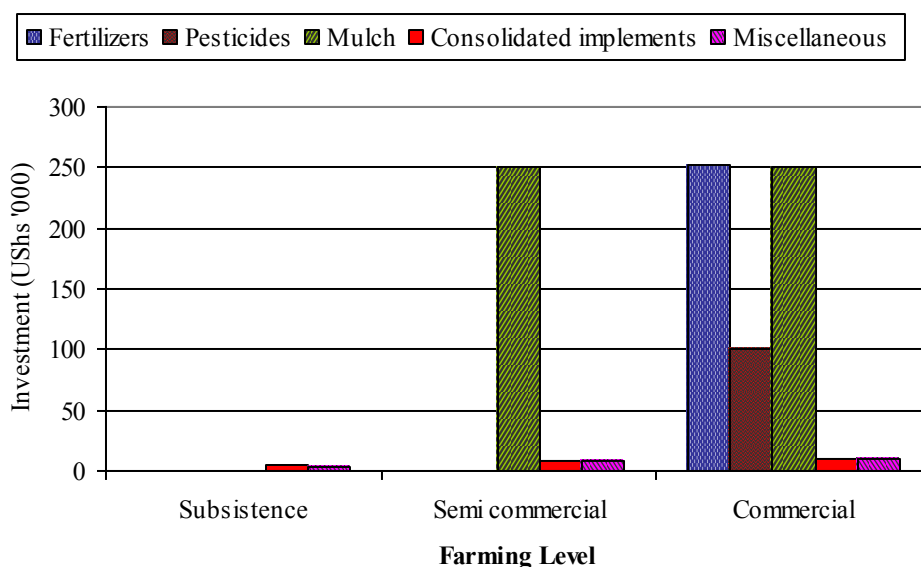


In general, commercial farmers seek knowledge on improved technologies to enhance their productivity and information on markets. These farmers tend to work in isolation but invest heavily in improved technologies and skilled labour. A study on adoption of banana technologies in central and western Uganda (Ssango and Sabiiti, 2009) show that subsistence farmers invested the least in agro-inputs; followed by semi-commercial farmers while commercial farmers invested the most. Figure 10 summarize the investment practices of the three categories of producers and their net profitability respectively.



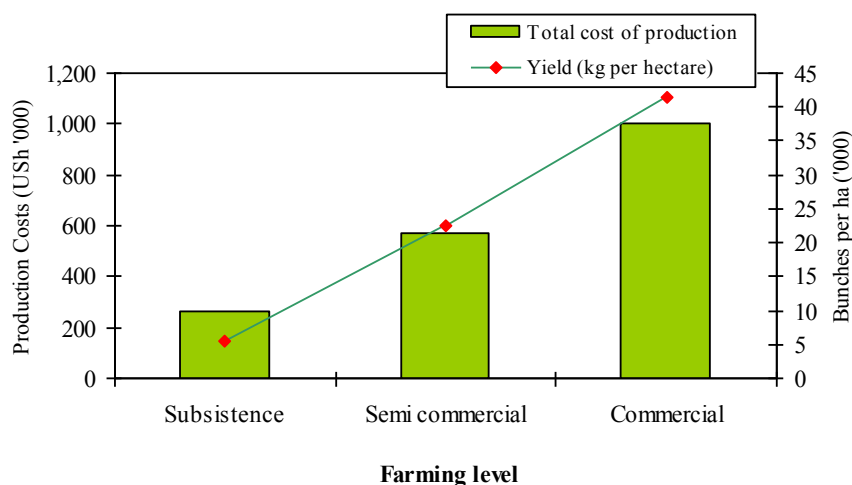
**Figure 10: Investments in Labour**

As can be seen in Error! Reference source not found. below, plantation maintenance (notably weeding and pruning) and harvesting are unavoidable activities in all types of farming. These activities all demand manual labor and hence contributed to large proportion of Luwero farmers’ expenditure on labour. Due to the large scale of production, commercial farmers invested more in farm inputs in order to minimize labour costs so as to increase their returns. Semi-commercial farmers invested more in less expensive farm implements because their labor costs are not as high as commercial farmers.



**Figure 11: Investment in Farm Inputs**

This study shows that low investment in both human and physical capital reduce the subsistence farmers’ profit margin (**Figure 12**). Low returns on investment are often perceived as losses by small-scale farmers and this discourages subsistence farmers’ from re-investing in banana production.



**Figure 12: Plantation Yield as a Function of Production Costs**

As a result of low investment, subsistence farmers in all six districts studied had lower returns than semi-commercial and commercial farmers (Ssango and Sabiiti, 2009). **Figure 12** shows investment habits of different categories of farmers in Luwero district and the yield of bananas per hectare.

In general, the commercialization of banana production has followed similar patterns as commercialization of agriculture which is being championed by NAADS. Under NAADS, subsistence farmers are being assisted to access knowledge and technologies (see Section 5.4.2) so as to scale-up their production to commercial level, as a strategy to move peasants out of poverty. NAADS ‘model farmer’ concept has specifically catalyzed scaling-up of banana production to commercial level. Under this concept, farmers that exhibit progress are selected to serve as “model” farmers and in the process receive technical support, farm inputs and advisory services directly from NAADS. This category of farmers often easily adopt the recommended agronomic practices, attain higher yields, and many increase acreage to scale-up their production. Hence, some subsistence farmers have turned semi-commercial while semi-commercial farmers have become fully commercial. The increased number of commercial producers, has in most cases resulted in overproduction during the peak seasons and this has in turn propagated the growth of the banana processing industry.

### **5.1.2 Processors**

This group of entrepreneurs has greatly contributed to the development of the banana sub-sector by improving market access of bananas and their products. These processors can also be categorized in three major categories, namely: i) small scale artisanal processors producing different products on subsistence level; ii) farmers’ groups adding value to their produce to improve their access to markets; and iii) firms targeting urban centres and export markets. To improve clarity, processors will be discussed based on the types of products they produce.

#### **5.1.2.1 Fresh Peeled Matooke Processors**

Banana vendors (women) in urban markets peel green bananas which they sell to consumers that want ready-to-cook matooke. Peeled *matooke* target single males such as university students, working class women that may not want to dirty their hands with sticky banana sap, and those that lack time to peel bananas. These peeled bananas cost a bit more than unpeeled ones but our interviews of banana vendors in food markets around Kampala city revealed that there is growing local demand for peeled matooke. To address this growing demand, researchers at FRAVESEMA have been investigating means to improve the shelf life of peeled *matooke*.

#### **5.1.2.2 Processors of Dehydrated Banana Chips and Flours**

Dehydrating bananas by sun drying is a traditional practice that had almost ceased. Traditionally farmers in the western and eastern parts of Uganda dehydrate peeled whole bananas and banana chips (locally called *obukeke*, *omukeke* or *obuteere*) which were stored in granaries and used during the “lean” season. There are also practices where banana varieties (especially *mbidde* and *musa* which are used for juice and alcohol making) are dehydrated in the lean season to reduce sap so that these bananas can be consumed as food. These practices are weather dependent and hence were done on small scale to meet household food needs.

Banana dehydration and flour processing technologies have been revived and up-scaled by NGOs and research institutions as a strategy to improve food security through harnessing of indigenous food preservation practices. For example, INIBAP is documented to have popularized dehydration among farmer groups in Bushenyi. To further popularize banana dehydration, Farm Africa together with MBADIFA provided solar driers and taught farmers in Mbarara and Bushenyi to process the chips and flour from *Matooke* (cooking banana). These initiatives were designed to increase utilization of bananas during the peak production seasons and thereby reduce on post-harvest losses.

According to a representative from MBADIFA, around 2003 – 2004 when the banana dehydration project was taking-off, the price of bananas went as low as US\$0.300. The flour was used to make doughnuts, cakes and other pastries. Subsequently, the prices improved to an average of US\$3000 – 5000. As a result of the rise in prices for fresh bananas, many farmer groups realized that they could earn more money (and with less effort) from selling fresh bananas and hence abandoned flour processing. Banana flour and dehydration technology has recently been revitalized under the Presidential Initiative on Banana Industrial Development (PIBID).

### InFocus 3: The Presidential Initiative on Banana Industrial Development (PIBID)

The PIBIP project focuses on researching ways to enhance production and marketing of banana flour and flour products. PIBID employs both graduates as well as skilled persons in the areas of production and processing. Major investments for PIBID included renovating its center in Bushenyi (former District Farm Institute), procurement of processing equipment, setting up the banana plantation, and organizing local farmers into out-growers scheme. Besides research on banana dehydration processes, researchers in PIBID are currently experimenting on yield enhancement through irrigation and good agronomic practices. Other research foci include optimizing use by-products from matooke by using banana waste to produce other products such as biogas and tablemats

In addition to activities of NGOs and research institutions, the bulk of banana chips production is currently carried out by private processors. As of 2002 Fruits of the Nile enjoyed a share of 76% of this market followed by AMFRI (10%), Masaka Organic Producers under St. Jude’s training centre (9%), Tefu (4%), and Flona Commodities (1%) while new entrants such as Sulma Foods were still test marketing their products. These processors focus on dehydrating apple bananas for export and to a limited extent to supply local super markets.

Due to stiff market requirements, commercial banana chip processors often seek new knowledge and technologies to improve their competitiveness by assuring improved quality, quantity and market access. According to Envalert, most companies have specialised in organic apple banana production because organic products fetch 50% more returns than inorganically produced products on the European market. As shown in **Table 4**, private processing companies invest in machinery (notably solar driers and hybrid driers). Companies invest in hybrid driers because both electricity and sunshine are not reliable all year round or throughout the day.

**Table 4: Banana Dehydration Companies' Investments in Driers**

Company	Drier used	Number of units	Unit cost (US\$)
Fruits of the Nile	Cabinet dryers	Na	180
Amfri Farms	Cabinet/Cabin dryer with solar collector. Prevents direct sunlight hitting the fruit	42	600
St. Jude	Tunnel Dryer (Danish design)	4	Na
Tefu	Tunnel dryers (Danish design)	6	Na
Sulma Foods	Hybrid dryer (Kawanda)	1	250

Source: National Post-harvest Program KARI (2002) (These figures may have changed by now, but this serves to indicate the practice of investing in equipments by processors).

Other costs involve procuring of raw materials, transportation of bananas from production sites to factories and from factory to the airport, and certification of producers or companies engaged in organic production. The certification process can cost as much as USD 5000 per company for organic exporters.

In terms of competencies and performance, processors are themselves skilled in the area of their enterprises, they employ and train personnel to produce high quality products to leverage their positioning in the processed banana market. Processors also invest in qualified personnel and capacity building of public extension staff to work directly with out-growers. Many also have banana plantations and invest in good yielding varieties such of Kilometer 50 (improved apple bananas).

According to processors that were interviewed in this study (most of whom also double as exporters), the market demand of processed banana products is huge (especially for organic products), but it is the seasonal supply of bananas that limit their ability to meet the market demands. Besides the seasonality of banana production, other challenges faced by processors included the fear especially by organic exporters that farmers could be enticed to unacceptable chemicals, high transportation costs due to poor road network, the increasing cost of fuel, and unpredictable supply of electricity.

### 5.1.2.3 Banana Juice Producers

Banana juice (commonly called *ensande* or *eshande* in the western and *mubisi* in central regions) has always been the most commonly consumed non-alcoholic beverage in the banana producing areas. The juice is mostly produced on small scale for household consumption. Some farmers occasionally produce juice for sale at public gatherings and special functions. Most juice processors use as a sweetener in fermented porridges.

In the 1970s and early 1980s NGOs started promoting the processing of banana juice into 'wine' as a strategy to improve incomes of rural farmers. What was referred to as wine then was concentrated banana juice which was boiled at high temperatures until it turned to syrup. This syrup would then be reconstituted by adding water to make a refreshing banana beverage. Banana syrup was popular but expensive and hence was sold as a specialty item mostly to churches and at special occasions such as wedding ceremonies. Participants in central and southwestern regions seemed unaware of this process but in

the western region (Kabarole district) It is the banana syrup that is still referred to as ‘banana wine’.

In the past decade, there has been an increase in small and medium scale enterprises outsourcing banana juice from artisanal processors. These enterprises often pasteurize and bottle the juice or use it in making juice cocktails and other food products. For example, the Department of Food Science and Technology at Makerere University and Jacana Foods Ltd pasteurize and package banana juice outsourced from farmers.

Banana juice production has remained underdeveloped mainly because of lack of technology to juice large quantities of bananas under acceptable hygienic practices. Traditionally, large quantities of bananas are juiced by trampling the bananas with feet using grass for traction. Researchers at the Department of Food Science and Technology in Makerere University are investigating strategies to improve the process of banana juice making and quality of banana juice. This project is also funded under the Presidential initiatives to add-value to agro-produce.

#### 5.1.2.4 Banana Winemakers

The processing of wine from bananas is a recent innovation to help farmers reduce post-harvest losses during peak *matooke* production and to add value to juice from underutilized banana varieties such as FHIA. Since wine production requires specialized skill and equipment, most wine processors are farmers’ groups, which often register as companies in order to improve their competitiveness and to access international markets. By end of September 2010, Uganda Export Promotions Board (UEPB) had registered 5 companies under banana wine production, namely: Tigebwa Development Association, Kibatsi, KKANS, Bushenyi Banana and Plantain Farmers Association (BUBAPFA), and NK. Since wine production targets ripe *matooke*, this technology has great potential to reducing post-harvest losses and stabilizing banana prices.

In Uganda, banana wine production has been spearheaded by research organizations such as INIBAP Uganda Cooperative Alliance, and NGOs. These institutions focus on value addition and hence invest heavily in training of farmers and farmer groups. For example, Mbarara District Farmers’ Association (MBADIFA) builds capacity of farmers’ groups in processing, quality control, branding, and marketing of their wine. At the time of this study, MBADIFA was supporting 15 farmers groups; which include 4 groups in Bushenyi, 3 groups in Mbarara, and 5 groups in Ntungamo.

#### InFocus 4: Wine Processing and Marketing by Tigebwa DFA

Tigebwa Development Farmers Association started off as the Association for Advancement of Rural Development (ASERUDE) which was a farmers association. ASERUDE started banana processing in 1992 when INBAP selected their parish (Nkanga) as one of their study sites for an IPGRI funded project, under which INIBAP was studying banana plantations, varieties of bananas grown, and their uses. As part of this project, INBAP introduced ASERUDE members to banana flour and wine processing technologies. The group started processing flour which they sold in local markets and used some of their banana flour to make doughnuts and cakes. The group was advised to abandon banana flour processing in order to concentrate on wine production by one entrepreneur in banana business. In 2004 twelve (12) members of ASERUDE underwent

training on wine production in Tanzania and in the same year these 12 members broke away from ASERUDE and started Tigebwa Development Association to specialize in wine production. Tigebwa membership is documented to have increased to 20 in 2009 and had further increased to 30 members by September 2010.

#### ***Benefits to members:***

According to Tigebwa members, wine processing is lucrative business and helps them reduce on post-harvest losses they used to incur during peak banana production seasons. The group uses only *matooke* varieties in their wine production. During peak production times, members bring bananas for processing, during lean periods the Association buys from members on cash basis. Either way members have a good outlet for their bananas. At the time of the study, a bottle of wine fetched between US\$8,000 to US\$10,000. In 2009, the group invested only US\$1,976,100 but earned a total income of US\$3,071,000; realizing a 53% net profit.

Due to the high profit margins realized from linking *matooke* production to wine processing, some members had remodelled their houses, installed solar panels for electricity generation, installed improved water harvesting technologies, can educate their children in better schools, and some have got motorcycles from wine. Members also have other individual income generating projects to supplement the income from wine production.

#### ***Linkages and collaborations***

Tigebwa has received technical and financial support from various institutions which has greatly improved its capacity to engage in wine production on commercial scale, as well as its income.

- Ankole Private Sector Promotion Center (which is a local organization) provided several short courses on management and quality control during the initial stages of wine production.
- In 2005, Uganda Cooperative Alliance (UCA) started offering Tigebwa members training on quality control and networking to improve their access to credit and markets.
- Through MBADIFA, Tigebwa learned that to be competitive both at local and in the export market, labeling was key. With the help of MBADIFA, the group now has a label and its sales are improving.
- Tigebwa's wine processing unit is house in UCA building in Nyabubare sub-county, Bushenyi
- Tigebwa works with local community and NOGUMU shop in Kampala to market its wine.

#### ***Challenges***

*Fermentation Containers:* The group needs several 500 litre drums. At the time study each new member had to buy a container but these seem not to be enough. The group has to balance between sharing profits and investments.

*Increasing prices of sugar:* When the group started in 2004, the price of a 50 kg sack was at US\$40,000/=. It had risen to US\$140,000/= at the time of the study.

*Packing Containers:* Wine requires special bottles, which the Association buys from Owino market in Kampala and sterilizes them using boiled water and detergents. The challenge with these bottles is that their availability and uniformity is not guaranteed. Due to limited access to bottles, the group sells some of their wine in the 20-litre jerricans (equivalent of 26 wine bottles) at a giveaway price of US\$100,000.

*Corks:* Kulika Trust in Nsambya used to be a reliable source but they sold the business to NOGAMU that now imports corks from France. When NOGAMU is out of stock, the group cannot bottle their wine. These corks are also expensive -each cork costs US\$500/=.

Access to equipments like the lactometer (measuring the amount of sugar since bananas have varying amounts of sugar, alcoholmeter to measure alcohol content, a filtering machine to ensure

no solid particles go into the wine). The Association was accessing this equipment by sharing with four other groups in the area, and this affected their production.

### 5.1.2.5 Banana Beer (*Tonto*) Brewers

Banana beer (commonly called *Tonto*) is considered one of the traditional beers in Uganda (Mwesigye and Okurut, 1995), especially in central and western regions. Traditionally *tonto* was for household consumption and made from indigenous varieties called *mbidde Kabula* or *Mbidde* in central and *mbira* in western regions. Following the 1980s declines in prices of coffee (a crop which was often intercropped with bananas), some farmers sought to diversify their incomes by producing *tonto* for sale. This commercialization of *tonto* is believed to have led to increased use of non-traditional juicing banana varieties such as *kisubi*, *gonja*, *sukalindizi*, *kivuvu*, and later *musa* for *tonto* production. The banana bacterial wilt is believed to have grossly led to the decline of banana beer production since it almost wiped out *sukalindizi* and *musa* varieties – which are the two varieties that had dominated beer production. This resulted in farmers diverting to other enterprises, whereby many of these farmers (especially in central region) completely abandoned banana production.

The decline in production of *sukalindizi* and *musa* also led to an emergence of a new breed of actors – commercial *tonto* processors. These *tonto* processors are not banana farmers; but rather bulk beer varieties (mostly *mbide* plus remnants of beer varieties) from buying as few as one or two bananas from individual farmers. These bananas are then ripened to make *tonto* for commercial purposes.

To improve marketability of *tonto*, researchers in the Department of Food Science and Technology are investigating strategies to improve processing, bottling, and shelf-life of banana beer. This research is funded under Presidential technology development fund and commissioned by the Department of Food Science and Technology at Makerere University as part of the national strategies to improve value-addition to Uganda's agro-produce. This initiative is likely to popularize *tonto* production, with technical backstopping from these researchers, many farmers and processors are expected to re-invest in *tonto* production at commercial scale.

### 5.1.2.6 Banana Leaf Processors

Banana leaves are traditionally used in steaming foods such as matooke, potatoes, cassava, yams, and maize meal (*posho*) in many parts of Uganda. Due to increased urbanization, some farmers specialize in processing and trade in fresh banana leaves. These processors sell banana leaves from which stalks and midribs have been removed to yield sheets of banana leaves used for lining cooking containers and covering food in the steaming process. Track loads of banana leaves are sold in Kampala markets on a daily basis.

There are many other actors involved in bulking, transport, and selling of these leaves. The bulk of these leaves are sold in food markets and fresh food stalks on retail basis. At the time of the study, traders (middlemen) purchased a bundle of 100 – 150 leaves at the



farm-gate price of US\$2,500 (which is a little over USD 1<sup>4</sup>). These are then sold on wholesale basis to vendors in city markets at US\$6,000 -7,000 (USD 2.6 - 3). The vendors sell 3 small fresh leaves for US\$200 or US\$100 per leaf while large leaves were being sold at US\$500 for a pack of 3 or US\$200 each. From a bundle of between 100 – 150 leaves, retailers earn between US\$13,300 - US\$16,700 (USD 5.8 – 7.3 ). Hence, banana leaves are lucrative business especially for middlemen and retailers.

In addition to fresh leaves, some leaf processors specialize in commercial production of smoked tender leaves which are used to hold soups and sauces during the steaming process. This is a growing industry because many restaurants and cooked food outlets are increasingly adding traditionally steamed sauces and soups (*Luwombo*) as speciality items on their menus. To meet the demand for smoked banana leaves, some farmers in central region specialize in production of *kisubi*, *sukalindizi*, and *musa* just for leaf production. These varieties are said to be tougher and yet softer than leaves from other banana varieties.

At the time of this study, the average number of dealers in roasted leaves was 3 per market and these leaves were being sold at an average US\$300 per leaf to regular customers or on order. Irregular consumers can pay as much as US\$500 per leaf. *Luwombo* leaf vendors expect high sales mostly during festive seasons such as *Idhi*, Easter, Christmas, and New Year holidays; hence these vendors do not maintain large stocks as fresh banana dealers. Most consumers tend to buy *Luwombo* leaves over the weekends and for special occasions such as traditional weddings and receptions. Respondents in the four Kampala markets that were visited indicate that processors are continuously innovating to provide stronger leaves that double as flavour enhancers.

### 5.1.2.7 Crafts Makers

In Uganda, crafts production is mostly a commercial enterprise dominated by women and youth groups. Banana fibers have long been used to make a variety of traditional household items such as baskets, mats, ropes, table mats, container covers, pot supports, bags, and children's toys such as balls and dolls. Banana fibre is now used to make many crafts and accessories that attract both local and foreign markets. The majority of crafts are made by individual producers (mostly women) or groups. Production by individual craft makers are unpredictable, many participate as a hobby, producing for sale only when there is demand for cultural functions.

In this study two major craft outlets in Kampala were visited, namely: National Arts and Crafts Association of Uganda which oversees about 40 stalls at National Theater grounds and Exposure Africa – USSIA Women Development Center which is located on Buganda Road. Traders at both centres dealt in a variety of crafts which they trade retailers from different parts of the country but the majority of the suppliers come from Mukono, Masaka, Luwero, and Kampala districts. **Table 1** below shows prices of the 12 products that were available at the two centres during the time of our survey.

<sup>4</sup> Rate in November 2010 was 2290: 1 USD: US\$

**Table 5: Banana Fiber Crafts Sold at Major Craft Centres in Kampala**

Items or category	Average Price of Products (UShs)	
	NACA <sup>†</sup>	Exposure Africa <sup>‡</sup>
Money purses	3000	3000
Mobiles (battery operated) dolls	10,000	ND
Hand bags	5000 small	10,000 – 15,000
Wall hangings	8,000 – 25,000	10,000 – 25,000
Dolls	5000	2000
Earrings	2000	2000
Greetings cards	1000	2000
Table mats	15,000 – 20,000	10,000 – 15,000
Bracelets	3000	ND
Baskets	8000	8000
Photo frames	5000	5000
Balls	1000	1000

<sup>†</sup> National Arts and Crafts Association of Uganda (40 shops) at the National Theater

<sup>‡</sup>Exposure Africa – USSIA Women Development Center on Buganda Road, Kampala

ND = Prices not determined because items were not available at time of survey

Learning by traditional processors is by passing on skills from elders to the next generation and often unaltered. Crafts producers mostly link with suppliers of raw materials (mostly banana fiber and palm leaves), traders, and in some cases with cultural practitioners who may require special items made. Craft-making is partly dominated by women because this kind of enterprise does not require high capital investment and can easily be integrated in usual time use of most women in Uganda. Raw materials constitute the bulk of financial investment in this enterprise and there is usually no hired labour. In Focus 4 provides an example of a housewife that engages in craft-making as a business enterprise.

#### InFocus 5: Profile of a Small Scale Traditional Crafts-maker

We interviewed Nakato a housewife who crafts from banana fibre and palm leaves to earn some money to support her family. In general, Nakato can be described as a small-scale entrepreneur who makes crafts in her spare time; she concentrates her efforts on craft-making when she secures an order. The crafts she makes regularly from banana fibers include table mats, bags, baskets, money purses, and decorations. According to Nakato, baskets have the highest demand.

In a normal week, Nakato makes a dozen of small items such as pouches that serve as pencil holders and small money purses. When Nakato secures an order, she engages her children and collectively they are able to make 50 hand bags, 20 tissue boxes, 50 pencil cases, or 100 money purses in a month if they concentrate on one item.

When asked about how she learned to make crafts, Nakato informed us “*I learned to make crafts as a young girl from my mother and have taught my children*”. She, however, added ‘*Observing products on the market have improved my skills*’”.

Nakato mostly acts as a producer and her key crafts sale outlet is the NOGAMU shop in Kampala but she also sells to individual other traders. She buy a sack of banana fibers at UShs. 30,000 and some palm leaves at about UShs.1000 per bundle.

Although most women in Uganda engage in craft-making through activities organized by local women’s groups, Nakato prefers to work alone. When asked about why she is not in a group, she stated that “*groups demand a lot of time, have stringent conditions, and some leaders exploit members*”

### 5.1.2.8 Feed Processors

In the past, banana peels, stems, and the male banana flower were used mostly as fodder for cattle and goats. As more people engage in zero grazing for cattle and piggery plus poultry farming, more processors are emerging to add-value to banana peels for feed production. The process includes drying, grinding and using the powder in place of maize bran with other ingredients. One successful enterprise is the Kasubi Parish Local Community Development Initiative (KPLCDI) which dries, grinds and adds other ingredients to banana peels to make formulations for ruminant animals, pigs, and poultry. According to this firm, processing feeds from banana peels has advantage over maize bran because peels are readily available all year round and at low cost. FRAVESEMA also processes poultry feeds from the peels generated from processing its vacuumed packed bananas.

### 5.1.2.9 Producers of Alternative Fuels

Other non-food products such as charcoal and biogas are also made from banana stalks and peels. In addition to processing feeds, Kasubi PLCDI also makes charcoal briskets with technical support from the Faculty of Engineering and Technology at Makerere University. Biogas is mostly produced by institutions Kulika Charitable Trust and research projects such as FRAVESEMA because the initial investments in the biogas plant are higher. The use of banana wastes for fuel production is being driven by the recent fuel wood crisis and the need to contribute to environmental conservation. One charcoal producer in Kibuli estimates that the price of charcoal briskets made from banana peels may be lower given that these briskets last longer. This area is still underexploited as many consumers increasingly show interest in environmentally friendly fuel alternatives.

## 5.2 INPUT SUPPLIERS

This category of actors supports the ASTI system by providing agricultural inputs such as farm implements, planting material (suckers and plantlets), pesticides, herbicides, fertilizers, manure and water harvesting and irrigation technologies. Key input suppliers

in the banana sub-sector include general stockists, firms and farms that supply suckers; tissue culture laboratories that produce plantlets, and farms that supply manure.

### **5.2.1 Stockists**

These are generic agro-supply shops with farm equipments and implements such as hoes, *pangas*, pruning sickles, and wheelbarrows. Some shops carry general agrochemicals such as herbicides and growth promoters. Some shops also deal in vegetable seeds, which some farmers in Bushenyi were intercropping with banana as a strategy to maximize profits from plots under banana plantations.

Stockists invest large capital in stocking supplies; they grow the stock based on demand. They usually use family labour as attendants and these may be of elementary education. In this study, we interviewed one stockist in Mbarara Town. The shop attendant was a relative who had completed the second year of secondary school. The shop did not have any specific product for bananas but was stocked with general farm supplies such as hoes, wheelbarrows, plus poultry feeding and drinking troughs. In general, livestock related chemicals and seed for horticultural crops dominated in stock. According to farmers, some of the agro-inputs can easily be accessed in weekly markets from mobile vendors.

### **5.2.2 Suppliers of Planting Materials**

This group of actors is vital in ensuring that farmers will receive quality planting materials on time. These actors are often engaged in innovating processes to improve generation and/or supply of planting materials. By the time of our study, suckers and tissue culture plantlets were the major planting materials available to farmers. Major suppliers include public research institutions, NGOs, private sector, and farmers who supplied mainly suckers.

#### **5.2.2.1 Public Entities**

NAADS is the major public entities mandated to support farmers with improved varieties of planting material and other farm inputs, as part of the national strategy to improve yields and quality of agro-produce. NAADS does not produce planting material but often subcontracts public and private research organizations. Kawanda Agricultural Research Institute (UNBRP) and Makerere University Agricultural Research Institute Kabanyolo (MUARIK) are the major producers of planting material. These organizations engage in generation of new technologies such as tissue culture banana plantlets and multiplication of improved varieties. They often have limited capacity to produce enough planting material to meet farmers' needs hence private companies such as AGT produce the bulk of banana planting material. In addition to providing plantlets, all public bodies supplying suckers or tissue culture reported that they provide training and information to farmers. Much of the outreach activities were part of the on-farm field trials.

#### **InFocus 6: Tissue Culture Laboratory at Makerere University**

Makerere University is the oldest university in Uganda and has for long engaged in various research to contribute to national development. The Faculty of Agriculture is particularly involved in various resource and developmental initiatives to improve productivity of the

agricultural sector. Makerere University Tissue Culture Laboratory was established in 1992 under the Department of Crop Science and oversaw major revival in 2005. The TC lab is mandated to promote training, research and outreach on several crops. Key services offered by the lab include:

- Collection and maintenance of farmer preferred cultivars of major crops (notably bananas, cassava and sweet potatoes),
- Conducting research into the best *in vitro* micropropagation protocols for different cultivars,
- Researching into low cost alternatives for *in vitro* micropropagation,
- Offering advisory services in crop production.

At the time of this study, the TC lab was concentrating efforts towards producing pathogen free plants, and to help meet the perpetual demand for quality banana planting material in Uganda.

#### ***Benefits of Tissue Culture***

Quickest way to multiply clean planting material. One sucker is expected to yield about 400,000 plantlets in one year (Mukasa, 2009). The propagation also allows for molecular indexing for viruses, which contributes to quality control.

#### ***Collaborations and Linkages***

Researchers in TC lab collaborate with various researchers in Makerere University and public institutions such as NARO. Lab works closely with AGT in conducting research and securing lab supplies.

#### ***Challenges***

Public procurement process delays research processes. Because of the delays, the lab cannot commit to supply large quantities of planting material to the public.

### **5.2.2.2 Non-governmental Organizations**

NGOs such as VEDCO, Kulika Trust, Send-A-Cow, and CARITUS have been instrumental in supplying clean and improved planting materials to farmers. In the input supply system, NGOs serve as intermediaries. NGOs do not produce or multiply planting material but purchase large quantities of suckers and tissue culture plantlets from research institutions and private laboratories which they supply to farmers.

Since most NGOs often provide inputs to farmers under developmental programs to reduce poverty or improve food security, they often supply inputs to farmers at more favorable terms than other input suppliers. In most cases, inputs are supplied to farmers free of charge, at subsidized fee, or on credit – and this has significantly improved farmers access to high quality and disease free planting materials. Farmers in Mukono explain that they would not have been able to secure planting material if CARITUS had not given them enough time to start harvesting their banana crop before they start paying for planting material.

### **5.2.2.3 Private Firms**

In this study Agro Genetic Technologies Ltd (AGT) was identified as the major private firm dealing in multiplication of high quality, disease-free banana planting material. In line with its vision “to become the most successful, profitable and respectable suppliers of agricultural biotechnology products affordable to farmers in Africa”, AGT is the major

commercial supplier of planting material (especially tissue culture plantlets) in Uganda, Rwanda, and Burundi.

AGT was supported by ASARECA, IITA, UNBRP, and MUARIK initially and now is an established private firm supplying tissue culture plantlets to farmers. The firm also produces planting material for other crops including coffee, pineapples, and aloe vera; however banana are increasingly dominating AGT's seed production component. This firm started in 2002 and by 2006 bananas were constituting about 70% of the firm's tissue culture plantlet's production. NGOs and government organizations such as NAADS are cited as the major clients for AGT but the firm also sells plantlets to individual farmers and farmers groups.

In addition to supplying planting material, AGT also provides trainings to farmers on best agronomic practices. AGT documents a 30-40% increased yield to farmers that engage in the firm's training using established demonstration gardens (Nsubuga, 2002).

In general, most farmers engaged in this study were aware of the benefits of tissue culture. However, a few farmers believe that tissue culture plantlets are not real bananas while some farmers associate TC with genetic modification. It was noted by some users of tissue culture and suckers from ZARDIs that often varieties are mixed up. One farmer in Mukono reported having to replant the entire plantation after realizing that the variety he had received through NAADS was not what he wanted.

During the validation workshop participants from NAADS and extension workers pointed out that it was the commercial producers that compromise quality for financial gain. When NAADS and intermediary institutions like CARITUS order for specific varieties which are not in stock or in limited supply, commercial suppliers fill the orders by just topping up with whatever other variety they have. This has compromised farmers' confidence in some centers, compelling some to restrict themselves to obtaining planting material through the farmer-to-farmer exchanges.

Overall, more and more farmers are investing in tissue culture plantlets. However, some participants at this study's result validation workshop raised the issue of some tissue culture plantlets being infected. Researchers present associated the infection of plantlets to poor land preparation and having infected plants nearby.

#### 5.2.2.4 Farmer-to-farmer Arrangements

This is the traditional way of seed and planting material acquisition and technology transfers. Farmers in areas studied indicated that suckers used to be acquired from other farmers free of charge but the increased commercialization in the banana sub-sector has pushed up demand for planting materials, and suckers are increasingly being sold. Some farmers are now specializing in supply of suckers as an income generating activity and this is proving a lucrative business. For example, Kulika reports of its model farmers in Teso region earning more money out of selling suckers than from selling the bananas. The danger with this sucker distribution system is the high risk of distributing suckers infested with nematodes and diseases.

### 5.2.3 Manure Providers

Integration of livestock in banana cropping systems has long been promoted as one of the strategies to restore or maintain soil fertility. This practice is mainly being promoted in central and southern regions which have already experienced the negative consequences of poor soil management practices. Integration of livestock in cropping systems has for years been championed by Send-A-Cow but many other NGOs and government institutions have followed suit. St Judes in Masaka is a model farm where use of manure helped increase productivity and facilitated the scale-up of production from subsistence to commercial level.

Due to the increased demand, cow dung is another input that used to be free but is gaining market. Farmers in Mbarara reported that a truck load (about 1-2 tonnes) of cow dung sells for US\$100,000 while a wheelbarrow load of dung costs US\$4000. Manure has become widely acceptable as an essential farm input to the extent that institutions such as NAADS and EBBO SACCO in Mbarara provide loans and support for farmers to buy dung and urine for soil improvement; however, many farmers cannot access manure.

*Farmers without livestock are forced to buy cow dung as an input for soil fertility management.*

## 5.3 KNOWLEDGE AND TECHNOLOGY GENERATORS

Research improves ASTI systems by generating knowledge and technologies while training facilitates the sharing, transfer, and utilization of this knowledge and technologies. In this study, research and training institutions were identified as the knowledge and technology generators.

Like in most ASTI systems, research and training in the banana sub-sector are conducted by both public and private institutions. Key institutions engaged in research and training in Uganda include academic institutions such as universities and colleges, public agricultural research institutes (PARIs), and non-governmental organizations. In addition to formal training, private research institutions such as AGT and organizations such as BARNESA, ASERECA, and IITA also engage in non-structured training of junior scientists (including university students) and their staff to build capacity in their institutions' research areas. Some of these institutions also train farmers to improve uptake of the knowledge and technologies they generate. These trainings are both on-farm and demonstration gardens owned by these institutions.

### 5.3.1 Research Institutions

#### 5.3.1.1 Uganda National Banana Research Programme (UNBRP)

UNBRP was initiated in 1989 under Kawanda Agricultural Research Laboratories (KARL) to prioritize banana research. UNBRP was designed to reverse decline and bring back sustainability of banana production 'through development and promotion of

technologies for integrated management of weevil, black sigatoka, and nematodes'. (ICPSR, 2010). Since its inception, UNBRP has been focused on:

- Developing banana genotypes with resistance to black *Sigatoka*, weevils, and nematodes;
- Evaluating improved germplasm (local and foreign) under different ecological conditions and collecting cultivars that are most acceptable among farmer for dissemination;
- Identifying and testing biological and cultural control options for management of weevils and nematodes; and
- Accelerating transfer of improved banana technologies to farmers and other stakeholders through on-farm research. (ICPSR, 2010)

To date UNBRP has evaluated and recorded 98 varieties of which 83 are endemic (71 for *Matooke* and 12 for beer); 11 are exotic varieties (3 for roasting, 3 for dessert, and 5 for beer); plus 4 hybrids/ ABB (FHIA). Some key on-going banana research projects at KARI include:

- Biofortification of banana to improve beta carotene content
- Tissue culturing to ensure supply of disease free planting material

#### **InFocus 7: UNBRP's Investment in Quality of Personnel is Key to its Performance**

UNBRP is among the most well staffed institutions in Uganda. This programme employs mostly specialized personnel in different areas of expertise but its highest concentration of highly trained personnel is in the area of biotechnology. As highlighted below

- Administration (Head) – 1 PhD
- Pests – 3 PhD
- Soil Economy – 4 PhD; 1 MSc
- Diseases – 2 PhD, 2 MSc, 1 Bsc;
- Soils – 1 MSc;
- Biotechnology – 7 PhD, 7 MSc, 12 BSc, 1 Diploma
- Post-harvest – 1 PhD, 2 MSc;
- Development Communication – 2 MSc
- IT and system – 3
- Support staff – 2

In addition to recruiting highly qualified staff, the Programme also invests significantly in the continuous learning of its personnel: At the time of the study, several staff holding Bachelors and Masters degrees were on formal academic training to attain their Masters and doctoral degrees, respectively. The Programme also provides staff opportunities to attend short courses, seminars, and workshops at local and international levels.

Overall more than 80% of research conducted by UNBRP is funded by donors. In 2008 government funding towards UNBRP was 9% and this was increased to 19% in 2009, which makes the program 80% - 90% dependant on donors. As such research under UNBRP are keen to make and maintain good linkages with donors and research partners (see Table 6below).



**Table 6: Donors and Research Partners Linked to UNBRP**

Donors who have funded the Programme	Research Partners
<ul style="list-style-type: none"> <li>• Bill and Melinda Gates Foundation</li> <li>• The Rockefeller foundation</li> <li>• Department for International Development (DFID)</li> <li>• Gatsby Charitable Foundation</li> <li>• International Development Research Center (IDRC)</li> <li>• Uganda government</li> <li>• European Union</li> <li>• Food and Agricultural Organization (FAO)</li> <li>• United States Agency for International Development (USAID)</li> <li>• German Technical Cooperation (GTZ)</li> <li>• International Atomic Energy Agency (IAEA)</li> </ul>	<ul style="list-style-type: none"> <li>• Rahan Meristem (Israel)</li> <li>• International Institute of Tropical Agriculture (IITA)</li> <li>• International Network for the Improvement of Banana and Plantain (INIBAP)</li> <li>• Natural Resource Institute (NRI)</li> <li>• CAB International International Center for Research in Agroforestry (ICRAF)</li> <li>• Centro Internacional de Agricultura Tropical (CIAT)</li> <li>• Association for Strengthening Research in Eastern and Central Africa (ASERECA)</li> <li>• International Center of Insect Physiology and Ecology (ICIPE)</li> <li>• Makerere University</li> <li>• University of Reading ,UK</li> </ul>

### 5.3.1.2 Zonal Agricultural Research and Development Institutes (ZARDIs)

ZARDIs carry out adaptive research on all commodities (crops, livestock, trees, fisheries, vegetables, and others) to meet the regional needs. Of the 9 functional ZARDIs, the ones conducting research on bananas were Mbarara, Kyembogo, and Mukono. In this study, we visited only Mbarara ZARDI in Mbarara district (see **InFocus 4**) but also obtained information about Kyembogo ZARDI in Kabarole district. ZARDIs carry out adaptive research on all commodities (crops, livestock, trees, fisheries, vegetables, and others) to meet the regional needs. Of the 9 functional ZARDIs, the ones conducting research on bananas were Mbarara, Kyembogo, and Mukono.

#### InFocus 8: Mbarara ZARDI Engages in Banana Improvement

Mbarara ZARDI conducts research based on the regional needs. With regard to bananas, this ZARDI selects varieties which seem beneficial and assesses their performance by running trials at the station or on farmer fields. ZARDI then multiplies better performing varieties which are demanded by farmers.

At the time of the study, the Institute had such high demand for clean banana suckers that it was expanding its mother plantation to meet the increasing demand. The plantations had 3 varieties of FHIA (#5, #11 and #23) and local improved varieties which were being improved included *Lumenyamagali*, *Kabukiragye*, *Siira*, *Lwambarara*; *Mpologoma*; *Entatagoza*, *Atwalira*, *Enyeru*, and *Ntiika*. Of the local varieties, farmers highly demanded *Mpologoma*, *Lumenyamagali*, and

*Ntiika.* Farmers were willing to pay US\$1,000 per sucker because they knew they were getting genuine and disease free planting material.

In addition to planting material, Mbarara ZARDI also carries out sensitization on the recommended mitigation measures for the BXW including sterilizing equipments and removing the male flower.

**Challenges:**

- Formation of new districts increased demand for services from Institute. Initially Mbarara ZARDI covered 9 districts, at the time of this study, the institute was serving 13 districts and each expected the presence of researchers from the ZARDI.
- Institute was understaffed; as of October 2010, this ZARDI had only 7 out of the 12 research positions filled and 22 out of the 42 total employee positions were filled. Lack of personnel limited ZARDI's activities. For example, ZARDI needs people to oversee the multiplication process to ensure that farmers have access to suckers and to do necessary follow-ups. According to the Director, young graduates preferred to work in Kampala and did not want to move to rural districts.
- Inability to contain the BBW means that more resources are allocated to research and management of BBW. This stifles investment in other areas

Like most research institutions, Mbarara ZARDI also receives much of its funding from donors. This funding is directed to conducting research to address regional problems while funding from government is mostly directed to personnel expenses and general upkeep of the institute. At the time of this study, the bulk of funding received by Mbarara ZARDI was a 4-year USD 300,000 competitive grant from the McKnight Foundation which was received through NARO.

In addition to research, the institute invests a lot in specialized training of staff in targeted areas to improve the knowledge and skills in different aspects of agriculture. Besides employees going for further studies to earn higher degrees, the staff members of Mbarara ZARDI are attached to other research centers within Uganda. For instance, at the time of this study there were 2 technicians from Mbarara ZARDI that were being hosted at Kawanda NARL who were learning how to develop banana tissue culture plantlets. This skill was deemed important for Mbarara ZARDI because the institute planned to increase its production of planting material in order to meet the increasing farmers' demands. To build their capacity in various aspects, employees at this Institute also attend targeted capacity building short courses and workshops at Makerere, Namulonge, and some are sent to Nairobi.

The major challenge faced by the institute was limited funding in infrastructure development. When staff members acquire new skills, new structures are required to enable the trained employees to implement what they have learnt. For instance, Mbarara ZARDI needs a tissue culture laboratory, which the center had not yet set up at the time of this study. To improve its efficiency and effectiveness in conducting research, the institute works in collaboration with other local and international research institutions. For instance, the Institute has strong linkages with Bioversity International. At the time of the study, Mbarara ZARDI housed the Bioversity regional banana germplasm.

### 5.3.1.3 International Research Organizations

International organizations play a key role in ASTI systems by conducting research, providing technical and financial support to research activities, and in training of researchers. The main international organizations engaged in banana research in Uganda include Bioversity, IITA, INBAP, and ASARECA.

**Bioversity** mainly supports the banana sub-sector in areas of genetic modification to improve resistance to diseases and pests, adaptation to environment, and banana quality. For example, at the time of this study, Bioversity was finalizing trials on *Black sigatoka* resistant banana varieties and was conducting a second trial on vitamin A and iron biofortification. To improve its efficiency, Bioversity collaborates with other institutions. For example, confined field trials for banana wilt are conducted with the National Biosafety programme. Bioversity also maintains its regional germplasm collection center located on Mbarara ZARDI. This plantation was started in October 2008 and as of October 2010, the Center had accumulated 147 diploid varieties, 197 triploids and 200 East African highland varieties.

**IITA** is another CGIAR center that supports research on bananas. Its research is mainly up stream, and coordinates the banana work in the region from Uganda. Its main support to the banana sub-sector is in areas of agronomical and social-cultural practices. IITA in Uganda helped start breeding for hybrids and raised the profile of bananas in NARO's research agenda. The center has published several papers. The center also translated banana management materials to local language. The challenge has been slow rate of uptake by NARO and diffusion through extension and others.

**ASARECA** is a sub regional Agricultural Research organization for East and Central Africa. The mandate of ASARECA is to support research and capacity building for research, with a view to improve livelihoods; Supports aspects of policy; and most of these projects fall under CAADP pillar 4.

ASARECA's support to the banana sub sector include:

- Offering of competitive research grants on managing the banana wilt through NARO
- Through Bioversity/IITA still on banana wilt but working on molecular strains – different accessions to attain resistance; and management .
- Supported AGT in collaboration with Bioversity on technologies and production of clean planting materials through tissue culture.
- Is in process of establishing standards for banana wine
- Informs and influences across border policies relating to movement and trade in planting materials in east and central Africa region

The main challenge faced has been in the area of disbursement of funds according to donor requirements. They are supposed to account after using 75% but in reality institutions are spending less. Poor accountability by grant users

**Banana Research Network for Eastern and Southern Africa (BARNESA)** was created in 1994 to encourage cooperation between national research programmes in order to reverse the observed decline in banana production.

In this study, international organizations were recognized and repeatedly mentioned by various actors for their role in catalyzing development by disseminating new innovations in areas such as biotechnology, processing (especially wine and flour making), and supporting research to improve propagation protocols.

### 5.3.1.4 Universities and Tertiary Institutions

Universities and other institutions of higher learning invest heavily in training but also engage in continuous processes to create knowledge and technologies through research. Researchers at universities and colleges often undertake independent research and research areas are often defined by the donors. Of late, the Government of Uganda has boosted agricultural research through the Millennium Science Initiative (MSI) and Makerere University's banana tissue culture research partly benefits from this initiative. To improve their research capacity, universities also work in collaboration with international and local research centers such as ASARECA and IITA to support research on different crops including bananas. Regional programs such as RUFORUM have also helped to link researchers and research institutions in order to improve their efficiency and effectiveness in conducting agricultural research.

Students tend to specialize on researching banana or banana products at post-graduate level but the areas of research depend on funding and interests of students and their academic supervisors. At the time of this study, students at Makerere University were engaged on projects ranging from social to molecular aspects of bananas.

The increase in number of players engaged in research is expected to improve the applicability of research outputs, however, having many autonomous players reduces focus (resources are spread thin) and makes it hard for research institutions to harmonize their research agenda. Lack of harmonization of research activities is likely to lead to duplication of efforts and loss of mandate by lower level research institutions. For example, some researchers interviewed felt that UNBRP 'was too hands-on at the field level, and sometimes hardly involved the ZARDIs'. They therefore recommended that the program involves centers so they can adequately follow up.

### 5.3.2 Training Institutions

The role of training in the banana sub-sector, and in agriculture sector in general, is to equip actors with knowledge and skills to enable them to engage in appropriate farming practices. The knowledge and skills transferred to trainers is generated from research, hence training is part of dissemination of research outputs. Universities, colleges, and secondary schools offer academic training while NGOs and farmers associations offer competence based training in difference aspects of agriculture.

*Agriculture employs about 73% of Uganda's working population but most of those engaged in agriculture dropped out of school at primary level - before they were introduced to agriculture.*

### 5.3.2.1 Universities

Among the academic institutions in Uganda, Makerere University hosts the largest training program in agricultural sciences but agriculture is also offered at Gulu, Kyambogo, Ruwenzori, Busitema, and Nkozi universities. For all universities, the undergraduate curriculum is generic and bananas are just one of the perennial crops taught under agronomy. However, bananas are prioritized among the regional staple crops along side maize, cassava, sorghum and beans, hence students get some training on bananas but this training may not be adequate for students to provide adequate services on graduation from universities (see **InFocus 8**).

The contribution of training to the development of the banana sub-sector cannot be easily assessed since university lecturers are not specialised according to commodities. Lecturers are specialized in disciplines such as plant breeding, pathology, agronomy, entomology, nutrition or soil science, and molecular biology. Areas covered by universities under banana research include seed multiplication including tissue culture and molecular markers under GMO research at Kawanda NARL, MUARIK and NARI at Namulonge. University lecturers often engage in learning by participating in workshops and seminars within and outside of the country, involvement in research projects, and through staff exchange visits.

#### **InFocus 9: An Educator's Perspectives on Agricultural Training at Universities**

According to one retired professor from an agricultural training institution *“university graduates are “unemployable” because they are irrelevant to farmers needs. Most of the good students are employed by the universities and research stations, a few by NGOs but most people prefer diploma and certificate holders because they are trained to do practical work, while university graduates look for management jobs.”* According to this respondent (who is also a banana farmer) *“the upgrading of agricultural colleges to university [status] is doing the agricultural sector a disservice. It is eliminating the human resource that is hands-on and are employable.”*

When asked to comment on the DSIP, he argued that universities were not involved and he suspected that neither were the other stakeholders consulted. As such *‘developmental plans are delinked from stakeholder realities and education’*. He recommended for the reactivation of farmers’ cooperatives and cooperative training centers to *“specifically train farmers; provide subsidized inputs and link farmers to markets. By these farming will become profitable and will attract the youths.”*

This study noted, and as noted by the retired professor, that university training was delinked from development needs as stipulated in PEAP, PMA, and now DSIP. In general, national priorities have not informed curriculum development and reviews. This is partly attributed to staffing and funding shortfalls. The Ministry of Education is also not always fully engaged in the implementation of national development programs.

### 5.3.2.2 Agricultural Training Colleges

At the time of the study, colleges in Uganda that were specializing in agricultural training were Bukalasa, Arapai, and Tororo. Busitema had been upgraded to university status. Agricultural colleges are mandated to train and graduate students at diploma and certificate levels and to provide in-service training for extension agents.

In this study, researchers visited Bukalasa College which is a major agricultural college in the country. The college has 28 staff members. Four members were in areas of management /economics, extension and business; five in crop science; 3 in floriculture; and one in agro-business.

According to Bukalasa College academic staff that were engaged in focus group discussion under this study, the college has no specialized training on bananas per se as they fall under perennial crops in the college curriculum. However, since Bukalasa is in the central region which used to be a major banana growing region, there are special components that focus on bananas. Some of the topics that focus on banana include: the botany of bananas plus natural requirements and environmental issues with regard to bananas. Students are also exposed to agronomy issues such as land preparation, spacing, and procurement of planting materials of bananas.

In general practical components of training at Bukalasa College have been affected by structural transformations which influence the flow of financial resources into the college. At the time of the study, the college had just re-allocated under the ministry of Agriculture Animal Industry and Fisheries (MAAIF) after having spent more than 10 years under the Ministry of Education and Sports. **InFocus 8** below provides highlights of a focus group discussion with Bukalasa academic staff who are also involved in college administration.

## InFocus 10: Structural Transformations Affect Agricultural Training

Bukalasa College, like all sector colleges, was transferred to the Ministry of Education and Sports (MOES) as part of restructuring process which was designed to improve the colleges' access to resources and consequently improve training. According to Bukalasa College staff that were engaged in focus group discussion under this study, the MOES ended up with far too many colleges to allow individual colleges to participate in policy discussions. As a consequence, the specific needs of sector colleges were neglected. Delay in disbursement of funds further jeopardized the planning of seasonal activities such as students' practicals and placements.

### *Challenges:*

- Lack of resources to implement practicals was diluting the training. Curriculum delivered was theoretical because the College has few demonstration sites on college land and students lack transportation facilities such as bicycles and motorcycles which they need in order to go and do fieldwork.
- Terms of employment while under the MOES did not favour promotion of tutors. Many of the current college lecturers were recruited while the college was under MAAIF and these lecturers (as they were called under MOES) entered service as agricultural officers. Under MOES lecturers have to conduct research and publish papers to be promoted however many of Bukalasa staff are supposed to devote their time to teaching. As a result, promotion became difficult and the low pay continued to demotivate staff.
- Bukalasa College staff used to go for short courses in the Netherlands, UK, and Belgium while the College was under MAAIF. For the 12 years when the college was transferred under MOES, none of the staff members had accessed training. Lack of training is believed to have negatively influencing their learning and thereby greatly reduced their effectiveness in terms of keeping up with new innovations in the mother sector (MAAIF).
- While under MOES, the college was compelled to take in more private students to generate operational funds and to facilitate some level of practical work by pupil. In 1990 while the college was still under MAAIF, the college had 107 pupils and this number had increased to 7060 students by September 2010. The increase in number of students should have been parallel with increase in number of staff but this did not happen. At the time of the study, Bukalasa had only 28 lecturers and there was no provision for teaching assistants. This imbalance was believed to negatively affect student training.
- Since the number of students increased, on-campus student accommodation has also become a problem. With regard to practical training, having some students not residing on campus affects their engagement in morning duties – which are designed to give students hands on experience in working in different aspects of a farm.

Now that the College has been re-allocated to MAAIF, Bukalasa lecturers have just received salary adjustments after 12 years. At the time of the study the college was in the

process of forging partnerships with an Indian institute to have the college upgraded to international standards

### 5.3.2.3 Post-graduate Agricultural Training

Makerere University also hosts the Continuing Agricultural Education Center (CAEC) at Kabanyolo campus. This Center conducts short courses, workshops, and seminars on various topics to improve competences of graduates and other actors in the agriculture sector. The Center started in 1993 under NARO as a project designed to improve agricultural training and research by offering short courses to Makerere and NARO staff (both teaching and research staff). Initial funds were contributed by The World Bank and the Government of Uganda but currently the Center is funded by various actors and provides outreach services to communities as a way to link university activities with community needs.

### 5.3.2.4 Non-academic Training Institutions

Kulika Charitable Trust (hitherto referred to as Kulika) is the major not-for-profit and non-governmental institution that engages in training of farmers and service providers to fulfill its mission of supporting community development in Uganda. Under Kulika's training programme, which started in 1981, farmers are empowered to use their land efficiently and sustainably by adopting sustainable organic farming methods. The farmers trained serve as 'Key Farmer Trainers' and are mentored to share knowledge and skills acquired with other farmers through Kulika's 'Farmer to Farmer Extension' program.

Trainees from Kulika's centers are awarded diplomas or certificates depending on the length of program they engage in. Those who attend training for one year receive a Post Experience Diploma in Sustainable Organic Agriculture; 6-months training leads to the award of a Certificate in Organic Agricultural Practices; while 1-week workshop attendants receive certificates of attendance. These diplomas and certificates serve as incentives especially for participants without academic training. Some graduants of Kulika Trust training program use these certificates for job promotions and/or to secure new jobs especially with international NGOs and interest groups that promote organic farming.

The topics covered in Kulika's training programme included:

- Principles and practices of sustainable agriculture
- Crop husbandry
- Livestock husbandry
- Farm management
- From power and appropriate technology
- Foods and nutrition
- Gender analysis and family life education
- Agro-forestry and environmental management
- Product marketing strategies
- Farmer to farmer extension education and training
- Organic farming
- Soil and water conservation

By October 2010, Kulika was running 6 training centers strategically placed to serve different parts of the country.

- Kabale serves western and southwestern regions



- Lutisis and Masaka serve the central region
- Kamuli serves the near east
- Nakasongola serves the northern region
- Kaberamaido serves eastern and northeastern regions.

At the time of this study, Kulika had 16 trainers who were comprised of 7 undergraduate (bachelor) degree holders, 3 members with Masters degrees, and the remaining 6 were diploma holders and some these were graduates of Kulika.

In terms of achievement, Kulika measures its success based on the number of households trained. At the time of this study Kulika had trained 4085 participants and the number of trainees was increasing rapidly.

- 120 people were trained by end of 2002
- 144 people were trained by end of 2004
- In 2005, four additional centers were added and number of trainees increased. Between 2006 and 2010 an additional 3821 people were trained: 85 from Kabale, 3500 from Lutisis and Kamuli, 140 from Nakasongola, and 96 from Kaberamaido.

Many Kulika trainees have emerged to become successful farmers and trainers with many starting model farms of their own. Examples of Kulika's graduates that are recognized nationally and internationally include:

- John (deceased) and Josephine Kizza that started St. Jude Training Centre in Masaka (see **InFocus 7**)
- Galiwango at Bukomansimbi integrates bananas with livestock
- Walude Mutwalibu in Mbale integrates bananas, bees and livestock
- Perezi integrates bananas with fisheries and networks internationally. Students come to his farm to learn about sustainable agricultural practices.

### InFocus 11: **Practical Training Transforms Farmers Productivity**

**St Jude Training Center in Masaka** provides farmers opportunities to engage in experiential learning approaches. St Jude training center is an example of how using sustainable organic farming practices (especially using manure) can improve productivity of small scale subsistence farming enterprises to commercial scale.

The founders of St Jude are reported to have started with 2 pigs and local chicken on three acres of land in 1987 (Niombo 2006). They later received one dairy cow from Send A Cow which boosted their access to manure which was used to improve the Centre's banana plantation while the proceeds of milk sales contributed to improved the Centre's income base. It is this humble beginning that is a major motivator for farmers that visit and train at the center.

While training at the center, farmers are exposed to organic methods of farming and modern methods of food processing and preservation. For instance, farmers learn about drying fruits (including apple bananas) to meet quality requirements for local and export markets. Since the focus is on simple production and processing technologies, many farmers utilize the knowledge acquired to initiate or improve their own enterprises.

Many farmers that have gone through Kulika's training are now registered with NAADS at district levels. As one way to contribute towards national development, Kulika also provides scholarships for students to undertake undergraduate and graduate (master's) training at local universities such as Makerere University and partner universities in the United Kingdom.

## 5.4 SERVICE DELIVERY AND INTERMEDIARY INSTITUTIONS

These actors contribute to efficiency in functioning of the banana sub-sector ASTI system by facilitating diffusion of knowledge and technologies among actors in the system. For example, intermediary institutions link farmers to knowledge on production technologies and market to improve yields and market access, respectively. From this study, it was determined that there were various actors assisting farmers and processors to improve production, processing and marketing of banana products. The key actors serving as intermediaries include: (i) public institutions such as the Agricultural Extension Programme (AEP) under district production departments and NAADS; (ii) non-governmental organizations such as VEDCO and TechnoServe; and (iii) farmers associations such as district farmers' associations.

### 5.4.1 Public Agricultural Extension

Public extension workers are employed under the Public Services Commission and deployed at district and sub-county levels in the production departments. Extension workers' positions in production departments were expected to be phased out following the launch of NAADS in 2001. Under this arrangement, public extension workers were expected to form private firms and bid for jobs under NAADS on a competitive basis with other service providers and the Public Services Commission was supposed to stop paying their salaries. However, the mandate of the production departments was not changed; as a result agricultural extension workers remained on the payroll and continue to carry out their duties as public extension workers. **InFocus 12** provides an expert from an interview of officers in the Production Department, Mbarara district headquarters.

#### **InFocus 12: District Production Units Contributes to Diffusion of Knowledge**

When asked about the activities of the Production Department, one officer responded that '**the mandate of the department is to provide extension services to farmers**'; hence the department's activities include:

- Training farmers on disease management and control, for instance addressing BBW and *Sigatoka* for bananas.
- Training farmers on the use of manure, soil and water conservation measures like construction of contours and double digging.
- Providing technical support and information to help farmers to diversify their production enterprises to avoid relying 'on the same enterprise everyone else in the area has engaged in'.

The officers cited 'increased banana production' as one of the Department's achievements but lamented that the bumper harvest had negative economic implications. The farm-gate price of a bunch of banana drops to as low as US\$2,000 to US\$3,000 from a price of US\$10,000 to US\$12,000 in low harvest season.

### ***Benefits of banana growing***

- The officers pointed out that most banana farmers also own cattle. Proceeds from the sale of milk sales cushion them against the poor returns from banana sales. Benefits of integrating livestock and banana production were mostly realized during the dry season when the peak banana production season coincides with low milk production. Cows are fed on the ripening bananas, male flowers, and pseudo stems which add to the animal feeds and milk yields. When the price of bananas is low, the price of milk goes up from UShs.150 to UShs.350 or 400 per litre.
- Planting of bananas was also credited for having ‘forced pastoralists to settle down, to reduce on the number of animals, and to upgrade their breeds’.
- Bananas also integrate well with zero grazing because farmers plant Napier grass as feeds and for mulching.

### ***Challenges***

- Fluctuating prices of bananas and ‘seasonal production booms’ threaten further investments in banana production.
- Persisting diseases threatening production
- Poor road network in remote areas limit farmers access to markets.
- Budget allocations to the Production Department do not adequately cover extension workers’ costs in conducting field work.

### ***Collaborations***

Production department partners with civil service organizations to enable extension workers access resources for training farmers and providing follow-up technical support. Also collaborates with UNBRP, Mbarara ZARDI, and NGOs.

Public extension officers learn mainly through interactions with both researchers and farmers. Extension workers usually latently learn about new threats and mitigation strategies as farmers seek advice from them .but fully engage in learning about new technologies from researchers in workshops, seminars, in-service training, and publications. Participation in research projects (for instance in various research projects focuses on BXW and other diseases) also creates avenues for extension workers to learn and exchange knowledge. Extension workers from Mbarara district production department work in collaboration with UNBRP and Mbarara ZARDI, attend short courses offered by NGO partners, and participate in competence based training with the support of NGOs. For example, through participation with UNBRP in the research on BBW, extension workers learned about its transmission and mitigation measures. Consequently, besides the usual extension services, staff at Mbarara Production Department were also trying to formulate by-laws on control of BBW and other diseases. The plan was to have task forces in control of BBW at village, sub-county, and district levels.

Interviews with NAADS personnel indicate that in the first phase (2001-2007) some of the private providers were sub-contracting public extension workers to train farmers, and that public service still paid their salaries; hence NAADS plans to work more directly with production offices in order to access public extension workers.

## **5.4.2 National Agricultural Advisory Services (NAADS)**

The National Agricultural Advisory Services (NAADS) is a programme under the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) which was created

under the Act of Parliament of the Government of Uganda (see 24). NAADS was established in response to the failure of the public Agricultural Extension Programme (AEP) to improve productivity and expansion of agriculture despite the high costs the government was incurring in implementing agricultural interventions. Currently, NAADS is the top public institution mandated to provide advisory services to farmers. These services are extended directly by NAADS or through other firms and organizations that sub-contract with NAADS. As of October 2010, NAADS had rolled out its services to cover all districts and had programmes in 1,030 sub-counties. Working through farmers fora at national, district and sub-county levels and through local governments, a total of 40,000 farmer groups have been registered.

Services provided to farmers include the provision of suckers and tissue culture plantlets of improved varieties of bananas, cow dung for manure, seedlings of grasses for mulch, and livestock for integration in banana systems so as to improve access to manure. To improve profitability of banana farming, NAADS also offers farmers advice on marketing of their produce.

NAADS program by design is based on collective lessons from other agricultural interventions by government, NGOs and cooperatives, on how best to reach farmers with advisory services and support. For instance, the enterprise selection and farmers' groups institutional development were adopted from UCA; the model farmer approach from NGOs, while competence based training has also been adopted from NGOs. Services provided to farmers under the banana programme include the provision of suckers and tissue culture plantlets of improved varieties of bananas from research centers, loans to access cow dung for manure, seedlings of grasses for mulch, and livestock for integration in banana systems to reduce the expense of acquiring manure. To improve profitability of banana farming, NAADS also offers farmers advice on marketing of their produce. However the value addition and actual linking of farmers to markets was still weak, but is part of NAADS current focus under the implementation of DISP.

In addition to improving productivity and marketing of fresh banana products, NAADS also provides solar drivers for farmers engaged in processing dehydrated fruits such as pineapples and apple bananas. Dried fruit is being targeted for both local and international niche markets. According to NAADS, marketing of dried fruit was being hampered by processors inability to obtain phytosanitary and traceability certifications. Since quality standards needed to be met even at farm level, NAADS was asked by dried fruit exporters to mobilize export groups for joint inspection and certification (MAAIF, 2007).

There many testimonials of how farmers in the banana sub-sector have greatly benefited through NAADS initiatives (Mugalu, 2010). From these stories, it can be deduced that farmers were not paying attention to banana production as an economic enterprise. Farmers increased investments (effort and time) in banana production when they realized improved access to inputs, technical support, and markets.

The major challenge faced by NAADS is inability to bridge the gap between stakeholder expectations and actual NAADS mandate. Most farmers treat NAADS as a donor agency;

hence many fail to pay back. NAADS also experiences shortfalls in obtaining matching funds from the local governments and this affects its planning.

### 5.4.3 Non-governmental Organizations

NGOs emerged to fill the gap left by public extension services such as NAADS and production departments. While public extension services focus on production, NGOs offer a range of advisory services in areas such as processing, marketing, credit access, and financing of agricultural enterprises. Some of the organizations that have played a major role in improving the functioning of the banana sub-sector include VEDCO, Kulika Trust, and TechnoServe

#### 5.4.3.1 TechnoServe

TechnoServe initiated the first banana project in Uganda in 2005 and this project focuses on linking farmers to markets in order to improve their incomes. This project is designed to reduce transaction costs across the banana supply chain in order to increase returns to

*“Farmers did not lack banana suckers but needed streamlining the marketing of products to lift themselves out of poverty.”*

*TechnoServe staff member*

farmers and cut costs for buyers and was modeled on the banana project TechnoServe had implemented in Kenya. After realizing that there was inefficiency of the banana market chain that affected prices and reduced benefits to smallholder farmers (those who harvest about 30 bunches a month), TechnoServe embarked on strategies to reduce middlemen.

As an advisory institution, TechnoServe:

- Trains farmers on good agronomical practices especially weeding and pruning to prevent pests and diseases and using cow dung manure to improve yields.
- Empowers farmers to control prices and avoid losses during peak harvest season of May –July by planning the planting season to ensure peak harvest during the December festive seasons when bananas are scarce and fetch better prices.
- Encourages farmers to diversify their food crop production such that they feed on alternative foods like cassava, millet, and maize during low harvest seasons and sell bananas at good prices.

**InFocus 13** describes TechnoServe’s strategy for recruiting and linking farmers to markets.

#### InFocus 13: **Capacity Building in Marketing Improves Profitability of Banana Enterprises**

TechnoServe’s strategy is to promote aggregation and collective marketing. This process involves:

- Recruiting small-scale farmers and organizing them into producer business groups. Where groups exist for other purposes (e.g. merry-go-rounds, burial groups, saving and credit), TechnoServe facilitates group formation around marketing through the community development assistants and local leaders

- After the groups are formed, TechnoServe presents the group with its proposition on market links, which are often wholesale buyers. Targeting wholesalers is designed to reduce middlemen who tend to exploit and misinform both farmers and bulk buyers creating false scarcity to buyers while creating false gluts to producers. Middlemen also do not buy much banana compared to wholesalers
- Through groups, farmers are exposed to the competitive production strategies such as ensuring good bunch sizes, producing adequate numbers of bananas, and being responsive to market needs. Farmers are not only advised to select varieties such as *Musakara*, *Kibuzi*, *Zagoti*, and *Mbwazirume* because they are most preferred by consumers, but to produce for specific market segments. For instance, farmers encouraged to produce *Musakara* for Rwanda and Kigali because this variety has long fingers suitable for roasting and making *Katogo* (stew); and to produce *Kibuzi* and *Mbwazirume* for Kampala because these do not ripen fast and are good for making *matooke* meal. In addition, farmers are facilitated to access the preferred varieties
- Farmers groups are then trained and supported to keep accurate records so that they can make informed decisions for reinvestments. This involves taking record of bunches harvested, sold and used for household consumption

To improve marketing of bananas, TechnoServe was working with Mobile Telephone Network (MTN)-Uganda, Google-Uganda, and Grameen Foundation (AppLab) to create a Google SMS platform which links farmers to a virtual market. Through this service, farmers can advertise their banana produce and potential buyers can close deals with farmers

#### **Challenges:**

- Farmers were enthusiastic about the SMS marketing service but lack of tracking systems was also making it hard for TechnoServe to monitor deals that have gone through.
- Having no standard measures for bananas was making it difficult for buyers to agree on prices without physically looking at the bananas. TechnoServe was encouraging farmers to weigh their bananas but traders in Kampala (major market) were not weighing

#### **Collaborations**

- TechnoServe works with:
  - Local leaders to mobilize farmers
  - Other service providers such as district production officers and public extension agents to beef up technical expertise and staff needed to implement activities at field level.
  - Dairy farmers to supply cow dung for manure especially for banana farmers without cows who want to buy dung.
  - Entrepreneurs dealing in bananas such as Dr Bazirake of FRAVESEMA and Kenya investors to market farmers bananas
- Works with Area Cooperative Enterprises (ACEs) in Mbarara district to train farmers on bulking produce to improve bargaining power and value-addition initiative such as making wine from *matooke*.
- Links farmers to Centenary bank which offers an agricultural support product. This has helped farmers improve or expand their plantations and to acquire farm inputs.
- Developing a Food Business Innovations Center in collaboration with Makerere University. This center is envisioned to nurture small and medium-scale food-processing enterprises and help improve markets for *matooke* (TRIAS 2007).

Overall, TechnoServe has been successful in organizing farmers and linking them to markets. Technoserve started in three sub-counties of Rwanyamahembe, Nyakayeru and Kitunda but at the time of this study it was operating in Mbarara, Isingiro, and Ntugamo districts and had helped form 400 farmers groups (producer business groups) each with an average of 30 farmers' households. TechnoServe has also been innovative in linking farmers to markets through the use of SMS, which has already connected 17,000 producers' out of the targeted 25,000 (by 2011). The organization also supports RWAMPOMA cooperative with 700 farmers to access wholesale market in Kampala. To improve its efficiency, TechnoServe has also adopted the use of model farmers and invests in them to become experts. These farmers train and provide day-to-day support to other farmers.

Factors that contributed to TechnoServe's success include:

- The political will since the organization came in through the Office of the President as partner in the Poverty Eradication Action Plan (PEAP). The organization was given a free office and was embraced by local communities and local leaders.
- Policies toward trade are in line with what TechnoServe advocates for; hence TechnoServe's services are supportive to farmers' activities.

#### 5.4.3.2 Send A Cow Uganda (SACU)

SACU started in 1988 in the central region and now covers a total of 36 districts in central, eastern and northern Uganda. SACU started focusing on bananas in 2004 after realizing that livestock can be integrated in banana cropping systems. The vision of SACU is to see "a world without poverty and malnutrition" and to fulfill this vision, SACU (in collaboration with livestock managers) empowers farmers to change their skills, knowledge and attitudes to sustainably integrate livestock into their livelihood systems. The organization now supports farmers by:

- Providing farmers with information and helping them select and access **disease resistant banana varieties**
- Training farmers on **best agronomic practices** in banana management. Examples of topics covered include making of contours, mulching, and application of manure to improve soil fertility; adequate spacing to improve bunch size; intercropping to improve soils and plot productivity; and planting open stands.
- Promoting **integration of agro-forestry in banana cropping systems** for shade and to control wind breakers. SACU promotes multipurpose tree species such as *ficus*, *musizi*, *albizia* and *grevalia* while discouraging nutrient mining trees such as papaya and trees that drain water from soils (especially pines and eucalyptus).
- Trains farmers and provides information on **organic pest management practices**. For example, promotes use of Mexican marigold and Moringa in controlling nematode infestations; trapping and appropriate disposal of banana weevils; and creates awareness on use of undesirable products such tobacco in home-made pesticide concoctions.

*"Farmers now see cow dung as a treasure. Many have integrated the animals and crops well in that banana peels and cut stems are fed to the animals, which is some kind of symbiotic existence. A few have tried charcoal briskets from peels."*

*SAC Programme Officer*

## InFocus 14: SACU Helps Farmers Integrate Livestock in Banana Cropping Systems

Send A Cow Uganda (SACU) is highly credited for improving farmers knowledge of best practices in integrating livestock and banana cropping systems. Providing cows catalyzed this process because farmers got hand-on experiences in caring for the cows, collecting and processing manure. Farmers effectively use manure and urine on all crops and realize fast changes in yields of both crops and milk production

Besides training farmer groups in organic farming, SACU has adapting its intervention to suit farmer needs. SACU started by giving farmers exotic cows in 1988 but later learned that poor farmers could not afford the management of these cows. Some very poor farmers preferred small livestock. To match the needs of farmers, SACU then changed and started giving farmers locally bred hybrids, local cows, goats, turkeys, pigs and chickens. Regardless of type of livestock, SACU places emphasis on integrating livestock with crops.

Through monitoring the progress of SACU beneficiaries such as St. Jude, SACU has learned that the integration of crops maximizes benefits from livestock, especially the cows. In 2004 the organization adopted bananas as the major food security crop, and started promoting kitchen gardens with a wide variety of vegetables. Soil management became a central theme in their interventions. Many farmers that have been responsive have significantly benefited from integrating livestock in crops such as bananas.

### ***Benefits to farmers***

As pointed out by one field worker, SACU has benefited many farmers. In general,

- Beneficiaries reported improved household food security within 2 years of being in the program, and ‘people have at least a square meal each day’
- Some farmers have scale-up their production and can now supply NOGAMU weekly with organic bananas
- Many farmers use the increased income to pay school fees, medical bills and invest in other enterprises
- 

### ***Collaborations and Linkages***

- NOGAMU – helps in marketing organic products for farmers
- Kulika Trust supports SACU farmers in Mubende with training in banana and animal husbandry as well as other crops from Kulika’s training center at Lutisi
- SACU is a member of PELUM and this has facilitated SACU staff and farmers to participate in local trade fairs and exchange visits. This facilitates sharing of experiences and helps SACU farmers to link up with farmers from other countries. PELUM also helped farmers to access internet
- SACU collaborates with Heifer International on the African Breeding Service. The two organizations assure nitrogen and semen for artificial insemination.
- St. Jude serves as a reference center for exposure and sharing experiences. SACU farmers in Masaka and Rakai have in turn become out-growers for St. Jude
- In collaboration with World Vision, SACU is in the process of weaning off mature SACU groups from direct support. World vision is being talked into taking over these groups



### 5.4.3.3 VEDCO

VEDCO has about 700 Rural Development Extension workers with 400 of these based in the central region which is among the major banana cultivation areas. These extension workers mainly serve districts of Luwero, Nakasongola, Mukono, Wakiso, Mpigi, and Nakaseke. At the time of this study, VEDCO had trained and awarded certificates to about 22,316 farmers in 1500 groups. Several farmers used the certificates to get jobs with NAADS as rural development extension workers.

Since the organization is focused on improving food security, VEDCO has played a big role in promoting good agronomic practices in banana cultivation and helping farmers access planting materials. The company has for long acted independently and of late is one of the NGOs often sub-contracted by NAADS to implement various initiatives including supporting banana sub-sector. To improve access to planting material, VEDCO has established and runs banana tissue culture multiplication sites in some sub-counties. VEDCO is credited for helping groups select bananas as an economic enterprise and in Mukono 6000 farmer have taken up banana growing on a semi-commercial basis.

As an intermediary organization, VEDCO strategically selects partnerships to improve farmers' access to new knowledge and technologies. In regard to bananas, VEDCO collaborates with:

- **Catholic Relief Services (CRS)** to **educate farmers** on management of BBW
- **PELUM** to **train farmers** on sustainable agricultural practices such use of manure and integration of livestock and crop husbandry.
- **Bukalasa** to provide **field attachments** for students during their internship. This benefits students while improving VEDCO's staffing needs.
- **NAADS** to improve farmers' access to **planting material** in form of tissue culture plantlets and to set up community nurseries.
- **Plan international** to access **funding** to promote bananas.
- **Bioversity** in conducting studies on agro-forestry, integration of bananas and small livestock, and promoting tissue culture plantlets to **improve productivity**

Some of the major challenges that were highlighted by VEDCO employees include:

- poor preparation of university graduates to work with farmers, the NGO has to invest further in hands-on training to train university graduate and much more time to change their attitudes towards farming.
- the fluctuating banana market; and
- the migration of its RDE trainees to other regions compelling them to keep training new ones.

### 5.4.3.4 TRIAS

The aim of TRIAS is to support local economic development, through capacity building of member farmers' associations. Through the Participatory Agro-enterprise Development (PAED see InFocus 12) approach, farmers are facilitated to identify and select income-generating enterprises. Just like TechnoServe,

*“Improving productivity of plantations ensures that bananas are harvested all year round which, together with group marketing, ensures timely repayments of loans.”*  
Fieldworker

TRIAS supports farmers to realize economic gains in their selected enterprises by improving their understanding of markets and marketing and help farmers make informed decisions. Exposure visits to potential markets (participatory market research), exchange visits, and trainings help farmers internalize the concepts.

TRIAS targets subsistence farmers that are income and food insecure, market illiterate, lack capital and are not organized in group with a goal to transform them into commercial farmers who are food and income secure. TRIAS helps farmers become income and food secure through the development of common agro-enterprises and collective marketing. It therefore employs graduates in the areas of microfinance, organizational development, and enterprise development.

TRIAS implements most of its work through partnerships with farmers associations and MFIs. The implementation process involves building the capacity of partners' staff through exposure visits to potential markets, engaging them in participatory market research, and training them about enterprise selection concepts. The partner organizations do the implementation while TRIAS provides technical backstopping and sometimes financial support. In general, TRIAS is not restricted to banana growing areas but works with various implementing partners across the country TRIAS. MBADIFA and EBO SACCO in Mbarara are among the beneficiaries of TRIAS programming. Other partners include CIAT where TRIAS adopted the Participatory Agro-enterprise development (PAED) approach.

TRIAS also offers farmers' mentoring through field schools. Groups identify farmers to host the field schools. The farmer is trained and in turn takes over the mentoring and support role to the others. According to one TRIAS employee, government support in form of infrastructural development (especially feeder roads) would support its activities by improving farmers' access to markets.

#### **5.4.4 Farmers' Associations**

After the collapse of cooperatives and their marketing boards in the late 1980s, a new farmers' association model emerged under UCA to replace district unions that were commodity based. This led to the formation of farmers associations at different levels with each district having a district farmers' association to perform coordinating functions for the primary farmers' associations. The district associations operate autonomously and are designed to help farmers in identifying profitable markets.

Primary farmers associations offer agricultural advisory services on improved farming practices and technologies to farmers through trainings and demonstrations. Members in these associations operate on volunteer basis and do not have established agricultural staff; hence the activities of farmers' associations are often implemented by agricultural field advisors (AFAs) who work closely with extension link farmers (ELFs). In this study, the investigators visited Mbarara District Farmers Association (MBADIFA) in Mbarara town.

#### 5.4.4.1 Mbarara District Farmers Association (MBADIFA)

The mission of MBADIFA is to unite and improve the livelihoods of farmers in Mbarara through efficient capacity building, lobbying and advocacy, and networking to improve food and income security. In line with this mission, MBADIFA, provides farmers groups with guidance in selection of enterprises that ‘make economic sense and contribute to food security’. Under the participatory agro-enterprise development (PAED) program, which is championed by TRIAS, MBADIFA helps farmers groups to conduct market surveys and undertake value chain assessments to improve their understanding of market dynamics. Lead farmers trained through this program become parish trainers’ and diffuse knowledge and technologies on production and marketing to other farmers. **InFocus 15** provides an example of MBADIFA’s support to banana production and value addition.

##### InFocus 15: MBADIFA Links Farmers to Knowledge and Technologies

Mbarara District Farmers Association (MBADIFA) plays a major role in supporting banana farmers because Mbarara is a major banana growing district and many of the farmers’ associations seek advice and support on banana management and marketing.

By October 2010 there were about 146 groups registered with MBADIFA which had bananas as their major enterprise for cash and food. Each group had about 20 to 30 members, which means that on average MBADIFA was supporting about 3650 households. This association is believed to have made major advancements in boosting the banana sub-sector around 2004 – 2005 when it received financial support from Farm Africa. This support was designed to specifically address the issue of surpluses in banana production by reducing post-harvest losses during the bumper seasons.

With financial support from Farm Africa, through Maendeleo Agricultural Technology Fund (MATF), MBADIFA trained farmers (through farmer groups such as ASERUDE) on best agronomic practices to increase production and post-harvest handling practices. To build capacity of farmers to process *matooke* into flour, MBADIFA introduced solar driers which farmers used to produce *matooke* flour. This flour was used to make cakes, doughnuts and other bakery products which were sold locally to generate income for group members. Flour was also mingled to make *matooke* meal for household consumption thereby improving food security.

Drying bananas in peak seasons helped stabilize banana prices from a low of US\$300 to an average low of US\$3000; however farmers abandoned the *matooke* flour processing enterprises when they realized that ‘*it was easier to sell the fresh matooke than to process, and the seasons remained good until this year*’ (in reference to 2010).

##### ***Challenges encountered by Intermediary Organizations***

Overall, intermediary organizations are doing a good job in improving farmers’ access to knowledge and technologies and linking them up with other service providers and markets. The challenges encountered by intermediary organizations include:

- **Lack of standardized extension messages.** There are reports of farmers receiving information from people with little knowledge about the subject. In reference to NAADS arrangement of sub-contracting service providers, one respondent pointed out that “*under the current arrangements, it is common to find a veterinary doctor training farmers on bananas.*”

- **Not being assured of genuine and ‘clean planting materials’.** Some NGOs have had problems with supplying farmers’ infected planting material (including tissue culture) and in most cases the varieties asked by farmers are not what they receive. This was blamed on lack of adequate facilities to supply tissue culture plantlets. When demand is high, workers in nurseries just add in whatever plantlets they have to fill the order. There are reports of farmers having to uproot plants (6 – 8 months later) after realizing that what they planted was not what they had ordered.

*“Politicians, extension agents, and researchers all have different messages to farmers. This makes it a challenge for intermediary organizations to pass on information and technologies. In some cases, farmers get confused and incur unnecessary losses.”*

*NGO field worker*

## 5.5 CREDIT AND FINANCIAL INSTITUTIONS

Historically, the Government of Uganda used to regulate financial services by monopolizing the management of Uganda Commercial Bank. Through this arrangement government regulated interest rates and criteria for advancing credit. As noted in **section 4.2.3** liberalization of the financial sector encouraged competition; however, this did not lead to significant improvements in farmers’ access to credit services. Liberalization of the financial sector encouraged competition and improved people’s access to financial services. As banking institutions such as Stanbic bank and Equity bank started setting up branches in small towns to widen customer base, farmers in rural areas had improved access to banking services. For example, Stanbic bank (after taking over cooperative bank and Uganda Commercial Bank) reported a 98.2% coverage at district level (55 of the total 56 districts then) in 1993 which was a big achievement for the financial sector. With expansion to rural district towns, banks also developed agricultural products in order to meet the needs of their customers.

Commercial banking services mostly benefit semi-commercial and commercial entrepreneurs that can afford to secure loans. The majority of farmers in banana sub-sector do not have assets that can serve as security for then to access loans in regular commercial banks. It is the establishment of microfinance institutions that has improved farmers access to credit and other financial services.

### 5.5.1 Microfinance Institutions (MFIs)

SACCOs seem to be the most accessible sources of financial support to banana farmers, and hence SACCOs are fulfilling the government plan to increase poor peoples’ access to affordable credit. For example, Centenary bank was documented to have developed an agricultural product which it offers to farmers through SACCOs. Beneficiary groups and financial institutions use these products to support farmers. **InFocus 16** provides an example of how TRIAS has collaborated with a local SACCO to improve farmers access’ to credit services.

#### InFocus 16: **Banana Improvement Loan Enhances Farmers' Access to Credit**

TRIAS in Mbarara has supported MBADIFA since 1999. After realizing that smallholder farmers did not have a lot of land, TRIAS turned to investment in improving their productivity. According to TRIAS, improving productivity of plantations ensures that bananas are harvested all year round, which together with group marketing ensures timely repayments of loans.

To help farmers improve the productivity of their plantations, TRIAS collaborates with EBO SACCO to improve farmers' access to the "Banana improvement loan". TRIAS initiated this process by advancing EBO SACCO a loan of Ug. Shs. 160,000,000 (about US\$80,000) at 1% interest. Under this product, EBO disburses the funds through groups' accounts and the groups in turn loan to the individual farmers. Groups also carry out the monitoring and follow up at individual level to ensure that the individual farmers adhere to using the funds for banana improvement.

***Loan requirement:***

To access the 'banana improvement loan' a farmer must already have a plantation that he or she wants to improve and the money should be used for plantation management or to buy improved banana varieties, fertilizers, manure and other farm inputs. Other requirements include:

- Application fee of US\$5,000 (about US\$2.50)
- 1% of the loan retained as commitment fees
- 1 % of loan allocated to Insurance fees to cover risks such as death of person taking up the loan
- 1 % default penalty
- Frequency of payment – monthly over 12 months' period

Through this investment, 811 groups of 30 members each (2430 farmers) have been reached. Most of the groups are women's groups and about 70% of the product beneficiaries are women because EBO SACCO encouraged them to form their own groups and to be leaders. The SACCO provides them leadership skills.

***Benefits to Farmers:***

- Increased acreage under bananas
- Increased plantation yield due to improved crop management
- Easy access to markets through groups
- Better prices through groups
- General improvement in livelihoods indicated by home improvements, increased incomes and food security, and farmers ability to send their children to better schools

By the end of September 2010, EBO SACCO had 127 groups each with an average of 20 members; which means that at least 2540 individual farmers were benefiting from the 'banana improvement loan'

***Benefits to SACCO:***

The loan has boosted the SACCO's financial profile. At the time of this study EBO SACCO had a loan portfolio of US\$1.2 billion, about US\$ 650–700 million savings, and a share capital of US\$300 million.

## 5.6 MARKET CHAIN ACTORS

In the past, farmers that engaged in large scale banana production were those producing *matooke* to supply institutions such as boarding schools. This is still a lucrative business for farmers that have direct links with the institutions. Due to changes in public procurement (PPDA) regulations, most institutions are currently supplied by individuals

and firms that have acquired tenders to supply these institutions. Hence, bulk *matooke* sales to institutions mostly benefit the middlemen that acquire tenders to supply institutions. Market chain actors include all those players involved in buying and selling of bananas from producers to the various consumers along the value chain. Overall market chain actors can be grouped generally under traders and transporters, cold facility operators, and exporters. The functions of these actors are discussed below.

## 5.6.1 Traders and Transporters

### 5.6.1.1 Middlemen

The number of middlemen in the banana chain varies based on remoteness of farms and the type of buyer.

**Middlemen 1:** For most transactions, there is a bicyclist who obtains bananas from the producers (farms) and these constitute Middlemen 1. In remote places they are the only means by which producers access market and hence are indispensable in areas with poor roads. Middlemen 1 supply either the collection centers or middlemen 2.

**Middlemen 2:** These are bulk buyers who sell to retailers or other bulk buyers. Sometimes Middlemen 2 connect to producers directly and eliminate Middlemen 1 by buying in bulk from producers and selling at their mini-collection centers. In this case Middlemen 2 negotiate the farm gate as well as the bulk buyer prices, hence influence prices of bananas on the market. On the other hand, when they rely on middlemen 1 to buy and supply bananas, they negotiate with middlemen 1 and bulk buyers. Due to their position along the value chain, Middlemen 2 control prices and their profit per bunch is more or less fixed. The bulk buyer and producers bear the losses due to price fluctuations.

### 5.6.1.2 Traders at Collection Centres

Collection centers are a recent innovation by bulk buyers to bring bananas closer to the market. Prior to formation of collection centers, lorries used to drive deep into villages collecting bunches from farmer but this was extremely difficult because of the poor access roads which made collection from farms impossible during rain seasons. Collections centers are located along all weather main roads and many are now well known by traders and truck owners. In this study, we visited Kisoro daily market in Mbarara (see **InFocus 13**).

#### InFocus 17: **Banana Trading at Kisoro Market in Mbarara**

Kisoro market is a vibrant trading centre which serves as a banana collection centre. Besides the convenient shops that flank its boundary from one side, this centre had fresh bananas as the only commodity which was being traded on the open market.

##### **Market Operations:**

This market is run by 20 traders who have specific destinations for their bananas and these traders are supplied by bicyclists from surrounding villages. One of the traders reported that he was

supplied by an average of 45 cyclists (270 bunches) in three days of every week. According to the owners, Kisoro market has over 200 youths that collect bananas from farmers from neighboring villages and from middlemen. Traders at this collection centre, bulk the bananas and transport them to urban markets and Kampala takes the bulk of their collections.

#### ***Getting Banana to Final Destination***

Traders at collection centers do not own trucks but hire out transportation services once they have collected enough bananas. In the case of Kisoro Market, truck owners are based in Mbarara and Ntungamo and the transport fares for transporting bananas from Kisoro market to Kampala varied based on the size of the truck used. The smallest truck (*Fuso*) was being hired at US\$ 0.8 to 1 million per day, the medium ten-wheeled truck (*magulukumi*) cost US\$ 1.2 to 1.5 million/day; while the largest trailer truck cost 1.8 to 2 million per day. Traders often overload trucks to make sure that they recover the transportation costs. Traders that are not able to load a full truck pay a standard rate of US\$ 2000 per bunch to transport their bananas from Mbarara (Kisoro market) to Kampala.

#### ***Challenges:***

Lack of standard weighing system for bananas was one challenge faced by middlemen and bulk buyers at Kisoro market. Buyers negotiate prices by visually assessing the quantity and quality of bananas being sold. This results in bargaining, which is often time-consuming, and smaller bananas with tightly packed fingers end up attracting marginal prices. To improve marketability and their returns from small bunches, traders at collection centres pluck and pack fingers into sacks. These traders often end up earning more from selling individual fingers than from selling banana bunches. The number of sacks generated varies based on the quality (size) of bananas but on average traders load about banana finger 30 sacks per lorry.

### **5.6.1.3 Transporters**

Transporters play the major role of moving bananas from production areas to urban markets. On any given day, truckloads of bananas can be seen headed for Kampala and other major towns such as Entebbe and Jinja. To improve understanding of sources of banana sold in urban markets and the dynamics of getting these bananas to the market, researchers interviewed transport agents in some of the major food markets around Kampala City (St Balikudembe, Nateete, Kalerwe, Nakasero, Kibuye, Kasubi, Kireka, and Kyengeru) and the truck park in Nabugabo. In most cases, drivers were interviewed in mid-morning just after they finished off-loading bananas. Most transporters refused to give an interview suspecting that research staff were ‘undercover agents from the revenue office’. **InFocus 18** provides a summary of key findings from these interviews.

#### **InFocus 18: Dynamics of Banana Transportation**

##### **Ownership of vehicle**

- Nine out of ten of the transporters that were interviewed were the owners of the vehicles which they used. Many started off as transport agent and used to hire vehicles but were able to save money and bought their own vehicles. Only hired. Most vehicles were of the Fuso make, there was mention of 1 bus and 1 trailer. Only one group was mentioned: Mf Friendly transporters in Owino. All other transporters work as individuals

##### **Group membership**

Only one respondent belonged to a transporters association.

### **Frequency and amount of bananas supplied**

On average transporters carry about 50-60 bunches three times in a week – in addition to other goods. The highest numbers of bananas transported were 300 – 450 bunches (which makes a truck load) supplied twice a week.

### **Sources of bananas**

The major sources in order of precedence were Mbarara, Ntungamo (Lugaga and Lubaale collection centers), Masaka, Bushenyi, Fort Portal, Kiboga, Kibaale, Singo, Kasese, Kanazi, Rakai, Kakatuna, Biharwa, Lyantonde, Buzibwera, and Kyazanga. All transporters except one produced bananas. This transporter specialized in *Bogoya* (Gros Micheal) which he sells to traders in Kampala and in Katuna (border town on Rwanda side). After seeing the returns from *Bogoya* trade, this trader has encouraged neighboring farmers to invest in *Bogoya* cultivation.

### **Consumers preference**

Since transporters work closely with the wholesalers and sometimes serve as middlemen, they were knowledgeable of consumer preferences. The most preferred species in order of superiority were *Nakitembe*, *Musakala*, *Kibuzi*, *Mwazirime*, *Mpologoma*, *Nakayima*, *Rwambarara*, and *Bogoya*.

### **Destination markets**

Bananas are delivered to almost all food markets around Kampala. Kasubi, Owino, Nakasero, and Nateete were mentioned by most respondents. Those mentioned once included Port bell, Kalerwe, Kyengerea, Nakawa, Nansana, Namungona, Nabugabo, Kibuye, Luzira, Katwe, Star Kitebi, Wankulukuku, Bwaise, Nakulabye and Busega. In most cases, a single transporter supplies several markets per route.

**Taxation:** Taxes levied varied based on the source of bananas. Some transporters pay at the district level while most pay small fees at destination markets.

### **Access to loans:**

Only 2 out of 10 transporters interviewed accessed loans and one of these got a loan from Centenary bank. All other transporters accumulated their own savings because they were ‘suspicious of bank terms and had several testimonies of traders who lost everything through servicing bank loans’.

### **Linkages and collaborations**

Major interactions were with:

- Middlemen who negotiate prices at the farm level and bulk or advise on collection terms
- Local authorities (especially market regulators) at the collection centers and destination markets;
- Youths who load and off load bananas
- Traders who buy the bananas
- Regulatory bodies such as police and personnel from Uganda Revenue Authority
- Financial institutions especially to facilitate cash exchanges and savings

### **Benefits from transporting banana**

Ability to educate their children and remodel their houses; daily sustenance; job security and advantage of being self-employed; and most transporters have purchased their own vehicles (trucks).

### **Challenges:**

Traffic police often find faults with their business and demand bribes



Not having weighing equipment often results in overloading. Those working along Kampala-Masaka and Kampala-Mubende roads end up paying penalties or bribes at the truck weighing stations.

Bruising and ripening of bananas results in losses especially when the transporter is carrying his own stock

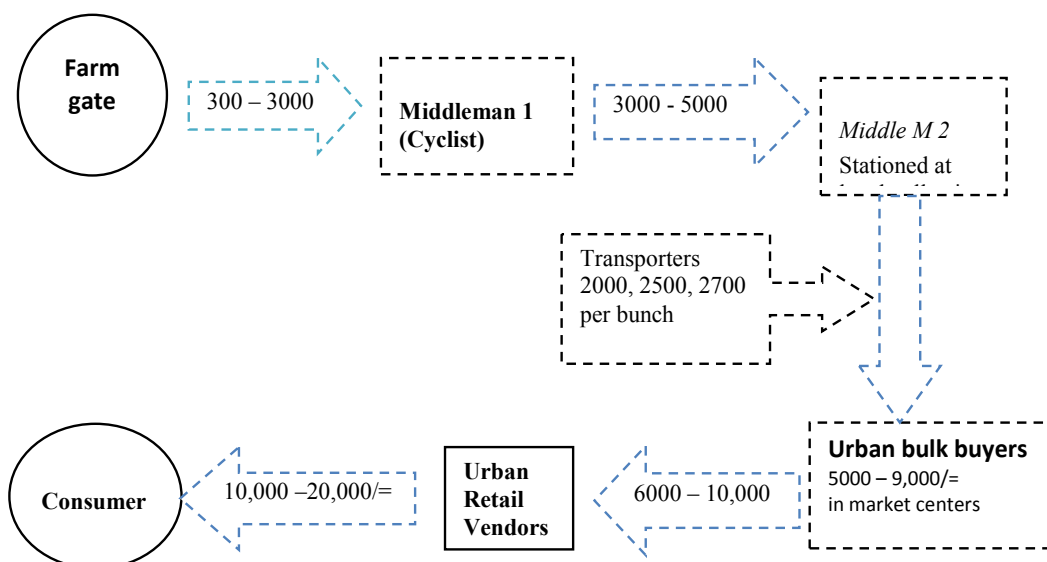
Vehicle breakdowns, which are often due to bad roads, lead to losses (money and time)

**Innovations to off set challenges:**

- Buy bananas on the day of transportation and travel at night to avoid ripening
- Cushion high value bananas such as *bogoya* (Gros Micheal) with fresh banana fibres and leaves to minimize bruising
- Increase the transport charges per bunch from 1200/= to 2500- 2700 to off set the cost having to pay fines at the weighing machine
- Invest in proper packing and off loading to avoid fingers or clusters breaking off from bunches
- Carry other commodities such goats, Irish potatoes, banana leaves, cassava, passion fruits in addition to bananas. Sales from these products cushion losses due to ripening

### 5.6.1.4 Market Vendors

These actors buy from trucks and sell to consumers or other small scale traders. These vendors have regular suppliers. Some specialize in selling bunches while some sell fingers only. Their profit margin is determined by amounts of bananas supplied in the specific markets in which they operate. In general, prices of bananas are more stable now. **Figure 13** shows how banana prices are affected by middlemen and transportation costs.



**Figure 13: Changes in *Matooke* Prices Along the Supply Chain**

Under normal market conditions, it is the market vendors that supply the consumers, receive feedback on species, size and quality and inform the bulk buyers, who in turn informs the transporters and the latter takes feedback to middlemen who inform the farmers. Where this chain of communication is active, farmers understand which species to prioritize in production. This feedback mechanism has been realized especially among farmers that are marketing their produce in groups.

## 5.6.2 Handling and Cold Storage Providers

Cold facilities are needed in vehicles (trucks) and at export terminals to keep perishable goods fresh in transit. The number of cold transport, handling and storage facilities in Uganda is still low but increasing at a fast rate. These facilities provide a unique service that increases the longevity of fresh bananas while in transit to supermarkets and to international destinations. The usage of cold facilities by banana dealers could not be established as in most cases bananas are stored along side other commodities. Examples of cold storage facility operators currently dealing with bananas include:

**Ssemwanga Fresh Logistics** is engaged in bulking, sorting, packing, and distribution of fresh fruits and vegetables at local and international markets. Fresh bananas and dessert bananas are some of the products they deal in.

**Maersk Uganda Limited** transports various products. Company has state-of-the-art reefer containers, with special features such as:

- a. Dehumidification systems ensuring optimum humidity inside the container
- b. Controlled atmosphere providing optimum conditions, improving quality and shelf life of products
- c. Super freezers capable of maintaining temperatures as low as  $-60^{\circ}\text{C}$   $-76^{\circ}\text{C}$

**Entebbe Handling Services Ltd (ENHAS)** offers courier services and cold storage for fresh fruits and vegetables while in transit. Currently has cold storage capacity of about 230 tonnes.

**Fresh Handling** leases out small storage facilities at the airport at USD 120 per tonne but most small scale exporters try to avoid these additional costs.

**Icemark-Africa** has refrigerated trucks for fresh bananas to the airport.

## 5.6.3 Exporters

Exporters play a major role of improving market access of a variety of banana products. This study has identified three categories of actors:

- i. Producers that export their own banana products (fresh and/or processed). These exporters are few but the number is increasing. Many are producing high value products such as apple bananas in addition to other fruits such as pineapples. Some are also engaged in processing high value products such as wines.

- ii. Assemblers or middlemen who buy from growers and deliver to the exporters. Often these may also be growers who sub-contract their neighbors to bulk the volume of products agreed with exporters (Sseruwagi and Ssemwanga, 2010).
- iii. Exports who outsource their bananas, add some value and then export. This category constitutes the majority of exporters and many operate in form of companies. Their out-growers are usually specialized to supply only one product. This category of exporters usually experiences high rejection rates (up to 90%) because of poor quality supplied by farmers, having outgrowers selling to other buyers which often results in inability to meet the agreed amounts, and high costs of collection from scattered out-growers.

Whatever the category, exporters invest heavily in order to access the required quality and quantities of bananas.

At the time of this study, exporters that were dealing in bananas or banana products who were registered under UEPB included:

- Busukuma Young farmers
- FFP (U) Ltd
- Galaxy
- St. Jude
- Fruits of the Nile
- Amfri
- Sulma foods
- Bibumba farm
- Harvesters of hope
- Kumi Fresh and general Ug. Ltd
- Tatgem
- Sunfruit
- UTBM Afro fruits
- Morgen
- Envalert.

In addition to registered exporters, Uganda also has a number of traders engaged in informal across boarder trade in banana products.

Major destinations for Uganda's *matooke* are UK, United Emirates, and USA. Dessert banana products (especially organic dry fruit) has major destinations in the European Union. Fresh *matooke* is exported (mostly informally) to Rwanda, Kenya, and southern Sudan. Uganda also imports some *Gonja* from the Democratic Republic of Congo.

## 5.7 QUALITY CONTROL AND REGULATORY BODIES

Regulatory institutions and standard setters improve the ASTI system by assuring quality of goods and services. In addition to protecting consumers, quality assurance promotes trust among all actors in the system; which improves the productivity of the ASTI system and leads to economic growth.

### 5.7.1 Governmental Institutions

In Uganda, many of the quality control and regulatory bodies are government departments and agencies responsible for implementation, monitoring and enforcement of government and international laws and regulations. Key actors involved in quality control and regulatory services are the Ministry of Agriculture, Animal, Industry and Fisheries (MAAIF); Ministry of Trade, Tourism and Industry (MTTI); Uganda National Bureau of Standards (UNBS), Uganda Export Promotions Board (UEPB); and Uganda Revenue Authority (URA). **Table 7** provides a listing of major processes involved in trade and movement of agricultural products.

Many of regulatory institutions at national level are not directly linked to production functions; however there are local ordinances that influence farmers' activities. For instance, under *Bulungi bwansi*<sup>5</sup> local ordinances, farmers in the banana sub-sector are required to engage in recommended agronomic practices (such as timely weeding and pruning of their banana plantations) and defaulters are subject to fines. In some localities in Bushenyi, when farmers do not uproot banana plants infested with disease, village members have the mandate to uproot the entire affected plantation. Under self-help initiatives, farmers and other community members are also required to contribute labour or monies in maintenance of feeder roads and bridges which facilitate movement of goods and services into rural communities. It is these kinds of local ordinances that assure productivity and profitability of banana sub-sector

### 5.7.2 Non-Governmental Regulatory Bodies

Overall, there are no efficient monitoring systems to control the quality of banana products. Consumers are not informed and farmers sell whatever they cannot eat. For example, tobacco, often in form of organic concoctions (animal urine plus chillis and tobacco) used to manage pests and diseases, is believed to pose a risk of increasing nicotine factor; however, only organic farmers and processors exporting to EU countries adhere to controlling use of undesirable products such as tobacco. The ability of interest groups such as NOGAMU and NGOs to control the quality of products is hindered by lack of legal framework through which to enforce good practices and penalize culprits. Many of this bodies end up providing a supportive role

---

<sup>5</sup> Means 'for the common good' and refers to self-help initiatives

**Table 7: Major Institutions Involved in Regulating Movement and Trade in Agro-inputs and Products**

<i>Responsible Institution or Agency (actors)</i>	<i>Required Documentation</i>	<i>Relevancy of Documentation</i>	<i>Required by Who</i>	<i>Charges (UShs)</i>
Ministry of Justice Registrar General's Office	Certificate of registration	More credible to transact as an established entity than an individual	All exporters	Varies based on type of company and start up share.
Ministry of Tourism, Trade and Industry	Export trade licence	Gives permission to export general products	All exporters	1,500
Uganda Export Promotion Board	Export registration licence	Gives exporters membership to the board and is given priority to enjoy benefits provided by UEPB	All exporters	55,000
	EURI certificate	A result of the Cotonuo agreement between EU and ACP. Product from ACP are charged a Zero import duty into EU	Export consignments to EU countries	5,000
	EAC certificate	Applies within the EAC nations for products stipulated to benefit under the EAC trade arrangements	Exports to EAC countries	5,000
	COMESA Certificate	Applies to COMESA region for products identified to quality for preferential treatments under the arrangement	Exports to COMESA member countries	5,000
	GSP certificate	Uganda's exports to developed nations after a tariff concession was sought	Applicable to industrialized countries including Japan, USA, Canada, Australia and Denmark	
Boarder districts	Border permit	For exports not exceeding USD 500. More practical for traders operating near boarders	Small & medium enterprises (SMEs) exports at boarder	Not exceeding USD 500.
Ministry of Agriculture, Animal Industry and Fisheries	Phyto-sanitary Certificate	A mandatory International requirement for trade in plant products. It certifies that the product does not contain any injurious to plants, animals and human health	For all exports of crops and plants on consignment basis	2,000

<i>Responsible Institution or Agency (actors)</i>	<i>Required Documentation</i>	<i>Relevancy of Documentation</i>	<i>Required by Who</i>	<i>Charges (UShs)</i>
Uganda National Bureau of Standards	Quality assurance certificates	Assures the consumer/importer of the safety, hence confidence in the product	Required mainly for chemicals	30,000/= and above depending on the type of materials.
Chief Government Chemist, Food and Drugs section	Certificate of analysis	Certifies that the product meets the parameters spelt out in the specification	Required on request	30,000/= per line of test.
Airline transporters	Airway Bill	Issued by the air freighter to the exporter from the point of departure to the point of destination of the consignment. It evidences the air carrier receipt of goods but does not represent the title of goods	All air exporters using air freight	
Ocean freight transporters	Bill of landing	Document of title of carriage and receipt of goods, 90% of trade is conducted by vessels	All exporters using sea freight	
Railway Transporters	Consignment note	Indicates what is contained in the consignment. The details of the consignee, transportation route, weight and packages	All exporters using rail freight	
Road Customs transport documents	Road transport document	Assists in custom clearance at border points	All exporters using road transport	
	Weighting bridge receipt	Ensure that trucks carry appropriate weights as indicated on the vehicles	All trucks carrying goods	
MAAIF	Plant movement certificate	In case of epidemics, to restrict outbreaks to affected areas	Affected plants	
Uganda National chamber of commerce and Industry	Certificate of Origin	Certifies the country of origin of the product and applies to goods/countries not entitled to and not providing any preferential treatment	All exports on consignment basis	5,000

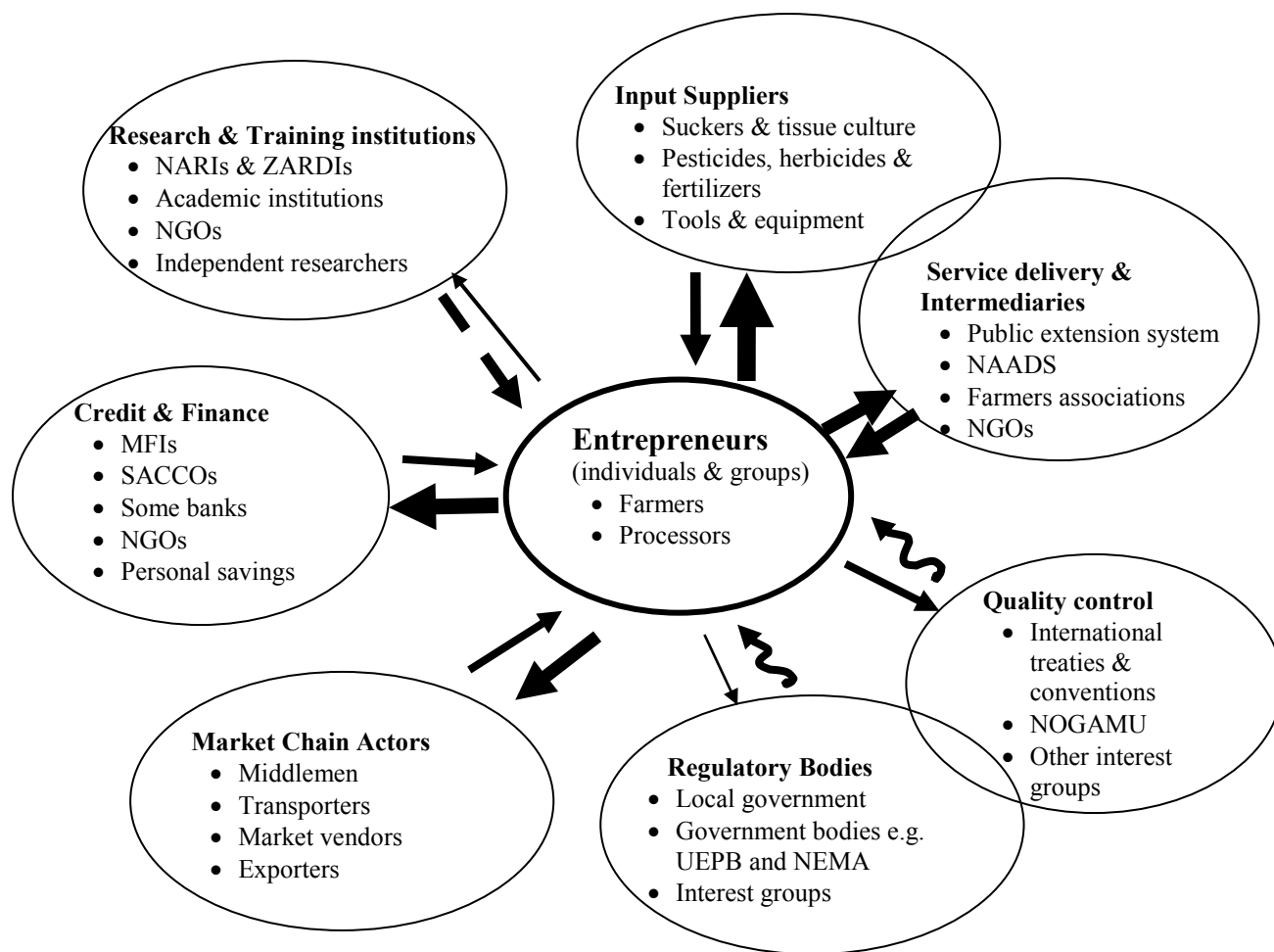
Source: Uganda Export Promotions Board (UEPB)

## 6.0 IMPROTANCE OF ACTOR LINKAGES TO THE PERFORMANCE OF THE BANANA SUB-SECTOR

It is the linkages between and among actors that encourage, support, facilitate innovations or discourage and hinder it. Besides the not-for-profit organizations and governmental, all other actors in the banana sub-sector are engaged in various activities for economic gain. Hence, these actors are actively engaged at different levels of interactions in order to access knowledge and technologies to improve the efficiency and profitability of their different enterprises.

### 6.1 LINKAGES AMONG ENTREPRENEURS AND OTHER ACTORS

This section focuses on entrepreneurs (farmers and processors) because these form the majority of the actors engaged in Uganda’s banana sub-sector. Entrepreneurs also are the major



Straight line = Direct interactions; thickness of line show frequency and value of interactions  
Dotted line = Information not always true or beneficial to receiver  
Curve = Limited direct interactions

**Figure 14: Entrepreneurs Linking with Other Actors in Banana Sub-sector**

implementation (performance) function in the banana sub-sector and the agricultural sector as a whole. **Figure 14** above shows interactions among entrepreneurs with other actors in the banana sub-sector. Entrepreneurs are actively engaged in seeking support from input suppliers, credit and financial institutions, and intermediary organizations (offering extension services). Interactions between entrepreneurs and training and research institutions were moderate, limited to experimental or demonstration plots and farm trials.

### **6.1.1 Entrepreneurs and Input Suppliers**

In all value chains, entrepreneurs depend on input suppliers to provide raw materials for their enterprise and input suppliers depend on entrepreneurs to provide market for their products – hence the two groups naturally have strong linkages between them. In this study, the linkages observed between input suppliers and entrepreneurs (especially with farmers) have been strengthened by the increased environmental and biotic factors (pests and diseases) that threaten survival of banana crop and the commercialization of banana products. The increase in both abiotic and biotic stresses requires input suppliers to continuously learn and invest in technologies to mitigate or adapt to these stresses. This also requires continuously promoting the improved knowledge and technologies to entrepreneurs. On the other hand, commercialization of banana products pushes entrepreneurs to improve their production habits and in most cases to use products and processes that increase yield and quality at minimal cost. Hence, entrepreneurs are pushed to demand improved products from input suppliers and to acquire knowledge and technologies on how to use the new products. As input suppliers learn and invest to handle these stresses, the entrepreneurs also adapt the new knowledge and technologies to stay competitive hence the two group have to maintain strong interactions to improve the efficiency of the ASTI system in banana sub-sector.

The degree and frequency of interactions between input suppliers and entrepreneurs is defined by nature and scale of enterprises. In general, commercial and semi-commercial entrepreneurs have stronger interactions with large scale or commercial input suppliers while subsistence farmers mostly interact with input suppliers within their communities (more often fellow farmers), through groups, or through other service and intermediary agents. For example, in this study commercial and semi-commercial farmers such as WAKA International Ltd (see **Figure 17**) had strong direct links with input suppliers such as KARI and AGT. Conversely, subsistence farmers depend on fellow farmers or obtain inputs and information through groups or intermediary organizations.

In general farmers are well linked with suppliers of planting materials and manure providers but have lesser interactions with stockists. Unlike farmers, processors have strong interactions with both raw material suppliers and stockists that supply equipment and chemical reagents. Since the majority of entrepreneurs in the banana sub-sector are subsistence farmers, it is the lack of feedback mechanism among stockists and entrepreneurs (mostly farmers) that has weakened the linkage between input suppliers and entrepreneurs.

### **6.1.2 Entrepreneurs and Market Chain Actors**

The strength of linkages between entrepreneurs is mostly a result of frequent interactions with middlemen. Since entrepreneurs invest to gain profit, linking with middlemen adds value to their



production function by improving their products' market access. Entrepreneurs also learn about market requirements through market chain actors and in turn target production to meet market demands.

In general, entrepreneurs who engage in value-addition have stronger relationships with other market chain actors. For example, farmers engaged in organic farming are well linked to exporters and can easily sell their products locally through interest groups such as NOGAMU. Farmer groups that process banana into flour were also well connected to biscuit and bread making companies such as Macdamom, Britania, and Hot Loaf. In this case, the buyers communicate market requirements and entrepreneurs produce to meet the market demands.

One category of entrepreneurs that was observed to have weak linkages with market chain actors are the craft makers. The individual retailers that were interviewed at the two craft centres in Kampala indicated that they do not have regular suppliers. Craft producers and wholesalers bring their merchandise to retailers and retailers select what to buy based on their tastes, current demand, or just try out new ones. This means that there are no established relationships between the shopkeepers and producers/wholesalers; which makes it difficult for the latter to predict the market. The unpredictability of the market in turn reduces the producers'/wholesalers bargaining power, makes them vulnerable to exploitation from shopkeepers, and makes it harder for wholesalers and producers to re-invest heavily in crafts.

The linkage among market chain actors in banana sub-sector can however be strengthened by improving access to valid market information. As of now, market chain actors exploit farmers by giving them false information on prices and offering low prices for their bananas. This lack of trust has weakened the linkages between entrepreneurs (especially farmers) and other market chain actors. Initiatives by TechnoServe (**Section 5.4.3.1**) show that reducing the number of middlemen directly benefit farmers.

### **6.1.3 Entrepreneurs with Credit and Financial Institutions**

The dual interactions between entrepreneurs and credit and financial institutions (CFIs) can be attributed by the dependency of the former on the later for capital to invest in their enterprises. Since agricultural enterprises are riskier than service and industrial ventures, financial institutions often build an environment of trust before advancing credit. Because of the high security requirements, it often the commercial and semi-commercial farmers that can access credit from banks while subsistence farmers access credit mostly from their SACCOs. Often these institutions do not help farmers progress but rather focus on making sure that farmers pay back money lent to them - hence weakening the nature of interaction between the two parties. In **Figure 14** the thickness of the arrow linking entrepreneur to CFIs is thicker because of frequent interactions of many entrepreneurs accessing various financial services as savings.

It should be noted that the nature of the interactions vary among producers based on their needs and level of production. In general, semi-commercial and commercial institutions are likely to have stronger linkages with input suppliers and credit and finance institutions than subsistence farmers. Producers and processors that are performing at semi-commercial and commercial scale also engage in collaborative efforts with other actors in the sub-sector to improve their competitiveness.

### **6.1.4 Entrepreneurs with Knowledge and Technology Generators**

The functioning and productivity of any agricultural system depends on research and training because it is through these functions that knowledge is created and shared to inform investment. There is a lot research on different aspects of banana that is currently on going; however, the design and implementation of research is always not done in consultation with end users. The relationships among entrepreneurs and training and research institutions are short term, often for purposes of demonstrating technologies and not considered central to entrepreneurs performance.

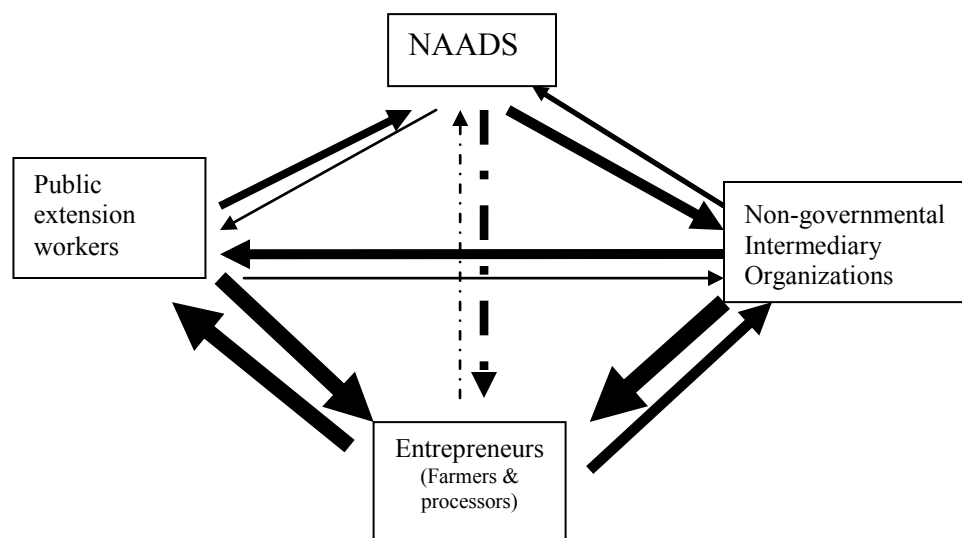
Researchers work with entrepreneurs in conducting field trials, in piloting new innovations, and to access products to use in their research. Once research is complete, it is the Service delivery and intermediary organizations (SDIOs), entrepreneurs and input suppliers that transfer acquired knowledge and technologies to entrepreneurs. This is mainly a result of training and research institutions not having established processes for sharing knowledge and technologies with farmers. In most cases, knowledge is not packaged in a user friendly format to facilitate dissemination by intermediary organizations. As such research outputs often come late or are not shared with end users.

### **6.1.5 Entrepreneurs and Intermediary Organizations**

The strong linkages between entrepreneurs and service delivery and intermediary organizations relate to the many services provided by the latter. In general, there are many SDIOs and each organization provides multiple services to many actors. Entrepreneurs highly depend on SDIOs to quickly access knowledge and technologies (which are often free). There is an overlap between input suppliers and many SDIOs who also serve as input suppliers, and this has significantly improved farmers demand, access, and utilization of improved knowledge and technologies. On the other hand, in response to farmers demands or problems SDIOs gain better understanding of the usefulness of available knowledge and technologies and often inform and/or work with research institutions to ensure that entrepreneurs needs are addressed. This feedback mechanism facilitates continuous innovation and is vital to the sustainability of banana crop and development of the banana sub-sector.

In general, this study determined that the linkages between entrepreneurs and NGO intermediaries are stronger than linkages between entrepreneurs and governmental SDIOs. This is due to the fact that government SDIOs (namely public extension and NAADS) have fewer agents operating at field level. Non-governmental intermediary organizations often operate at field level whereas governmental institutions like NAADS often implement their programs through secondary intermediaries (including NGOs and CBOs); as shown in **Figure 15** this strengthens the relationships between entrepreneurs and NGO SDIOs.

As shown in **Figure 15** below, the visibility of NAADS (which is the apex governmental SDIO) is low since it operates through other agents. Although NAADS has tried to improve linkages with farmers through creation of farmers fora, interactions with entrepreneurs is still limited to ‘model or lead’ entrepreneurs. As shown using dotted lines, many programs are directed to the entrepreneurs but feedback from entrepreneurs is limited. Lack of direct linkages reduces learning and often results in programs that are not responsive to entrepreneurs needs.



**Figure 15: Interactions between NAADS and other Intermediary Organizations**

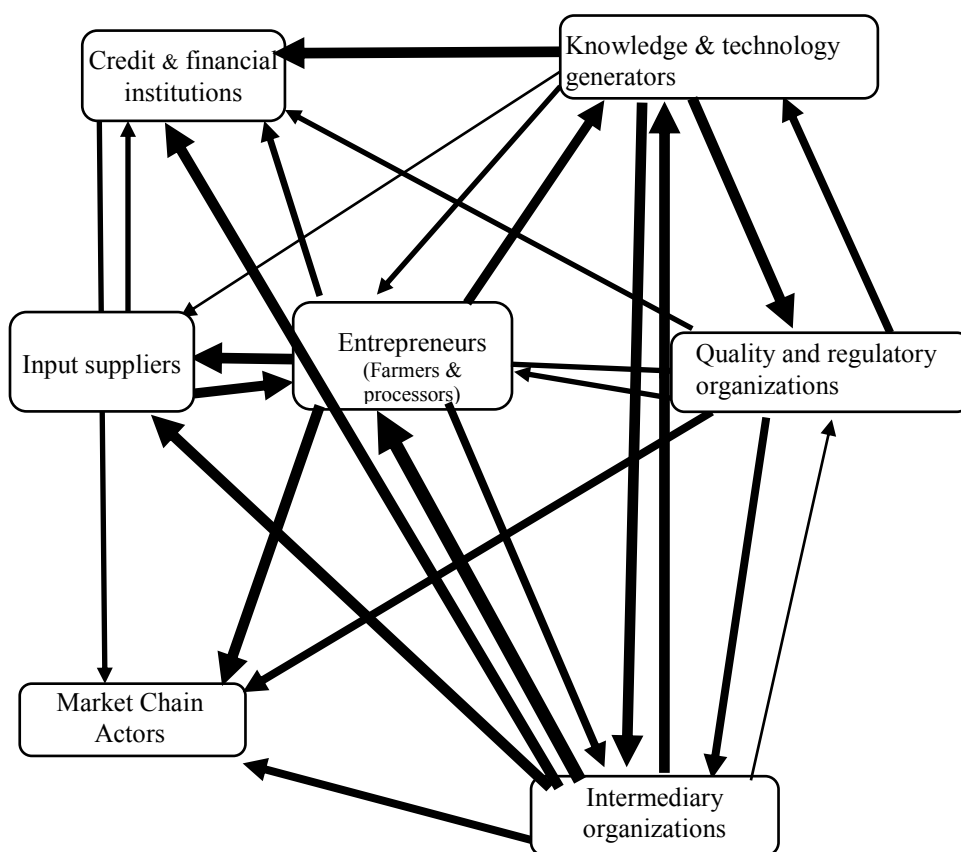
Historically, public extension workers have maintained strong relationships with farmers because extension agents are often local people and the nature of their job demands disseminating knowledge and technologies to farmers. The recent increase in small scale processing industries has also resulted in frequent interactions between extension workers and processors. These strong interactions between entrepreneurs and public extension agents need to be harnessed because it is through these linkages that knowledge and technologies are put to use. Hence this link is important for the development of the banana ASTI system and agricultural system as a whole.

### 6.1.6 Entrepreneurs with Regulatory Bodies

Lack of direct linkages were noted among entrepreneurs and regulatory bodies. is mostly related to limited knowledge of policy by the former and limited resources by the later to implement the policies. Quality control bodies work best with processors because these have more control of the final product.

## 6.2 GENERAL LINKAGES AMONG ACTORS IN THE BANANA SUB-SECTOR

In general, it can be concluded that actors in the banana sub-sector are actively interacting to improve their efficiency and productivity. **Figure 16** provides a summary of actor linkages based of scores (experiences) of participants at the result validation workshop for this ASTI study. From this figure, it can be noted that strong interactions exist wherever there are exchanges of knowledge, technologies or products. These linkages need to be supported to enhance the productivity and profitability of the banana sub-sector.



**Figure 16: Summary of Linkages among Actors in Banana Sub-sector**

As shown above, actors in banana sub-sector link up to improve their performance. In general, actors operating at large scale have more linkages than those engaged in small scale enterprises. InFocus 19 below provides an example of how a commercial scale banana farmer and processor leverages on linkages with various actors in the sub-sector.

**InFocus 19: Example of an Actor Engaging in Effective Interactions**

**Figure 17** is an example of how WAKA International Ltd interacts with different actors to improve its access to knowledge, technologies, and to markets. For example, WAKA International Ltd:

- Collaborates with scientists from the DFST Makerere University in monitoring the quality of the firm’s products. At the time of the study, consultations were underway in assessing equipment needs to improve protocols for pasteurizing the firm’s banana juice.
- Gets technical supports on wine production and is linked trainers by the Uganda cooperative Alliance (UCA). UCA also links the firm other entrepreneurs which improves its networking capacity.
- Maintains good relations with Madhvani to ensure sustained supply of bottles and labels. Wine bottles are expensive in Uganda so WAKA has arrangements with Madhvani for direct shipments of bottles.

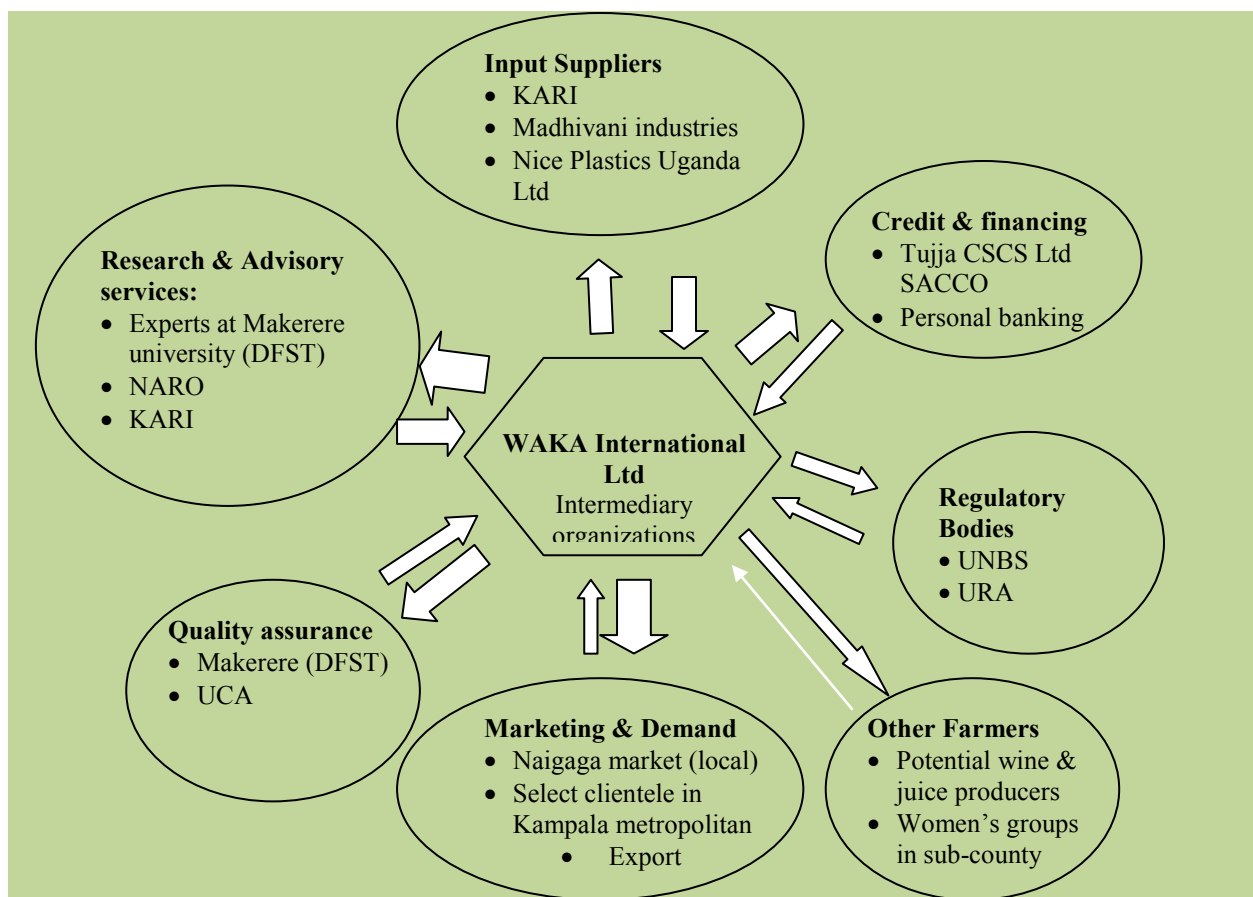


Figure 17: Linkages of a Commercial Banana Farmer and Processor with other Actors

- Has good working relationships with Nice Plastics Uganda Ltd which supplies the firm with plastic jerricans with capacity to hold different volumes of wine.
- In setting up the irrigation system worked with environmental specialists on assessing the impact of harvesting water from the local stream on the ecosystem. Also works with NEMA to monitor soil and water quality.
- Was consulting with KARI on feasibility and logistics of having a tissue culture facility [nursery] to improve access to disease free planting material especially for farmers in the sub-county.
- Works with researchers from NARO and KARI to build the firm's staff capacity in management of pests and diseases. The firm has strong links with the institutions, but depending on its needs, sometimes the firm hires the services of individual researchers from these institutions.
- Is member of Tujja Credit and Savings Cooperative Society Ltd ( a local SACCO) which helps the firm finance its various production and processing activities. The owners also attest to maintaining good credit history and are assured to financing from their personal banking institutions. Such relationships with credit and financial institutions make it easier for WAKA to re-invest in various initiatives. At the time of the study, WAKA had just completed replanting one of its old plantations.

- Director of the firm was trying to initiate a production cooperative so as to improve collaborations among farmers in the area. The planned cooperative would help the firm fill gaps in wine demand since wine production is a lengthy process.

In addition to networking for its own advancement, WAKA also engages in community outreach programs. WAKA shares its planting material and promotes FHIA cultivation as a food security crop and a business enterprise so as to contribute towards community development. Efforts are underway to form a production cooperative for wine whereby farmers will do fermentation individually then get technical support at filtration stage; and the group will then bulk their wine at packaging and marketing stages. To improve farmers' access to planting material, the firm has also been advocating for government to support the setting up of a tissue culture facility within the sub-county. For the case of the banana sub-sector, these kinds of interactions between a productive enterprise such as WAKA International Ltd and the community benefit both actors in that:

- Better agronomic practices in the community reduces threats from pests and diseases
- Productive community is likely to attract:
  - bigger government investment in terms of infrastructure such as road network and processing facilities
  - better outreach and extension services
- Partnering with community to scale up production helps individual processing firm:
  - reduce gaps in supply
  - expand its raw material base through outgrowers
  - improve access to markets (free advertising)
  - improves trust and creates a supportive environment

Overall, WAKA is benefiting from linking up with various actors.

According to MAAIF (DSIP 2010), poor links among actors in the agriculture sector was attributed to the limited value addition and the associated low returns experienced in the sector (DSIP 2010). According to MAAIF, less than 5% of Uganda's agricultural products are processed and the limited capacity of farmers to engage in the value chain was pointed out as one of the limitations to value addition. This situation can be improved if farmers are linked to markets for minimally processed banana products, are linked to processors in need of raw materials for the various banana products. While processors such as FREVASEMA are having difficulties accessing good quality raw products on regular basis, farmers are not informed of market requirements. There is need to build capacity of farmers on accessing information on market requirements and standards so that they can engage in demand oriented production and consequently improve their products access to the markets.

## 7.0 SUMMARY OF ACTOR FUNCTIONS AND PERFORMANCE OF THE BANANA SUB-SECTOR

Individual roles of actors are important to the performance of the agricultural innovation system; however, the level of performance of the system is determined by the extent to which individual categories actors fulfil their key functions. **Table 8** (Appendix 2) shows how actors in the banana sub-sector are perform various functions to develop the sub-sector and contribute to their own development.

### 7.1 GOVERNMENT FUNCTIONS

In general, governments facilitate the development of the agricultural sector through policy formulation, resource allocation, and performing regulatory functions.

#### 7.1.1 Policy Making

Overall policy formulation is the key function of government. All actors are expected to engage in the policy formulation; however, actual involvement of actors in the banana sub-sector was limited to a few consultative meetings. Most of the actors engaged in this study see government as the key policy maker and felt that their role is only to influence policy during consultative meetings or to lobby for inclusion of their issues (such as the push for organic farming requirements and provisions) on national agenda. Consequently, actors have limited understanding and support to the implementation of policy frameworks such as PEAP (ended 2010) and PMA.

#### 7.1.2 Resource Allocation

The Government of Uganda, reads its annual budget in June of every year. Prior to this, ministries are expected to account for the previous year's expenditures and to present a new budget for coming year. Policy frameworks such as the DSIP provide overall guidance to the prioritization of programs for the government to invest in. Participation in this process is a core function of all managers of government organs at all levels, and through this mechanism contributes or influence allocations while the final decision making lies with the Ministry of Finance and Economic Development (MoFED). As such many of the government programs and departments resort to lobbying and influencing just like the non-government agencies. This study found that many of the actors in the banana sub-sector access government resources through NAADS programmes and via allocations to research institutions such as UNBRP, NARIs and ZARDIs.

#### 7.1.3 Regulatory

Once a government policy framework is launched and translated into laws and bye-laws, it then becomes the function of government regulatory bodies to enforce these laws and bye –laws at all levels. With the exception of the genetic modification policy that is under formulation, there are currently no specific national policies addressing the banana sub-sector. As such many actors formulate their own bye-laws to govern their operations. For example some farmers in Bushenyi

had a bye-law that engaged farmers in better agronomic practices to control the spread of BXW (see **Section 5.7.1**).

On the other hand, NGOs and exporters of organic products operate under international guidelines and use these guidelines to advise farmers on practices to engage in. At the time of this study, agencies like NOGAMU and AgriCert only offered advice but did not have any legal backing to enforce organic standards. Many of these organizations are lobbying for the government of Uganda to have a policy provision for organic farming; and which can form a legal basis for these bodies to enforce the international standards.

The enforcement or regulatory function of government in some cases has not been effective partly due to the fragmentation of its delivery mechanisms. In most cases, the policy making bodies are detached from implementation of these policies, roles are not clearly defined during the policy formulation process, and in most cases there are no mechanisms for monitoring the policy implementation process. A good example of this is the failure of the Public Service Commission to facilitate the phasing out of the public extension worker system discussed in **Section 5.4.1**.

This study determined that regulatory bodies were most active at export and marketing levels, and many do so by providing documentation of approval processes mostly in form of issuing certificates (see Section 5.7.1).

## 7.2 IMPLEMENTATION FUNCTIONS

### 7.2.1 Financing

In the banana sub-sector, and agriculture as a whole, financing at implementation level was determined to be a function of government, donor agencies, and entrepreneurs (self-financing).

#### 7.2.1.1 Government financing

Financing for agriculture goes through MAAIF, which disburse funds to programs such as NAADS, NARO, production departments at district level, and agricultural colleges. Agricultural programs in universities receive funding through the Ministry of Education and Sports just like other academic programs; however universities can access funds for research from MAAIF. In MAAIF's new Development Strategy and Investment Plan (DSIP), government intends to implement agricultural development as private sector.

#### 7.2.1.2 Donor Financing

This seems to constitute the bulk of funding used to implement research and service delivery activities at all levels of the agricultural system: NGOs, which mostly engage in service delivery and research, are fully dependant on donor funds. Research activities by governmental institutions such as NAADS, PARIs, and ZARDIs also heavily depend on donor funds and farmers Cooperatives and groups.



### **7.2.1.3 Self Financing**

This was common among entrepreneurs (farmers and processors), input suppliers, and market chain actors. As mentioned in section 5.1.4, producers and processors are largely self-financed, which affects their adoption and scaling up of innovations in the sub-sector.

Overall, the majority of actors in the banana sub-sector are operating on subsistence basis and self-finance their activities. These actors access government and donor funding through microfinance credit schemes (see Sections 4.2.4 and 5.5.1) and through services offered by governmental institutions such as NAADS (Section 5.4.2). There is need to improve access to finances to facilitate adoption of improved knowledge and technologies.

### **7.2.2 Implementing**

The implementation function in the banana sub-sector includes production, processing, knowledge and technology generation while other actors either support or facilitate the implementation process. In general, this study determined that the banana sub-sector is still operating under capacity. Production and processing is mostly done by small-scale entrepreneurs. As noted in Section 5.1.1 subsistence farmers are major producers while most the majority of processors (Section 5.1.2) are also small scale cottage industries. Although the number of semi-commercial farmers is increasing, the lack of market often stifles scaling up of banana cultivation enterprises. Some producers are going into processing in order to improve access to markets. Government is also engaged in processes to promote value-addition in order to facilitate the development of the banana sub-sector through initiatives such as PIBID and FREVASEMA; however, these programs are still at experimentation stage.

### **7.2.3 Human Resources and Capacity building**

In Uganda, the function of building the capacity of the human resource is the mandate of education system under the leadership of the Ministry of Education and Sports (MOES). At the implementation level, universities (Section 5.3.2.1) and agricultural colleges (Section 5.3.2.2) develop curricula and train students in various aspect of agriculture. Actors interviewed in this study believed that academic training is not aligned to the national development goals because the graduates do not have adequate practical experiences. This is partly attributed to limited funding of academic institutions which limits students' engagement in field-based learning opportunities. To improve competencies of graduates, Continuing Agricultural Education Centre (Section 5.3.2.3), intermediary organizations such as Kulika and VEDCO (Section 5.3.2.3), and research institutions such as AGT and MUARIK offer seminars, workshops, and short courses to their staff and various actors in the agricultural sector. Competence-based training by SDIOs also targets entrepreneurs and contributes significantly to diffusion of innovations to end-users.

## 7.2.4 Provision of Infrastructure

Providing developmental infrastructure (such as roads, water and electricity) is among the primary functions central government while provision of capital goods (such as land, food processing equipment, and trucks for transporting bananas) is the responsibility of entrepreneurs. In this study, it was noted that public infrastructure is inadequate especially in rural areas. Due to underdeveloped infrastructure, entrepreneurs and market chain actors invest more to fill gaps left by government. For example, the road network is not well developed to facilitate transportation of bananas from remote areas to markets hence banana traders have established collections centre (markets). On the other hand, poorly managed roads cause vehicle breakdowns hence trailer trucks are used to haul banana to markets. These extra costs increase investment capital for entrepreneurs and market chain actors.

Overall, this study noted major gaps in infrastructural development. The national priority for infrastructural development focuses on towns which marginalizes rural areas and stifles development of the agricultural sector; yet ironically agriculture is often flagged as the backbone of Uganda's economy. In the last decade, there have been major improvements in construction of major roads, however the feeder road network is not well developed to support development of rural areas. Electricity is also restricted to towns and along major roads which discourages establishment of agro-processing industries in rural areas. In addition, water supply is also limited to urban centres and yet dependency on rain-fed agriculture is often sited as a key factor in poor yields experience in agriculture. There is need to boost rural infrastructure in order to improve development of the agricultural sector as a whole. Efforts such as rural electrification should be harnessed and well monitored to ensure that such infrastructure addresses the developmental needs of rural areas.

## 8.0 STRENGTHS AND WEAKNESSES OF BANANA SUB-SECTOR

From this study it was noted that the banana sub-sector is among the largest sub-sectors of Uganda's agricultural system. Since banana is a non-traditional cash crop, this sector is not well organized to allow thorough analysis of the functions of actors in the sub-sector and how they fulfil their functions. In general, this system has some strengths that need to be harnessed and weaknesses that need to be avoided in order to improve the performance of the sub-sector. **Table 8** below summarizes the strengths and weaknesses of the banana sub-sector.

**Table 8: Strengths and Weakness of Banana Sub-sector**

<b>Strengthening factors</b>	<b>How to exploit them further?</b>
+ Many actors engaged in research, production, processing, and marketing of banana crop and its by products increases employment opportunities at various levels	+ Improving linkages among actors in order to improve learning and investment practices
+ Wide range of banana varieties and products generated from bananas provide opportunities for value-addition and economic development	+ Agro-ecological matching of varieties to improve productivity
+ Political will to promote banana production and value addition as demonstrated by financial support under the Presidential Initiatives has increased funding to sub-sector	+ Improve resource allocation to entrepreneurs (farmers and processors) to help them scale up production. Research projects also need to be facilitated to scale up processing activities in banana producing areas. PIBID model provides a good example.
+ Perennial nature of crop reduces investments in plantation establishment and fosters sustainability of the sub-sector	+ Research mechanisms to sustainably engage farmers in appropriate soil management and agronomical practices
+ High biomass and nutritive value assures food security which has improved the social economic profile of crop	+ Aggressive marketing of different banana products to optimize utilization and ensure higher returns on investment in banana cultivation
<b>Weakening factors</b>	<b>How to avoid them?</b>
- Perishability of banana fruit (which is the major product) limits entrepreneurs negotiation for better prices especially during peak harvest seasons. This in turn stifles scaling up production.	- Aggressive promotion of processing especially among subsistence farmers to improve food security and returns during peak harvest seasons
- Laxed regulation of agro-input supplies (including planting material) limits farmers access to authentic agro-inputs <sup>6</sup> .	- Improve mechanisms for farmers to report culprits and get compensated in case fake products are used. A special regulatory body is needed.
- International policies such as EU increasing imports from South American countries likely to reduce quotas of banana products from Uganda	- Value addition coupled with aggressive promotion of utilization of processed products in order to widen local and regional markets for banana products

From this study, it can be concluded that the banana sub-sector is an economically viable sub-sector whose potential has not yet been fully realized. It is important to improve the linkages among actors in order to improve the performance of this sub-sector. The weaknesses identified above can all be minimized if the banana sub-sector is organized like other cash crops such as coffee.

## 9. CONCLUSIONS AND RECOMMENDATION

Although overall data on production, processing, exports is fragmented and in some cases absent all together, which makes it difficult to prove the actual contribution of the subsector to the national economy and livelihoods, bananas are a common sight in all markets across the nation and a source of livelihood for many.

The banana sub-sector has been fast evolving over time, emerging from a staple crop cultivated in a few zones by subsistence farmers, to a food and cash crop covering 10 out 14 NAADS zones, and attracting both semi commercial and commercial farmers. While the biotic and abiotic factors, less investment in improved inputs, and dependency of rain-fed production have reduced the productivity and longevity of banana plantations, the sub-sector is fast growing propelled by the interest and investments of a wide range of actors, especially the processing and export oriented actors.

### 9.1. Critical actors and their characteristics

The banana sub-sector employees a wide range of actors. This study identified 7 broad categories, within several sub categories.

#### viii. **Entrepreneurs:**

- Producers: subsistence farmers, Semi commercial farmers and commercial farmers
- Processors of: Fresh peeled; Dehydrated banana chips and flour; Banana juice; Banana wine; Banana beer; Fresh banana leaves; Crafts makers; Feeds; and alternative fuel.

#### ix. **Scientific knowledge and technology generators:**

- Research Institutes: UNBRP; ZARDIs; International Research Organizations; Universities and tertiary institutions
- Training institutions: Universities; Agricultural colleges; Post-graduate training; Non- academic training institutions (NGOs)

#### x. **Service providers:**

- Public Agricultural extension
- National Agricultural Advisory Services (NAADS).
- NGOs
- Farmers Associations

#### xi. **Quality control & regulatory bodies:**

- Government Institutions
- Non-government regulatory bodies

#### xii. **Credit and financial institutions:**

- Micro finance Institutions.

#### xiii. **Input Suppliers:**

- Stockiest
- Planting materials suppliers: Makerere University tissue culture laboratory; NGOs; Private firms; Farmer-to-farmer
- Manure providers

#### xiv. **Market chain actors:**

- Traders and transporters: Middlemen, Collection centers operators; Transporters, Urban market vendors;
- Handling and cold storage providers

- Exporters.

Characteristics of Actors were analysed based on three important factors: Competencies, learning and investments.

Competencies varied among actors based on the specific functions or mandates of the broad category and specific actor. For instance, research and trained employed highly qualified people with PhDs and masters degrees. The level of academic qualification is important for his category of actors. On the other hand entrepreneurs focused on experience irrespective of academic qualifications. And while Service providers considered and invested in academically qualified persons, they tended to prefer people with “useable” skills, which they said college graduates possessed. At farm levels, the knowledge and competencies played a major role in seeking after knowledge and utilizing it as observed among the semi-commercial and commercial farmers.

Learning defined as changes in practice based on new knowledge was particularly dynamic among semi-commercial farmers, processors and market vendors. There was new knowledge in terms under production: either propagation using tissue bananas or suckers; use of manure and various processing opportunities. However the confidence to put this knowledge and technologies to work was observed among the elite farmers (senior and middle level civil servants) who comprised the semi-commercial and commercial farmers; the elite processors, scientist ceasing an opportunity to supply clean planting materials (AGT) and to some extent farmers in groups supported by NAADS and NGOs. The common factors across all these seemed to be conviction about the anticipated benefits and access to finances. Subsistence farmers and traditional processors for instance were limited by fear of total loss if they invested in technologies and they failed. This is what made farmers in groups, who share the cost of new knowledge uptake seemed to learn better than those outside of groups.

Investment in terms of spending significant amounts of money to improve delivery was observed among processors, researchers and exporters. These actors invested in expensive equipments, highly qualified personnel, licences and means of transport. At the time these seemed to pay off especially for processors and exporters. Producers on the other hand, invested in clean cultivars, fertiliser and labour. Although the amounts were not huge in comparison to the later, commercial and semi-commercial farmers invested in production (Pesticides, fertiliser/manure, weeding and pruning, mulching and harvesting). It was the subsistence farmers that hardly invested cash, but employed their own labour and time for weeding, pruning and harvesting. As indicated under learning, levels of investment were equally influenced by access to information, money and conviction about the expected benefits. The study clearly shows clearly that at the farm level, profits were directly proportional to investments.

### **Recommendation**

Access to knowledge in forms and practices suitable for different actors is essential for adoption. The traditional cash crops sub-sectors such as cotton, tobacco and coffee have formalized authorities that help coordinate and organize producers, lobby and influence government investments. Non-traditional cash crops do not have formal structures or systems. Actors operate in isolation making them vulnerable to market threats. The lack of organization also affects the visibility of the sub-sector at the national economic system level. The inception and validation workshops proposed the formation of a Banana Sub-sector platform or forum (Some kind of a Banana Produce Marketing Board) that would cover the following:

- a) Facilitate training, learning, support innovation development, implementation and market literacy creation. It would serve as an avenue for government competitive grants such as the Youth development Fund and the Presidential initiatives.
- b) Promote research on issues identified in the sector by supporting graduate students research, hosting researchers and directly link research to development.
- c) Carry out annual surveys on production, consumption, processing, exports and overall contribution to GDP and national economy to improve the visibility of the sector.
- d) Become a one-stop-centre for information and up-dated data on the banana sub-sector

## 9.2. Linkages

All actors are interlinked for various reasons and to varying degrees. This study observed stronger inter-linkages within categories, for instance between producers and processors; between researchers and training; among service delivery organizations - NGOs, Farmers groups, NAADs, and public extension, than across categories.

The main function of the linkages was to share:

**Knowledge:** Processors who link with the market know the quality requirements of the market. Those targeting organic markets adopt and support producers with knowledge in organic production; research and service providers provide leaflets with nutrient requirements for the various regions

**Technologies:** Research and production of tissue culture bananas; varieties from research centres; processing into various products

**Market access:** Tele- marketing, export opportunities through UEPB, local market linkages support by NGOs.

All these have resulted in improvements in production and increased incomes along the value chain.

Links that needed attention include the following:

- Between Knowledge / technology generators and entrepreneurs
- Between Quality and regulation and input suppliers
- Between Service provider and regulatory organs
- Between Entrepreneurs and credit

Proposed improvements are discussed below

Recommendations

- a) **Improve interactions between entrepreneurs and actors engaged in research and training in order to facilitate learning and adoption of improved knowledge and technologies.** While it is not the mandate of research and training institutions to directly engage in development work, this study shows that strengthening this link beyond experimentation will greatly benefit the banana sub-sector as well as research and training. Secondly, in the absence of a formalized feedback mechanism, longer term linkages with entrepreneurs will enable research and training to assess the impact of their products, will enhance research and training priorities in terms of relevancy to development needs, and greatly improve the performance of entrepreneurs.
- b) **Establish a regulatory mechanism to improve quality of agro-inputs accessible to farmers and processors.** In particular there was mention of quality adulteration by input suppliers, both on chemicals as well as banana cultivars. At the moment the regulators are not mandated to intervene especially in the case of suckers and tissue culture plantlets.

Although government bodies such as National Drug Authority and the Uganda Bureau of Standards constantly monitor chemicals traded in the country, many stockist in rural areas and those that operate in weekly markets are hardly checked. There is need for regulatory bodies to restore farmers confidence in the authenticity of agro-inputs in order for the farmers to use them and improve agricultural productivity.

- c) **Involve service providers in development and monitoring of policies at field level.** One of the roles of service providers is to lobby and advocate for favorable conditions of operation. Several NGOs get involved with policies after they are passed to lobby for changes, but are not keen to get involved in the consultations and meetings that lead to policy formulation. Service providers need to work closely with regulatory bodies to monitor the implementation of policies and to provide feedback on emerging challenges since their activities are often closer to the entrepreneurs.
- d) **Improve entrepreneurs' access to credit.** Initiatives in the financial sector to reach banana farmers are isolated and few. Most producers and processors prefer to use their own resources, which are limited than borrow money from banks with stringent conditions. This has greatly slowed down investments by entrepreneurs to boost their banana enterprises. Scaling up of targeted credit schemes such as the banana improvement loan offered by TRIAS through EBO SACCO in Mbarara is essential to the development of the banana sub-sector and agriculture sector as a whole.

### 9.3. Policy environment.

- i. The overall policy environment, political and public support to the sector is positive and facilitative of innovations. There are good intentions reflected in the institutional changes and pro-active promotion of the sector. Examples include: The Presidential initiatives promoting banana processing at commercial levels, the UNBRP specifically designed to address the research needs of bananas, the return of sector colleges to line ministries; the DSIP and National Development plan focusing on improving investments and productivity. The National Development plan also targets bananas as one of the “high value markets in high income countries”. Other positive policy changes include: Cooperative Act that re-instated Uganda Cooperative alliance as umbrella and the resultant farm level support initiatives; the Financial Amendment Act that opened up the sector to allow farmers own saving systems (SACCOS) now providing the most important affordable loans to farmers; and NAADS mandated to transform the farming community and many farmers in groups have accessed inputs and loans. The challenge has been with the implementation.
- ii. There are still underlying practices identified from historical policies that impinge considerably on the performance of the sector, namely: Limited or no value addition to exports; agro-ecological zones that limit extension support to a few crops; urban biased infrastructural development that has left the rural areas poorly connected in terms of roads, electricity and water. Road construction and rural electrification programs exist but as mentioned above the challenge is in implementations.
- iii. Besides these, there are important policy gaps identified in this study that need to be addressed: the fertilizer and irrigation policy.

### Recommendations

- a) Targeted support to move the Presidential initiatives from research to full scale development implementation.
- b) The implementation of ZARDIs in such way that “non-traditional” crops in the regions do not get left out. NGOs continue to provide services in new regions taking up banana production; there is need for adaptive research to inform species selection by service providers.
- c) Linking exports to household incomes and food security: at the moment most exporters also have their own plantations with a few contracted farmers. There should be programs that link farmers to processors and exporters. Support to the proposed Banana Produce Marketing Board formulation could address this need.
- d) Training: The good gesture of returning the Agricultural colleges back to the ministry should be followed by targeted support in curriculum revision to suit the human resource needs of the sector needs. In this sub-sector, trainees of NGOs seem to emerge as effective implementers of knowledge, Government institutions should partner with NGOs in curriculum development and delivery to improve relevancy of graduates to the sector.
- e) SACCOs are mushrooming, have received recognition and support from government, however, there are currently no monitoring and regulatory mechanism for SACCOs to ensure security of farmers savings. SACCOs under UCA are monitored and provided technical support but the majorities are self regulating. There is need for a centralized body with clear guidelines to regulate SACCOs.
- f) Scaling up good performance from a few NAADS supported farmers to the targeted subsistence farmers: There is need for clear guidance and mile stones on how to reach subsistence farmers outside of groups.
- g) Uganda needs to revises its policy on priorities for road construction, water and energy supply should correct the historical urban preference and proactively focus on rural connectivity. This will ease market linkages, enhance production and promote value addition. The government needs to open up and allow other stakeholders to participate in public infrastructural development, as it has done under extension services. There is also need for participatory social accountability processes to hold service providers accountable for programs not delivered
- h) Uganda needs a market evidence based policy on fertilizer use. Government agencies like UEPB and UBS should be mandated and financed to carry out a market preference survey in SADC, EU, COMESA, and USA on organic versus inorganic product and inform policy makers for appropriate actions.
- i) Uganda needs an irrigation policy supported by courses on irrigation in colleges and universities, plus a department to execute its implementation.

#### **9.4. Functions at the system level**

Key conclusions are:

- i. Under policy, the majority of actors are lobbying and not participating in policy formulation or monitoring, the levels at which government needs public input to make policies relevant. This could partly explain the challenges highlighted above at implementation level.
- ii. Secondly there is a high level of self financing, which would be positive if the actors had substantial capital. Interviews revealed that the majority of actors distrust financial institutions because of their stringent lending conditions. Actors therefore prefer to start



small with their own resources and slowly build up their capital, or rely on SACCOS that provide affordable but small loans. This implies that the financial system of Uganda has not yet appropriated its services to the needs of its largest labour force found in the agriculture sector.

- iii. Thirdly, the functional analysis reveals that while there are mandated public training institutions, almost all other actors are also training. This leads to the following possible conclusions:
- Either the majority of Ugandans who drop out of the education system and end up in agriculture do so before they are fully equipped to become “useable” human resource. Consequently whoever works with this category has to first train them;
  - Or the education system of Uganda has failed to produce the required human resource for the agricultural system. As such whoever employs products from public institutions has to invest in additional training.
  - Or the education curriculum development is not adequately linked to the local realities. As such the system is not able to equip students to deal with local realities. They therefore need orientation to be useful.
  - The fourth option is that all the above are true, meaning the education curriculum is not relevant to agricultural development needs. Requiring both the drop-outs and those who complete to equally need capacity building.

#### Recommendation

- a) The initiative by TRIAS, in which a commodity specific product was developed to promote investments in banana production, should be adopted by NAADs under enterprise development.
- b) The involvement of actors in the policy making process, monitoring and adaptations should be promoted among actors. Likewise the development of national development priorities should be the basis of curriculum reviews, targeting and assessments.
- c) Adaptive research and training should be rooted on farms to ensure relevance to development needs. One option could be for research to adopt villages each financial year to work on generic as well as specific farm based challenges. Training likewise could adopt communities or each student adopts a farmer group to study the challenges, opportunities, characteristic (knowledge seeking and utilization), linkages, and investments. The student should be channels of scientific knowledge and skills to the challenges encountered at farm level. The best students could be recommended to the Youth Development Fund for resources to set up their own model farms.
- d) The same can be extended to training in sectors like engineering for rural road construction and processing equipments that are essential for national agricultural development. The engineering and technology faculties could adopt a district and work on their rural roads. This will put young minds to solving national challenges and make the graduates more “ready to use” and therefore employable.
- e) With so many of Ugandan youths dropping out of school, the observed need to re-train both graduates and semi-illiterate employed in agriculture, require government re-visit its education curriculum to focus more on equipping its human resource for life at each level of the education system.
- f) In-service training and vocational courses in “Agriculture as a competitive business” should be instituted along side others now popular courses taken by managers to improve

their competitiveness as employees. Agriculture needs repackaging and advertising with evidence of wealth generation clearly demonstrated.

## **BIBLIOGRAPHY**

Agona, J. A, Nabawanuka, J. A, Kalunda P (2002). *A market overview of the dried fruit sector in Uganda*. A Foodnet grants award project. National Post-harvest Programme/KARI

Bagamba, F (2007). *Market access and agricultural production: The case of banana production in Uganda*. PhD thesis submitted to Wageningen University, Netherlands.

Banda, J. and Kaunda, E. K. W. (2009) *Agricultural Science Technology and Innovation (ASTI) Systems in ACP Countries: An analysis of the aquaculture and fisheries sub-sector in Malawi*. Technical Report submitted to The Technical Centre for Agricultural and Rural Cooperation (CTA)

Bank of Uganda (1999). *The annual supervisory and regulatory report: Bank supervision Function*. <http://www.bou.or.ug/bouwebsite/export/sites/default/bou/bou.../ASR1999.pdf>

Bank of Uganda (2008). *The annual supervisory and regulatory report: Bank supervision Function*.

Benin S., Nkonya E., Okecho G., Pender J., Nahdy S., Mugarura S., Kayoby G. (2007) *Assessing the impact of the National Agricultural Advisory Services (NAADS) in the Uganda rural livelihoods*. International Food Policy Research Centre.

Bolo M ,(2005). *Agricultural systems of science, technology and innovation (ASTI): The case of Kenya's floriculture industry*. The Technical Centre for Agricultural and Rural Cooperation (CTA)

Daves, G. (1993) *Domestic banana-beer production in Mpigi district, Uganda*. InfoMusa 2 (1): 12-15.

Dijkstra T (2001). *Export diversification in Uganda: Developments in non-traditional agricultural exports*. African Studies Centre Working Paper #47  
[www.ascleiden.nl/pdf/exportdiversificationuganda.pdf](http://www.ascleiden.nl/pdf/exportdiversificationuganda.pdf)

Edmeades S, Kikulwe E, Smale M (2006). *Banana cultivars and planting material: A baseline assessment of banana management practices*. Uganda country report. NARO/IFPRI/INBAP

FAO (2007) *Food and agricultural commodities production*. In: FAOSTAT

Global Status Report on Alcohol 2004 4, © World Health Organization 2004

Goff P (2003). *Structural adjustment policies*. Development Economics Web Guide, Unit 5B Issue 1 . May 2003

Gold C S, Speijer P R., Rukazambuga D.N, Karamura E.B. (1994). *Assessment of banana weevils in East African Highland banana systems and strategies for control*

ICPSR (2010) *National Banana Research Programme (UNBRP)*. In: Scientific Institute Detail – Uganda. ISESCO Center for Promotion of Scientific Research website.

Jungbluth, S. (2002) *Microfinance Associations: The case of the Association of Microfinance Institutions in Uganda (AMFIU)*. GTZ Division 41, Economic Development and Employment Promotion.

Kapiriri M, (2008). *Baseline study of the status of the cooperative movement in Uganda*. Report written for CoopAfrica.

Karamura D A (1999). *Numerical taxonomic study of the East African Highland Banana (Musa AAA-EA) in Uganda*. PhD thesis submitted to the Department of Botany Makerere. IPGRI

Kikulwe E, Nowakunda E, Namaganda J, Talengera D, Katungi E, Tushemereirwe W (2006). *Development and dissemination of improved banana technologies: A baseline assessment of banana management practices: Uganda country report*. NARO/IFPRI/INBAP

Larsen, K., R. Kim, and F. Theus *Agribusiness and innovation systems in Africa*, pp. 171.

Maguza-Tembo F, Magombo M, Sikawa D, Njaya F, Nagoli J, Banda M, Banda J, and Kaunda E KW (2009). *Agricultural Science and Technology Innovation (ASTI) Systems in ACP Countries: An analysis of the Aquaculture and Fisheries Sub-sector in Malawi*. Technical report written for CTA/RUFORUM.

Ministry of Agriculture, Animal Industry & Fisheries. *Pillars of PMA and general public information*. Global Forum on Agriculture 29-30 November 2010 Policies for Agricultural development, poverty reduction and food security. OECD Headquarter, Paris.  
<http://www.oecd.org/dataoecd/60/45/46444179.pdf>

Ministry of Agriculture, Animal Industry & Fisheries (2007) *Environmental and social management frame work – ESMF*. NAADs and NARO

Ministry of Agriculture, Animal Industry & Fisheries (2007). *Annual report 2006 – 2007*. NAADs

Ministry of Agriculture, Animal Industry & Fisheries (2010). *NAADs phase II Document*

Ministry of Agriculture, Animal Industry & Fisheries, March 2010. *Development Strategy and Investment Plan 2010/11- 2014-15*. [http://www.finance.go.ug/docs/NDP\\_April\\_2010-Prot.pdf](http://www.finance.go.ug/docs/NDP_April_2010-Prot.pdf)

Ministry of Finance, Planning and Economic Development (2000). *Poverty Reduction Strategy Paper Uganda's Poverty Eradication Action Plan; Summary and Main Objectives*

Ministry of Finance, Planning and Economic Development (2007) *5-year National Development Plan for Uganda PEAP Revision Process 2007/8: Concept note for revision process*. PEAP18-09-07Final.doc [http://www.finance.go.ug/peap/docs/revision\\_process.pdf](http://www.finance.go.ug/peap/docs/revision_process.pdf)

Ministry of Finance, Planning and Economic Development (2007), National Development Plan (2010/11-2014/15). URL: [http://www.finance.go.ug/docs/NDP\\_April\\_2101-Prot.pdf](http://www.finance.go.ug/docs/NDP_April_2101-Prot.pdf)

Mugalu M. (2010) *NAADS millionaires come of age*, The Observer, Kampala, Uganda.

Mwesigye P.K., Okurut T.O. (1995) *A survey of the production and consumption of traditional alcoholic beverages in Uganda*. Process Biochemistry 30:497-501.

Mwebaze S. M. N (1999). *Uganda Pasture forage resource profile*; Grassland and Pasture crops, FAO

NAADS (2001) *National Agricultural Advisory Services (NAADS): Programme Implementation Manual*.

Ngambeki D.S., Tushemereirwe W., Okaasai O. (2006) *Awareness of banana bacterial wilt control in Uganda: Community leaders' perspectives*. African Crop Science Journal 14:165-173.

NARO/IITA (2009). *Banana fertilizer recommendations for Uganda* (Information flier).

National Banana Research Programme (UNBRP) website.

Nkwiine C, Tumuhairwe J K, (2004). *Effects of market oriented agriculture on selected agor-biodiveristy. Household income and food security components*. NURRU working paper No. 36. NURRU publications

NOGAMU (2007). *Organic Uganda; A quarterly update from the NOGAMU*. NOGAMU Bulletin.

Nsubuga (2002), Agro-genetic Technologies. Uganda – “Transfer of Banana tissue culture technology to small-scale farmers. Presentation.

Philip's (1996). Modern College Atlas for Africa, 20<sup>th</sup> edition, Leeds international books limited

Robertshaw P, (2006) *Africa's earliest bananas*. 59 (5) California State University, San Bernadino

Rubaihayo, P. R., and C. S. Gold (1993). *Rapid rural appraisal of highland banana production in Uganda*. InfoMusa 2:15-16.

Safalaoh ACL, Bokosi J., Kabambe V, Chilongo T, Mhango W, Banda J. W, Kaunda E. K.W,(2007). *Demand led research and analyzing the agricultural science technology and innovation (ASTI) systems in ACP countries: A case study report on the maize sub-sector in Malawi* The Technical Centre for Agricultural and Rural Cooperation (CTA)

Sapri Dakha (2000). *Consequences of Structural Adjustments on the poor* final draft.

Smale M, Abodi P, Rhinehart I, Edmeades S, Byabachwezi M, Eledu C, Nowakunda K, Wood S (2006) *Sample survey design. A baseline assessment of banana management practices: Uganda County report*. ARO/IFPRI/INBAP

Spilsbury J S, Jagwe J N and Ferris R S B (2002) *Evaluating the marketing opportunities for baana and its products in the principle banana growing countries of ASARECA*. IITA and Foodnet Report

Ssango F, Sabiiti J (2009). *Market-led banana technology adoption in central and western districts of Uganda*. Agribusiness management Associates

Ssemwanga J, Sseruwagi P (2010). *The latest developments in the horticulture supply chain in Uganda*. GobleHort publication

Sulma Foods web page

Tunburn J, Kamuhande R (2005). *Making services work for the poor: The experience of Uganda*. DFID/ILO

TRIAS (2007) Program summary document

Uganda Co-operative Alliance (UCA) *Development of the co-operative movement in Uganda*. <http://www.uca.co.ug/publications/coophist.pdf>

UEPB (2008). *Uganda Export Promotions Board Annual Report 2009*

Uganda Cooperative Alliance Limited (2009). *Annual report for the year 2007/2008*

Valmayor, R.V., Davide, R.G., Stanton, J.M., Treverrow, N.L. and Roa, V.N. (eds.) *Banana nematodes and weevil borers in Asia and the Pacific*: Proceedings of a conference workshop on nematodes and weevils borers affecting bananas in Asia and Pacific. Serdang, Selangor, Malaysia, 18-22 April, 1994.

Van Asten P.J.A., Gold C.S, Wendt J, De Waele D , Okech S.H.O, Ssali H., Tushmereirwe W.K, (2005) *The contribution of soil quality to banana yield problems and its relation to other banana yield loss factors in Uganda*. Report written for NARO and IITA.

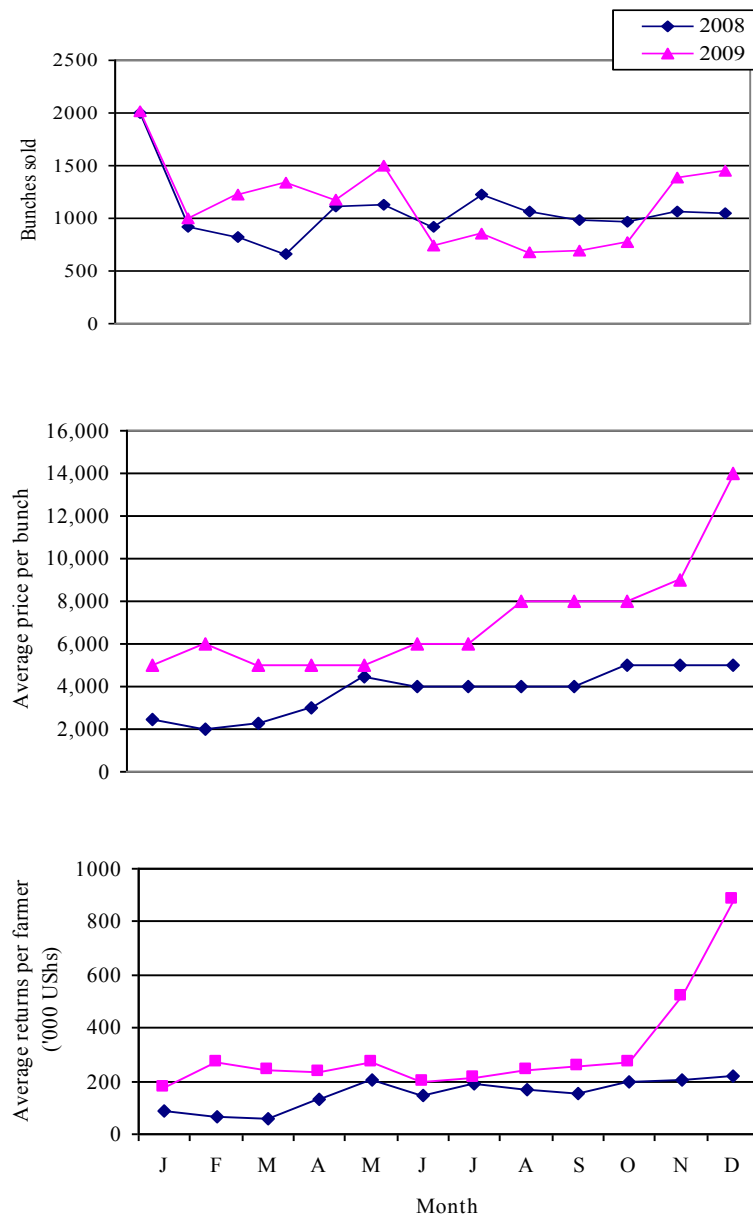
Wairegia L.W.I., Van Astena P J.A, Tenywa M, Mateete A. Bekunda (2010) . *Abiotic constraints override biotic constraints in East African highland banana systems*. Field Crops Research 117 (2010) 146–153.

Wanetosi J. B.A. R (1998). *A revised Edition of Mastering African History*. Riso Printers Wandegeya

WOUNET (2010) *The untapped potential of banana juice "omubisi" in Uganda*.

## APPENDIX 1:

### Engagement in Groups Improves Yields and Returns for Subsistence Farmers in Luwero



**Figure 18: Luwero Farmers in Groups Record Changes in Banana Profitability**

**APPENDIX 2:** Analysis of Functions of Actors in Banana Sub-sector**Table 9: Functions of Actors in Banana Sub-sector**

Actor Category	Government Functions			Implementation Functions			
	Policy making	Resource allocation	Regulatory	Financing	Implementation	Capacity building	Infrastructure
<b>Producers</b>	Lobby			Self financing	Key/ production	Member training	Farms
<b>Processors</b>	Lobby for organic		Enforce organic	Self financing	Key/ Processing	Of producers	Processing plants
<b>Stockists</b>				Self	Key Supply		
<b>Planting materials</b>	Lobby	Recipient	NGOs/ organic	Fundraise/ Self	Key/Produces and supplies	On-farm trials; Field attachments for ZARDIs	Research plots, Labs e.g. for tissue culture
<b>Public research institutions</b>	Key Formulation and influence	Lobby and source	Key	Provides for PARI/ZARDI	Key/ research	Staff & farm schools to share new knowledge	Labs, demonstration plots, seed multiplication centres etc
<b>Tertiary institutions</b>	Lobby		Key on organic	Fundraise and cost sharing	Knowledge & techn. transfer	Key training	Training facilities
<b>Governmental SDIOs</b>	Lobby	Influence	Create awareness	Key	Support	Key	
<b>NGOs &amp; Farmers cooperatives</b>	Lobby	Links to donors	Create awareness	Cost sharing	Facilitate	Key	Investing more in IT
<b>Central bank</b>	Key	Key	Key			Creates awareness on provisions	
<b>MDIs</b>				Key		Creates awareness on provisions	
<b>SACCOs</b>	Own policies		Own regulations	Self/ fundraise	Facilitate	For members	Buildings
<b>Transporters</b>	Lobby on taxes			Self/ loans	Purchase and supply		Key Provide transport
<b>Market vendors</b>				Self/ loans	Purchase and supply		Lobby for proper shades
<b>Handling &amp; Cold storage</b>				Self and loans	Provide services		Storage facilities
<b>Exporters</b>	Lobby			Self and loans	export	Awareness ff suppliers	Storage
<b>Government regulatory bodies</b>	Key Formulates	Influences	Key/ Enforces			Creates awareness	Support
<b>Other regulatory bodies</b>	Lobby for Organic		Enforcement	Supports	Key certification	Creates awareness	