MINISTRY of AGRICULTURE,
ANIMAL INDUSTRY and FISHERIES,
THE REPUBLIC of UGANDA

No.

THE REPUBLIC OF UGANDA

THE STUDY ON IMPROVEMENT OF POST-HARVEST PROCESSING AND MARKETING SYSTEM

FINAL REPORT

OCTOBER 2006

JICA

THE STUDY ON IMPROVEMENT OF POST-HARVEST PROCESSING AND MARKETING SYSTEM IN THE REPUBLIC OF UGANDA

Final Report

October 2006

JAPAN INTERNATIONAL COOPERATION AGENCY

TAIYO CONSULTANTS CO., LTD.
OVERSEAS MERCHANDISE INSPECTION CO., LT

R D
J R
06-55

**MINISTRY of AGRICULTURE,
ANIMAL INDUSTRY and FISHERIES,
THE REPUBLIC of UGANDA**

THE STUDY
ON
IMPROVEMENT OF POST-HARVEST PROCESSING
AND MARKETING SYSTEM
IN
THE REPUBLIC OF UGANDA

Final Report

October 2006

JAPAN INTERNATIONAL COOPERATION AGENCY

TAIYO CONSULTANTS CO., LTD.
OVERSEAS MERCHANDISE INSPECTION CO., LT

PREFACE

In response to a request from the Government of the Republic of Uganda, the Government of Japan decided to conduct the Study on Improvement of Post-harvest Processing and Marketing System and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Haruo Tsuchiya, Taiyo Consultants Co., Ltd., 11 times to Uganda between May 2003 and August 2006.

The team held discussions with the officials concerned of the Government of the Republic of Uganda, and conducted a series of field surveys in the country. After the team returned to Japan, further studies were also conducted and the present report has been prepared.

I hope that this report will contribute to the sustainable development of agriculture in Uganda and to the enhancement of friendly relationship between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Uganda for their close cooperation extended to the Study.

October 2006

Ariyuki Matsumoto
Vice President
Japan International Cooperation Agency

October 16. 2006

Mr. Ariyuki Matsumoto
Vice President
Japan International Cooperation Agency
Tokyo, Japan

LETTER OF TRANSMITTAL

Dear Sir

We are pleased to submit to you herewith the report on the Study on Improvement of Post-harvest Processing and Marketing System in the Republic of Uganda. The report presents the results of all works performed in both Uganda and Japan during a total period of 42 months from May 2003 to October 2006.

In line with the development framework of agriculture in Uganda, namely Plan for Modernization of Agriculture, the Study prepared a development plan for improved post-harvest processing and marketing system in central and eastern Uganda, with particular emphasis on collective action by farmers/ farmers' organization. Based on the results of the pilot projects conducted in the course of study on collective post-harvest processing and marketing by farmers' organization, implementation of the model projects with support by the government is proposed in the development plan. We sincerely hope that the model projects as to be implemented by the Government of Uganda as early as possible.

We wish to express our deep appreciation and sincere gratitude to your Agency, the Ministry of Foreign Affairs, the Ministry of Agriculture, Forestry and Fisheries of the Government of Japan for the courtesies and cooperation kindly extended to our team.

We also wish to express our deep appreciation and sincere gratitude to the Uganda Office of your Agency, the Embassy of Japan in Uganda, the Ministry of Agriculture, Animal Industry and Fisheries of the Government of Uganda and other authorities concerned for their close cooperation and assistance extended to our team during our field investigation and studies in Uganda.

Very truly yours,

Haruo Tsuchiya
Leader of the Study team
Improvement of Post-harvest Processing and Marketing System in the Republic of Uganda

Project Area

Map No. 3862 Rev. 3 UNITED NATIONS
September 2002

Department of Public Information
Cartographic Section

Project Area

Capital (Kampala)

Activities of Farmers' Groups

Rice Processing and Marketing Project

Transport of paddy to mill

Milling facility

Drying yard of the milling facility

Milling paddy

Trading in milled rice with traders

Stock yard of milled rice

Activities of Farmers' Groups

Cassava Flour Production and Marketing Project

Facility of cassava flour processing

Peeling of cassava

Chipping cassava

Drying chipped cassava

Milling cassava flour

Packing cassava flour

Activities of Farmers' Groups

Fruit Processing and Marketing Project

Facility of fruit processing

Pineapple field

Peeling and pressing to extra juice

Making pineapple wine

Juice packed by plastic pouch and bottle

Pineapple wine at retail shops

The Study on Improvement of Post-Harvest Processing And Marketing System in the Republic of Uganda

Draft Final Report

Table of Contents

CHAPTER 1 INTRODUCTION ..... - 1 -
1.1 Background of the Study ..... - 1 -
1.2 The Objectives of the Study ..... - 2 -
1.3 The Study Area ..... - 3 -
1.4 Scope and Contents of the Study ..... - 3 -
1.5 Preceding Reports of the Study ..... - 3 -

CHAPTER 2 GENERAL SITUATION OF AGRICULTURE AND MARKETING IN THE STUDY AREA - 4 -
2.1 Current Situation of Agriculture ..... - 4 -
2.2 Categorization of the Study Area ..... - 5 -
2.2.1 Agro-ecological Zoning ..... - 5 -
2.2.2 Agricultural Production ..... - 8 -
2.2.3 Scale of farming (farm size) ..... - 11 -
2.2.4 Demand/Supply Situation ..... - 12 -
2.2.5 Priority Commodities of the Respective Districts ..... - 13 -
2.2.6 Socio-economic Issues ..... - 14 -
2.2.7 Result of Categorization ..... - 17 -
2.3 Current Situation of Marketing ..... - 19 -
2.3.1 Cross Cutting Issues ..... - 19 -
2.3.2 Major Characteristics by Commodities ..... - 21 -
2.3.3 Current Situation of Farmer's Organization ..... - 49 -

CHAPTER 3 COMPREHENSIVE POLICY AND STRATEGIES OF AGRICULTURAL SECTOR 53
3.1 Poverty Eradication Action Plan (PEAP) 53
3.2 Plan for Modernization of Agriculture (PMA) 54
3.3 Agro-processing and Marketing Issues in PMA 55
3.4 Other Related Pillars Related to Agro-Processing and Marketing 56
3.5 Rural Development Strategy (RDS) 58
3.5.1 Increasing incomes through export : A Plan for Zonal Agricultural Production, Agro-processing and Marketing . . 58
3.5.2 The Model Sub-county Development Programme (MSDP) 60
3.6 Support by Donors on Agro-Processing and Marketing 61

CHAPTER 4 PILOT PROJECT 64
4.1 Basic Concept of the Pilot Project Implementation 64
4.1.1 Basic Concept 64
4.1.2 Selection of the Pilot Projects 65
4.1.3 Workshop for Consensus Building 66
4.1.4 Organizational Structure for the Pilot Project Implementation 68
4.2 Zirobwe Rice Processing and Marketing Project 71
4.2.1 Outline of Project 71

4.2.2 Planning and Performance of the Project 71
4.2.3 Results of the Evaluation 79
4.2.4 Lessons Learnt 85
4.3 Bulamogi Rice Processing and Marketing Project 90
4.3.1 Outline of Project 90
4.3.2 Planning and Performance of the Project 91
4.3.3 Results of the Evaluation 99
4.3.4 Lessons Learnt 107
4.4 ACAPROMA Cassava Flour Production and Marketing Project 111
4.4.1 Outline of the Project 111
4.4.2 Planning and Performance of the Project 112
4.4.3 Results of the Evaluation 123
4.4.4 Lessons Learnt 130
4.5 Kangulmira Fruit Processing and Marketing Project 137
4.5.1 Outline of the Project 137
4.5.2 Planning and Performance of the Project 138
4.5.3 Results of the Evaluation 150
4.5.4 Lessons Learnt 156
4.6 Overall Evaluation of the Pilot Project 161

CHAPTER 5 DEVELOPMENT PLAN 167
5.1 Basic Concept of the Development Plan 167
5.2 Basic Approach of the Development Plan 168
5.2.1 Promotion of Collective Post-harvest Processing and Marketing by Farmers' Organization 168
5.2.2 Commodity Based Approach/ Target Districts for Identified Commodities 168
5.3 Target of the Development Plan 169
5.3.1 Projection of Production and Market Supply 170
5.3.2 Increase in Market Share of Collective Marketing 170
5.4 Model Project 171
5.4.1 Outline of Project 171
5.4.1.1 Types of the Model Projects 173
5.4.1.2 Business Model/ Commodity Specific Plan 175
5.4.2 Implementation Plan 199
5.4.2.1 Implementation Period 199
5.4.2.2 Implementation and Support System 199
5.4.2.3 Implementation Procedure 202
5.4.2.4 Financial Plan 204

CHAPTER 6 RECOMMENDATIONS 207

Annex1 Plan of Pilot Project A-1
Annex2 Baseline Survey A-55
Annex3 Impacts to Farmers' Group A-75
Annex4 Newsletter A-85
Annex5 Manual A-115

Abbreviation

ACEs	Area Cooperative Enterprises
CBO	Community Based Organization
CIAT	International Center for Tropical Agriculture
D/P	Development Plan
DAOs	District Agricultural Officers
DDA	Dairy Development Authority
DDP	Draft Development Plan
FAO	Food and Agriculture Organization of the United Nations
GEM	Gender Empowerment Measure
Ha	Hectare
HORTEXA	Horticulture Exporters Association
IDEA	Investment in Developing Export Agriculture
IITA	International Institute for Tropical Agriculture
IT/R	Interim Report
JICA	Japan International Cooperation Agency
KARI	Kawanda Agriculture Research Institute
M/M	Minutes of Meeting
MA	Management Adviser
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MB	Management Board
MT	Metric Ton
MTTI	Ministry of Tourism, Trade and Industry
NAADS	National Agricultural Advisory Services
NARO	National Agricultural Research Organization
NEMA	National Environmental Management Authority
NGO	Non-Governmental Organization
NOGAMU	National Organic Agriculture Movement of Uganda
NRI	National Research Institute
PAB	Project Advisory Board
PDM	Project Design Matrix
PEAP	Poverty Eradication Action Plan
PMA	Plan for Modernization of Agriculture
S/W	Scope of Works
SG-2000	Sasakawa Global-2000
TA	Technical Adviser
TWG	Technical Working Group
UCA	Uganda Cooperative Alliance
UCE	Uganda Commodity Exchange
UGT	The Uganda Grains Traders Ltd.
UNDP	United Nations Development Programme
UNFFE	Uganda National Farmers Federation
UNHS	The Uganda National Household Survey
UNIDO	United Nations Industrial Development Organization
URA	Uganda Revenue Authority
USAID	U. S. Agency for International Development
WFP	The United Nations World Food Programme
WRS	Warehouse Receipt System

Currency Exchange Rate : US$=1,850 Ush. (April 2006)

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

Uganda is a landlocked country located right on the equator, bordering with Tanzania and Rwanda in the south, Congo in the west, Sudan in the north and Kenya in the east, with total geographical area of 241,039 sq.km (including water and swamp area of 43,942 sq.km). With average altitude of 1,222m, temperature is generally moderate as yearly average of 15- 30℃, with precipitation of 750mm-1,750mm per year.

Total population in 2005 was 26.8 million, more than 80% of whom depend on agriculture. Agriculture is the mainstay of the Ugandan's economy, contributing to total GDP by around 40.8% and exporting around 67% of the total. Most of the farmers are small scale and subsistence, with less than 2.0 ha of farmland, producing mainly food crops for their home consumption. Export crops, such as coffee, cotton, tobacco and tea are also produced.

Since 1986, aiming to achieve the recovery from the social and political turmoil persisted for so many years, the government of Uganda adopted the structural adjustment program and started to receive the assistance of IMF, World Bank and other international and bilateral donors. The structural adjustment program contributed much in reducing inflation and achieving high economic growth, and was highly esteemed among international community as a result of the structural adjustment program.

As a comprehensive development framework of Uganda, Poverty Eradication Action Plan (PEAP 2004) is grouped under five(5) pillars of i)Economic management, ii)Enhancing production competitiveness and incomes, iii)Security, conflict resolution and disaster management, iv)Governance, and v)Human development. Plan for Modernization of Agriculture (PMA) was formulated as an important element of PEAP. PMA is a comprehensive and strategic framework aiming at sustainable improvement of the living standard of the people through multisectoral policy interventions. Shift from subsistence farming to commercial farming is one of the major focuses of the strategy.

The PMA has 7 main public intervention areas that lead to poverty eradication through more productive and commercial agricultural sector. They are: (1) research and technology development; (2) agricultural advisory services; (3) rural finance; (4) agro-processing and marketing; (5) agricultural education; (6) sustainable natural resource management; and (7) supportive physical infrastructure. This Study aims at addressing the agro-processing and marketing related constraints to agricultural development, so as to enhance the marketing

possibilities of small-scale farmers.

The Government of Japan had extended cooperation to Uganda in 1994 for the project "Study on Master Plan (MP) for Agricultural Development in Central Uganda". Based on the recommendation of the Study (M/P), grant aid project for the establishment of "Agricultural Extension Center" was implemented in 1999. Recommendation in the M/P also included proposal on project for agricultural marketing.

In July 2000, a request was made from the Republic of Uganda to the Government of Japan to conduct the Study on Improvement of Post-Harvest Processing and Marketing System in the Republic of Uganda.

In response to the request, the Government of Japan conducted a preliminary study through Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation program, by dispatching a preliminary survey team to Uganda, to discuss and define the project with Ugandan counterparts in December 2002. Both sides agreed upon the implementation of the Study on Improvement of Post-harvest Processing and Marketing System in the Republic of Uganda.

The Study is to be conducted in accordance with the Scope of Work (S/W) and Minutes of Meeting (M/M) agreed upon on that occasion between the Ministry of Agriculture, Animal Industry and Fisheries of Uganda and JICA.

1.2 The Objectives of the Study

The objectives of the study, as referred to in the S/W, are;

(1) To formulate a detailed Development Plan (D/P) in accordance with the Plan for Modernization of Agriculture, aiming at improvement of agricultural post-harvest processing and marketing system in Central and Eastern Uganda; Pilot project(s) would be implemented in the course of the Study; and
(2) To carry out technology transfer to the Ugandan counterpart personnel as well as the communities concerned by the Study Team in the course of the Study

1.3 The Study Area

The Study area covers fourteen (14) districts, five (5) districts (Kamuli[1], Iganga, Jinja, Bugiri and Mayuge) in Eastern Uganda and nine(9) districts (Nakasongola, Luwero[2], Kiboga, Kayunga, Kampala, Mukono, Mpigi, Wakiso and Mubende) in Central Uganda.

1.4 Scope and Contents of the Study

The Study was conducted in the two (2) phases.
In Phase 1 (from May 2003 to March 2004), formulation of the draft Development Plan for the Improvement of Post-Harvest Processing and Marketing System was made with the preparation of the pilot project(s).
In Phase 2 (from June 2004 to November 2006), implementation of pilot project(s) was conducted, with monitoring and evaluation, and Development Plan was prepared feeding back the results of the pilot project(s) implementation.

1.5 Preceding Reports of the Study

The following reports were prepared and submitted to the concerned parties in Uganda and Japan.

1) Inception Report May 2003
2) Progress Report (1) August 2003
3) Interim Report (1) January 2004
4) Interim Report (2) February 2004
5) Progress Report (2) December 2004
6) Progress Report (3) June 2005
7) Progress Report (4) October 2005
8) Progress Report (5) March 2006

The report submitted here is, therefore, The Final Report of the Study.

[1] Kamuli district was divided into Kamuli district and Kaliro district last year.

[2] Luwero district was divided into Luwero district and Nakaseke district last year.

CHAPTER 2 GENERAL SITUATION OF AGRICULTURE AND MARKETING IN THE STUDY AREA

2.1 Current Situation of Agriculture

Agriculture is the dominant sector of the Ugandan economy, accounting for 43% of GDP, 85% of export earning and provides most of the raw materials to the agro-based industrial sector. Around 85 % of the total population lives in the rural area, depending mainly on agriculture.
Therefore, agriculture sector is the major target of poverty eradication programs and projects.
Agricultural production depend on around 3 million small-holder farmers, many of them being subsistence farmers.

Food crops predominates agriculture sector with 71% of agricultural GDP, followed by livestock with 17%, export crops with 5%, fisheries with 4% and forestry with 4%. Only one-third of the food crops produced are marketed while two-third of the livestock produced are marketed.
About 42% of agricultural GDP consists of subsistence crops for producers' family consumption.
In terms of areas cropped, bananas constitutes 28% of the total, followed by root crops of 17%, cereals of 14% and oil seeds of 8%. Export crops, such as coffee, tea, cotton and tobacco share 8% of the total cropped area.
Compared to many Sub-Saharan countries, Uganda has many advantages that include;

- Reasonably fertile soils
- Satisfactory and reasonable rainfall
- Wide range of crops available owing to better combination of temperature, rainfall and soils.
- Scopes of expansion of cultivation for wide range of crops and livestock
- Existence of many lakes and swamps
- Low labor cost for a competitive strength in supply cost.

In 1970s and '80s, growth in agriculture sector in Uganda was hampered by a series of policy and constraints such as a) Government monopolistic control of food and export crops marketing, b) inadequate infrastructure, c) shortages foreign exchange, and d) insecurity in the country.
Many of these constraints have been removed during the implementation of the Economic Recovery Programme during the past decade.
However, there still exist constraints to be addressed for the sustainable growth of agriculture as follows;

- Technology generation and dissemination
- Financial constraints
- Land tenure and policy

- Farmers' organization
- Human resource constraints
- Information constraints
- On-farm and off-farm storage
- Environmental degradation
- Effect of HIV/AIDS

Except for traditional export crops such as coffee, tea, cotton and tobacco, marketing for other commodities are not well organized. Policy orientation from subsistence farming to commercialized farming calls for improved marketing for the benefit of small holder farmers and other stakeholders.

2.2 Categorization of the Study Area

For the preparation of the Development Plan (D/P) of the Study area, 14 districts in Eastern and Central part of the country, categorization of the area is considered, using following factors.

1) Agro-ecological Zoning
2) Agricultural Production
3) Scale of Farming (farm size)
4) Supply-Demand Situation
5) Priority Commodities of the Respective District
6) Socio-economic/Rural Structure

2.2.1 Agro-ecological Zoning

In considering zoning, three types of Agro-ecological zonings (AEZ) now available were referred. These include that of National Environmental Management Authority (NEMA), International Center for Tropical Agriculture (CIAT) and Agricultural zoning used by MAAIF/Arg.2004.

(1) National Environmental Management Authority: NEMA

NEMA classifies the whole country by 13 AEZs (including lakes) with 9 major farming systems. According to this classification, the Study area belongs mostly to Lake Victoria Crescent/ Mbale Farmland, followed by South Eastern Lake Kiyoga basin, Central Wooded Savanna and Western mid-altitude farmland/Semliki flats.

In this zoning 9 different farming systems are recognized, of which following 4 systems are observed in the Study area.

	Zone Coverage in the Study Area
(1)Intensive Banana Coffee Lake Shore System:	***Bugiri Mayuge Jinja Mukono Wakiso Kampala Mpigi***
(2)Banana Millet Cotton System:	***Iganga Kamuli Kayunga Kakasongola Luwero***
(3)Western Banana Coffee Cattle System:	***Kiboga Mubende***
(4)Pastoral and Some Annual Crops System:	***Mubende***

Of the above, (1) and (2) have the larger share in the Study area.

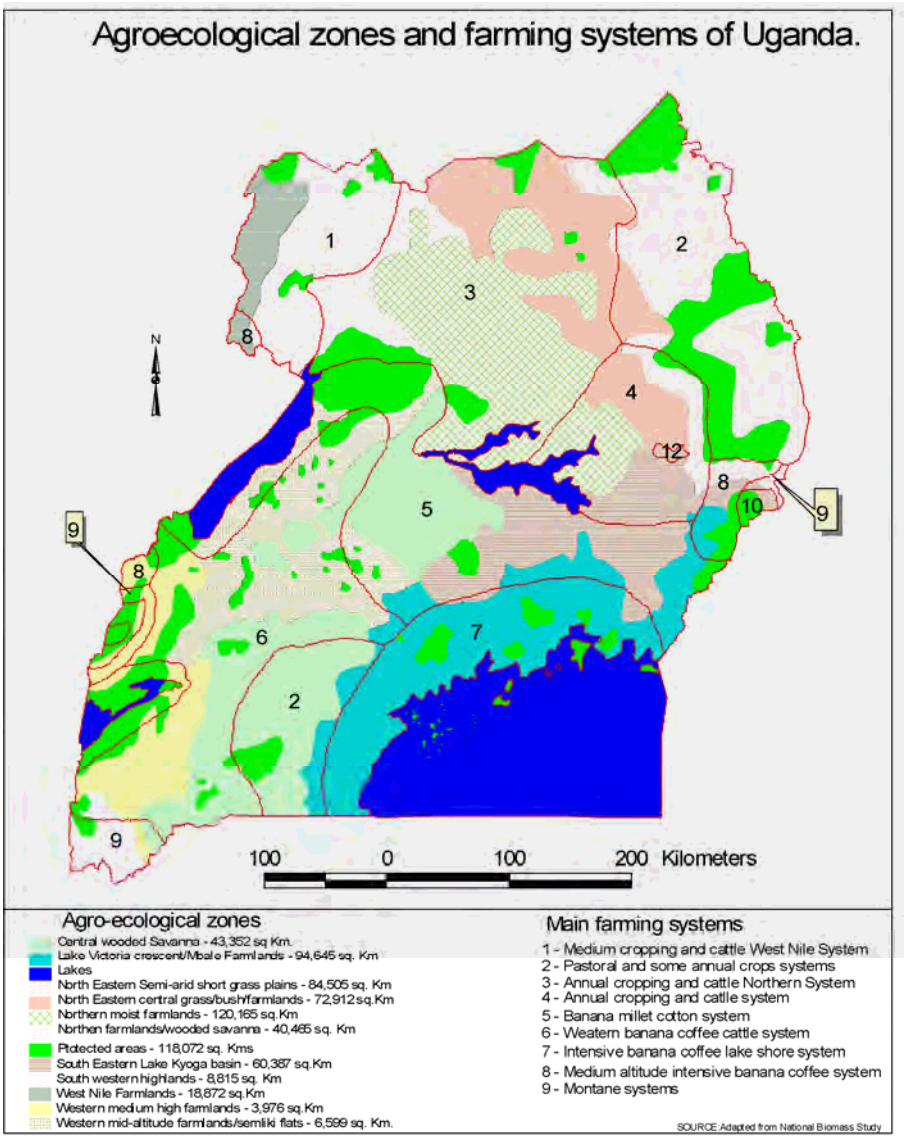


Figure 2.1 Agro-ecological Zones and Main Farming System

(2) International Center for Tropical Agriculture: CIAT

CIAT's AEZ, a more recent one, identifies 33 AEZs, from which NARO has carved out 12 sub-regions. These zones were delineated and defined based on such factors as climatic and soil

variables, population, land use and major crops.

According to this classification, the Study area is spread to 7 zones below.

	Zone Coverage in the Study Area
i) Jinja and Mbale Farmland:	***Jinja***
ii) Southern and Eastern Lake Victoria:	***Northern part of Iganga, Northern part of Bugiri, Kamuli***
iii) Central Buruli Farmlands:	***Kayunga, Southern part of Luwero***
iv) Central Woodland Savanna:	***Nakasongla, Northern part of Luwero, Northern part of Kiboga***
v) Western Mid-land Farmlands:	***Southern part of Kiboga, Mubende, Mpigi***
vi) Lake Victoria Crescent:	***Mpigi, Wakiso, Kampala, Mukono, Iganga, Mayuge, Bugiri***
vii) Sango Plains:	***A part of Mubende***

In the zoning, Lake Victoria Crescent occupies the major part in the Study area.

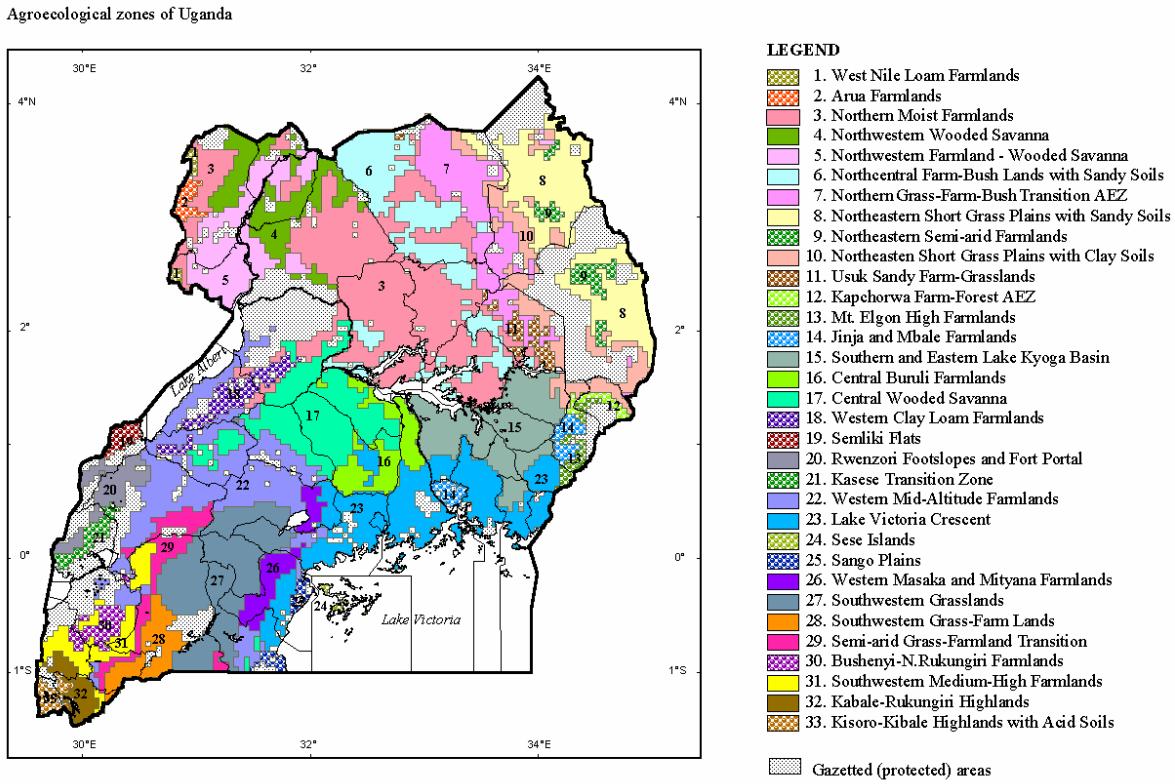


Figure 2.2 Agro-ecological Zones of Uganda

(3) Ugandan Agricultural Systems by MAAIF

Ministry of Agriculture, Animal Industry and Fisheries classifies the country by 7 agricultural systems as follows;

i) Teso system (Cotton, Finger Millet, Groundnuts, Cattle)
ii) Banana and Coffee system
iii) Banana, Finger Millet, Cotton and Groundnuts
iv) Northern systems (Cotton, Simsim, Finger Millet, groundnuts, Sunflower)
v) West Nile system (Tobacco, Cotton, Cassava, Coffee, Groundnuts)
vi) Montane system (Coffee, Banana, Cotton, Cereal)
vii) Pastoral system

Major part of the Study area belongs to system ii), and partly to iii).

ii) Bugiri, Iganga, Jinja, Mukono, Wakiso, Kampala, Mpigi, Mubende
iii) Kiboga, Luwero, Nakasongola, Kayunga, Kamuli

2.2.2 Agricultural Production

Agricultural production in the Study area is diverse, as the case in the country as a whole. Tropical climate is considerably modified by elevation. Average temperature is normally at 21－22℃ and average annual rainfall is 1,300 mm with variation by the region. Two rainy seasons are observed in the Study area, one in March - May and another in September - November. Owing to these natural endowments, tropical and temperate crops are widely grown in the area.

(1) Crop production

Food crops grown include banana, cassava, sweet potatoes, Irish potatoes, maize, finger millet, sorghum, rice and beans. Oilseed crops include groundnuts, simsim, soybeans, and sunflower. Fruits crops include pineapple, papaya, citrus, mango avocado and passion fruits. Vegetables such as onion, chili, eggplant, cucumber, carrot, pumpkin are also widely grown, though the exact figures on planted area and production seems to be difficult to estimate.

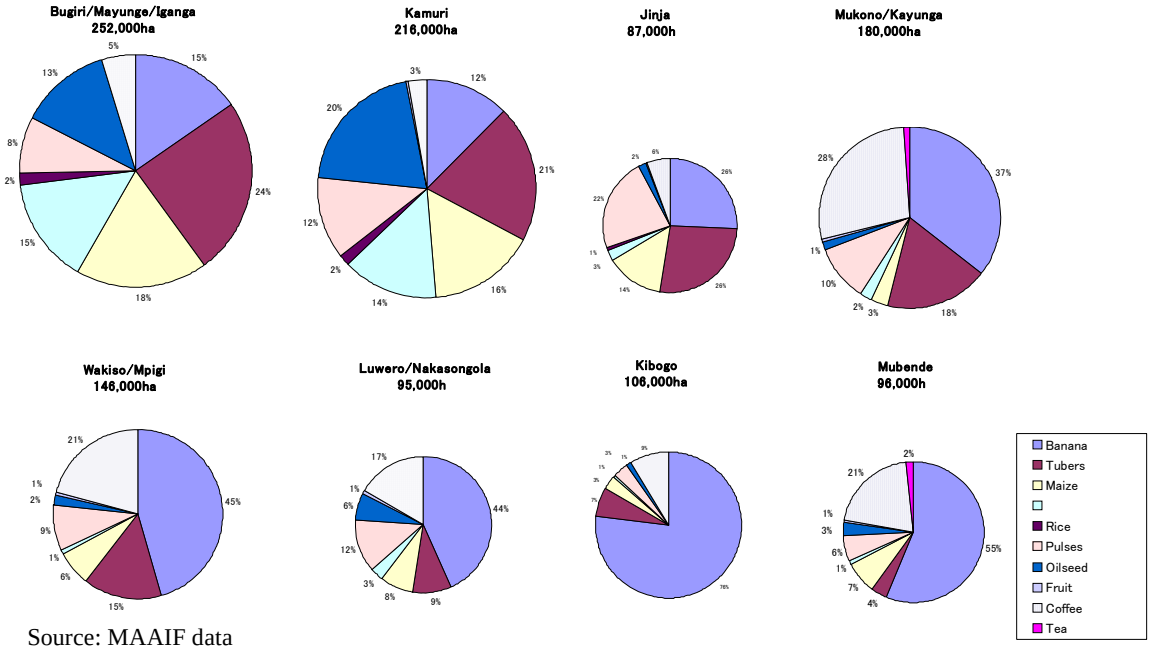
Traditional export crops produced in the Study area are coffee, tea, vanilla and cocoa. Coffee, the most important export commodity of the country is produced in the area around 32% of the total. Another important crop to be noted is sugarcane, produced in Mukono and Jinja districts where commercial plantations locate.

Cultivation areas of the major crops of the Study are as follows;

Table 2.1 Cultivation Area of Main Crops (Ha)

	Eastern				Central							
District	BUGIRI	MAYUGE	IGANGA	JINJA	KAMULI	MUKONO	KAYUNGA	KAMPALA	WAKISO	MPIGI	LUWERO	NAKASONGOLA	MUBENDE	KIBOGA
Banana/Tubers														
Bananas		38,502		22,442	26,904	63,913	–			66,295		40,971	54,130	81,197
Cassava		28,728		3,158	18,298	13,668	–			12,246		3,337	244	3,129
Sweet potatoes		31,589		18,495	23,980	18,960	–			9,226		2,911	2,129	3,786
Irish potatoes		1,542		1,515	1,839	400	–			686		2,393	1,105	–
Cereals														
Maize		46,513		12,052	33,960	5,433	–			9,457		7,755	7,003	2,997
Finger millet		30,181		2,345	27,218	2,485	–			191		1,106	606	404
Sorghum		7,032		–	3,332	1,497	–			1,275		1,774	370	190
Rice		4,176		680	3,786	–	–			–		–	–	–
Pulses														
Beans		17,956		19,482	26,051	17,992	–			12,557		10,845	5,445	3,631
Cow peas		995		38	199	–	–			–		934	11	–
Pigeon peas		139		–	–	7	–			–		–	–	–
Oilseed														
Ground nuts		9,272		413	7,173	1,938	–			1,394		3,372	1,598	1,066
Simsim		3,089		–	2,686	301	–			19		263	70	–
Soya beans		1,942		1,282	34,163	296	–			1,253		2,137	1,253	–
Sunflowers		–		–	61	–	–			–		255	–	–
Fruits														
Pineapple		40		20	10	350		30		300		200	200	
Passionfruit		15		20	–	60		30		100		20	30	
Citrus		100		40	250	15	–			10		40	20	
Mango		80		10	80	40	–			80		200	80	
Avocado		50		40	40	100		20		100		80	40	
Papaya		200		100	80	250		40		250		150	150	

Source : MAAIF



Source: MAAIF data

Figure 2.3 Main Crops' Occupancy Rate (Cultivation Area)

(2) Animal production

Livestock raised in the Study area include cattle, goat, sheep, pig and chicken. Beef cattle are popular where natural inland grassland is available, though there exist small scale cattle raising around the areas of Lake Victoria. In the former, cattle are raised on large scale ranches or free range while in the latter, beef cattle or dairy cattle are raised on a small scale, being fed by cut grass or small pastureland.

Goats and sheep are raised for meat, often being grazed together with cattle, but generally tethered near the farmhouses on a small scale.

Pigs are raised by farmers who are primarily crop farmers on a small scale of 10 heads or less.

Pigs are often allowed to roam freely on farm plot.

Most of the poultry are indigenous one, and raised on free range system. They are left out during the day and housed at night. Exotic breed of layers and broilers are emerging. In this case, poultry is kept indoors usually by deep-litter system and fed on commercially prepared feeds.

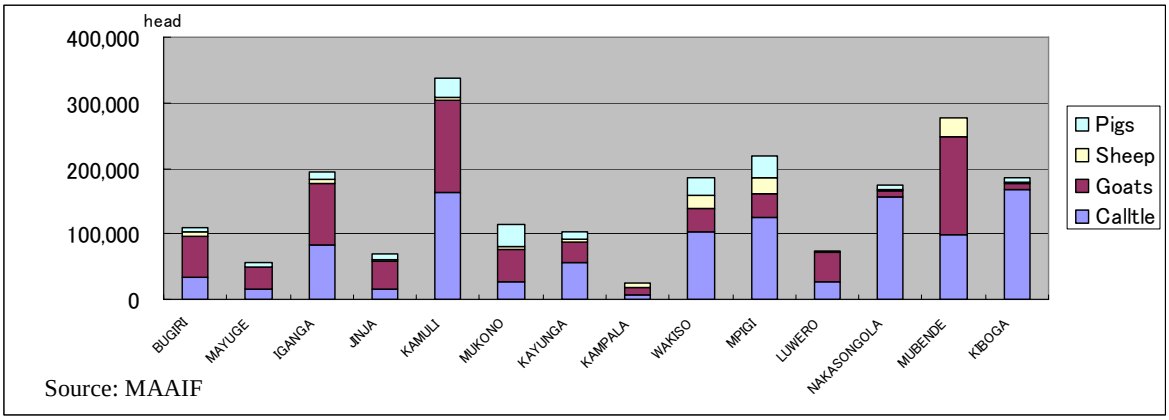


Figure 2.4 Animal Population by Districts

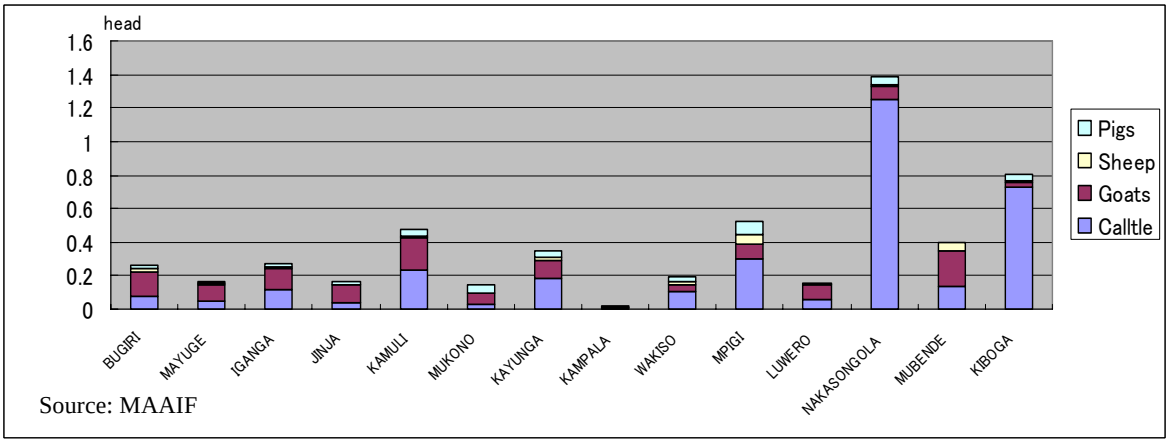


Figure 2.5 Number of Animal Per Capita

(3) Fisheries

Fishing is another important economic activity in the Study area. Among 6 major lakes in the country, two lakes, Lake Victoria and Lake Kyoga have direct access to the Study area. Fish catch in Lake Victoria and Lake Kyoga account 61% and 25% of the national total fish catch respectively. Mukono district outnumber in fish catch as the major landing sites of Lake Victoria are mainly located. Over 60 % of the fish catch seems to be sold fresh. Smoked and sun-dried fish are for local market.

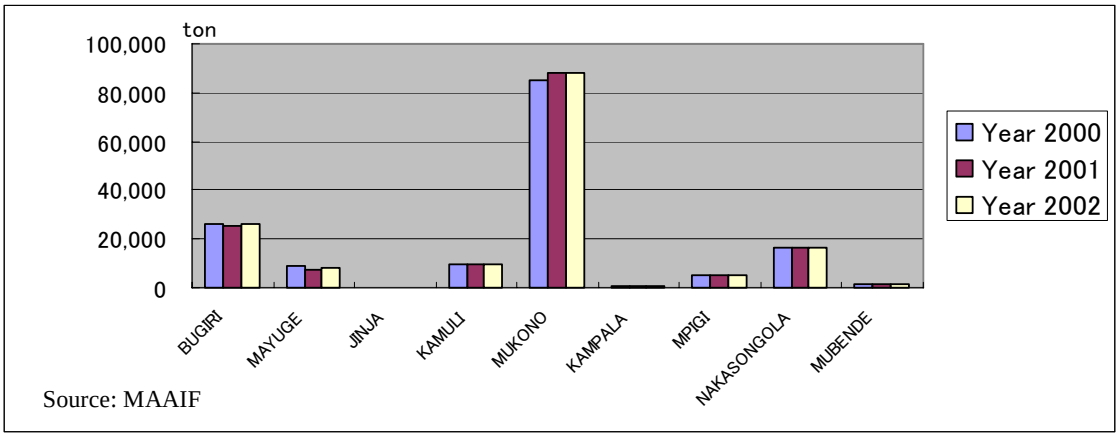


Figure 2.6 Fish Production

2.2.3 Scale of farming (farm size)

Small scale and subsistent farming is the dominant characteristic of agriculture of the country. The average size of the farm in the Study area is estimated at 2.39ha, ranging from the smallest of Jinja at 1.6ha, followed by Mukono/ Kayunga 1.91ha, Luwero/ Nakasongola 1.97ha, Wakiso/ Mpigi 1.99ha, Mubende/ Kiboga 3.11ha and the largest of Kamuli of 3.15ha. High share of the household less than 1.0 ha are observed in those districts facing Lake Victoria, as Bugiri/ Mayuge 45%, Jinja 49%, Mukono/ Kayunga 45%, Wakiso/ Mpigi 50%.

Table 2.2 Ratio of Farmers by Farm Size

District	< 1ha	1-2ha	2-5ha	5-10ha	10ha >	Number of household	Average ha
Eastern							
Bugiri Mayuga Iganga	**45%**	24%	19%	7%	5%	110,395	2.56
Jinja	**49%**	26%	19%	5%	0%	22,827	1.60
Kamuli	25%	28%	**31%**	11%	5%	70,628	3.15
Central							
Mukono Kayanga	**45%**	29%	17%	6%	2%	127,641	1.91
Kampala	-	-	-	-	-		
Wakiso Mpigi	**50%**	31%	12%	4%	3%	82,609	1.99
Luwero Nakasongda	34%	31%	28%	5%	1%	44,593	1.97
Mubenda Kiboga	27%	27%	**30%**	10%	6%	85,805	3.11

Source: Uganda National Census of Agriculture and Livestock

Available area for expansion for each district was calculated from the total cultivable area and the existing farmland. Potentials for expansion of farmland are assessed as follows;

Table 2.3 Districts Clustered by Available Expansion Area

Potential Expansion Land Area Available		
High	Medium	Low
Mubende, Kiboga, Luwero, Nakasongola	Mukono, Mpigi, Kamuli Kayunga	Wakiso, Kampala, Jinja, Bugiri, Iganga, Mayunge

Source: Uganda National Census of Agriculture and Livestock

FIS (Farm Household Income) was observed by UNC's (Uganda National Census of Agriculture and Livestock) results. According to the UNC, among total net income of household by farm size, that of the stratum less than 2.0 ha was 1,117,000 Ushs while that of 2.1-5.0 ha was 1,409,000 Ushs. Net income increases in parallel to proceed to higher stratum, but the trend of increase seems to be rather modest.

Table 2.4 Farmers Income by Farm Folding Size

Farm holding size		< 2ha	2.1−5ha	5.1−10ha	10.1−20ha	20.1−30ha	30.1−70ha	70ha >
Agricultural	1,000UShs							
Gross Income		1,047	2,981	5,589	7,387	10,959	13,700	27,721
Expenditure		589	1,921	3,182	4,149	7,403	8,168	14,220
Net Income		458	1,060	2,717	3,238	3,556	5,532	13,500
None agricultural income		660	349	1,739	926	358	4,367	1,357
Total net income		1,117	1,409	4,456	4,164	3,915	9,899	14,858
Members of family	men	8.8	11.4	16.1	14.8	16.0	13.5	17.9
Hired labours	men	1.1	1.7	3.9	5.3	5.5	12.1	30.1
Cultivated area	ha	1.4	3.5	8.1	15.9	27.2	55.2	88.6

Source: Uganda National Census of Agriculture and Livestock

2.2.4 Demand/Supply Situation

Demand/Supply situation on major food crops at each district were estimated for the purpose of assessing the supply capacity of each district.

Demand is calculated based on the Regional per capita consumption of major food commodities (Source: Food Security and Export 1992/1993) and population. For the figure of supply, MAAIF's Figure for production was used. Thus surplus and deficit were calculated for each commodity of respective districts. Those commodities in surplus are banana, cassava, Irish potatoes, maize, soybean, while sweet potatoes, sorghum, rice, beans, cowpeas, and groundnuts are in deficit.

Table 2.5 Supply/Demand of Food by Each District

(Unit: tons)

District	Eastern			Central						Total of Study Area	UGANDA
	BUGIRI/ MAYUGE/ IGANGA	JINJA	KAMULI	MUKONO/ KAYUNGA	KAMPALA	WAKISO/ MPIGI	LUWERO/ NAKASONGOLA	MUBENDE	KIBOGA		
Banana/Tubers											
Bananas	31 924	72 916	57 651	150 260	*(265 880)*	67 472	104 874	211 623	499 521	930 361	4 764 962
Cassava	193 080	*(14 626)*	154 759	49 704	*(154 694)*	*(4 379)*	*(30 137)*	*(82 480)*	65 415	176 643	2 278 358
Sweet potatoes	*(9 051)*	40 754	35 780	*(4 698)*	*(99 101)*	*(70 705)*	*(36 175)*	*(31 105)*	28 913	*(145 388)*	612 082
Irish potatoes	8 697	10 602	12 461	*(3 839)*	*(7 493)*	*(3 334)*	15 991	623	1 898	35 608	325 734
Cereals											
Maize	53 453	13 053	47 735	*(14 149)*	*(26 830)*	*(12 380)*	1 461	*(18 460)*	591	60 631	661 259
Finger millet	14 610	*(5 387)*	26 580	*(2 415)*	*(6 768)*	*(7 397)*	*(1 632)*	*(4 657)*	*(717)*	13 809	186 592
Sorghum	*(2 280)*	*(3 684)*	*(4 671)*	1 745	*(604)*	1 272	173	*(416)*	147	*(7 738)*	209 209
Rice	869	*(277)*	2 276	*(3 094)*	*(3 384)*	*(3 842)*	*(1 680)*	*(2 328)*	*(649)*	*(11 758)*	30 502
Pulses											
Beans	*(15 639)*	6 051	4 994	*(8 177)*	*(23 204)*	*(17 243)*	*(3 659)*	*(15 966)*	*(1 818)*	*(68 306)*	52 395
Cow peas	*(1 674)*	*(708)*	*(1 084)*	*(884)*	*(967)*	*(1 098)*	433	*(665)*	*(185)*	*(6 722)*	34 251
Pigeon peas	*(1 030)*	*(331)*	*(570)*	7	0	0	0	0	0	*(1 923)*	72 100
Oilseed											
Ground nuts	*(4 394)*	3 858	1 175	*(4 543)*	*(6 284)*	*(6 269)*	*(1 026)*	*(4 324)*	*(544)*	*(20 707)*	18 212
Simsim	*(1 029)*	*(290)*	881	*(177)*	*(363)*	*(376)*	*(44)*	*(249)*	*(70)*	*(1 642)*	73 826
Soya beans	25 049	1 468	44 268	166	*(242)*	1 362	2 672	*(166)*	*(46)*	76 192	140 776
Sunflowers	–	–	73	–	–	–	324	–	–	397	123 901

Source: Estimated by the Study Team

Composition of Export in agricultural products was observed at value basis from 1996 to 2001. Coffee has the dominant share of 32%, followed by fish and fish products (24%), tobacco (10%), tea (9%) hide and skin (9%), flowers (5%) and cotton (5%).

Table 2.6 Composition of Agricultural Export

(value in million US$)

	1996	1997	1998	1999	2000	2001	
Coffee	396.098	309.742	295.220	275.333	125.394	97.654	32%
Cotton	7.546	30.221	7.691	17.792	18.966	9.759	3%
Tea	10.577	12.851	28.181	21.489	27.532	27.208	9%
Tabacco	4.856	12.838	22.494	14.739	24.926	30.065	10%
Beana	6.411	6.364	2.300	5.903	3.001	1.607	1%
Simsim	9.759	0.628	0.010	1.413	0.789	0.795	0%
Other Pulses	1.834	0.120	0.083	0.025	0.107	0.101	0%
Cereals	13.198	11.917	9.497	5.115	2.555	10.973	4%
Fish & its Products	45.935	29.983	39.408	25.044	24.163	73.244	24%
Fruits & Vegetable	1.136	2.112	1.980	3.662	2.492	3.342	1%
Hides & Skins	8.444	9.622	6.561	4.262	13.607	25.944	9%
Flowers	3.376	6.292	7.410	6.719	6.221	15.611	5%
Cocoa beans	1.209	1.595	1.553	1.488	1.185	1.902	1%
Vannilla	1.489	0.074	1.867	0.071	1.720	5.153	2%
Total Value	511.868	434.359	424.255	383.055	252.658	303.358	

Source: Bank of Uganda

It should be noted that, in response to the growing domestic demand, rice import has increased in recent years, at annual import volume of around 50,000 tons.

2.2.5 Priority Commodities of the Respective Districts

In planning agro-processing and marketing improvement at farmers' level, priority crops/

commodities for their cash income need to be identified. At the national level, Crop Survey Module-UNHS 1999/2000 reports the proportion of total sales to total output for major agricultural products, which shows the supply capacity for respective commodities. However, data at district/ sub-county levels is not available. Therefore, information collected by questionnaire to district agriculture officers was used together with the 2.2.4 Demand/Supply Situation mentioned above.

Following table shows the priority crops in post-harvest processing and marketing of respective districts.

Table 2.7 The Priority Crops in Respective Districts

Crop	Mubende	Nakasongola	Kiboga	Mpigi	Luwero	Wakiso	Mukono	Kayunga	Jinja	Kamuli	Iganga	Mayuge	Bugiri
Maize			○+							○	○+	○	○+
Beans, Soybean			○						○	○		○－	
Ground nut											○		
Rice					○+					○	○+		○+
Matooke			○+		○								
Fruits	○			○	○	○	○+	○		○			
Vegetable	○			○+	○+	○		○+					
Cassava		○+	○－		○－		○+				○	○	○
Sweet potato		○			○								
Cattle	○	○	○	○	○			○					
Fish		○		○			○						
Milk	○	○	○	○	○	○	○		○	○			
Cotton		○－									○－	○	
Coffee	○		○－	○－	○－		○－	○－			○－	○	

○ : Important + : Increasing importance －: Decreasing importance

- Fruits are Mpigi: Cocoa, Luwero: Mango, Mukono: Citrus, Mango, Pineapple, Kayunga: Pineapple
- Vanilla, tobacco and flower are not listed.
- Reply to questionnaire to district agriculture officers have not yet collected from Jinja, Kamuli, Wakiso and Mubende districts.

2.2.6 Socio-economic Issues

Population of the Study area is 7,818,898, around 32% of the national total, whereas the land area occupies only 22% of the national total (see Table 2.8). Population density (P/D) of the Study area is thus comparatively high (188ps/km^2) compared to national average of 121ps/km^2. However, wide difference is observed in population density among districts in the Study area. Kampala, the metropolis, with 6,717ps/km^2, outnumbers other district. Generally, most of the districts in the Study area exceed national average of 121ps/ km^2 except such districts as Nakasongola (39), Kiboga (57) and Luwero (84).

Of the total population of 24.7 million, 3.0 million or 12.2 % live in urban area, with rest of 21.7 million or 87.8 % in rural area. Urbanization and population density are closely related. Rate of urban residents of the whole country is 12.2 %. In the Study area, rate of urban residents of Kampala is 100%, followed by Jinja of 24.2% and Mukono of 17.6%. All other districts are below the national average. Therefore, although located in the central part of the country, the Study area is seen as rural in general except Kampala.

Table 2.8 Population, Urbanization

	District	Total	Density	Rural Resident	Urban Resident	Rate of Urban Resident
Eastern	**Bugiri**	**426,522**	163	407,858	18,664	4.4%
	Mayuge	**326,567**	212	317,634	8,933	2.7%
	Iganga	**716,311**	287	678,302	38,009	5.3%
	Jinja	**413,937**	609	313,600	100,337	24.2%
	Kamuli	**712,079**	200	700,858	11,221	1.6%
	5 districts total	2,595,416	238	2,418,252	177,164	6.8%
Central	**Mukono**	**807,923**	176	665,933	141,990	17.6%
	Kayunga	**297,081**	185	277,097	19,984	6.7%
	Kampala	**1,208,544**	6,717	0	1,208,544	100.0%
	Wakiso	**957,280**	499	883,060	74,220	7.8%
	Mpigi	**414,757**	127	404,540	10,217	2.5%
	Luwero	**474,627**	84	419,349	55,278	11.6%
	Nakasongola	**125,297**	39	118,707	6,590	5.3%
	Mubende	**706,256**	115	655,164	51,092	7.2%
	Kiboga	**231,718**	57	219,836	11,882	5.1%
	9 districts total	5,223,483	170	3,643,686	1,579,797	30.2%
Study area: 14 districts		7,818,898	188	6,061,938	1,7,56,961	22.5%
Eastern: 15 districts		6,301,677	210	5,872,468	429,209	6.8**%**
Central: 13 districts		6,683,887	168	5,000,019	1,683,868	25.2%
Northern: 13 districts		5,345,964	64	4,868,843	477,121	8.9%
Western: 15 districts		6,417,449	126	5,978,836	438,613	6.8%
Uganda: 56 districts		24,748,977	121	21,720,166	3,028,811	12.2%

Population data:"2002 Uganda Population and Housing Census, Provisional Results" -UBOS-
Land area data: GIS Section, Department of Survey & Mapping, Ministry of Water, Lands & Environment

Poverty issues, Human Poverty Indices (HPIs), are observed through UNDP's Human Development Report 2002. Three essential dimensions, 1) longevity, 2) literacy and 3) living standard are taken for comparison of the Study area with national average and those variations among districts in the Study area. Longevity (probability not to survive to age 40) index of national basis (56 districts average) is 42.9 while the districts in the Study area shows better figures of less than 38.0 (Kampala 29.1 is the lowest, Luwero and Nakasongola are the highest of 37.8). Illiteracy index by national basis is 37, while that of the Study area is less than 33 , with the lowest of Kampala(6), followed by Wakiso and Mpigi(15) and highest(33) are observed in Mayuge, Iganga, Kamuli and Nakasongola. Standard of living (economic provisioning) consists of three variables, namely no access to safe water, those lack access to health services and malnutrition of the children age under 5. While the national average of the index (by composite of the 3 above) is 30.6, figures vary widely by districts in the Study area. Apparently, Kampala,

the most endowed shows 5.9, followed by Jinja of 10.8. Three districts of Nakasongola, Mubende and Kiboga show the figure fairly worse than national average. These may imply their infrastructure being comparatively lagged behind.

In Human Poverty Index(HPI) composed of the above 3 dimensions, national average stands at 37.5, while most of the districts of the Study area show lower figures (better off). However, variation is significant, Kampala as the best of 20.3 followed by Jinja of 23.3 Wakiso and Mpigi of 24.3, Mukono and Kayunga of 27.0 and so forth. Worse than national average are Nakasongola of 40.9 and Mubende of 38.9.

Human Development Index (HDI) measures human progress in terms of income per capita expressed in Purchasing Power Parity, educational attainment and life expectancy (see Table 2.9)
HDI of Uganda in 2000 was 0.4496, with Central districts the highest of 0.5280, followed by Eastern of 0.4410, Western of 0.4320 and Northern of 0.3460.
The Study area of 14 districts belongs to either Central or Eastern, the highest figure being for Kampala of 0.5933, and the lowest for Kamuli of 0.4167. Five districts were below the national average, mostly in Eastern region (Bugiri, Mayuge , Iganga and Kamuli) and Kiboga district in Central region.

Table 2.9 Human Development Index

District		GDP Index	Combined Education Index	Life Expec - tancy index	HDI
Eastern	**Bugiri**	0.3548	0.5606	0.3432	**0.4195**
	Mayuge	0.3634	0.5673	0.3432	**0.4246**
	Iganga	0.3634	0.5673	0.3432	**0.4246**
	Jinja	0.4912	0.7055	0.4069	**0.5346**
	Kamuli	0.3655	0.5262	0.3584	**0.4167**
Central	**Mukono**	0.4199	0.6885	0.3015	**0.4700**
	Kayunga	0.4199	0.6885	0.3015	**0.4700**
	Kampala	0.5892	0.8006	0.3900	**0.5933**
	Wakiso	0.4840	0.7747	0.3319	**0.5302**
	Mpigi	0.4840	0.7747	0.3319	**0.5302**
	Luwero	0.4200	0.7274	0.3260	**0.4911**
	Nakasongola	0.3849	0.6607	0.3260	**0.4572**
	Mubende	0.3956	0.6281	0.3506	**0.4581**
	Kiboga	0.4228	0.6039	0.2952	**0.4406**
Eastern: 15 districts		0.3810	0.6060	0.3370	0.4410
Central: 13 districts		0.4820	0.7440	0.3580	0.5280
Northern: 13 districts		0.2960	0.4940	0.2480	0.3460
Western: 15 districts		0.3960	0.6490	0.2520	0.4320
56 Districts total		0.4101	06355	0.3033	0.4496

"Uganda Human Development Report 2002" -UNDP-
(data are collected before the districts were subdivided to create new districts, namely Mayuge from Iganga, Kayunga: from Mukono, Wakiso: from Mpigi)

Gender equality and women empowerment is an issue of importance particularly in rural

development in Uganda. Uganda's Human Development Report 2002 assesses gender inequality in economic and political opportunities by Gender Empowerment Measure (GEM). It is reported that, Uganda has made tremendous efforts in the empowerment of women but the challenge is still big on how to narrow the gender inequality gap. GEM in 2000 was at 0.417. Ratio of girls' primary school enrollment to boys is now 99.3% (2000) compared to 94.5% in 1992 and women's share in parliament increased from 18.6% in 1996 to 26% in 2001. The report does not show the details by district level, or rural and urban deviation, but it is assumed GEM might be lower in rural area than urban area.

2.2.7 Result of Categorization

Based on the analysis in the above, categorization of the Study area has been made.

Categorization here intends to present the directions of development in agro-processing and marketing system with particular focus to major cash income commodities in respective areas. Therefore, it is not necessarily represent the specific districts, but indicating the applicability of these categories to respective districts in general. Different categories are, therefore, could be applicable to each district.

In selecting the target commodities, needs and potential of collective processing and marketing are emphasized.

Five (5) categories are tentatively identified as follows;

Category I

Major target commodities: Maize, Beans, Soybeans

Objectives: To increase farmers' income through collective agro-processing and marketing by farmers' group

Activities: To establish collective marketing channels to traders/ institutions through introduction and adoption of improved drying, hulling and cleaning and packing system. Quality control will be emphasized.

Physical inputs expected:

Drying yard with concrete floor, Huller/ Cleaner, Storage facilities
Quality control and inspection tools, Plastic sheet, PP bags, etc.

Districts to be applied:

Bugiri, Mayuge, Iganga, Kamuli, Jinja and Kiboga

Category II

Major target commodity: Rice

Objectives: To increase farmers' income through collective agro-processing and

marketing by farmers' group

Activities: To establish collective marketing channels to traders/ institutions through introduction and adoption of improved drying, milling cleaning and packing system. Quality control will be emphasized, with due attention from the stage of production such as measures for birds and rodents damages, threshing and others at individual farm level.

Physical inputs expected:

Thresher, Cleaner, Ox-cart at farm level

Collection & Processing Center with; Drying yard with concrete, Milling facility, Storage facilities, Quality control and inspection tools

Districts to be applied:

Bugiri, Iganga, Kamuli and Luwero

Category III

Major target commodity: Cassava (flour)

Objectives: To increase farmers' income through collective agro-processing and marketing by farmers' group

Activities: To establish collective marketing channels to millers / bakeries through introduction and adoption of grater and improved solar dryer.

Quality control will be emphasized. Rural women's participation for processing activities is expected.

Physical inputs expected:

Collection & Processing Center with; Grater, Solar dryer with transparent plastic sheet, Milling machine, Storage facilities, Quality control and inspection tools

Districts to be applied:

Iganga, Kamuli, Mayuge, Kiboga, Luwero and Nakasongola

Category IV

Major target commodities: Fruits & Vegetables

Objectives: To increase farmers' income through collective processing and marketing of fruits (pineapple, mangoes etc.) by farmers' group

Activities: To establish collective marketing channels to urban markets/ traders through introduction and adoption of improved technology.

Quality control will be emphasized. Rural women's participation for processing activities is expected.

Physical inputs expected:

Collection & Processing Center with; Processing tools/devices, Solar

dryer,
Bore –holes/ water catchments, Water filtration, Storage facilities
Quality control and inspection tools

Districts to be applied:
Kayunga, Mukono, Wakiso, Luwero, Mpigi and Mubende

Category V

Major target commodity: Livestock (milk)

Objectives: To increase farmers' income through collective supply of fresh milk to urban market by farmers' group

Activities: To establish milk collection center for supply of high quality milk to city dwellers, with minimum spoilage.
Quality control and sanitation will be emphasized.

Physical inputs expected:
Milk Collection Center with; Cooling Tank,
Quality control and inspection tools

Districts to be applied:
Kiboga, Luwero, Mpigi, Mubende and Nakasongola

2.3 Current Situation of Marketing

2.3.1 Cross Cutting Issues

On agro-processing and marketing, various cross-cutting constraints are observed. These include following;

(1) Small scale supply of produce and their uneven quality at producers' level

Most of the farmers are small scale and subsistent ones, producing various crops and raising animals. Therefore, limited quantity and different quality of the products are supplied by individual farmers, leading to the disadvantageous position of farmers in marketing.

(2) Road network

Current road network in the Study area is considered fairly thin and not well equipped. Road densities (road km/ area sq.km) in respective districts are 1.77 for Kampala, followed by Jinja of 0.510, Mpiji of 0.308, Mukono of 2.77, Luwero of 0.223, Kamuli of 0.206, Iganga of 0.203, Mubende of 0.141 and Kiboga of 0.071 as the lowest.

Among the roads referred, share of tarmac road is limited except in Kampala. In other districts

gravel or dirt road are dominant. These show the general difficulty in transportation and marketing of bulky agricultural commodities.
Further, some district roads in swamp areas cannot be passable due to occasional flood in rainy season. This negatively affects farmers in access to the markets

(3) Transportation cost

Fuel cost for vehicle is relatively high in Uganda, partly due to the situation of landlocked country. Apparently, fuel cost is substantial in total transaction cost, with varying degree by commodities.
Further, in shipping the products from producing area to Kampala, the biggest market in the country, back-cargo from Kampala is often lacking. This limits the transportation efficiency and raises transportation cost.

(4) Marketing facilities

Marketing facilities are, in general, not well organized both in producing areas and large cities including Kampala. This hinders smooth flow of the commodities and transparent price realization.

Although the market distribution in sub-county level has not fully examined as yet, it is reported that a comprehensive rural markets and rural trade centers do exist. The rural traders markets are periodically held usually once a two weeks or twice a month. These markets are reasonably accessible for farmers, with average distance of 5.7km in the central region and 4.0km in the eastern region (UNHS Community Survey 1999/00).
However, infrastructure facilities in/around the markets are not well organized both in producing areas and Kampala. This hinders smooth flow of the commodities and increases the transaction cost.

(5) Marketing finance

Currently, access to credit for marketing is very limited. On the part of the producers/ farmers, they are forced to sell the products soon after harvest to obtain cash for next crop planting or for daily necessities, while the traders in general wish to maximize their capital rotation without holding the commodity for long. Seasonal fluctuation of the commodities is thus very high and existing capacity of warehouse is not effectively utilized.

As the new development in marketing finance, establishment of Uganda Commodity Exchange (UCE) and the move to legalizing Warehouse Receipt System (WRS) are noted.
The UCE Limited was registered in 1998, under Companies Act of Uganda with four founding shareholders namely;

UCA (Uganda Cooperative Alliance)
UCTF (Uganda Coffee Trade Federation)
UNFFE (Uganda National Farmers Federation)
CFA (Commercial Farmers Association)

The WRS, bill of which was passed at parliament in April 2006 will contribute, together with UCE, to ease the tight financial situation in marketing of agricultural commodities when these start operation.

(6) Agro-processing

Agro-processing plays an important role for value addition of the produce and increased job opportunities in rural area. Most popular facilities are maize/ cassava flourmills or rice mills privately operated at district towns. There are a limited number of mills or other processing facilities also, owned and operated by farmer groups. In large cities, there exist various processing enterprises including those dealing with export commodities.

Most of the machines and equipment are imported from China and India. There are a number of manufactures of these machineries in Kampala. However, most of them are made manually and quality depends on the ability of craftsmen.

(7) Market information

Market information is of critical importance to farmers as well as traders and consumers. Though access to the market information had been limited to farmers, recent development of the information services of the Foodnet Project by IITA provides improved access to the market information regularly on specified commodities through FM radio stations, Newspapers, E-mail, Internet and mobile phones. NAADS, succeeding the projects, started Market Information Systems at pilot basis in 2003. The programme covers 6 districts of Arua, Soroti, Tororo, Kabale, Kibaale and Mukono.

2.3.2 Major Characteristics by Commodities

(1) General Situation of the Selected Commodities

The general situation of the selected commodities is presented as follows;

1) Maize and Beans/Soybeans

a. Production

Maize is widely grown in the Study area and increasingly gaining importance not only as a major food crop but also as a cash crop for small-scale farmers in Uganda.

Table 2.10 Maize Production and Per Capita Consumption

Year	1960	1965	1970	1975	1980	1985	1990	1995	1999
Area planted (1000 Ha)	141	284	300	476	358	320	400	594	600
Production (1000 tons)	190	300	335	523	286	450	600	950	750
Unit production (tons/Ha)	1.35	1.06	1.12	1.10	1.11	1.41	1.50	1.60	1.25
Per capita consumption (Kg)	26.0	35.9	34.8	48.1	31.5	32.5	35.4	48.8	35.7

Source: US Department of Agriculture

In Uganda, almost 90% of the total maize produced is by small-scale farmers, 60% of which being consumed by these farm families. Household survey in 1999/2000 shows that 740,000 ton of maize was produced in that year, 56% of them being consumed in rural area and remaining 44% sold to the markets. Major maize producing districts were in the eastern region such as Tororo and Mbale where roughly 400,000 tons or 55% of the total were produced.

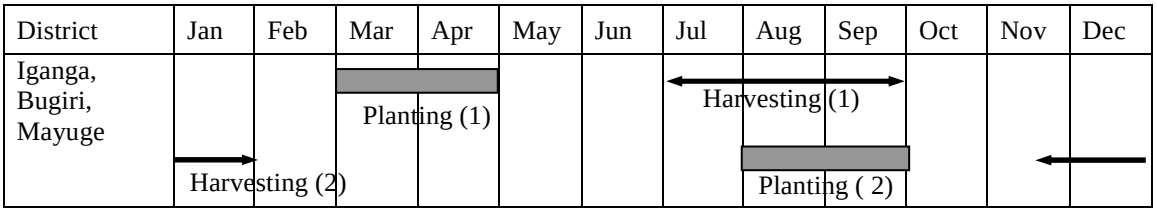
Table 2.11 Regional Maize Production

(Unit: tons)

Central	Eastern	Western	Northern	Total
151,078	407,672	123,599	56,828	739,177
20.4%	55.2%	16.7%	7.7%	100%

Source: Uganda National Household Survey (1999/2000)

Two crops in a year are possible in Eastern Uganda, and possibly three crops if the irrigation system is provided.



Source: JICA Study Team

Figure 2.7 Cropping Calendar of Maize in Eastern Uganda

b. Post-Harvest Processing

For drying of maize, the system to dry ear corn in crib by natural ventilation during storage is recommended and promoted by NARO. But most of small-scale farmers do not have such crib and normally they dry maize in the form of ear corn on a ground under the sun after husking. A farmer in Bugiri district reported that ear corn drying in crib takes only 1 week if maize is reasonably dried on the field and takes 1 month in case fresh ear corn is harvested.

Threshing is done by hand or using simple instrument. A locally made engine driven thresher is not popular as yet. Some farmers in the eastern region, in order to get higher price at the beginning of harvest season, remove raw maize grain from the ear corn using knives then put on a ground for sun drying. Maize grain becomes dirty on the surface but this does not cause serious problems as maize grain is consumed after flouring. Therefore, farmers put maize on a ground for drying and sometime they leave them even when it rains.

Maize milling is carried out using Engerberg type huller, Hammer type milling machine and cyclone for flour collection. Roller mill is not used. In Kampala and district towns, huller is used for removing germ/embryo and crusts prior to flouring process. The current system of separation of by-product by a blower is poor in efficiency. Air aspiration separator shall be introduced. Village flourmills do not use huller, just a hammer mill makes maize flour. Maize grain is fed into a machine as a whole and the germ/embryo and crusts are also floured together.

Flour collection is made using a cyclone. In the cyclone system currently used, fine flour is blown out from the top of the cyclone, thus leading to low efficiency. A small dust room shall be constructed in a flourmill. The exhaust pipe should be connected to the top of cyclone and dust room for collection of flour. By this way, working environment in flourmill will be improved by reducing flour scattering.

c. Marketing

Flows of maize grain are illustrated in the following map. Most of the maize grains produced in the east side of Nile River are marketed to Kenya in a form of grain[3]. Supply to Kampala is in a form of grain and milled at Kisenyi in Kampala city, where about 120 small-scale millers concentrate.

[3] It is said that exports to Kenya is almost entirely informal and accurate volume statistics do not exist. However, in good production of years it is estimated by traders that 100,000 Mt of maize is sold to Kenya. (Transaction cost analysis, Final report, Apr. 2002 – NRI/IITA)

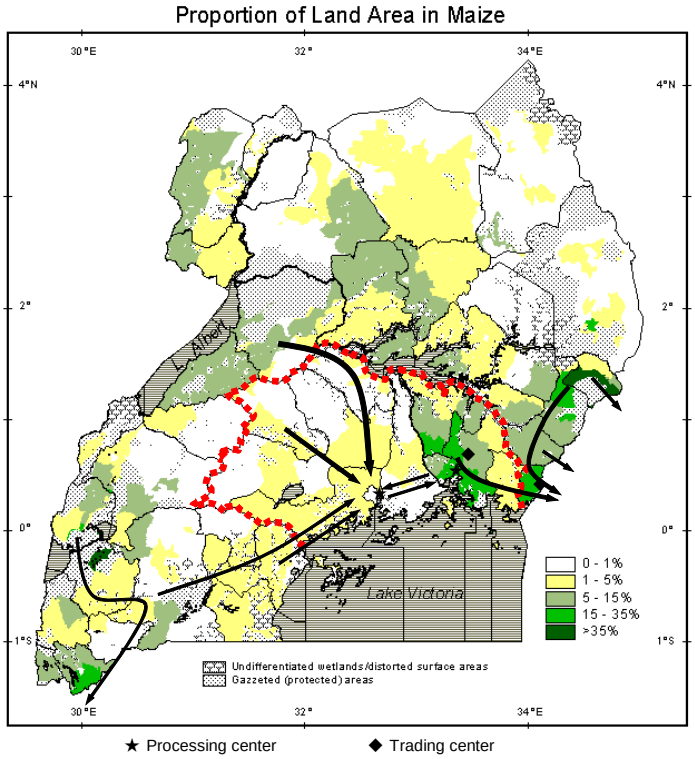


Figure 2.8 Commodity Flows : Maize

The flow chart of maize and maize flour is as follows;

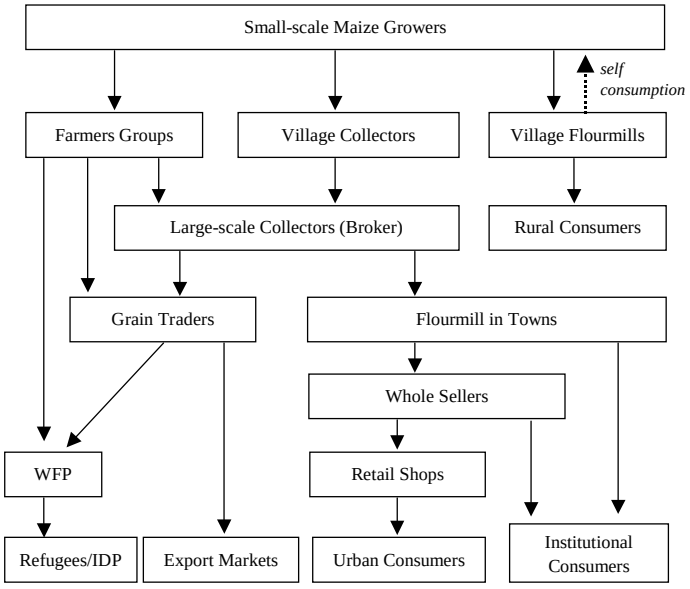


Figure 2.9 Trading Chain of Maize Grain

The production scale of individual farms is small and the maize supplied by each farmer to a market is also very small. This makes the maize collection costly. Large, medium and small-scale traders are involved in maize marketing channels from the farm gate till the end user, flour mills or exporters. Some traders operate flour mills too.

In general, grain quality is not considered seriously in the marketing channels to domestic markets and to Kenya because the dirties on the surface of grains are ripped off in the process of milling.

Maize buyers who buy with set specification, i.e. take into account of grain quality (moisture contents and dirt) are only UGT (Uganda Grain Traders Ltd) and WFP (United Nations World Food Programme). In order to deal with these quality-conscious buyers, bulking is essential. However, it is impossible for individual small farmers to do this. Therefore, though limited in number, some farmers have started collective bulking by group to ship to WFP in the Study area.

WFP/Uganda Office purchased 124,000 tons in total of maize grain in 2005. In line with the policy of PMA (Plan for Modernization of Agriculture), WFP set a policy to purchase 12,000 tons (10% of the total purchase) from farmers' group directly. Major condition for this purchase was as follows.

- Minimum purchase per contract is 50 tons. The quality should meet the tender specification.
- Inspector(s) will check the quality prior to the contract.
- The farmers' group must be registered officially.
- The group shall submit Performance Bond when signing the contract.

Farmers' groups who can comply with these conditions, especially to arrange Performance Bond, are limited. Most of these groups are supported by NGOs.

Following table shows the marketing cost survey conducted by IITA in December 2002.

Table 2.12 Marketing Costs and Margins in Maize Trade in 2002

(Unit: Ush/kg)

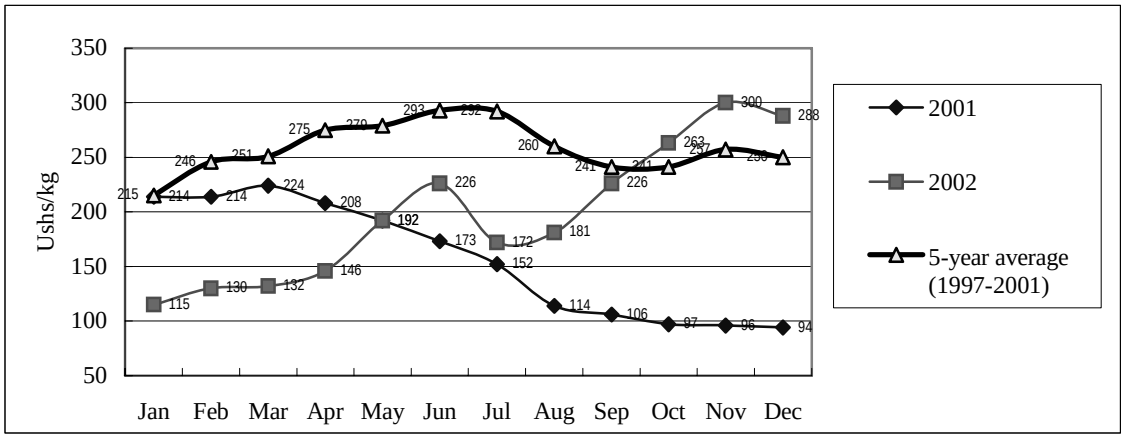
	Mbale	Iganga	Masindi	Average
Farm gate price	65	60	60	61.7
Transportation cost	11	12	18	13.7
Village Collector's Margin	9	6	5	6.7
Tax	0	2	2	1.3
Price in rural town	85	80	85	83.3
Packaging & Trans. Cost	15	15	19	16.3
Tax	1.5	1.5	1.5	1.5
Collector's Margin	3.5	5	4.5	4.3
Wholesale price	105	101.5	110	105.5
Transportation & handling	20	20	25	21.7
Retailer's margin	11	10	11	10.6
Retail Price in Kampala	136	131.5	146	137.8

Source: IITA Field Survey, Dec.2002

According to the above, farmer's gate price is 44.7% of retail price on average and transportation

cost and handling cost in total is 51.7 Ush/kg, which shares 37.5% of the retail price. Farmers should make bulking of maize grain and try to minimize the transportation costs, which will help farmers to increase their net income.

Maize supply/demand situation in Kenya influences the maize prices in Uganda. In 2001 maize price heavily declined due to good production in Kenya. WFP's purchases also have significant influence on domestic markets. Maize price also shows seasonal fluctuation; decline after the harvest seasons of July and November.



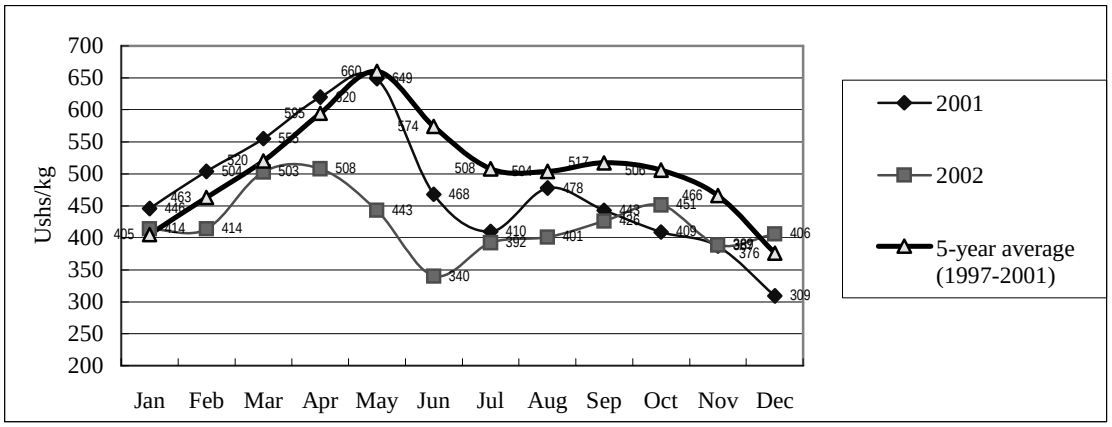
Source: Bi-Monthly Market Report, Grain Commodities, Summary of Market Report for 2002 – ADC

Figure 2.10 Trend of the Average Off-Truck Maize Prices in Kampala Markets

Beans and soybeans are also important daily food crops and are widely grown in the Study area. According to the result of an estimation work on district-wise supply/demand situation done by JICA Study Team, Jinja and Kamuli districts are assumed as major beans surplus districts in the Study area.

In case of soybeans, Iganga, Mayuge, Bugiri, Kamuli and Luwero districts are assumed as major surplus districts in the Study Area.

As the case of maize, market price of beans shows seasonal fluctuation; decline after the harvest seasons of July and November, and influenced by the exports to Kenya.



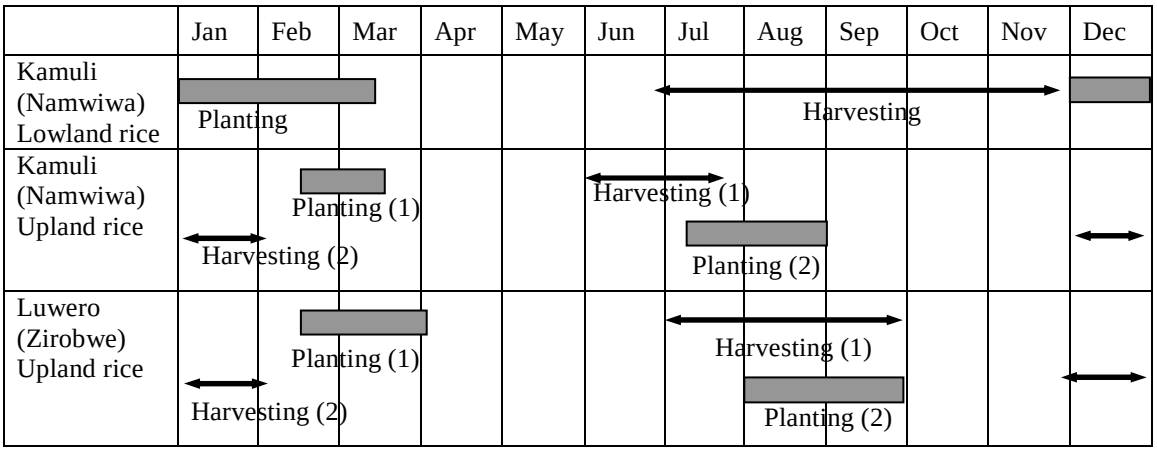
Source: Bi-Monthly Market Report, Grain Commodities, Summary of Market Report for 2002 – ADC

Figure 2.11 Trend of the Average Off-Truck Beans Prices in Kampala Markets

2) Rice

a. Production

Rice consumption is expanding mainly in the urban area in Uganda. Rice is grown traditionally in swamps in the eastern region where water is abundant. Upland rice cultivation is spreading recently in areas where farmers replacing cotton and coffee to rice as a cash crop. As rice price is rather stable, rice cultivation becomes attractive to many farmers. This phenomenon can be observed in Luwero district and the outskirts where upland rice cultivation is expanding, replacing coffee crop. In many districts, two rice crops in a year are possible on both lowland and upland. Cropping calendar of rice in Kamuli, in the eastern region and in Luwero in the central region is shown below.



Note: Harvesting period of lowland rice in Kamuli is very long (more than 3 months). The reason here is that rice cultivation is carried out on swamp edges where water level vary in long period.

Rice production by region in Uganda is shown in Table 2.13.

Figure 2.12 Cropping Calendar of Rice

Table 2.13 Rice Production by Region

(Unit: tons)

Central	Eastern	Western	Northern	TOTAL
176	31,640	1,949	8,130	41,895
0.4%	75.5%	4.6%	19.5%	100%

Source: Uganda National Household Survey (1999/2000)

MAAIF published rice production data by each district as follows.

Table 2.14 Rice Production by Districts

District	2000		2001	
	Production (tons)	Area planted (Ha)	Production (tons)	Area planted (Ha)
Study Area				
Bugiri	N.A.	N.A.	N.A.	N.A.
Iganga	5,909	3,956	6,180	4,176
Jinja	961	644	1,005	680
Kampala	0	0	0	0
Kamuli	5,361	3,587	5,607	3,786
Kayunga	N.A.	N.A.	N.A.	N.A.
Kiboga	0	0	0	0
Luwero	0	0	0	0
Mayuge	N.A.	N.A.	N.A.	N.A.
Mpigi	0	0	0	0
Mubende	0	0	0	0
Mukono	0	0	0	0
Nakadongola	N.A.	N.A.	N.A.	N.A.
Wakiso	N.A.	N.A.	N.A.	N.A.
(Sub total)	(12,231)	(8,187)	(12,792)	(8,642)
Other districts	95,769	63,813	100,162	67,358
Uganda	108,000	72,000	112,954	76,000
Share of the Study area	11.3%	11.4%	11.3%	11.4%

Source: MAAIF, 2002 NA: not available

Among districts outside of the Study area, Gulu, Kibaale, Kumi, Pallisa and Tororo districts in the eastern region are major rice producing areas. MAAIF also published domestic rice production, imported amount and per capita consumption.

Table 2.15 Rice Production Figures (Production and Acreage)

	2000	2001	2002	2003	2004	2005
Area planted (Ha)	72,000	76,000	80,000	84,000	93,000	93,000
Production (tons)	109,000	114,000	120,000	109,000	140,000	140,000
Production (Milled rice, tons)	65,400	68,400	72,000	65,400	84,000	84,000
Production per Ha (tons/Ha)	1.51	1.50	1.50	1.30	1.50	1.50

Source: FAOSTAT, 2006
Note: Production figures indicate un-hulled rice (paddy) and milled rice figures are calculated as 60% of paddy.

Table 2.16 Rice Imports into Uganda

	2000	2001	2002	2003	2004
Rice Import (tons)	51,257	22,225	43,000	48,925	60,428

Source: FAOSTAT, 2006

Table 2.17 Rice Consumption in Uganda (Estimated)

(tons)	2000	2001	2002	2003	2004
Domestic rice for consumption	65,400	68,400	72,000	65,400	84,000
Imported rice	51,257	22,225	43,000	48,925	60,428
Total	116,657	90,625	115,000	114,325	144,428

Source: JICA Study Team, Calculated based on the above table 2.15 and 2.16.

Based on the total population of Uganda in 2004 of 25.9 millions, the per capita rice consumption is estimated at 5.5kg. However, regional difference will be substantial since the eastern region produce a lot of rice, and people in Kampala consume more rice than those in the northern and western regions where rice production is negligible.

Rice production and consumption in neighboring African countries are shown for reference in the table below.

Table 2.18 Rice in African Countries in 2004

	Area planted (Ha)	Production Yield/Ha (paddy, tons)	Production (paddy, tons)	Rice import (milled rice, tons)	Consumption Per capita (Kg/person)	Population (x1,000)
Kenya	13,223	3.73	49,295	223,187	7.80	32,400
Tanzania	355,000	1.92	680,000	181,986	15.95	37,000
Congo Dem. Rep.	417,391	0.76	315,130	19,726	3.63	57,500
Rwanda	13,000	3.56	46,191	3,011	3.41	9,000
Zambia	10,000	1.20	12,000	14,192	2.04	10,500
South Africa	1,400	2.29	3,200	744,839	16.66	44,830
Sudan	4,800	3.28	15,748	49,511	1.75	33,610
Ethiopia	8,350	1.86	15,500	6,770	0.22	72,400
Nigeria	3,704,000	0.96	3,542,000	1,398,287	25.20	139,800
Ghana	119,392	2.03	241,807	448,430	28.13	21,100

Source: JICA Study Team basing on FAOSTAT, 2006
Note: Per capita consumption is calculated by { (Productionx0.6)+Rice import}÷Population

Rice production in Uganda is increasing, mainly by expansion of the planted areas. It will be possible to reduce the amount of imported rice, which is estimated at roughly 40,000 - 50,000 tons annually. Current low average yield of 1.5 tons/Ha shall be increased. Though maximum yield of upland rice may remain 3 tons/Ha, it would be possible to achieve 6 to 8 tons/Ha in

lowland rice through appropriate farming technologies such as water management and fertilizers use (Max. yield in lowland could be 12 tons/Ha).

In some village in the eastern region such as in Iganga, plowing works of lowland rice field is carried out by 4 oxen plough. This farming technology shall be extended all over the country (2 oxen can plow upland rice field). To increase acreage of rice field, utilization of draught animal is necessary. At the same time, appropriate technologies against damages caused by birds and rats before harvest and minimization of post-harvest losses shall be established and extended.

For threshing of paddy, usually farmers beat rice straw on a wooden bar. In this exercise, in some fields, curtains are hung around the threshing area to avoid scattering losses of paddy. In transportation of paddy from the field to farmhouse and from farmhouse to rice mill, farmers normally use bicycle. As a lot of cattle are available, utilization of such animals for transportation should be considered for improvement of transportation.

b. Post-harvest processing

Regarding post-harvest losses of paddy, FAO's data, 2000 is available as shown by the table below;

Table 2.19 Post-Harvest Losses on Paddy

Works	Losses	
	Min. (%)	Max. (%)
Harvesting	1	3
Pre-drying and Collecting	2	7
Threshing	2	6
Drying	1	5
Storing	2	6
Transporting	2	10
Total	10%	37%

Source: FAO

Survey report on post-harvest losses of paddy in Uganda is not available but SG-2000 estimates it as 30% in their report. Probably the amount would be much less than such figure, say around 10%, as each farmer works carefully to maximize his own product. The field survey carried out by JICA in Cambodia in 2001 reported the losses from harvesting till drying was 7 to 8%. The major problem during post-harvest processing in Uganda is the lack of proper paddy drying technology. Farmers spread their paddy on plastic sheets or paved roads for sun drying without proper control of moisture contents.

Moisture meter is not used for checking the moisture contents of paddy in Uganda yet. When paddy is rapidly by dried, the moisture contents at outer layer and inner layer of a grain becomes different. This difference causes a stress to a grain inside, eventually causing cracks to grain.

This cracked rice will become broken rice during milling process. This leads to lower milling recovery rate and lower market value of milled rice. Periodical mixing works of upper and lower layers of paddy during sun drying is important and rice farmers should adopt such practices. In addition, if small pebbles are mixed with milled rice, the consumer will be discouraged. Rice farmers and millers should be careful for the exclusion of impurities in rice, especially of stones, as there is no such machine as stone separator is available in Uganda yet.

For rice milling, following methods are practiced;

- Manual milling using pestle and mortar (windmill or water mill is not used)
- Small scale rice milling machine (A rice mill receives paddy for milling fee, called "Custom Mill")
- Large scale rice mill with complicated system (A rice mill purchases paddy and mills, called "Commercial Mill")

Small scale milling machine is dominant and three different types of milling machine are used in Uganda. Most popular one is Engerberg type rice mill, same as Huller for maize mill, and the next is Friction type rice mill, originally designed in Japan for milling brown rice. The third is Rubber Roll type rice mill, which is widely used in Southeast Asia. Engerberg and Friction types whiten rice from paddy directly to milled rice, which causes significant amount of broken rice resulting in poor milling recovery and lower market value. Further, by-product from Engerberg and Friction type mill is a mixture of chaffs of husk and rice bran, which cannot be effectively utilized. Pure husk can be used as fuel and rice bran is good for oil extraction, animal or fish feeds. These by-products can be obtained separately by Rubber Roll type mill.

The result of interview survey to rice millers at Semuto in Luwero District reveals the performance of these three (3) different types as follows.

Table 2.20 Milling Recovery by Type of Rice Mill

Type of Rice Mill	Milling Recovery (Average)	Broken Rice (Average)
Rubber Roll Type	68-70%	30%
Friction Type	60%	30-50%
Engerberg Type	55-60%	50%

Source: JICA Study Team, Survey result in Semuto, Luwero district

c. Marketing

Flows of rice are illustrated in the following map. Most of rice produced in the east side of Nile River is marketed to Kampala.

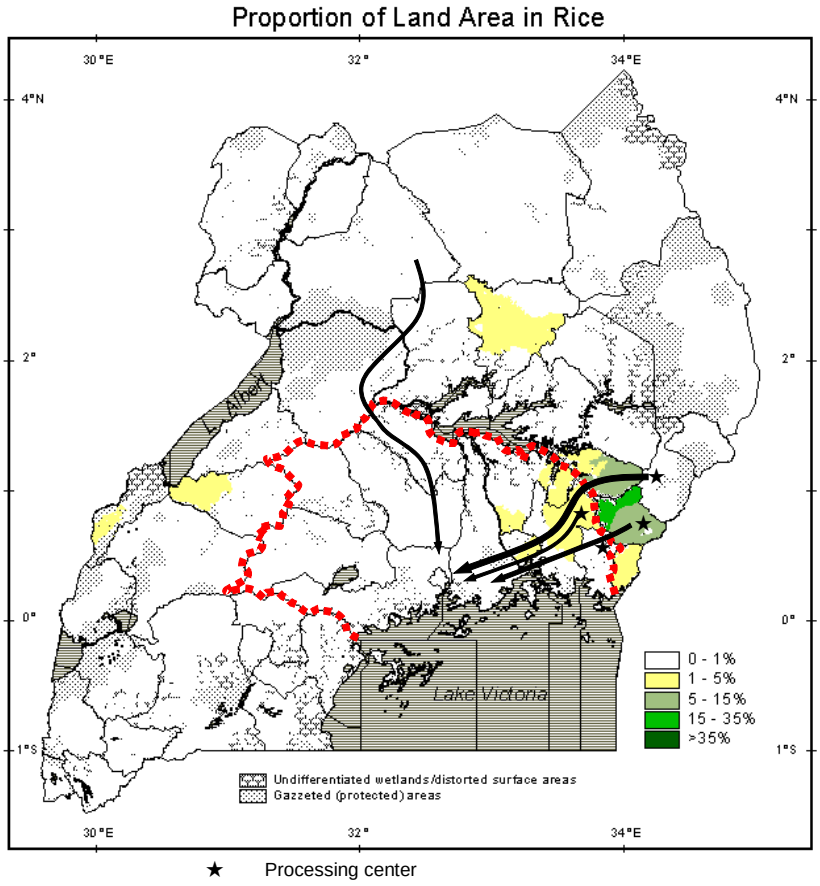


Figure 2.13 Commodity Flows : Rice

In Uganda, unlike most of the other rice producing countries, farmers sell rice in the form of milled rice. Exceptions are observed in some areas where middlemen purchase paddy at farm gate (this case is seen in villages with limited access to rice mill). Normally after harvest and drying, farmers carry their paddy to rice mills (custom mill) nearby and mill paddy paying milling fee, and then they sell the milled rice to traders who usually wait for the milled rice in front of rice mills. The principal reason for being taken this marketing method by farmers is the existence of large price difference between paddy price and milled rice price. For example, paddy price was 250-300 Ush/kg, milled rice price was 650-700 Ush/kg in the year 2003 with milling charge at 40-60 Ush/kg.

The flow chart of rice in Uganda is as follows

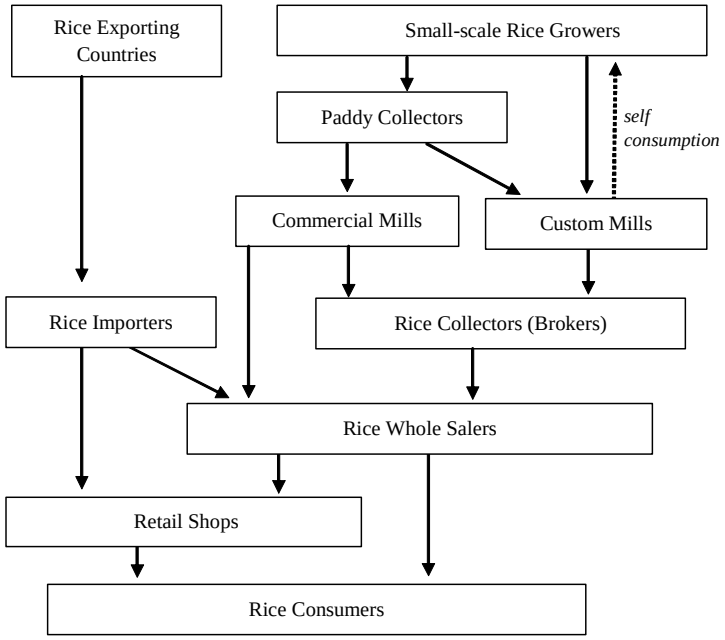


Figure 2.14 Trading Chain of Rice

Collective marketing of rice by bulking is almost none. Only co-operating transportation arrangement is observed in some remote area. Normally farmers have limited bargaining power against collectors. Some farmers say that cheating by weighing of paddy by collectors is common and hard negotiation on the rice price is also common when a farmer sells his rice after milling at custom mill to rice collectors (brokers).

Some wholesalers in Kampala make retail rice packs of 1kg or 2kg in plastic bags from 50 or 100kg rice bags. In doing this they remove small broken, chaffs of husk, discolored grain and stones by manual works for better market price. Tilda (Uganda) has released her milled rice in Kampala since November 2003. The physical quality is equivalent or better than imported rice from Vietnam or Pakistan. The retail price is about 50% higher than the rice price in Nakasero market in Kampala.

Consumer's needs on rice in Uganda are diverse. Some consumers are more quality conscious, preferring rice with less broken rice and no inclusion of impurities such as chaffs of husk and stone. Others prefer cheap rice though inferior quality with some broken and impurities mixed. Rice millers and rice traders should realize the customer's needs when they distribute rice to the market.

Uganda National Bureau of Standards has established the standard of rice as follows.

Table 2.21 Standard Grade Requirements for Milled Rice

Grading Factor	Requirements		
	Grade 1	Grade 2	Grade 3
Head rice, per cent, min.	90%	75%	50%
Broken, per cent, max.	10%	25%	50%
Chalky*/Green immature grain, percent, max.	2%	6%	15%
Red or red streaked, per cent, max.	1.5%	4%	15%
Other varieties, per cent, max.	1%	4%	8%
Foreign matter, per cent, max.	0.5%	1.0%	1.7%
Paddy grains, per cent, max.	0.15%	0.25%	0.35%
Moisture contents, per cent, max.	14%	14%	14%
Milling degree, min.	Well milled	Reasonably Well milled	Lightly milled

* Unless it is a variety characteristic Source: Uganda National Bureau of Standards

This Standard is not applied in the domestic market. Probably when traders in Uganda start rice export business, this Standard will be used for their contracts. But anyway rice farmers (group) should understand the market's needs and try to improve rice quality in order to attain their own good market. If farmers form a group for collective processing and marketing of rice under appropriate management, they will be able to enjoy better price and market access.

3) Cassava

a. Production

Introduced in Uganda between 1862 and 1875, cassava is currently one of the most important staple food crops in the country. It ranks second to banana in terms of area planted and total production. During the 1980s and early 1990s, cassava production in Uganda suffered from the Cassava Mosaic Virus. In response to this, around 12 new disease resistant varieties were introduced by research and extension services (e.g. NARO, IITA, NGOs), which, in turn, led to a renewed increase in production. Approximately 5.3 million tons were produced from 0.4 million ha of land in total (year 2001-MAAIF data).

Although cassava is grown throughout Uganda, the eastern region is dominant in production. It is relatively low in the districts of central region where Bananas have been the traditional staple food crops.

Table 2.22 Cassava Production by Region

(Unit: 1000 tons)

	Eastern	Northern	Western	Central	Total
1995/1996	1,659	447	531	110	2,747
1999/2000	1,213	457	381	195	2,246

Data source: UBS

Cassava is widely grown in the Study area, mostly for home consumption. According to the estimate of district-wise supply/demand situation by JICA Study Team, Bugiri/Mayuge/Iganga, Kamuli, Mukono/Kayunga and Kiboga districts are assumed as surplus districts in the Study area.

Table 2.23 Cassava Production in the Study Area

(Unit: 1000 tons, 1000 Ha)

Region & District	Production (2002)	Cultivation area (2001)
Eastern	701.8	50.2
Bugiri, Mayuge & Iganga	401.7	28.7
Jinja	44.2	3.2
Kamuli	255.9	18.3
Central	512.0	32.5
Mukono & Kayunga	191.1	13.7
Wakiso & Mpigi	171.2	12.2
Luwero & Nakasongola	46.7	3.3
Mubende	7.9	0.2
Kiboga	95.1	3.1
Kampala	--	--
Total of the Study area	1,213.8	82.7

Data source: MAAIF

The importance in daily diet varies depending on the region. The importance of cassava as staple food is relatively higher in the eastern region and in the cattle corridor where climate is semi-arid. Given its resilience to drought conditions, cassava plays an important role in farming system as safeguard against famine.

Per capita consumption of cassava flour is higher in rural than in urban area, reflecting the wider choice of foods available in most towns. Cassava flour, as always cheaper than maize flour, and also the cheapest carbohydrate sources when measured by calorific basis, is an important staple food for particular groups of poor consumers within Kampala.

b. Post-harvest processing

Following are the examples of cassava processing observed in the Study area. The technology adopted there seems to be applicable to farmer's group in other areas.

Table 2.24 Examples of Cassava Processing in the Study Area

Raw material	Products	Practitioner of processing	Location
Cassava	Dried chip	Individual farmers	All area
Cassava	Gari (pre-cooked food)	Member groups of RAPTA* (SG2000 supported)	Iganga
Cassava	Flour	Member group of RAPTA (SG2000 supported)	Busia
Cassava	Starch	Kiryanfufu Farm Estate	Luwero

* RAPTA: Rural Agro-processors and Traders Association

As cassava is perishable by nature, dry chip processing has been widely practiced by farmers. Drying is usually done at farmyard directly on the earth. Therefore, earth or sand dust are often mixed and original white color of the flour cannot be obtained. Vascular streaking is also a factor for coloring of the products. To avoid this, drying needs to be completed within a day. However, since most of the farmers do not possess any facilities it is often difficult to complete drying in a limited time, particularly in rainy season. This induces to limited chip supply and degraded quality. Thus, high quality cassava flour production in rainy season will be effective for value addition.

Potential demand for high-quality cassava flour is significant as a substitute of imported wheat flour (mostly used with wheat flour) particularly from bread and biscuit manufacturers. According the research work done by NRI, Foodnet /IITA and KARI.[4], the potential is considered as follows:

High-quality cassava flour has potential to partially replace (10%) wheat flour in bread and biscuits.

High-quality cassava flour in bread is an attractive area, with a market size equivalent to 26,400 tons of fresh roots per annum. The bakery industry expressed strong interest in testing cassava flour, as a way of reducing production costs. However, problems are the lack of gluten in cassava flour and consumers' acceptability as major concerns..

In practice cassava flour is more likely to be acceptable in biscuits than in bread in the near future.

High-quality cassava flour can readily replace imported materials in paper board, textile and plywood manufacture and could replace 10% of wheat flour in the manufacture of biscuits. These markets are small in size, with a total potential demand equivalent to 1,594 ton (600 tons for biscuits) of fresh roots per annum.

[4] Industrial markets for starch-based products: An assessment of the industrial potential for cassava in Uganda, Andrew Graffham et al. NRI, Foodnet/IITA, KARI, Nov. 2000

Thus, potential demand for high quality cassava flour is seems substantial. However, actual production and sales of high quality flour targeting at these manufactures has not yet started in Uganda. At present, a milling & bread manufacturer in Kampala, who uses clean/white-color cassava flour for composite flour production and for export, purchases ordinary cassava chips and scrape off the dirties on the surface by hand knife one by one.

The factors that hinder the realization of substituting the imported wheat by high quality cassava flour are listed as follows.

A package of appropriate processing technology from production to harvesting, drying and milling suited to the rural conditions in Uganda has not yet formulated. For example, low cost drying system to dry cassava chips in a short period has not been developed.

Financial support for initial investment capital is lacking.

The information/knowledge about market opportunity and processing technology are scattered, and, are not accessible not only for farmers but also for those involved in the private sector.

Activities for supporting/encouraging a formation of direct linkages between producers of dry chips (farmers) and potential buyers (food manufacturers) are not performed.

c. Marketing

Cassava is supplied in two forms to Kampala markets, fresh roots and dried chips. Data on the marketed volume is not available. Supply of dried chips is assumed to be exceeding the supply of fresh roots.

Cassava Chip & Flour:

Larger volume of dried chips are supplied to Kampala from outside of the Study area; from such districts as Apac in the north, Kumi, Soroti and Pallisa in the east, Hoima in the west. Imports from the Democratic Republic of Congo and Tanzania also reach the Kampala markets during the wet season.

At Kisenyi area, the trading and processing center of cassava chips/flour in Kampala, various cassava chips are processed and traded. According to the color and hardness, different prices are set. In general, consumers prefer white, non-odorous flour produced from well-dried chips. Some also prefer yellow-brown flour produced from fermented chips.

Trading chain of cassava chips/flour is illustrated in Figure.2.15. Competition in the dried cassava marketing is severe; many people compete with each other at every stage of the trading chain.

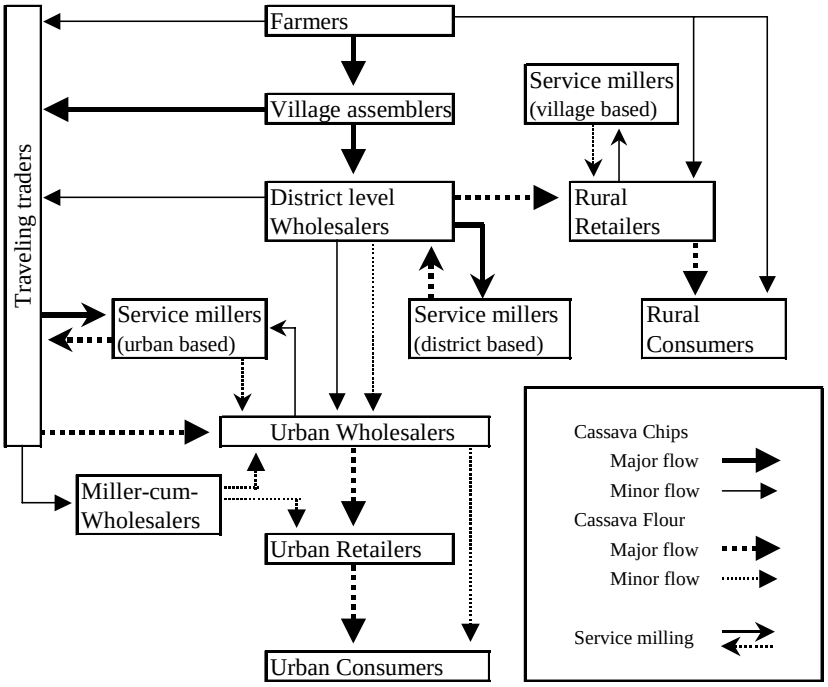


Figure 2.15 Trading Chain of Cassava Chips/Flour

According to the data shown in "Transaction Cost Analysis, Final Report", costs and margins of cassava in the channel from Kumi/Pallisa district to Kampala (in early 2002) is summarized as follows. It is considered that overall trader margins do not point to excessive profits. The long distance and complicated structure of the chain leads to high total costs and margins. As a consequence, the farmer's share of the final price tends to be low.

Table 2.25 Example of Costs and Margins in Cassava Chip/Flour Trading

Items	Ush/kg	Notes
Farmer's price (chips)	40.00 (15%)	Sell to village assembler at farm gate
Total net margins	86.83 (32%)	
Net margin of village assembler	7.64	Buy from farmer and sell to traveling trader
Net margin of traveling trader	14.38 *	Buy from village trader and sell to urban wholesaler
Net margin of urban wholesaler	24.25 *	Buy from traveling trader and sell to retailers after milling
Net margin of retailer	40.56 *	Buy from wholesaler and sell to consumers
Other costs	143.17 (53%)	Transport: 45Ush, milling: 20Ush
Consumer's price (flour)	270.00 (100%)	

* Before income tax and payment of trading license.

To increase farmers' share, there is a need to reduce overall length of the trading chain and to enhance economies of scale both at the production and retail levels.

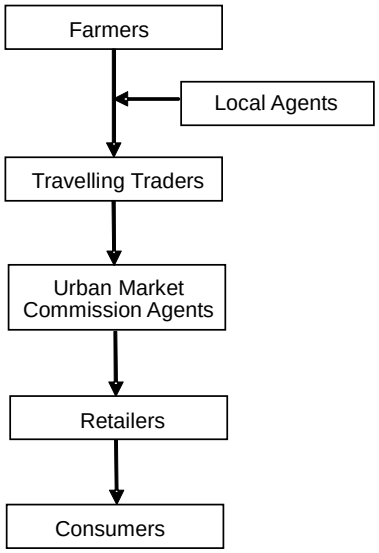


Figure 2.16 Trading Chain of Fresh Cassava

Fresh Cassava:

Trading chain of fresh cassava is illustrated in Figure.2.16. Fresh cassava trading chain is much more streamlined in comparison to the chain of dried cassava/flour. This is the reflection of the perishable nature of fresh roots, which necessitates swift movement from producer to consumer with a minimal number of transactions. Traders are forced to discount their price heavily if the cassava reached the market two to thee days after harvest. After five days, the roots are not salable.

Fresh cassava prices vary on a daily basis. While demand is usually constant, the arrival of a large number of traveling traders in a particular Kampala market can drive down prices. Conversely, a lower number of traveling traders will cause prices to rise. This daily variation creates price risks for traders, who cannot predict market prices when they purchase from farmers.

According the data shown in "Transaction Cost Analysis, Final report, farmer's selling prices (in standing crop) were 17 to 26% of the retail price in Kampala in the channel from Masindi/Bweyale (in early 2002). Total transportation costs including on-loading and off-loading represent 30 to 40 % of the final retail price depending on the form of marketing arrangement.

Price Trend:

Retail prices (real prices adjusted for inflation) during the past 10 years (1989-2000) show an upward trend in cassava flour, while matooke and millet flour do not show upward trend. A plausible explanation for this upward trend in cassava flour is the existence of refugees from the north in Kampala. As northerners prefer cassava flour, demand for this in Kampala has certainly increased.

Following figures show that the retail and wholesale prices of cassava fresh and flour in Kampala in the year 2002. Flour prices show less fluctuation than fresh ones. Especially, retail prices of cassava flour are stable throughout the year.

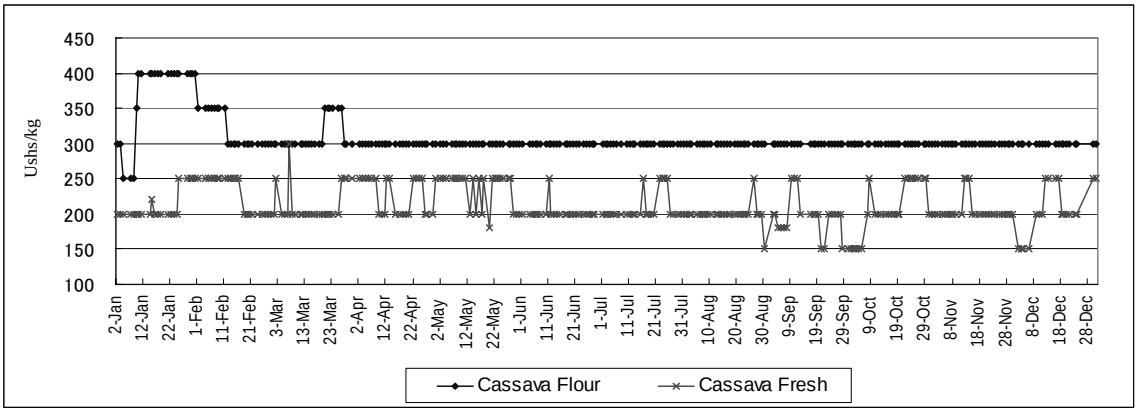


Figure 2.17 Retail Price-Owino Market in Kampala (Year 2002)

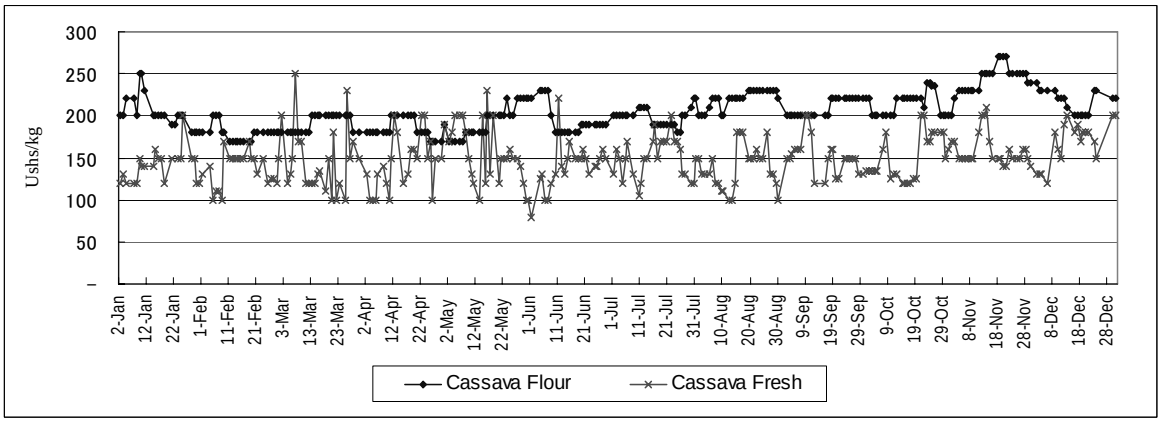


Figure 2.18 Wholesale Price Owino in Kamapala (Year 2002)

Although a seasonal fluctuation pattern is not clear in the above figures, according to the IITA/ NRI report, prices of cassava flour in Kampala show following seasonal movements.,

Table 2.26 Seasonal Price Fluctuation Pattern of Cassava Flour/Chips

Price decline	January to March (dry season)	Supply increase due to good conditions for sun drying
Price rise	March to June (rainy season)	Supply decrease due to difficulty in sun drying, farmers' are busy with seeding/planting, quality also declined.
Price decline	June to October	Demand decline due to harvest season of other food crops.

Source: IITA/NRI

4) Fruits and Vegetables

a. Production

In the Study area, pineapple, banana and passion fruits are the major fruits grown with some intensive care and with a certain scale for commercial purpose. Many of the fruits, such as mango, papaya and avocado are grown in the backyards of farmhouse or grown in wild without

any care. Particularly, there are a large number of mango trees, but their fruits are fibrous type and have limited commercial value. It is also reported that large quantity of wild mango fruits are abandoned outside of the Study area, in the northern region, such as Nebibi district.

Few vegetable growers have irrigation system. Therefore, production and supply fluctuate by season. In case of vegetables produced specially for export purpose, farmers are gradually improving their production techniques in response to exporters' demands. These vegetables include hot pepper and okra, for them local market demand being limited.

There is no reliable data on production of fruits and vegetables. According to the MAAIF's estimation（year unknown）, major fruits production is shown as follows.

Table 2.27 Production of Major Fruits in the Study Area

	Pineapple		Passion		Citrus		Mango		Avocado		Papaya	
	ha	ton	ha	ton	ha	ton	ha	ton	ha	ton	ha	ton
Study Area												
Iganga, Bugiri, Mayuge	40	600	15	105	100	1,200	80	200	50	500	200	2,000
Jinja	20	300	20	140	40	480	10	100	40	400	100	1,000
Kamuli	10	150			250	3,000	80	800	40	400	80	800
Mukono, Kayunga	350	5,250	60	420	15	180	40	400	100	1,000	250	2,500
Wakiso, Mpigi	300	4,500	100	700	10	120	80	800	100	1,000	250	2,500
Luwero, Nakasongola	200	3,000	20	140	40	480	200	2,000	80	800	150	1,500
Mubende	200	3,000	30	210	20	240	80	800	40	600	150	1,500
Kiboga	n.a.	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Kampala	30	450	30	210	--	--	--	--	20	200	40	400
Uganda	1,900	28,500	645	4,015	685	15,840	2,340	21,800	980	10,000	1,880	19,000

Source: MAAIF

However, from the hearing survey at the Kampala markets and field reconnaissance as well as the reference information, following are assumed as the major commercialized fruits and vegetable growing centers.

Table 2.28 Assumed Commercialized Growing Centers of Fruit & Vegetables in the Study Area

Crops	Districts
Pineapple	Kayunga, Luwero, Mubende, Mukono, Mpigi
Mango	Luwero
Citrus	Kamuli, Iganga
Passion Fruit	Mpigi, Kayunga, Kampala
Perishable vegetable for Kampala markets	Mukono, Wakiso, Luwero, Mpigi
Water melon	Kayunga, Mpigi
Hot pepper	Luwero, Mubende, Mpigi, Wakiso
Okra	Luwero, Mubende

Source: JICA Study Team and others

b. Processing

There exist many cottage scale enterprises processing and preserving fruits and vegetables in the country. Pineapple, banana, passion fruit, citrus, mango and tomato are the principal products processed.

Wine, fresh juices and dried fruits are major products by cottage scale processors. For wine making, banana and pineapple are widely used. Most popular wine in Kampala is "Banapo" brand, produced from banana and pineapple in Kabale district with capacity of about 15,000 bottles per month. For fresh juice production, pineapple and passion fruits are widely used. Low cost fruit juices are produce of imported concentrate by medium scale enterprises.
Apple banana, pineapple and mango are the major fruits dried. For dried fruit production, solar drying techniques are used. Some dried commodities are exported to Europe and low-grade products that do not meet export quality are sold in the domestic markets.

According to the KARI's study in July-2000, the estimated annual output of the dried fruit was 90 tons. This output was mainly from 5 processors involved in fruit drying and export, with 76% share by Fruits of the Nile, AMFRI Farms Ltd 10%, Masaka Organic Producers 9%, TEFU Ltd 4% and Flona Commodities 1% (Underlined are the companies in the Study area). There is high and growing demand for dried fruit products on the export markets, especially for organically certified ones. Though export volume is rather limited yet, some exporters face the difficulties in fully responding to the request of the clients. Some exporters say that they are able to respond only 10 to 20% of their demand. Fruits of the Nile, one of the leading exporters of dried fruits, employs out-growers production system.

In addition to the above 5 companies, followings 4 companies are listed by URA as major fruit and vegetable processing industries.

- RECO located in Kasese district, produces jams, chilli sauce, papain, fruit concentrates.
- Elgonia Industries located in Tororo district, produces passion and orange squash, tomato and chilli sauces.
- Magatrends located in Kampala, produces tomato sauce and chilli sause.
- Britania Foods located in Kampala, produces a varieties of fruit products including squashes.

Fruit Processing in the Study Area:
In the villages, fruit processing is not commonly practiced, except some types of banana for the traditional brewing. In some district towns there are cottage scale fruit processors who make wine, juice and dried fruits, but the number of processors as well as the volume of production are

limited. Following table shows the fruit processors identified in the Study area. In case of vegetable processing, only chili source making is observed.

Table 2.29 Identified Fruits Processors in the Study Area (Exclude the Processors in Kampala)

Products	Materials	Processor	Location
Dry fruits	Pineapple, Mango, Apple banana, Ginger	Individual farmers (Out-growers of Fruit of the Nile)	Kayunga
		Amfri Farms Ltd	Luwero
		Nakagoro Fruit Dryer	Luwero
		Tropical Ecological Food (U) Ltd	Mubende
Fruit Juice, Wine, liquor	Banana, Passion fruit, Pineapple	Kasper Food Enterprise	Mubende
		Ultra Food Enterprise	Mubende
		Kasaru Enterprises	Mukono

Notes : There is no commercial fruit processors in Nakasongola, Mpigi, Kiboga, Iganga, Bugiri, Mayuge Kamuli districts. It has not yet confirmed for Wakiso and Jinja districts.

Most of the fruit processing are individual business and some processors have been provided technical supports by the Micro and Small Enterprise Support Program of UNIDO. These processors are also providing technical advice and training to the new entrants.

c. Marketing

Fresh Fruits and Vegetables for Export:

Fruits and vegetables export have been promoted under the High Value Non-traditional Export Program of the IDEA Project. The share of non-traditional exports has risen from 14% in 1990 to 47% in 2000. In 2001, export value (f.o.b.) of fresh fruits and vegetables was US$ 3.07 million, compared to US$ 0.63 million in 1995 (ADC/IDEA project).

The major exports, in terms of volume, include matooke, hot pepper, bean, apple banana, chilli, okra, pineapple and passion fruit. Matooke and chilli (including hot pepper) account for 65% by quantity, and with more than 20 other products, are shipped in small quantities from Uganda to Europe. The prime destination of all fresh produce is UK where the main importers are British Asians who supply these to the ethnic community. Fresh fruits with an estimated value of $1.2 million were exported to neighboring countries in 2002 (IDEA Project, 2002 – Cross boarder surveys).

Among the vegetables, hot pepper is a major crop exported from Uganda, particularly in winter season when there are no supplies from the Netherlands and Spain. Major consumers are from ethnic community.

Table 2.30 Exports of Fruits and Vegetables

Year	Value (x 1000 US$)	Volume (tons)
1996	1,420	985 *
1997	1,830	1,175 *
1998	2,830	1,589 *
1999	3,300	2,393 *
2000	3,653	3,500
2001	3,561	4,528

* Figures shown fresh produce exports via Entebbe Airport and exclude exports of fruits and vegetables to neighboring countries.
Source: ADC/IDEA, HORTEXA

Table 2.31 Products and Major Destination Markets from Uganda

Products	Destination
Pineapple	UK, Holland, Belgium, Switzerland, Japan*
Passion fruit	UK, Italy, Holland, Oman, Switzerland
Avocado	UK, Holland, Belgium, Oman, Switzerland
Apple banana	UK, Belgium, Switzerland
Okra	UK
Hot pepper	UK, France, Holland, Belgium, Switzerland, Oman

* Exports of sun-dried pineapples and bananas
Source: Export Survey 2002

Fruits and vegetables for export are grown by small-scale growers, who sell regularly or intermittently to exporters. Such small-scale growers are said to be less than 3,000 in the country, mainly centered in the Lake Basin. Growers or growers' groups do primary grading/packaging.

Majority of exporters are small with limited capital, market and capacity and are not involved in production. Supply chain varies among the exporters. Some exporters, who are the members of the Horticultural Exporters Association (HORTEXA), have contracts with farmers.

Prices:
The long-term data of fruits prices are not available. However, fruits price fluctuates seasonally and it falls greatly in the harvest season. According to the commercial pineapple farmers in Kayunga district, pineapple price is 200 to 300 Ush/kg (400 Ush/kg for large size) in the off-season and 100 to 200 Ush/kg (200 Ush/kg for large size) in the peak season.

Situation of Collective Marketing:

In Kayonza sub-country of Kayunga district, pineapple growers are forming a group, registering it as a cooperative society, Bugerere Mixed Farmers Cooperative Society, to change the way of marketing. In Kangulumira sub-county of Kayunga district, a main center of pineapple production in Uganda, a farmers' group has been conducting collective marketing of fresh pineapple to Kampala and Busia (Kenya boarder town) regularly. No farmers' group has entered into the fruit processing business yet.

Organic Agriculture:
Trend of introducing organic farming in Uganda needs to be noted. Among the dry fruits processors above, some have already obtained certificate of organic products from the certification organization overseas. Further, National Organic Agriculture Movement of Uganda (NOGAMU), established in 2001 with more than 180 members, has been working on coordinating and promoting sustainable organic agriculture development, through networking and marketing. NOGAMU has been developing the Uganda Organic Standard.

5) Livestock (Dairy Milk)

a. Production

Livestock Production:
Livestock raised in the Study area include cattle, goat, sheep, pigs and chicken.
Beef cattle are popular where extensive natural inland grassland is available where being raised on large-scale ranches or free range (pastoral system). Beef cattle and dairy cattle are raised on small scale, being fed by cut grass or small pastureland at around the areas of Lake Victoria.
Goats and sheep are raised for meat, often being grazed together with cattle, but generally tethered near the farmhouses on a small scale. Pigs are raised by farmers who are primarily crop farmers on a small scale of 10 heads or less. Pigs are often allowed to roam freely on farm plot. Most of the poultry are indigenous one, and reared on free range system. They are left out during the day and housed at night. Exotic breed of layers and broilers are emerging. In this case, poultry is kept indoors usually by deep-litter system and fed on commercially prepared feeds.

The so-called "cattle corridor" covers the north and the northwestern part of the Study area. 6 districts in the Study area of 14 districts are in this corridor, namely, Nakasongola district, northwestern part of Luwero district, north-eastern part of Kiboga district, western part of Mubende district, western part of Mpigi district and northern part of Kayunga district. Main livestock production districts are Mpigi, Kiboga, Nakasongola and Luwero. Typically in these districts cattle are kept in the semi-arid marginal areas unfavorable to crop production, under extensive traditional pastoral system or beef ranching.

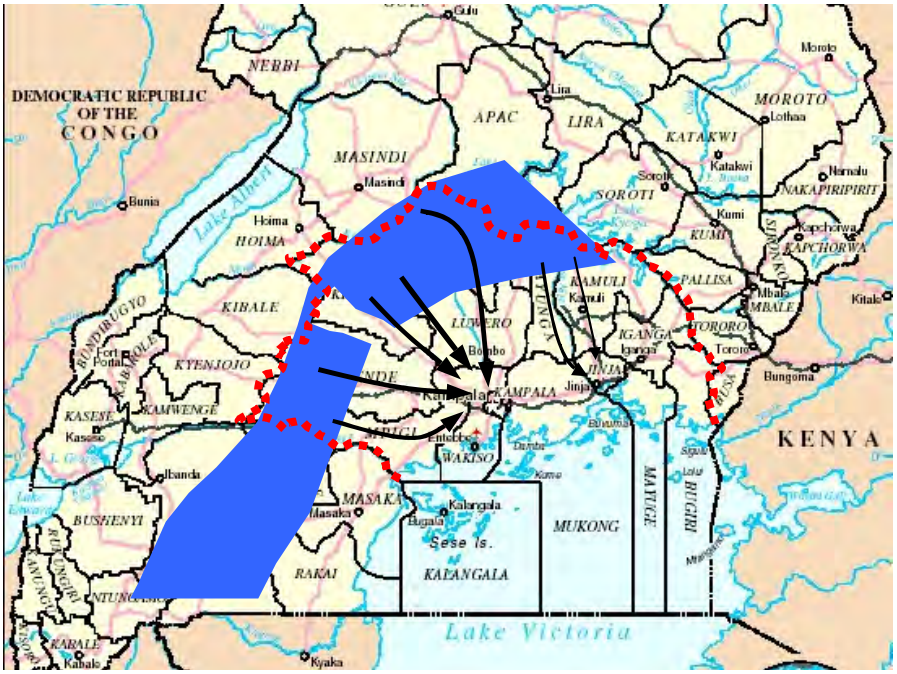


Figure 2.19 Cattle Corridor and Commodity Flow of Beef Cattle

Estimated numbers of livestock in the Study area are shown in Figure 2.20. The number of cattle is overwhelming in districts in the cattle corridor. Pastoral system accounts for 77%, ranching 20%, tethering 2% and zero-grazing accounts for less 1% in a cattle production system in Nakasongola district which shows typical feature of livestock system in the cattle corridor (Veterinary dept. Nakasongola District).

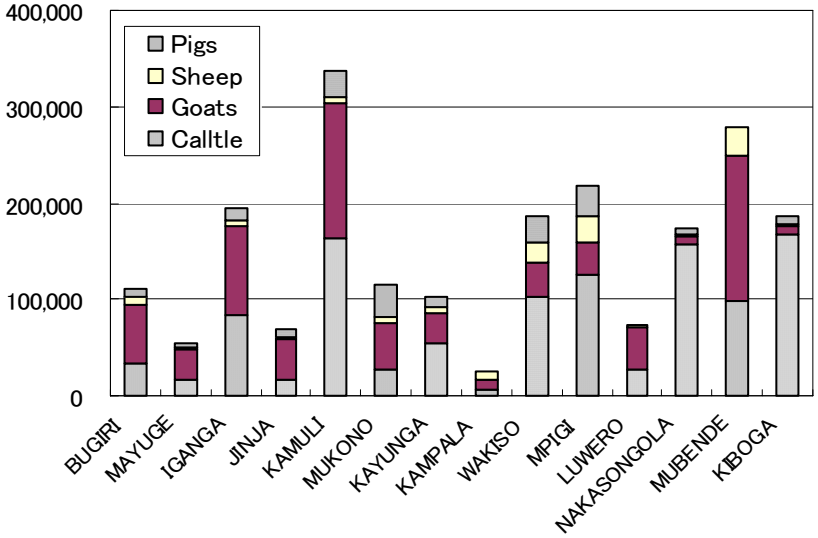


Figure 2.20 Livestock Population in the Study Area

Milk production:

National milk production has steadily increased since 1994. According to the Dairy Development Authority (DDA), national milk production was estimated at 800 million liters in

2001.Approximately 52% of Uganda's milk come from 12 districts in the south-west of the country, with Mbarara alone producing 15% of the national total.

Milk is produced from an estimated 5.9 million cows, of which only 0.278 million cows (4.7% of the total) are exotic or cross-breds. These aggregate figures suggest an average dairy milk yield per cow of just over 3 liters per day. By comparison, milk production per cow among the most productive herds in Uganda is between 18 and 20 liters per day during lactation.

The milk production system in Uganda ranges from large-scale dairy farming to semi-nomadic pastoralism. Within the Study area milk is mainly produced by pastoralists in the "cattle corridor"; in the western parts of Mpigi, and Mubende, the northeastern part of Kiboga, Nakasongola, northwestern Luwero and northern part of Kayunga. Commercial farmers and zero grazers are to be found in those districts adjacent to Kampala city as well as Kampala itself, Kamuli and Jinja.

Table 2.32 shows the cattle population by type and sub-country in Nakasongola district. Even in a particular district, there exist wide difference among sub-counties in total cattle population as well as in population by breed. Exotic and cross-breds are significant in Nabiswera sub-county and Kakooge sub-county. In Nakasongola district, it is reported that there are total nine zero grazing units, two in Wabinyoni sub-county and seven in Kakooge sub-county. Both of these sub-counties have relatively good access to urban centers in the district.

Table 2.32 Cattle Population in Nakasongola District

Type / Sub-county	Exotic	Crosses	Boran/ Bosmara	Local	Total
Kalungi	3	42	62	29,085	29,192
Wabinyonyi	12	113	45	25,352	25,522
Nabiswera	289	717	5,590	60,649	67,245
Kakooge	314	926	523	17,579	19,342
Lwampanga	3	6	0	13,361	13,370
Total	621	1,804	6,220	146,026	154,671

Source: Veterinary department, Nakasongola (2001) Figures based on old sub-counties.

b. Processing and Marketing

Livestock Markets:

The main market for livestock and livestock products is Kampala city. In the marketing channel of cattle, there are two (2) markets; up-country markets and city markets.

Up-country markets: These markets are held every 1 or 2 weeks and cattle are brought there for

sale either directly by farmers or by village traders who buy from farmers. These markets mainly function as assembly points where traders and those farmers looking for breeding stock can find a wide choice in one place. From 50 to 500 cattle are traded, depending on the location and season. Traders mainly from Kampala visit these markets and purchase live animals by individual deal and these animals are then transported to the city slaughterhouses by truck. However, these markets lack such basic infrastructure as bare minimum facilities like fences, cattle pens, weigh bridges, loading ramps and water facilities.

City Markets:

Cattle are transported to the city markets on a daily basis from up-country markets and private farms. Slaughterhouse is also the place for the traders to sell live animals to wholesalers by individual deal, then wholesalers have these animals slaughtered and sell quarters to butchers or other interested buyers on weight basis. Since the city slaughterhouses are open to anybody for wholesale trade, it seems logical that some big farmers take advantage of direct access to these markets. However this practice is not popular due to the existence of hidden barriers, such as the difficulty in bill collection for those who are not regularly involved in the business from the wholesalers

Milk Marketing:

Milk marketing system in Uganda can be divided into formal system and informal one. Milk demand of Kampala, the largest market in Uganda, is roughly estimated at 300,000 liter per day. Of this total, the formal system probably supplies less than 60,000 liters; the remainder is satisfied by the informal system.

Trading chain of milk marketing is illustrated in Figure2.21.

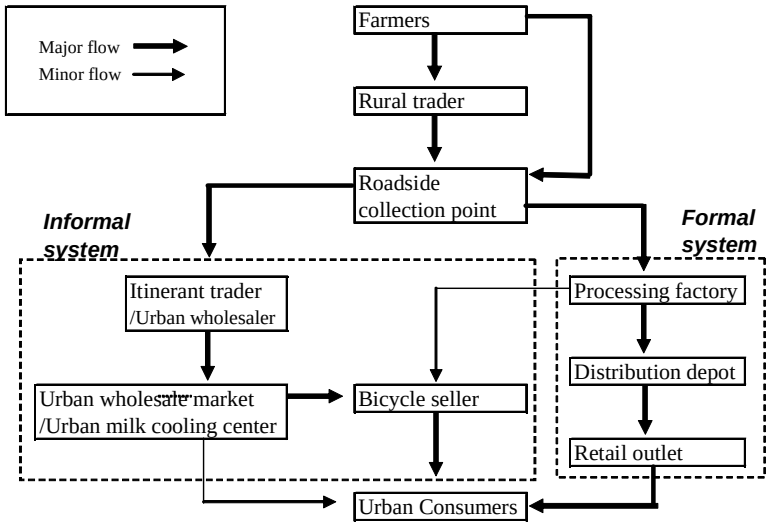


Figure 2.21 Trading Chain of Milk

Price and Cost/Margin:

There is no information available about price and cost/margin in the informal marketing system in the Study area. However, the case in the southwest Uganda might be referred.

In the southwest, farmers' milk price differs significantly depending on the distance from collection center and on the season. In dry season, when lack of forage reduces milk supply, price offered by informal sector traders at milk collection points can be as high as Ushs300/liter. In wet season, informal sector price drops to between Ush200 and 220. In the extreme case, where farmers are far away from collection points, farm gate price is as low as Ush100/liter.

Formal sector buyers in the southwest Uganda pay between Ush200 and 220/liter, regardless of the season. Farmers and rural traders therefore generally prefer to sell to informal sector traders. By comparison, farmers located near to Kampala sell their milk to formal and informal sector between Ush300 and 400/liter, depending on quality and season.

According the case study, cost and margin in the informal marketing system from southwest Uganda to Kampala are summarized as follows.

Status of Dairy Farmers' Groups:

In the Study area, there are several farmers' groups engaged in milk production under the zero-grazing system in/around Kampala and district towns. These farmers have relatively good access to the urban markets. On the other hand, there exist no farmers' (pastoralists') groups in the cattle corridor, where milk is produced in the semi-nomadic system.

Farmers' groups of zero grazers were formed for the purposes of introducing improved breeds and/or improving the husbandry and milk production with supports by Projects such as Heifer Project and Send a Cow. As a case of implementing collection/sales of milk collectively, there is a group in Mubende town, equipped with cooling facility, selling to the customers in Mubende town.

2.3.3 Current Situation of Farmer's Organization

There exist farmers' organizations, such as cooperatives and farmers' groups under the apex institution of UCA (Uganda Cooperatives Alliance) and UNFFE (Uganda National Farmers Federation) respectively.

(1) Cooperatives and UCA

The first cooperative was established in 1913 in Ssingo County in Mnbende, though no legal status was given at that time. It was in 1946 when the Cooperative Association Ordinance was enacted. The Cooperative Society Act was enacted in 1952, amending the Ordinance of 1946.

Since then a number of modification/revision on cooperative laws were made reflecting the political and economic environment of those days. In 1970, the Cooperative Societies Act took away the autonomy of the cooperative and gave the Minister direct control over the affairs of the registered cooperative societies. Cooperative Statute of 1991 paved the way to restore the autonomy of the members.

Structure of Cooperatives in Uganda was of four-tier system (Primary Societies, District Unions, National Cooperative Organizations and Apex UCA). In 1997, the structure was revised to so called flat structure, with major thrust on Area Cooperative Enterprises (ACEs)

In the Study area, there exist 1,420 primary cooperative societies (5,647 in all districts), of which 662 are marketing and 240 are saving and credit cooperative societies.

As for ACEs, 12 are now operating within the Study area in 4 districts, Iganga, Kamuli, Mukono and Kayunga. These ACEs consist of Primary Cooperative societies and Farmers Associations as their members.

Following are ACEs in the Study area with the location and number of member organizations

Table 2.33 Area Cooperative Enterprises in the Study Area (ACEs)

ACEs	Number of component organizations	Sub-County	District
1. Bukanga ACEs	4	Bukanga	Iganga
2. Bukawa ACEs	2	Bukawa	
3. Bulamagi ACEs	3	Bulamagi	
4. Nakalama ACEs	8	Nakalama	
5. Buka ACEs	4	Buka	Kamuli
6. Gisbup ACEs	8	Namwiwa, Gadumire	
7. Nabu ACEs	4	Kitayunjwa	
8. Nabuka ACEs	3	Bumanya	
9. Buna ACEs	7	Buna	Mukono
10. Kanada ACEs	6	Kanada	
11. Kangulumira ACEs	21	Kangulumira	Kayunga
12. Kayunga ACEs	6	Kayunga	
Total	76	13	4

(2) Farmers' groups under the Uganda National Farmers Federation: UNFFE

UNFFE was established in 1992, originally as Uganda Farmers Association (UNFA) and in 2002 renamed as it is. The objectives are 1) to lobby and advocate for farmer friendly agricultural policies, 2) to unite farmers' organizations under one umbrella organizations as a common front for the promotion, coordination and safeguarding of their activities and interests, and 3) to improve farmers income and welfare through increasing the quality and quantity of their produce on a sustainable basis.

Membership consists of district/ commodity based farmers organizations, community based farmers organizations, agro-related industries/ services and honorary members approved by the National Farmers Council. Individuals covered by UNFFE is said to be more than 200,000

Exact number of farmers groups and their membership in the Study area is not available as of now.

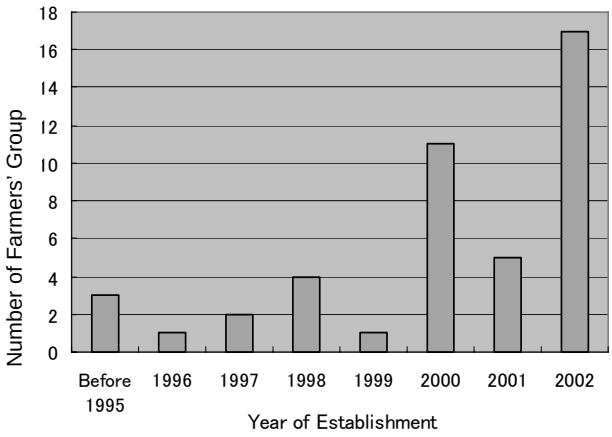


Figure 2.22 Number of Established Farmers Organization

(3) Outline of the farmers groups in the Study Area

During the second field study, the Study team conducted Preliminary Survey on farmers groups in Study area as a process of selecting candidate farmers groups for pilot projects. This survey covered 54 groups in 6 districts such as Nakasongola, Bugiri, Kamuli, Kayunga, Luwero and Iganga district. Outline of the farmers groups surveyed is shown below.

1) Establishment

Most of present farmers groups have been established after the late 1990s assisted by NGOs.

There are some areas where umbrella farmers' organizations exist consisting of several farmers groups, such as AECs and Farmers Associations. They have been just formed recently, and some of them are still under the official procedure for registration, and scarcely started practical activities.

2) Membership

According to the figure below, many of farmers groups surveyed range the number of membership from 21 to 30 members. It seems that the number of membership can be a rough criterion, which is relatively easy for organizing one group/unit of farmers.

Gender of farmers groups seems generally well balanced though each of them has different ratio of gender. There are some farmers groups, which consist of only female members.

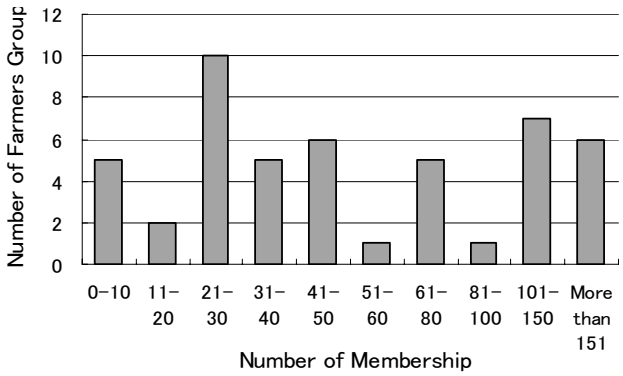


Figure 2.24 Distribution of Number of Membership

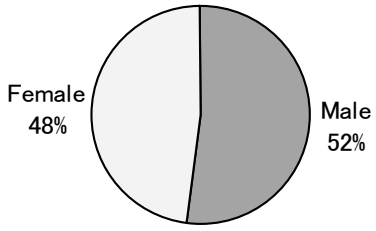


Figure 2.24
Average of Gender Ratio of Farmers Group

3) Activities

Most of their current daily activities are concerned with production. They don't work on collective marketing but selling individually. Some are observed on the stage of preparation for collective marketing. Only a few groups are engaged in collective marketing activities such as selling bulks of maize for World Food Program.

4) Problems and Needs:

It is observed that their major problems are generally concerned with processing and marketing rather than production, and processing are recognized as high priority.

As for their major needs, processing facilities such as drying machine for maize and cassava, milling machine for rice and cassava, pineapple processing and storage facility for maize, cassava and rice are of high priority.

Price fluctuation, unstable rainfall and disease are especially found as problems of pineapple.

Market information is highly prioritized needs for maize than others. And market itself is prioritized for rice and cassava.

CHAPTER 3 COMPREHENSIVE POLICY AND STRATEGIES OF AGRICULTURAL SECTOR

3.1 Poverty Eradication Action Plan (PEAP)

PEAP is Uganda's Comprehensive Development Frame Work. It is a strategy aimed at eradicating poverty and improving the welfare of the people.

The first PEAP, formulated in 1997, and revised in 2000 and 2004, improving the focus of the three years rolling Medium Term Expenditure Framework (MTEF) and thereby helping to achieve substantial reduction of poverty.

The proportion of population below poverty line declined from 44% in 1997/8 to 35% in 2000, though the level remains still high.

Five pillars of PEAP structure are as below;

- Economic management
- Enhancing production, competitiveness and incomes
- Security, conflict resolution and disaster management
- Governance
- Human development

Target of PEAP is to reduce the ratio of population below poverty line to less than 10% by 2017.

Macro-economic targets to achieve the objectives are as follow,

- Annual GDP growth rate of 7%
- Maintaining inflation ratio at 5% p.a. or less
- Foreign Reserves to cover 5 months import
- Competitive exchange rate

In expanding market following issues are taken up in PEAP

- Improving access to regional markets. (EAC, COMESA)
- Export promotion
- International trade negotiations
- Investment promotion
- Employment incentives
- Privatization

In removing institutional constraints to private sector development, PEAP considers following actions as needed;

- Financial sector reform
- Commercial justice reform

In improving infrastructure for private sector development, role of privatization of infrastructure are dealt, particularly on electricity, communications and transport. These infrastructures have crucial relevance to agro-processing and marketing.

In actions to directly increase the ability of the poor to raise their income embodied in PEAP focuses on agriculture/rural sector, as most of the poor are self-employed in agriculture, living in rural area. They need to raise income by increasing productivity in their current activities, by increasing price they can obtain for their produce and by entering new production activities or wage employment.
Plan for Modernization of Agriculture is the main thrust of the Government in this sector as elaborated below.

3.2 Plan for Modernization of Agriculture (PMA)

PMA formulated in August 2000, is a holistic, strategic framework for poverty eradication. Transformation of agriculture through multi-sector interventions is expected to achieve the goal of Poverty Eradication for the improvement of livelihood of the people in a sustainable manner.

(1) Objectives

PMA is thus a poverty-focused framework of principles whose main objectives are to increase in income

(2) Mission of PMA

Eradicating poverty by *"transforming subsistence agriculture to commercial agriculture"* is the mission of PMA. Improving the welfare of poor subsistence farmers will require that they re-orient their production towards the market.

(3) Strategies

Broad strategies of PMA include;

- Making poverty eradication the overriding objective of agricultural development
- Deepening decentralization to lower levels of local government for efficient service delivery
- Removing direct government involvement in commercial aspects of agriculture and promoting the roles of the private sector
- Supporting the dissemination and adoption of productivity-enhancing technologies
- Guaranteeing food security through the market and improved incomes, thereby allowing households to specialize, rather than through household self sufficiency
- Ensuring that all intervention programmes are gender focused and gender responsive

- Promoting two way (bottom up and top down) planning and budgeting process by empowering local governments and enabling them to influence public policy and allocate public resources to alleviate location –specific constraints in a non sectoral manner; and
- Ensuring the coordination of multi-sectoral interventions to remove any constraints to agricultural modernization

(4) Priority Areas for action of PMA

In order to effect agricultural transformation targeting subsistence farmers, 7 pillars for public intervention are identified as follows;

1) Research and Technology Development
2) National Agricultural Advisory Services (NAADS)
3) Agricultural Education
4) Improving access to rural finance
5) Agro-processing and Marketing
6) Sustainable Natural Resource Utilization and Management
7) Physical infrastructure

Among 7 pillars above, 5) Agro-processing and Marketing has the direct relevance to the Study, while 1) Research and Technology Development, 2) National Agricultural Advisory Services: (NAADS) and, 7) Physical infrastructure are also closely related.

3.3 Agro-processing and Marketing Issues in PMA

Improved market access is essential to transform subsistence agriculture to commercial agriculture, the mission of PMA. This area has also particular relevance to "the Study on Improvement of Post-harvest Processing and Marketing System" started in May 2003.

Agricultural Marketing and Agro-Processing Strategies (MAPS) are being developed by PMA's Marketing and Agro-processing Sub-Committee.

MAPS places priority for public intervention in the areas of agricultural marketing and agro-processing as summarized below;

Trade and Finance:

- Improved capacity to undertake trade negotiations in regional and international fora
- Establishment of expert teams to provide trade/market analysis and intelligence
- Improved access to financing for marketing / value-added interventions/ agri-business
- Improved rural contract law

Producer support:

- Provision of market information to farmers and traders, and introduction of quality standards and improved post harvest technologies
- Improved farmer organization
- Educational programmes to engage farmers more effectively in the liberalized market environment

Infrastructure:

- Increased rural road investments to link farmers with market
- Reduced rates for air and rail freight
- Overcoming other infrastructure shortcomings

In line with the above, for improving market accesses, following issues are focused, in addition to those issues handled in other parts of PMA.

- Road network
- Means of transport
- Market infrastructure
- Market information
- International market access
- Storage and Agro-processing
- Agricultural input

3.4 Other Related Pillars Related to Agro-Processing and Marketing

(1) Research and Technology Development

Strategies focus on;

- National Agricultural Research Policy and Strategic Pan
- Decentralization of Research
- Stakeholder Involvement
- Private sector Involvement
- Financing Research

Priority research areas include;

- Technology development and multiplication
- Socio-economic research
- Strategic research
- Farm-power and post-harvest technologies, and
- Land and water resources management

(2) National Agricultural Advisory Services (NAADS)

Realizing the importance of agriculture to the national economy, government places greater

emphasis on extension delivery. Under the PMA, National Agricultural Advisory Services is now put in place. The common concepts behind NAADS are;

- A shift from the concept of farmers as beneficiaries to users and client of the extension services
- A shift from system operated by public employees to that largely operated through contracting arrangements and by private institutions
- A shift of the public sector, the provider of services to the role of stimulating the development of a private market for advisory services
- Provide for flexibility and dynamic linkages with other services, e.g. marketing, credit, research and infrastructure development

NAADS priority areas of intervention include following;

- Formulation of NAADS policy
- Development of District and Sub-County Extension Strategic Plan
- Development/ Improvement of Operational Capacity
- Improvement/ Development of Management System
- Developing Delivery and Financing Mechanisms
- Strengthening Technology System and Pathways
- Strengthening Knowledge Information and Communication
- Stronger and Effective Linkage and Coordination

By the end of 2005/2006, NAADS Programme covered 49 Districts as listed below,.

The geographical expansion of the Programme has been planned in a phased manner and projections are that all Districts will be incorporated by the end of 2007/08.

Table 3.1 Geographical Expansion of NAADS

	Year-1 (2001-2)	Year-2 (2002 -3)	Year-3 (2003-4)	Year-4 (2004-5)	Year-5(2005-6)
District	Arua Kabale Kibaale Mukono Soroti Tororo	Bushenyi Busia Iganga kabarole Kapchorwa Kitgum Luwero Mbarara Wakiso Lira	Kamuli Mbale Nakapiripirit Rakai Hoima	Apac Bugiri Kanungu Kumi Masaka Moyo Rukungiri Yumbe	Bukwo(Kapchorwa) Butaleja(Tororo) Gulu Ibanda(Mbarara) Isingiro(Mbarara) Kaabong(Kotido) Kaberamaido Kaliro(Kamuli) Kasese Kiruhura(Mbarara) Koboko(Arua) Kotido Manafwa(Mbale) Mityana(Mubende) Mubende Nakaseke(Luwero) Nebibi Ntungamo

	Year-1 (2001-2)	Year-2 (2002 -3)	Year-3 (2003-4)	Year-4 (2004-5)	Year-5(2005-6)
					Oyam(Apac) Sembabule
Total	6	10	5	8	20(12)
Ac. Total	6	16	21	29	49

3.5 Rural Development Strategy (RDS)

The Strategy was launched in FY 2003/04, aiming at poverty eradication by increasing household incomes through agricultural productivity increases, enhanced value addition and market access/entry.

The key action areas of the strategy include;

a. Provision of support to farmers' groups
b. Enhancing rural micro-finance service provision
c. Establishment of communication information system
d. Enhancement of market access for agricultural produce
e. Facilitation of Agricultural input delivery
f. Agricultural productivity enhancement through demand driven extension services
g. Agro-industrial development through research and development

3.5.1 Increasing incomes through export : A Plan for Zonal Agricultural Production, Agro-processing and Marketing

The Plan was formulated in August 2004, with main objectives to;

1) Identify agricultural enterprises for which Uganda has competitive advantage and zones with comparative advantages to produce them
2) Promote and support zonal production of the selected enterprises
3) Promote and support profitable processing and value addition of the produce
4) Promote and support export of the products
5) Monitor and guide the initiative to address for new challenges and emerging opportunities

The country was divided up into ten (10) zones, based on the following key factors.

1) Agro-ecological factors
2) Farming systems/management systems
3) Socio-economic factors
4) Geo-politics
5) Infrastructure

6) Land

7) On-going agriculture-based programmes/projects/initiatives

Production Zones and selected commodity/enterprises are as follows.

Table 3.2 Production Zone and Selected Commodity/Enterprises

Zone No.	Zone Name	Districts	Commodities/Enterprises
I	North Eastern Dry lands	1.Moroto, 2.Northern Kotido 3.Eastern Kitgum	1.Gum Arabica, 2.Simsim, 3.Apiculture 4.Goats/Skins 5.Beef cattle/Hides 6.Ostrich, 7.Sunflower
II	North Eastern Savannah Grasslands	1.Pader 2.Kitgum 3.Eastern Lira 4.Katakwi 5.Northern Sironko 6.Northern Kapchorwa 7.Nakapiripirit 8.Southern Kotido	1.Apiculture 2.Beef cattle/Hides 3.Goats/Skins 4.Simsim 5.Cassava 6.Pulses 7.Sunflower
III	North Western Savannah Grasslands	1.Adjumani 2.Western Nebbi 3.Arua 4.Moyo 5.Yumbe 6.Northern Gulu 7.Northern Apac 8.Western Lira	1.Spices(ginger,cardamom, pepper,chillies) 2.Tabacco 3.Apiculture 4.Cotton 5.Pulses 6.Simsim 7.Robsta coffee
IV	Para Savannahs	1. Eastern Nebbi 2. South-western Gulu 3. Western Masindi	1.Spices(ginger, cardamon, white/black pepper, birds eye chillies, red chillies) 2.Fisheries 3.Cassava 4.Apiculture 5.Beef cattle 6.Goats 7.Mangoes
V	Kyoga Plains	1. Kayunga 2. Kamuli 3. Iganga 4. Northern Bugiri 5. Tororo 6. Northern Busia 7. Southern Mbale 8. Pallisa 9. Kumi 10. Soroti 11. Kaberamaido 12. Southern Lira 13. Southern Apac	1.Fisheries 2.Apiculture 3.Maize 4.Pulses 5.Beef cattle 6.Cassava 7.Goats
VI	Lake Victoria Crescent	1. Kampala	1.Robusta coffee

Zone No.	Zone Name	Districts	Commodities/Enterprises
		2. Mukono 3. Wakiso 4. Eastern Mpigi 5. Eastern Masaka 6. Eastern Rakai 7. Kalangala 8. Jinja 9. Mayuge 10. Southern Bugiri 11. Southern Busia	2.Fisheries 3.Soices 4.Floriculture 5.Horticulture(Okura, french beans, tomatoes) 6.Vanilla 7.Cocoa 8.Dairy cattle
Ⅶ	**Western Savannah Grasslands**	1. Hoima 2. Kiboga 3. Southern Luwero 4. Mubende 5. Kibaale 6. Kyenjojo 7. Kabarole 8. Kamwenge 9. Southern Kasese	1.Robusta coffee 2.Tea 3.Apiculture 4.Maize 5.Banana(Brewing) 6.Beans 7.Beef cattle/Hides
Ⅷ	**Pastoral Rangelands**	1. Eastern Masindi 2. Nakasongola 3. Northern Luwero 4. Central Kiboga 5. Southern Mubende 6. Western Mpigi 7. Western Masaka 8. Western Rakai 9. Sembabule 10. Eastern Mbarara 11. Southern Ntungamo 12. Northern Bundibugyo	1.Beef cattle 2.Dairy cattle 3.Goats 4.Spices(birds eye chillies) 5.Apiculture 6.Citrus 7.Pineapple
Ⅸ	**South Western Farmlands**	1. Western Mbarara 2. Bushenyi 3. Northern Ntungamo 4. Rukungiri 5. Northern Kanungu	1.Robusta coffee 2.Tea 3.Dairy cattle 4.Fisheries 5.Banana(Dessert) 6.Vanilla 7.Tobacco
Ⅹ	**Highland Ranges**	1. Northern Mbale 2. Southern Sironko 3. Southern Kapchorwa 4. Southern Kanungu 5. Kabale 6. Kisoro 7. Northern Kasese 8. Southern Bundibugyo	1.Arabica coffee 2.Passion Fruit 3.Vanilla 4.Dairy cattle 5.Spices(Cardamom, White/Black pepper) 6.Maize 7.Irish potatoes

3.5.2 The Model Sub-county Development Programme (MSDP)

As part of the implementation of the Rural Development Strategy, Government will launch a Model Sub-county Development Programme in F/Y 2006/07

MSDP intends to accelerate the implementation of RDS by a number of comprehensive activities

in one Sub-county of each of the 80 districts of Uganda

The Programme aims at increasing household income by;

- Developing an effective approach to strengthening input and output markets, and to accelerate the use of productivity enhancing inputs in a sustainable way.
- Increasing agricultural production, value addition and market access
- Expanding opportunities for off-farm employment through the growth of supportive service markets including financial services and inputs delivery, transportation and tourism, processing and value addition
- Building strong public private sector partnership in the implementation of the Programme

MSDP components are;

- Setting up and strengthening institutional coordination
- Developing the capacity of community personnel
- Selection of enterprises, identification of beneficiaries, provision of input kits and training
- Provision of micro-finance, marketing and value addition support service
- Monitoring and Evaluation

For the coordination and management of MSDP, institutional framework will be established. One new structure shall be formed at national level, while existing ones will be strengthened at local government level.

National level

Cabinet sub-committee: Steering Committee (MFPED, NPA, MAAIF, MTTI, MLOG etc.)
National Task Force (NTF, consisting of representatives of the ministries, agencies concerned)

Local level

District level: CAO will be responsible for overall management of MSDP
Relevant technical staffs provide technical backstopping

Sub-county level: Sub-county Technical Planning Committee (SCTPC) will be in charge of technical coordination
Sub-county Council will oversee the development of the Sub-county
SCTPC will report to Sub-county chief who will report to CAO.

3.6 Support by Donors on Agro-Processing and Marketing

A series of actions are taken in the related fields on marketing, among them are projects supported by development partners.

(1) Trade and Finance

EU supported project, UPTOP (Uganda Programme for Trade Opportunity and Policy) aims to enhance Uganda's competitiveness in the international market and as a result the growth of Uganda's private sector is increased in the context of globalization.

USAID supported project SPEED (Private Enterprise Expansion and Development) focuses on access to finance and business skill development.
The project began in March 2001 and runs through December 2003 with a US$15 million budget. The project implements activities focused on SME finance micro-finance, business development services (BDS), and institutional environment to support these goals.

IDEA designed to promote the export of non-traditional agriculture through an integrated approach to the whole productive chain. The project has been operational since 1995 and has focused on a wide range of non-traditional crops. It continues to widen its scope of work.

U-TRADE, supported by USAID, will support Government in developing a viable trade and investment strategy as well as in improving the legal and regulatory framework to promote export growth.

Under the MTCS（Medium Term Competitive Strategy for the Private Sector : 2000-2005), financial sector reform, particularly on establishing micro-finance institutions has been promoted, with supports from various donors and NGOs.

Uganda Commodity Exchange was established in 2001 and now operational while Warehouse Receipt System Bill has been approved by the Parliament in April 2006.

(2) Producer support

NAADS plays a key role in support of farmers groups in their effort for capacity building. Formation of farmers group and farmers controlled enterprise is encouraged by NAADS programme. NAADS is supported by World Bank, IFAD, DFID, Netherlands, EU and Ireland.
Market Information System is initiated by NAADS as a Micro-MIS project in 6 districts of Arua, Soroti, Tororo, Kabale, Kibaale and Mukono. Project activities undertaken by Food Net/IITA consist of data collection and analysis, MIS dissemination mostly on FM radio, and farmer training.
Micro-finance is another important aspect of the producer support.

(3) Infrastructure

1) Roads

Ministry of Works, Housing and Construction (MWHC) developed a 10-year District Road

Investment Programme in compliant with PMA for increased access of rural communities to urban markets.

2) Energy

A 10-year Energy for Rural Transformation (ERT) Project by World Bank is underway for increased access to energy, including rural roads of rural communities.

CHAPTER 4 PILOT PROJECT

4.1 Basic Concept of the Pilot Project Implementation

4.1.1 Basic Concept

As stated in the previous chapter (Basic approach), “to increase incomes of small scale farmers” is given particular emphasis in the Study. Collective agro-processing and marketing by farmers’ organization is placed as major thrust of the Study in compliant to PEAP and PMA.

The Draft Development Plan prepared in Phase1 intends to clarify the ways and means of improving post-harvest processing and marketing system in the Study area, with particular emphasis on collective activities of farmers’ groups.

The implementation of the pilot projects aimed at clarifying the validity and efficacy of collective agro-processing and marketing and obtaining guiding principle for promoting these in the Study area.
Direct objective of collective marketing is to increase farm income of participating farmers through bulk marketing of products with improved quality, by strengthening competitive power and increased market value.
Therefore, the Study encourages and supports the farmers’ organization for smooth and efficient operation of the pilot projects implemented by their own initiatives and responsibilities on management and technical operation. Progress of the pilot projects implementation has been monitored and evaluated regularly, aiming at contributing to develop improved agro-processing and marketing system in the Study area.

Two major components of the Study, D/P and Pilot projects have been implemented in parallel.
Flow of the activities in two phases is shown in the following chart, explaining the relation of the exercises to the goals and objectives of the Study.

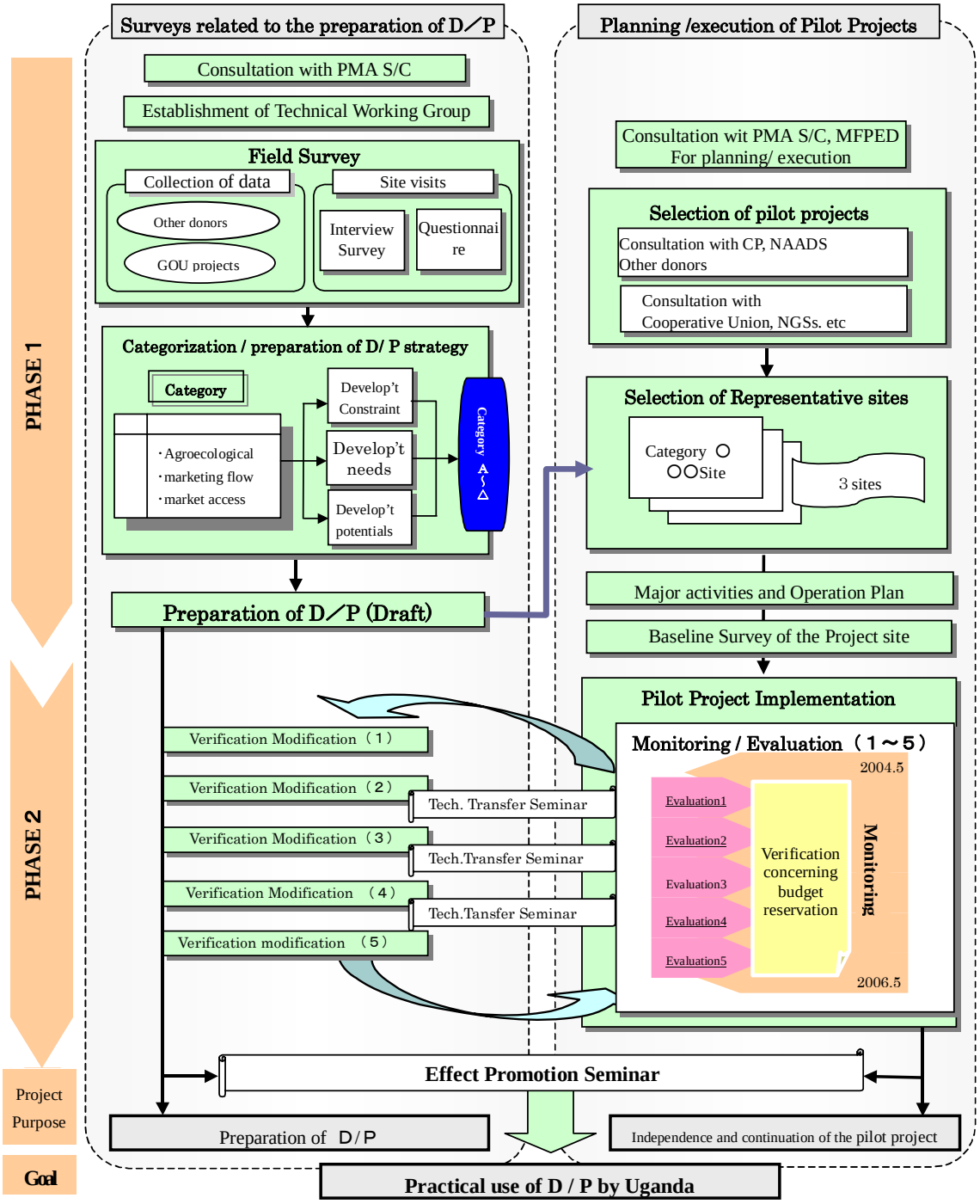


Figure 4.1 Framework of Development Plan and Pilot Project

4.1.2 Selection of the Pilot Projects

In line with the Draft Development Plan, pilot project(s) to be implemented was selected in the Study area. For the selection of pilot project(s), long list of candidate groups of farmers were prepared with the cooperation of UCA, UNFFE and district governments. These are scrutinized by the TWG meetings for short list to be conducted preliminary survey.

In selecting the pilot projects, special attention was given to the following.

(1) Emphasis placed on poorer area
(2) Farmers' willingness, eagerness and capacity to implement the project
(3) Available land for collective marketing activities and facilities
(4) Minimum infrastructure, such as road network, water resources etc.
(5) Model effect is to be expected for other development effort at similar conditions
(6) Cooperation and coordination with other programs/ projects are to be feasible

Selection of the candidates of pilot projects for the identified categories includes following;

Rice

(1) Zirobwe Rice Processing and Marketing Project (Luwero District)
The organization is under the process of official registration with the support of SG-2000.
(2) Bulamogi Rice Processing and Marketing Project (Kaliro District)
The group consists of 8 members (primary cooperative societies and farmers associations)

Cassava (flour)

(3) ACAPROMA Cassava Flour Production and Marketing Project (Nakasongola District)
The following three (3) groups are selected in Nakasongola Districts, namely Kiwenmbi Farmers Group, Eyebikiire Kisalizi Women's Group and Nyikira Okole Cotton Farmers Group. And it was basically agreed that these groups would form a new organization to implement the pilot project.

Fruits

(4) Kangulumira Fruit Processing and Marketing Project (Kayunga District)
Kangulumira Area Cooperative Enterprise in Kayunga District was selected. Due to rather limited scale of pilot project, it was requested that the core group be selected among farmers group in the Area Coops. Accordingly, High Quality Farmers' Association was selected as the final candidate. The group currently is carrying out collective marketing of fresh pineapple to Kampala and Busia markets. The purpose of the project will be to add value to fruits produced by member farmers. Products were considered to include wine, jam, juice and dry fruits.

4.1.3 Workshop for Consensus Building

Consensus for pilot project planning and implementation was built through discussions, debates and dialogues at various stages.

Based on the results of the preliminary study and through discussions with the representatives of the farmers' groups for pilot projects, draft plans were prepared by the Study team in the Field Study 2.

In the Field Study 3, Workshops on consensus building were held at the site of each project as follows;

(1) Zirobwe Rice processing and Marketing Project (Luwero District)

Date: March 7, 2004

Place: Sub-county office

Topics: Presentation of the draft plan and discussion
Confirmation of the needs to obtain a legal status
Encouragement of initial fund mobilization
Others

Participants: Farmers 60
Core members of farmers group
Representatives of SAO, SG-2000
District Agriculture Officer, Sub-county Officer
Study team

(2) Bulamogi Rice Processing and Marketing Project (Kaliro District)

Date: February 20, 2004

Place: Namwiwa Sub-county office

Topics: Presentation of the draft plan and discussion
Selection of the tentative Board members
Introduction of the tentative operation plan by board members
Encouragement of initial fund mobilization
Others

Participants: Farmers 250 including core members of the group
M. P. from Bulamogi, Chairman of LCV Council
District & Sub-county officers
MTTI (Coops. D.), NAADS, UCA representatives
Study team

(3) ACAPROMA Cassava Flour Production and Marketing Project (Nakasongola)

Date: February 28, 2004

Place: Nakasongola

Topics: Presentation of the draft plan and discussion
Discussion and decision of the project site
Confirmation of the needs to obtain legal status
Encouragement of initial fund mobilization

Participants: Farmers around 200, including core group members
District/ Sub-county officers
NDIFA (Nakasongola District farmers association)
Study team

(4) Kangulumira Fruit Processing and Marketing Project (Kayunga District)

Date: February 25, 2004
Place: Kangulumira Area Cooperative Enterprise (KACE)
Topics: Presentation of the draft plan and discussion
Confirmation of the needs to obtain legal status
Encouragement of initial fund mobilization
Others
Participants: Expected member farmers, 15
Core members of KACE
District/ Sub-county officers
Study team

4.1.4 Organizational Structure for the Pilot Project Implementation

(1) Farmers' Organization

Most of the farmers' organizations in Uganda fall under the following categories;

1) National

a) Cooperative Unions. Formed in the 1960's to market Uganda's cash crops. eg. Busogo Growers Cooperative Union.
b) National Associations. Formed to support a specific commodity. eg Uganda Bee Keepers Association.
c) Uganda National Farmers Federation.

2) Local

d) Community Based Organizations. CBO's formed mainly as a response to Government policy for farmers to associate to ease the provision of Government services and the work of NGO's. Mainly registered at Sub-County level.
e) Primary Cooperatives and Area Marketing Enterprises at Sub-County level. These were also mainly formed due to a drive by UCA to revitalize cooperatives.
f) Farmers organizations formed under the NAADS program.
g) District Farmers Associations under UNFF.

The farmers' organizations for this project fall under categories d), e) and g). Many of these groups were formed opportunistically in the hope of accessing assistance from the government, donors or NGO's.

(2) Management Board

For the smooth and effective implementation of the pilot projects, executive body was established for each project. Executive body consists of members selected/ nominated by the respective farmers' groups. This was decided by the General Assembly of the group, with giving mandate on management and operation of the project.

Executive body was called as Management Board (MB).

MB members was selected and nominated from among the members of the group.

MB is responsible to the management and operation of the project activities. MB is headed by MB Director, and consists of 5-7 members, subject to the situation of respective projects.

For daily operation of the project activities, under MB, full time personnel for operation manager and account need to be recruited, operation manager and accountant. These personnel be recruited from among the members of the group or from outside. In addition, part-time workers were hired for required workload for particular seasons or period.

(3) Project Advisory Board (PAB)

To supervise and support the MB on its smooth implementation of the project, Project Advisory Board was organized consisting of ;

h) TWG members
i) Representatives of the concerned district
j) Representatives of the concerned sub-county
k) JICA Study Team
l) Others as deemed required

Major tasks of PAB were as follows;

m) Administrative and/or technical advice
n) Monitoring and evaluation
o) Others as deemed required

(4) Advisers on Management and Operation

To realize the collective marketing and processing, farmers' initiatives to implement the project are essential. However, the experience and expertise as well as the financial resources of farmers to initiate the project are limited and substantial assistance from outside, particularly from the government and NGO, is necessary.

To assist MB, services of management adviser (MA), technical and marketing advisers (TA & MAA) were provided by the Study team for a limited periods as MB needs expertise on these matters. Advisers will be recruited from among the local NGOs and/or others.

Major functions of advisers are;

Managing advisors:

p) To work together with each farmers' group to establish a simple & efficient group management system.
q) To assist in establishing fair and transparent accounting system and its operation
r) To monitor progress at each pilot project site, ensuring that set schedules are met, overcoming problems and reporting such matters to the Study team, from time-to-time.

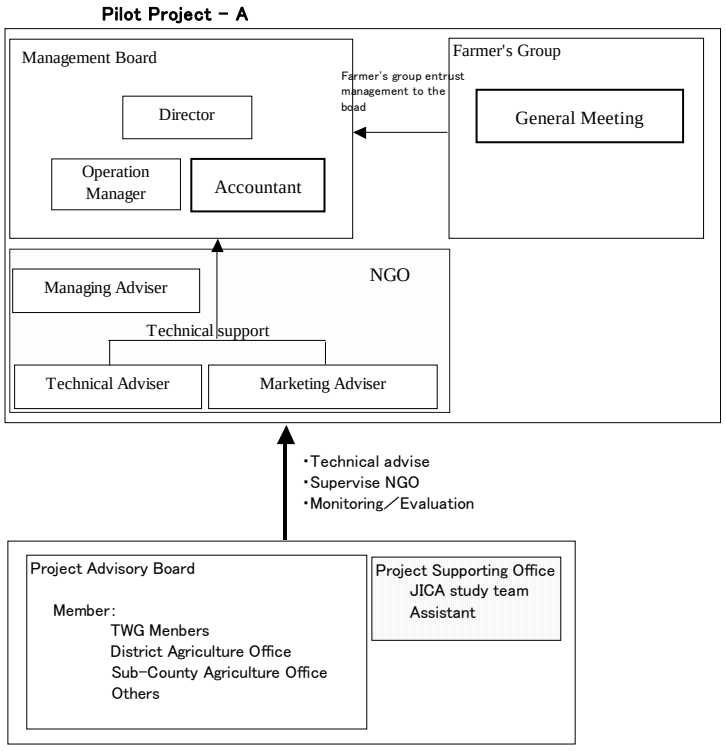
Marketing advisors:

s) To assist in identifying and access to reliable markets for their product in a manner that maximizes benefits of collective activity.

Technical advisors:

t) To assist operation and maintenance through direct advice or organizing technical trainings.

Basic structure was proposed for the implementation pf the pilot projects.
Details was decided through discussion among concerned parties.



Figurer 4.2 Organizational Structure of the Pilot Projects Implementation

4.2 Zirobwe Rice Processing and Marketing Project

4.2.1 Outline of Project

(1) Objectives

The project aims to increase income of small-scale farmers, through providing value addition activities (rice milling service) together with dissemination of improved post-harvest processing technologies of upland rice.

(2) Operating Body

ZAABTA (Zirobwe Agali Awamu Agribusiness Training Association) and SAO (Share An Opportunity - Uganda) established a partnership company as ZRM (Zirobwe Rice Mill).

(3) Activities

- Establishment of a solid organization for rice processing and marketing.
- Providing value addition activities to rice growing farmers (rice milling services).
- Ensuring sustainable management and operation of rice mill.
- Disseminating appropriate post-harvest processing technologies such as drying and cleaning of paddy.

(4) Project Facility (Rice Mill): Initial investment amount 32.8 million Ush in total.

The mill house was constructed by bricks with plaster and colored roofing material having 100 ㎡ space (10x10 meters) of milling and storing area and 30 ㎡ veranda (10x 3 meters). An office room has the space of 12.5 ㎡.

(5) Equipment: Initial investment amount 9.9 million Ush in total.

Rice mill:	One pass type with rubber roll husker, 15kW electric motor driven, Processing capacity 0.5 – 0.6 ton/hour (paddy)
Other equipment:	Moisture meter, Table scale, Sieves for broken rice separation, Husk stove, Office table, etc.

(6) Total initial investment: 44.3 million Ush

4.2.2 Planning and Performance of the Project

(1) Farmers' organization

Two key organizations, ZAABTA the farmers' organization and SAO as NGO formed Zirobwe Rice Mill (ZRM) as the partnership of the two parties.

1) ZAABTA

ZAABTA is the farmers' organization composed of 69 farmers' groups, most of which exist in Zirobwe sub-county, Luwero district. Before the project started, the number of farmer's group in ZAABTA was 64 and among them, 18 groups were growing upland rice. The number of rice growing farmer's group rapidly increased to 49 goups. ZAABTA has long been assisted by SG-2000 and SAO.

2) Share an Opportunity (SAO)

SAO Uganda is a locally registered NGO coming originally from Australia. Activities in Uganda cover wide range of agriculture, education, nutrition, water supply and small business support. SAO has conducted such various activities in Luwero since 1996. Zirobwe Sub-county has been one of its project coverage areas.

3) Process of the new organization established

In the initial stage of the planning in Luwero, ZAABTA was considered as a representing farmers' group in the targeted area. However, through the discussion between the Study team and ZAABTA from April to May 2004, both recognized the necessity of inviting a business partner from private sector for smooth management of rice mill business. ZAABTA selected SAO as a partner for the project, and then the two parties established Zirobwe Rice Mill (ZRM) as a partnership company.

4) Structure of ZRM

ZRM's management board consists of two members from ZAABTA and two members from SAO. The management board holds board meeting at least once a month. The board has been trying not only to manage daily operation but also to find and coordinate sales contracts of their milled rice with external entities. The following figure shows the structure of ZRM.

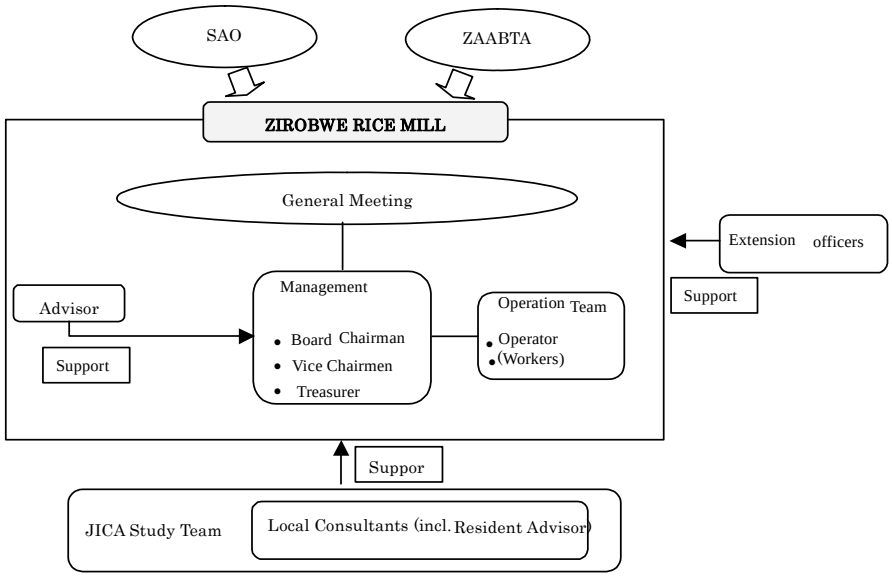


Figure 4.3 Organization Chart, ZRM

(2) Facilities and Machinery

1) Conditions of facilities

u) There was no serious trouble during civil construction though some minor modifications were made. The schedule was behind about 2 weeks from the contracted work schedule.

v) The building size was designed for enough working space and storing space of rice. In addition, ZRM constructed warehouse in 2005 adjacent to rice mill for keeping milled rice for Makerere contract and maize flour to be produced by the flour mill.

w) The facility keeps good shape and no damage or rain leaking were observed so far.

2) Conditions of machinery

- The milling machine is a type combined with rubber rolls for paddy husking and milling chamber for whitening originally developed in Japan (the unit is made in China). The mill performance is good in terms of milling recovery and rice quality. However, mechanical troubles were recorded so often due to very poor manufacturing level. Recently, cracks were generated on machine body and welding work was undertaken as countermeasures before the body will have serious trouble. Normally the life of this kind of machine is estimated at 5 to 6 years but this milling machine from China would be able to last for 2-3 years only.
- Electricity cost is lower than that of diesel oil, but frequent power cut causes the mill being idle. ZRM decided to install a diesel engine as a stand-by prime mover of rice mill at their cost. When electricity supply is cut off, the engine will start to run the mill. This diesel engine is now under installation and will start serving in middle of

June before peak season is coming.

- Simple designed electric resistance type moisture meter was introduced for checking the moisture contents. The equipment is easy to use and has been utilized effectively.
- Broken rice separating sieves were installed for producing high quality rice and for the differentiation of the rice in markets. ZRM uses these sieves to separate small broken rice before delivery to Makerere.

(3) Technical supports

1) Supports

- Management trainings to executives and manager were conducted emphasizing the merits of collective rice processing and marketing and the importance of quality control.
- Ten core members were sent for one day trip to Semuto to collect information on paddy drying, marketing of processed rice and rice bran.
- Training of the operators was conducted at Bulamogi rice mill for 5 days. Bulamogi was chosen because there was no paddy available for milling demonstration at Zirobwe/Semuto at that time. This training focused on routine mill and engine maintenance, trouble shooting and replacement of consumable parts such as rollers, screens, oil, etc.
- Training on the management of consumable spare parts and clearing and cleaning of the site was conducted at the project site.
- Demonstration was conducted on utilization of husk as by-products, such as Husk Stove and Husk carbonization for farm use by the Study team.
- OJT training on accounting works was conducted by the resident advisor, dispatched by the Study team.

2) Current situation

- The executives and manager are now able to manage the operation of the rice mill by themselves. As mentioned above, ZRM started collective rice marketing by bulking and quality control to Makerere University. Same efforts to find good rice market other than Makerere by bulking and quality control are underway. ZRM also plans to develop small package of rice for retailers this year.
- Though the experience of the operator is rather limited, he is gaining the skill gradually through daily operation and solution of several machine troubles faced. ZRM can expect much smoother operation in 2006. However, he needs to expand further his skill as routine operation and maintenance so that preventive measures can be taken before machine troubles happen.

(4) Processing Result (Milling service)

The original plan was to process 300 ton of paddy per year (150ton/season x 2 seasons/year), and the actual record of the operation in 2005 was 321.5 ton finally. The monthly record and the accumulation are shown in following figures.

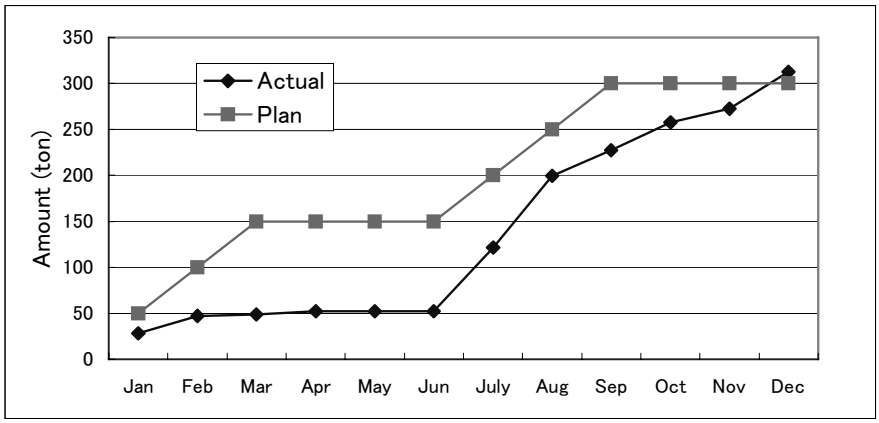


Figure 4.4 Planned and Actual Paddy Amount Processed by ZRM in 2005

The operation plan shown above was tentatively made in accordance to following cropping calendar.

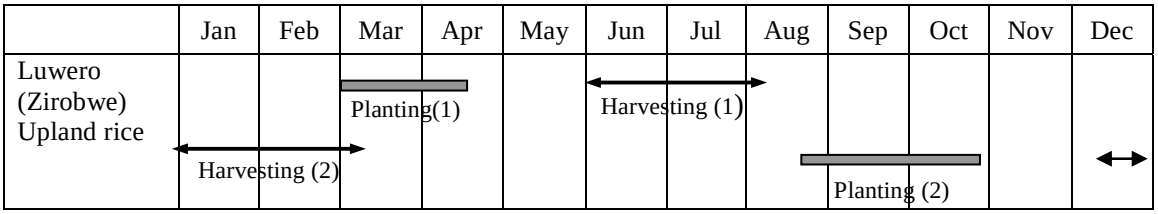


Figure 4.5 Cropping Calendar of Rice Cultivation in Luwero District

2nd season: The harvest from December to March 2005 was seriously affected by drought. So the planned processing amount of 150 tons in this season was not achieved and remained at only 50 tons of paddy.

1st season: 69 ton of paddy in July and 81 ton in August were processed. After September, though harvest of upland rice decreases, paddy delivery to ZRM continued and finally the target amount of 300 tons in 2005 was achieved.

Target area of ZRM expanded larger than the initial prediction. More farmers in and around the area showed interests in upland rice production, and started to plant them owing partly to seed support program of JICA and SG-2000. The expansion of the area contributed to the increase in rice production, which led to the significant increase in incoming paddy to ZRM.
Milling activity has gone relatively smoothly despite persistent power cuts. Paddy supply has been overwhelming during 1st season. 24 hour operations were often necessary to process

paddy supplied. ZRM supplied plastic sheets to rice growers for paddy drying on a credit basis. As farmers carefully dry harvested paddy on the plastic sheet, the quality of paddy is good. There is no claim received for the contamination of stone in milled rice from Makerere or retailers so far.

Table 4.1 Monthly Processed Amount of Paddy and Yields

2005	Paddy	Milled rice	Yields	Accumulation (paddy)
Jan	24,993	16,860	0.67	24,993
Feb	18,337	11,672	0.64	43,330
Mar	1,187	621	0.52	44,517
Apr	3,314	2,136	0.64	47,831
May	0	0	0.00	47,831
Jun	2,305	1,501	0.65	50,136
Jul	69,332	46,171	0.67	119,468
Aug	81,098	57,183	0.71	200,566
Sep	28,579	18,707	0.65	229,145
Oct	34,554	22,844	0.66	263,699
Nov	12,759	8,307	0.65	276,458
Dec	45,113	30,653	0.68	321,571
Sub-total	**321,571**	**216,655**	**0.67**	
Jan 2006	37,667	24,210	0.64	359,238
Feb	24,638	16,403	0.67	383,876
Mar	1,419	854	0.60	385,295
Apr	4,382	2,798	0.64	389,677
TOTAL	**389,677**	**260,920**	**0.67**	

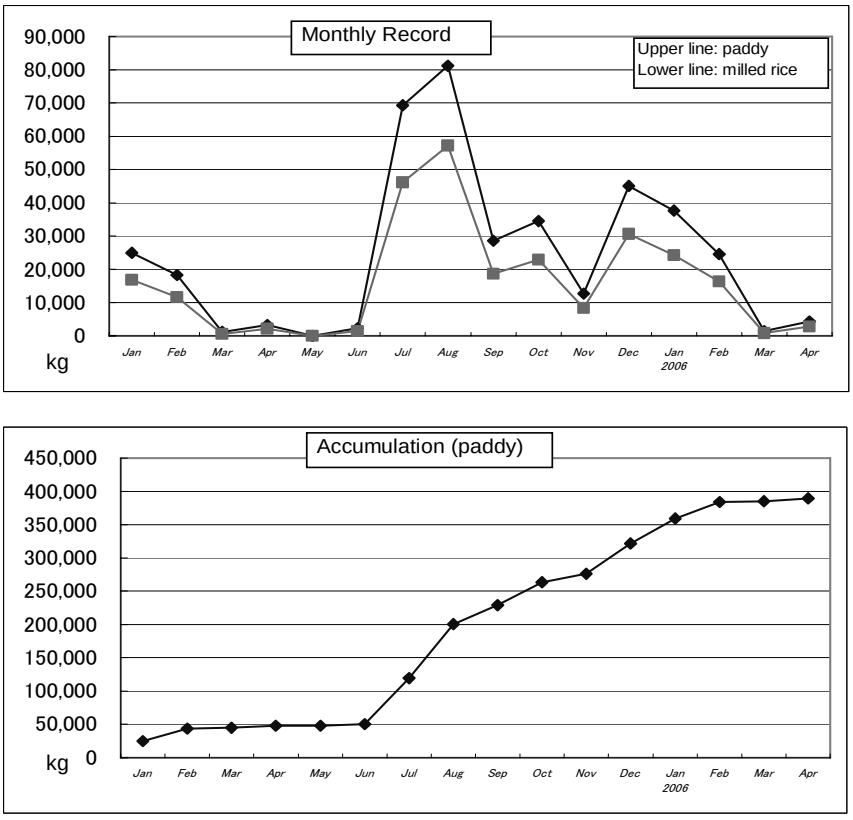


Figure 4.6 Monthly Record and Accumulation of Paddy Processed

(5) Marketing Result and Other Activities

For the initial stage, this rice mill started operation as milling service provider to rice growing farmers. However, as the project was expanding smoothly, new challenge of collective marketing of rice has emerged.

At the beginning of the operation in 2005, major buyers of milled rice were local small shops in Zirobwe. But, owing to establishment of the contract with Makerere University in July, nearly all the rice milled in the facility has been purchased by ZRM. ZRM purchased milled rice from farmers at 800 Ush/kg and sold them to Makerere University at 960 Ush/kg. ZRM utilized the loan from SACCO amounting to 50 million Ush, for the purchase of milled rice by cash from farmers. The purchasing price of ZRM has been kept favorable to farmers, equivalent or better than other markets price. This special condition has been attracting more farmers coming to the facility. The total sales to Makerere amounted to nearly 100 million Ush for 100 ton of milled rice.

1) Utilization of by-products:

As this rice-milling machine discharges rice bran and husk separately, the quality of rice bran is suitable as feed for poultry, pigs and fish, different from the other types of rice-milling machines widely used in Uganda which mix-up husk and rice bran. Rice bran has been sold to a chicken hatchery in Kampala from the beginning at the price of 60 Ush/kg, which contributed to additional income of ZRM. The total revenue by rice bran sales was 1.7 million Ush in 2005.

The utilization of husk has been promoted through such demonstration as husk stove and charcoaled husk making for soil improvement. However farmers limited the adoption of such new technologies in the beginning. Recently, rice husk is consumed as fuel for brick burning, poultry litter and washing material for oil removal at local buffets. Husk is supplied to those demands at free of charge at this moment. The utilization of charcoaled husk for soil improvement by farmers is not realized as yet.

2) Other activities:

Recently, ZRM also started to agricultural inputs such as plastic sheet for paddy drying, herbicide and chemical fertilizers as parts of their activities though the sales amount is rather limited.

(6) The balance of income and expense

Table 4.2 Profit and Loss Account 2005 below shows income, expenses and net profit achieved in 2005. Net profit in 2005 was Ush 3,675,084.

Milling service fee of 60Ush/kg and rice bran sale of 60Ush/kg are applied as planned. The durability of consumable spare parts is very poor. The cost of repair and maintenance was very high, totaling to Ush 2,672,300 including consumable spare parts. This amount is equivalent to 27% of total machine price. Originally it was planned to be less than 10% including consumable parts such as rubber rolls and milling screens.

Table 4.2 Profit and Loss Account in 2005

	(Jan-Dec.2005)	TOTAL (Ush)
Income		116 301 700
	Milling fee	12 929 800
	Bran sales	1 711 750
	Husk sales	21 000
	PP bag Sales	42 100
	SAO Bank Dividend	10 400
	Plastic sheet sales	2 760 000
	Rice sales	97 786 650
	Herbicide sales	740 000
	Fertilizer sales	300 000
Expenses		112 626 616
	Cost of sheets sold	2 300 000
	Cost of rice sold	84 644 611
	Cost of herbicide sold	555 000
	Cost of fertilizer sold	266 666
	Lunch	527 500
	Sundry wages	447 150
	Sundry expenses	255 950
	Communication	179 450
	Salaries	1 165 000
	Wages	1 287 500
	Repairs and maintenance	2 672 300
	Office expenses	357 300
	Security	259 200
	Administration expenses	348 300
	Overtime wages	16 000
	Electricity(estimated cost)	419 661
	Transport	491 700
	Loan Interest	7 996 028
	Bank charges	100 000
	Equipment	139 400
	Consumables	3 107 900
	Withholding Tax	5 040 000
	Trading license	50 000
		0
Net Profit		3 675 084

Note: Monthly balance is attached.

The bulking sales of milled rice to Makerere University shows a little deficits (Rice sales income was Ush 97,786,659 against the cost of milled rice: Ush 84,644,611, loan interest: Ush 7,996,028, consumables (rice sacks): 3,107,900 and withholding tax: 5,040,000, then total costs: Ush 100,788,539. The deficit was Ush 3,001,889 (3% of rice sales amounts).

In order to fulfill the delivery contract, ZRM spent a lot of efforts including partial procuring paddy from outside as available rice in the area was not enough. The amount brought from outside was 34 tons in November and 24 tons in December. This amount is not counted in above monthly record (Table 4.1 and Figure 4.6). This paddy sourcing cost ran up to Ush 550 per kg of paddy, which eventually caused certain deficits. This deficit can be said as a lesson fee of ZRM. The loan interest was quite high and ZRM negotiated with SACCO with the assistance of the Study team to convert the loan scheme to overdraft facility, which will reduce the interest amount. Farmers were very happy enjoying good price of Ush 800/kg to ZRM after milling.

The profit this year is expected to increase by income of milling fee expected by bumper rice production estimated this year and more profitable operation in Makerere contract. Sale tax of 6% incurred for the contract with Makerere University will be exempted from 2006. Zirobwe Rice Mill is considering purchasing paddy and processing it collectively aiming at more effective and profitable mill operation if farmers agree this new operation scheme.

The annual depreciation cost of facility and machinery estimated at about 1.8 million Ush. Zirobwe Rice Mill shall pay the usage fee of those facilities to ZAABTA equivalent to the amount of the depreciation cost.

4.2.3 Results of the Evaluation

(1) Relevance

The project is evaluated relevant from the following viewpoints:

1) Consistency with government policy

The purpose and contents of the project meet the government's present agricultural policy such as PEAP, PMA, MAPS and Rural Development Strategy that stress the importance of post-harvest processing and marketing of agricultural produce. The project area, Luwero district, is one of the target areas which strategically promote rice production on the governmental agricultural plan. In this sense, the project has high relevance from the viewpoint of the governmental policy.

2) Appropriateness of the target group

Selected target group of the project is also evaluated as appropriate. The target population has cultivated upland rice and strong interest in increasing rice production: nevertheless, they had limited access to rice milling facilities due to their far location, causing the farmers to spend transportation costs and time. Therefore, the farmers expressed keen interest and positive attitudes to the project formulation. In this line, the project reflected their strong needs.

3) Complementary effect with other supports

The target area has been receiving technical supports from another NGO called SG-2000 for the past years. The technical support especially on crop production and farm management has provided synergetic effects between the project and the SG-2000's program. In addition, a JICA expert and SG-2000 collaborated on seed distribution program in the area, which promoted targeted farmers to grow more upland rice. NAADS program also started to assist in farming techniques within the area.

(2) Effectiveness

1) Effectiveness from the viewpoint of Project Purpose

It is evaluated that the project purpose was achieved as of the project nearly ending.

Project purpose	Farmers can gain more profit from sales of milled rice than before the project started.
Verifiable indicator	Total profit including transportation cost to milling facilities exceeds the one before the project started.

In order to realize the project purpose, both i) solid sales routes of the milled rice, and ii) better sales price including transportation cost have to be realized.

Regarding the solid sales route, the project has now successfully sustained the sales contract with Makerere University. Owing to the solid sales route, farmers in the project need not to worry about the sales of rice after they milled.

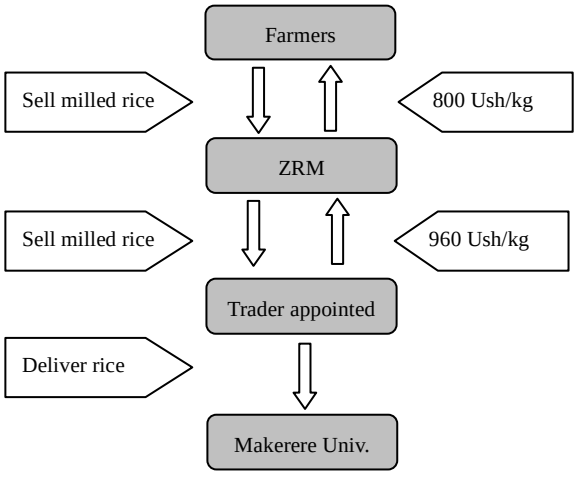


Figure 4.7 Sales Route between Farmers and Makerere University

The chart shows the sales flow of milled rice in 2005 at this project. ZRM purchased milled rice from farmers by 800 Ush/kg after they milled at the facility, and then ZRM sold the trader by 960 Ush/kg who was appointed by Makerere University[1]. Following this sales flow, ZRM gained 200 Ush/kg in nominal basis[2].

ZRM's purchasing price from farmers has been basically higher than that of the usual traders

[1] Sales prices are actual record in 2005. The prices may change along with market trend.
[2] ZRM has obtained loan from SACCO. Interest cover should be considered (3% per month).

partly due to the contract with Makerere University concluded in July 2005. Traders in commercial-basis rice milling facility in Semuto where most farmers used to go before the project has offered a little lower price as the project does. Farmers can enjoy more profits from saving transportation cost to Semuto[3].

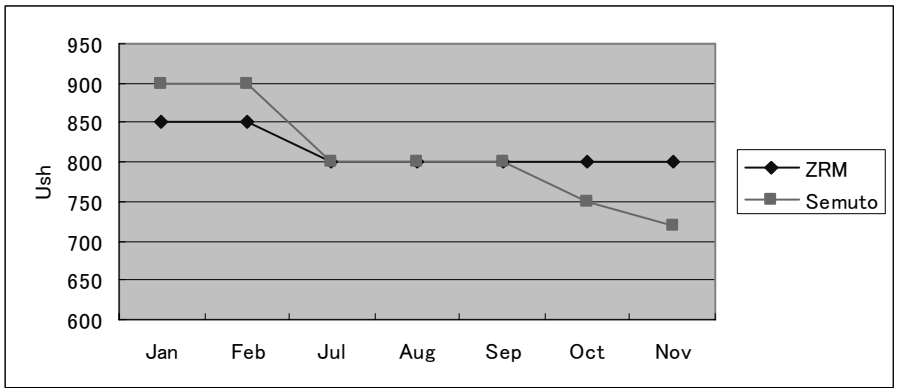


Figure 4.8 Comparison of the Market Price of ZRM and Semuto in 2005

The result of the questionnaire survey also shows the farmers' perception regarding the sales price, most of which are "better price than before".

Table 4.3 Sales Price of Rice (Farmers' Answers to the Questionnaire)

	Better price than before	Better price than before, but not all the time	Nearly the same as before	Worse
Number	38	2	4	1
%	84%	4%	9%	2%

Note: The table excludes the number of N/A.

2) From the viewpoint of farmers' satisfaction

The results of the questionnaire conducted to the target group population show their satisfaction with the project (see Table 4.3 and 4.6).

Table 4.4 Satisfaction of the Project (farmers' answers to the questionnaire)

		Number	%
Mid-term evaluation	Satisfied with the Project	58	98%
	Dissatisfied with the Project	1	2%
Final evaluation	Satisfied with the Project	50	100%
	Dissatisfied with the Project	0	0%

[3] Transportation to Semuto costs 30 Ush per kilogram. In addition,

The following Table 4.5 shows that the majority answered "Less distance to the milling facility, contributing to saving time and transportation cost" as the primary reason of the project's satisfaction. Also, "Better quality of milled rice" and "Reliable management of the project operation" are regarded as contributing factors of satisfaction to the project.

Table 4.5 Reasons of satisfaction (farmers' answers to the questionnaire)

	Mid term evaluation		Final evaluation	
	Number	%	Number	%
Less distance to the milling facility, contributing to saving time and transp. Cost	55	95%	49	98%
Cheaper milling fee	43	74%	34	68%
Better milling quality	55	95%	48	96%
Reliable management of the project (milling operation)	55	95%	48	96%
Expectation of profit share from the project by the milling operation	46	79%	46	92%
Others	3	5%	40*	80%

Note: Others* included the answers such as "reservation of sales market of milled rice~38 respondents", and "availability of rice bran at cheaper price~6 respondents".

(3) Efficiency

Inputs on human resources aspect are evaluated as appropriate, although several material inputs had difficulties to contribute to initially expected outputs.

1) Material/Facility Input

The project introduced rice mill machine run by electricity, taking into consideration that electricity type enables easier handling than diesel type, in addition to its advantage of lower cost. However, the area has suffered from electricity black out more frequently than the project had initially assumed. Therefore, its operation had to be interrupted so often[4]. Machine quality also sometimes posed problems. Lower durability of rubber role and milling screen in particular has required frequent change, resulting in excess of planned budget on consumables.
Other material inputs such as moisture meter are fully utilized to support better quality of milled rice.

The facility of rice mill is judged as appropriate in terms of space and structure, considering the current growing volume of paddy.

2) Human resources Input

[4] Rate of operation days from September 2005 to December 2005 was 62%.

A resident advisor had been dispatched by the Study team for nearly one year from the beginning of the project, whose major role was to assist in accounting and daily operation. The dispatch of the resident advisor was regarded as necessary one and contributed well especially to accounting. The Study team also has provided technical support to mill operators by experts of the Study team and others. The trained operator is now able to operate the machine without serious mishandlings and to deal with minor repairs. It is evaluated that the way of training of operators, which was composed of initial training and OJT basis training as appropriate.

(4) Impact

Following positive impacts have been observed in the project:

x) Rice production in the target area has increased, and more farmers now show strong intention to expand rice cultivation area.

y) Profit generated by sales of milled rice has contributed to increase in total family income.

z) ZRM management feels that they have acquired more bargaining power to rice traders. Their confidence has strongly linked to their motivation to run the facility continuously in the future.

aa) ZAABTA received new five farmers' groups, two of which are from parishes where ZAABTA had no member groups before. Reputation of the project strongly motivated new groups to join ZAABTA.

bb) Successful performance of the project encouraged ZAABTA and SAO to initiate other activities such as maize mill operation. SAO already built a warehouse of rice and a maize mill facility next to the rice mill.

Table 4.6 Family Income Growth (Farmers' Answers to the Questionnaire)

Evaluation	Answer	Number	%
Mid-term evaluation	Income grew than before	58	98%
	Same as before, or reduced	1	2%
Final evaluation	Income grew than before	42	84%
	n/a	8*	16%*

Table 4.7 Plan of Rice Cultivation (Farmers' Answers to the Questionnaire)

Evaluation/answer		Already increased	Not yet increased, but have plan to expand rice cultivation area	No plan to expand
Mid-term evaluation	Number	19	36	4
	%	32%	61%	7%
Final evaluation	Number	23	27	0
	%	46%	54%	0%

1) Changes/Impacts made in farmers' group

The project gave positive changes and impacts on the farmers' group, ZAABTA during the project period. Looking at the inside of ZAABTA, it is confirmed that the capacity of persons on management improved. As to the farmers' groups of ZAABTA members, many individuals increased their interests in group basis activities along with the increase in their income significantly or partly due to rice sales. The growth of interests contributed to realization of new economic activities represented by chicken farming.

In the relationship with external organizations, positive impacts are observed. In accordance with the growth of project's reputation, more farmers' groups asked ZAABTA to join them as new members. ZAABTA also gained more external supports than before the project in terms of the number of supporting organizations as well as contents of support activities.

2) Changes/Impacts caused in rural society

The project directly as well as indirectly gave positive impacts on rural society. From the viewpoint of community level, more brisk economy of Zirobwe is confirmed through the facts that more minibuses come to Zirobwe, which indicates more people and goods are transacted, and eight shops newly opened last year. At the same time relationship with rural government was also strengthened during the period.

As another viewpoint from household, many individuals now enjoy increased income through mainly sales of milled rice. The impacts are significant in their daily lives, and can be observed in such as security of school fee, improvement of housings, and less necessity of working away at big city to supplement their income, etc.

(5) Sustainability

1) Technical aspect

The rice mill operator has already handled the machine without serious mistakes and dealt with minor troubles by himself. It is evaluated that already he is able to operate and repair machines at a convincing level. In addition, the operator keeps contact points/addresses of engineers and machinery companies in the case of serious breakdown and/or for purchase of necessary parts/consumables. In this line, it is evaluated that the project almost can operate by themselves.

2) Financial aspect

Sustainability on financial aspect of the project shows positive prospects as of now. As aforementioned, milling performance has been overwhelmingly good to keep its business running. Also, more rice production is expected in the area, which strongly supports its

sustainable operation.

In order to reinforce the financial sustainability, ZRM needs to pay more attention on the interest to be paid for loan. In the course of the project ZRM borrowed from SACCO for the purchase of milled rice from farmers for the sales contract with Makerere University[5]. When deciding loan amount, ZRM should have determined based on the scrutinized estimation of the operation. However, it borrowed more than the necessary amount by improper estimation, which led to increase in loan interest.
In this line it has to be evaluated that ZRM still has difficulty to plan necessary loan amount based on the well scrutinized estimation. ZRM still needs advice and guidance on this aspect.

3) Organizational aspect

Management board consisted of ZAABTA and SAO has been managing ZRM smoothly with a certain period of assistance of the resident advisor. Not only ZRM management board members but also other key ZRM members had training opportunities from several NGOs for the past years. Owing to these training experiences, ZRM has gained its organizational capability at sufficient level to keep the operation running, which simultaneously gives positive prospects on project sustainability.

In addition, ZRM hired a new accountant/book-keeper in May 2006 after a long time vacancy of the post since the resident advisor left from the project. The new manpower input also supports organizational sustainability.

4.2.4 Lessons Learnt

(1) Organizational matters

1) Organizing process and organizational structure

Management structure as a partnership with NGO is an effective way to operate the project because the partnership organization has plentiful opportunities to receive information and skills from the experienced NGO.

On the other hand, it has risks for farmers' side to only follow ideas offered by NGO. In order to avoid one-sided decision, full consultation should be made between the two parties.
ZRM successfully secured the loan owing to the credit of SAO. In this line, ZRM made the most use of merits entailed by the partnership with SAO.

[5] When the sales contract with Makerere Univ. launched, ZRM borrowed 50 million Ush loan. To reduce the interest cover, revision of the loan was made in February, 2006.

However, arrangement and decision was not well organized. On important issues, there is a need to seek advice from the third party.

2) Human resource (outsourcing of human resource)

ZRM employed the person in charge of accounting from outside the organization, as the accounting tasks became more complicated with the business volume growing. Outsourcing of some tasks especially such as accountant, which requires special skills, is an effective human resource management. It is unnecessary to persist on internal human resource particularly in the case of persons requiring special skills. ZRM is trying to save the cost by employing a young person recently graduated from University.

(2) Operation and Management

1) Management

In a partnership operation with farmers group and NGO, NGO trends to hold an initiative of the operation as they have more experience. A system to transfer such know-how from NGO to farmers group shall be established. For example, meetings should be arranged more often so as the progress, record of operation, issues, countermeasure plan and etc. be shared by member farmers, not only by the management of farmers' group.

2) Annual Operation Plan

No accurate data on regional paddy production is available. The data from the Extension Officer and District Agricultural Office are sometimes inconsistent. It is necessary to make it more accurate by collecting various data from different sources and field survey for planning the annual operation. It is also important to make flexible operation plan.

3) Training of operator

In general, operator lacks basic knowledge of engineering. He cannot perceive the parts list from the drawings. Repeated practical training on the disassembling and erecting of machines is effective. The operator in ZRM now can exchange the main shaft of rice machine after such practical training.

4) Post-harvest processing technology

Paddy sample brought to rice mill and the milled rice should be analyzed and in case small stones are mixed, rice mill operator should instruct farmers on proper paddy drying practice.

Milled rice should be analyzed for every lot and in case the milling recovery is significantly low, rice mill operator should instruct the farmer to improve the post-harvest processing technologies such as proper timing of harvesting, threshing and drying. Such common post-harvest

technology should be disseminated through a newsletter written in local language to every rice farmers.

5) Marketing

Sales contract with institutes such as schools, hospitals and army will be effective for the smooth operation and management. Official support or assistance for such institutional contracts with farmers' group will enhance their activities.

6) Group collection

Though there is a very limited case of group paddy collection chartering a small lorry by farmers, in most cases farmers bring their paddy to rice mill individually. There is a need to arrange practiced transport services, such as a motorbike commonly being used in South East Asian countries, so that daily amount of paddy to be milled can be equalized.

7) Collective marketing

Farmers want cash on delivery of their products. In case of the contract with Makerere University, ZRM purchased milled rice from farmers by cash, using loan with substantive interest. To shift this cash on delivery system to differed payment system farmers consensus is required; farmers sell milled rice collectively without immediate cash payment and settle the bill of each farmer's after ZRM collects the bill. It will need long time to accomplish such consensus. In addition to the cases to WFP of maize, some small farmers groups, less than 10 farmers practice this differed payment system for vegetable, tubers and root vegetables.

It may also be effective if ZRM arrange differences of purchasing price of milled rice between cash payment and the differed payment.

ZRM has a plan to advance from the current system of milled rice purchase from farmers to paddy purchase for collective processing and marketing. In this paddy purchase and collective processing and marketing mechanism, ZRM need to differentiate purchasing prices of paddy based on the quality of paddy. This new system will encourage the adoption of proper post-harvest practice.

8) Utilization of by-products:

It is not easy to disseminate new technology such as utilization of charcoaled husk for soil improvement to farmers. It requires demonstration farm nearby the rice mill with technical assistance from NARO and NAADS to show tangible benefits by such new adoption to farmers.

(3) Facilities and Machinery Matters

1) Facility

A lot of calculation errors were found in B/Q prepared by local architects. Detailed counter-check of B/Q before placing the order.

2) Selection of machinery

- As planned, the rice machine performed good recovery ratio and better appearance of milled rice. For rice mill project, the combined type of rubber roll paddy husker and milling chamber should be introduced.
- The rice machine installed at ZRM is Japan origin and copied in China. The machine price is not high but the durability of the machine is very poor due to low manufacturing skill. If fund is available, it is recommended to purchase solid machine made in Japan or South-east Asian countries.
- The budget for repair and maintenance should be allocated enough (roughly 2 times more than the amount allocated in South-east Asian, i.e. say 5% in Asia but 10% in Uganda of machine cost).
- Electric motor was installed as the prime mover of rice mill. However, the power cut was so often. Thoroughly study of power supply condition is required before the selection of motor or engine. The arrangement of motor as a main and diesel engine as a stand-by can avoid such power troubles.
- The delivery of machinery and power supply was delayed and this caused limited operational training period. It is important to allocate ample time for the installation work period.

3) Maintenance works

The Study team confirmed the source of spare parts and work shops for repair and maintenance works, which contributed smooth operation and management of ZRM's own operation.

(4) Finances and Sustainability

1) Fund-raising

A part of the project cost of rice mill was supposed to be collected from member farmers but the planned amount was not fully collected. Usually farmers have limited cash and want to avoid cash disbursement. Such farmers' attitude in fund-raising shows their lack of the ownership of the project. Thorough campaign for the enlightenment to farmers/beneficiaries on their ownership, responsibility, and participation is important. In fund-raising system, instead of cash, paddy contributions should be explored.

2) Accounting

As the debit and credit accounts are getting more complicated due to the increased economic

activities of the organization, capacity to deal with financial and accounting issues should be strengthened.

3) The balance sheet

Their awareness of the depreciation is insufficient. It is necessary to make them fully understand on the additional expenses for renewal of machinery and facility, not only routine repair and maintenance cost.

4) Sustainability

Rice production in this area is increasing rapidly because farmers now enjoy better income by shifting from paddy sales to milled rice sales. The paddy production is expected to increase and support the sustainable operation of rice mill.

For the sustainability of the project, not only the development of collective marketing and post-harvest technology, but also improved rice cultivation technologies is very important. Especially those new rice growing farmers need supports on production from NARO, NAADS and NGO including pest and disease control, drought management.

5) Farmers' benefits

Farmers now enjoy better market price of rice by shifting paddy sale to milled rice sale after this project started. The appropriate response to farmers' needs enables the project sustainable and profitable.

6) Minimization of initial investment

The facility of the pilot project is rather solid as compared to the private small-scale rice mills. It may be possible to reduce construction cost of facility through participatory construction approach by beneficial farmers. This participatory approach would strengthen the sense of ownership among member farmers.

(5) Training

Local consultants whenever required participated in the Management Committee advise on the organization matters, operation plan and marketing system and contributed commencement and development of this project. Resident advisor dispatched by the project also successfully trained local staff mainly on accounting works through On-Job-Training. The employment of local consultants showed significant contribution to start the business.

Local consultants made every effort to source parts and technical information for trouble shooting during the absence of the Study team. He also transferred such information to ZRM as

training for efficient operation.

(6) Others

1) Income effect

Rice growers' income improved a lot after changing paddy sale to milled rice sale. If we take a look of small scale farmer's income who produce 1ton/acre/season, he could earn 600-700 thousand Ush per year（1,000kg x ＠300～350Ush/kg x 2seasons/year）. If he processes his paddy to milled rice at this rice mill, his can earn 1 million Ush (1,000kg x 0.67 x ＠800Ush/kg x 2 seasons/year - milling fee of 60 Ush/kg x 1,000). Such tangible benefits to farmers enabled the project to expand within the short period of time.

2) Employment effect

After this project started, many farmers started to grow rice and as a result job opportunity such as weeding works and transport service have increased. The promotion of cash crop such as upland rice for which domestic market is secured and value addition is possible by simple process contributes to the increased rural job opportunity and economic development.

3) Synergy effect

In addition to this project conducted through the Study on Improvement of Post-harvest Processing and Marketing System, production supports by JICA Expert and SG-2000; NGO significantly contributed rapid expansion of rice production and improvement of post-harvest processing and marketing system in this area. The circumstances for many farmers can participate in new crop cultivation with confidence are ready which provides synergy effect.

4.3 Bulamogi Rice Processing and Marketing Project

4.3.1 Outline of Project

(1) Objectives

The project aims to increase incomes of small-scale rice growing farmers through providing value addition activities (rice milling service) together with dissemination of improved post harvest processing. (Rice growing farmers in this area normally sold rice in a form of paddy)

(2) Operating Body

Bulamogi Rice Mill Cooperative Society (BRM) was formed for the project under GISPUB Area Cooperative Enterprise. Among about 1,200 rice farmers of GISPUB, 130 farmers joined the new primary cooperative society, BRM as of May 2006.

(3) Activities

- Establishment of a new primary cooperative society for collective post-harvest processing and marketing.
- Strengthening the capacity of the society on proper operation and management of rice mill enterprise.
- Providing value addition activities (milling services) to rice growing farmers.
- Disseminating adequate technologies on drying and cleaning of paddy.

(4) Project Facility (Rice Mill): Initial investment amount 44 million Ush in total.

The mill house is constructed by bricks with plaster and colored roofing material having 150 ㎡ space (15 x 10 meters) of milling and storing area and 84 ㎡ veranda (15 x 3 + 3 x 13 meters). Concrete yard for paddy drying is provided adjoining to rice mill having the space of 200 ㎡.

(5) Equipment: Initial investment amount is 17 million Ush in total.

Rice mill:	One pass type with rubber roll husker, 20HP diesel engine driven, Processing capacity 0.5 - 0.6 ton/hour (paddy)
Other equipment:	Moisture meter, Paddy cleaner (engine drive), Table scale, Sieves for broken rice separation, Husk stove, 2-wheels cart, Office table, etc.

(6) Total initial investment: 63.4 million Ush

4.3.2 Planning and Performance of the Project

(1) Farmers' organization

This project started operation by Rice Mill Management Committee formed within GISPUB at the end of December 2004. But the control of two accounts of rice mill and GISPUB's own business of collective marketing of cotton and maize was felt confusing by the mixing up. Finally, through several discussions held between GISPUB and the Study team it was agreed to set up a new exclusive organization responsible to rice mill operation and management before the start of full operation in 2005. This Bulamogi Rice Mill (BRM) is the 9th farmer's organization under Area Cooperative Enterprise, GISPUB.

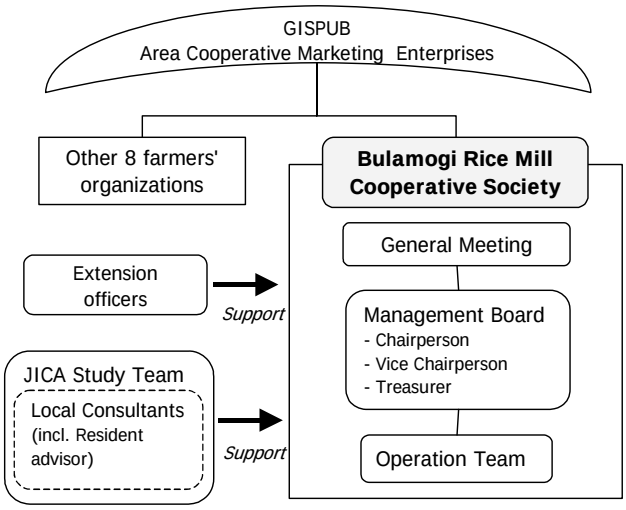


Figure 4.9 Farmer's Organization of GISPUB

The project established a "tentative" management board in the beginning of the project in order to select suitable personnel who are eager to work without political or other concerns. After the moratorium period, BRM set the management board consisted of 7 members in April 2005.

The management board held the board meeting at least twice a month. As collective sale of milled rice is not acceptable for farmers at present, the board is now promoting milled rice sales to traders at the facility individually.

BRM now has only 130 members among around 1,200 rice farmers. To increase the membership of BRM is one of urgent concerns for the sustainability of the organization.

(2) Facilities and Machinery

1) Conditions of facilities

- There was no serious trouble during civil construction though some minor modifications were made. The schedule was behind about 2 weeks from the contracted work schedule.
- The building size was designed for enough working space and storing space of rice. In the 1st year of operation, the paddy amount delivered to the rice mill was rather limited and not fully utilized.

2) Conditions of machinery

- The milling machine is same type installed in Zirobwe Rice Mill (ZRM). The milling performance is good in terms of milling recovery and rice quality but serious mechanical breakdowns were experienced by its poor manufacturing. Main pulley slipped out from the main shaft due to poor key-locking works and a roller shaft for paddy feeding was

broken due to no 'R' works on the edge. Seven (7) in August and twelve (12) operating days in September have been lost due to these breakdowns.

- As electric power grid is not available in this area, a diesel engine of 20 HP, made in China was installed. This engine also caused several troubles such as oil leakages from cracks of the oil tank and water spillages from the packing of water-cooling tank.
- For cleaning of delivered paddy, a Paddy Cleaner was procured but this is not used yet, as the farmers are not willing to utilize it, as the cost will increase.
- Two carts were provided for paddy transport but have not been utilized as yet. Farmers use bicycle for rice transportation as before. Nobody tried to use the cart for transportation of paddy/rice using motorcycle unlike Asian countries where this is very common.
- A moisture meter was introduced for checking the moisture content. The equipment is easy to use and being utilized effectively.
- Broken rice separating sieves were installed for producing high quality rice and for the differentiation of the rice in markets. Though farmers do not utilize these sieves for their sales of milled rice yet, rice traders who purchased milled rice at the mill were utilizing them to improve the quality before shipment to the retailers/consumers.

(3) Technical Supports

1) Following supports were provided

- GISPUB executive members who were initially candidates for the management were invited to a site visit tour in Semuto, Luwero District for observing actual operation and collecting information on the paddy drying technology, marketing skills and their market information of milled rice and rice bran.
- As the operation body was newly formed as Bulamogi Rice Mill (BRM), several trainings were conducted for rice mill operation and management to those newly elected management board members.
- Management training to board members emphasized the merits of the efficiency and quality control by collective rice processing and marketing.
- BRM nominated an operator and on-the-job training was conducted by the Study team for the operation, maintenance and exchange of spare parts.
- Training on the management of consumable spare parts and clearing and cleaning of the site was made.
- Demonstration for utilization of husk was made such as Husk Stove and Husk carbonization for farm use by the Study team.
- OJT training of accounting works was conducted by the resident advisor, dispatched by the Study team.

2) Current situation

- Though the experience of the operator is rather limited, he is gaining the skill gradually through daily operation and solution of several machine troubles faced. BRM can expect much smoother operation in 2006. However, he needs to expand his skill further on routine operation and maintenance so that preventive measures can be taken before machine troubles happen.
- The resident advisor assisted in the accounting works. This was transferred to treasurer of BRM without trouble, as the accounting system is rather simple in book keeping on cash payment basis.
- As the volume of the paddy delivered to the mill has been less than the plan, mobilization for increased delivery to rice farmers is underway.

(4) Processing Result (Milling Service)

GISPUB executives and district extension officer showed the Study team the estimation of the paddy production by members of GISPUB in the middle of 2004 as the Table below. However, it became clear that actual paddy production in this area was far below this estimation, probably less than 500 tons per year, mostly lowland rice and negligible amount of upland rice.

Table 4.8 Rice Productions by Member Groups in GISPUB estimated by GISPUB

Group name	Member	Rice farmer	2004(estimated)		2005 (planned)	
			Acres	Production (paddy/ton)	Acres	Production (paddy/ton)
Gadumire Primary Society Ltd	150	150	319	679	630	1,134
IsiNGO/Local Consultants Primary	150	150	226	339	404	666
Saaka Parish Farmers' Association	75	70	140	210	202	364
Panyolo primary Society Ltd.	201	194	388	582	820	1,476
Bupyana Primary Society Ltd.	153	150	351	122	838	1,608
Buyinda Parish Farmers Association	94	94	188	382	624	1,123
Bukonde Parish Farmers Association	117	115	230	345	394	709
Busulumba Primary Society Ltd.	203	200	402	603	903	1626
TOTAL	1,143	1,123	2,244	3,262	4,815	8,706

GISPUB and the Study team made the operation plan for the year of 2005 by the end of 2004. The target amount was set as 500 tons for 2005. However, the actual record of the operation was 182 tons only in 2005. The monthly record and the accumulation are shown in following tables and graphs.

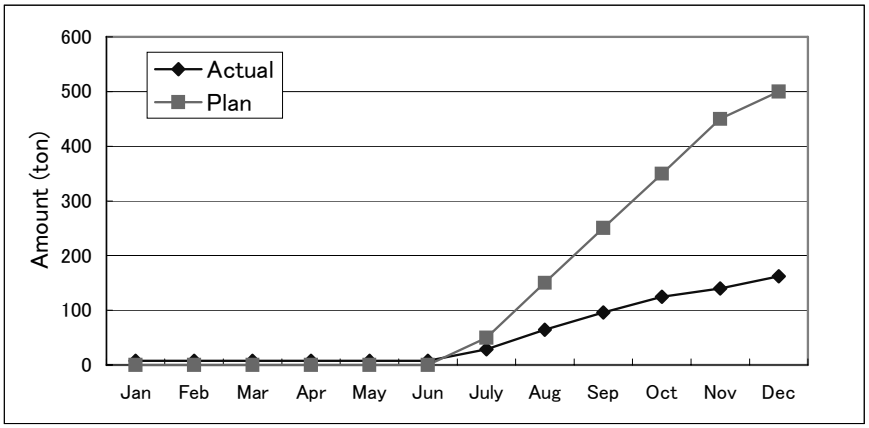


Figure 4.10 Planned and Actual Paddy Amount Processed by BRM in 2005

Above operation plan was tentatively made in accordance to following calendar.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kaliro Lowland rice	Planting							Harvesting				
Kaliro Upland rice	Harvesting (2)	Planting (1)				Harvesting (1)		Planting (2)				

Figure 4.11 Cropping Calendar of Rice Cultivation in Kaliro District

As mentioned before, the upland paddy production in this area was very limited although many farmers started to pay interest to upland rice glowing as the cotton price dropped sharply in 2005. Upland rice cultivation and lowland rice cultivation in 2006 is expected to increase partly owing to SG-2000 program supported by JICA for upland paddy. Cultivation technology for higher yield is also expected from the Project: Study on Poverty Eradication through Sustainable Irrigation in Eastern Uganda by JICA.

Table 4.9 Monthly Processed Amount of Paddy and Yields

	Paddy (Kg)	Milled Rice (Kg)	Recovery %	Accum. (paddy) (Kg)
Jan. 2005	8,042.1	5,029.6	0.63	8,042.1
Feb	429.5	284.8	0.66	8,471.6
Mar	0.0	0.0	-	8,471.6
Apr	0.0	0.0	-	8,471.6
May	0.0	0.0	-	8,471.6
Jun	1,157.6	745.8	0.64	9,629.2
Jul	21,098.5	13,884.3	0.66	30,727.7
Aug	53,354.8	37,145.6	0.70	84,082.5
Sep	31,910.7	22,249.9	0.70	115,993.2
Oct	28,537.7	19,379.9	0.68	144,530.9
Nov	14,627.8	9,906.5	0.68	159,158.7
Dec	22,429.8	14,723.6	0.66	181,588.5
Sub-Total	**181,588.5**	**123,350.0**	**0.68**	
Jan, 2006	4,974.6	3,297.4	0.66	186,563.1
Feb	4,470.9	2,857.9	0.64	191,034.0
Mar	3,810.9	2,528.6	0.66	194,844.9
Apr	1,614.4	1,119.6	0.69	196,459.3
Total	**196,459.3**	**133,153.5**	**0.68**	

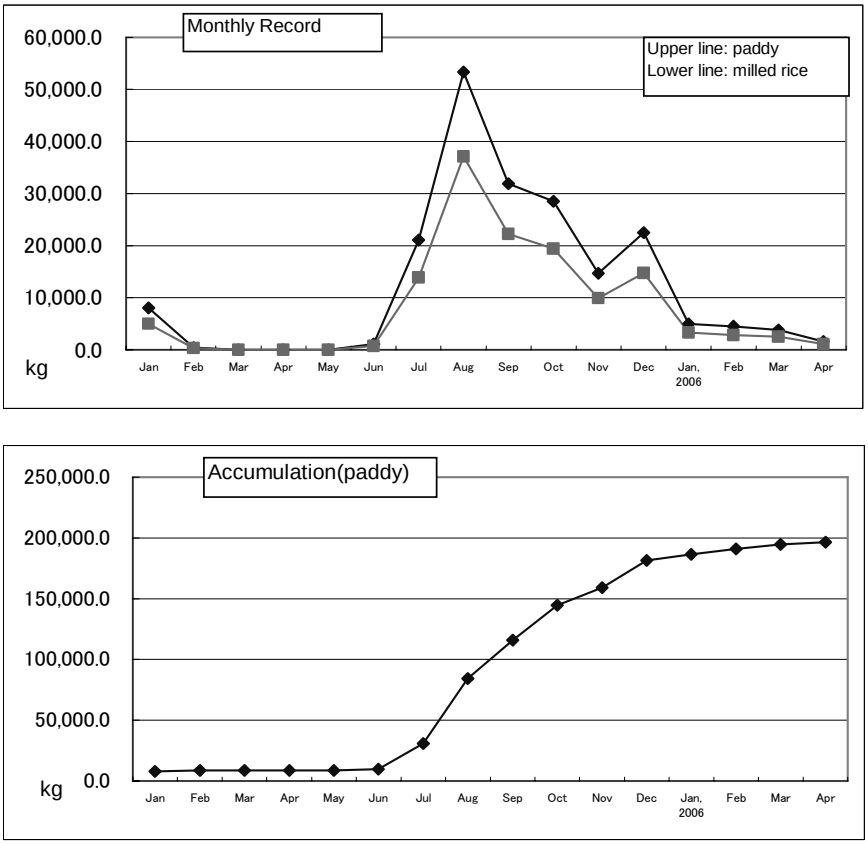


Figure 4.12 Monthly Records and Accumulation of Paddy Processed

(5) Marketing Result

Bulking sales of milled rice by BRM or farmers group as seen in ZRM has not started yet. Farmers sell their milled rice individually to local retail shops or to traders who come from Iganga and Kaliro. Each trader negotiates freely with a farmer for the best possible price taking into consideration of the variety and the quality. The monitoring survey by Study team shows the farmers' selling price started at Ush 700/kg in July and gradually increased up to Ush 950/kg in December 2005.

For selling rice to traders as high price as possible, farmers need to improve rice quality. Harvesting technique to minimize the contamination of immature grains shall be introduced (proper harvest timing) and bulking of milled rice to attract rice traders shall be carried out. To emphasize their awareness on these points is crucial.

The traders stop visiting BRM for rice purchase if the milled rice amount is not sufficiently available for their business requirement at the site. A farmer who needs immediate cash by selling rice after milling have no choice but to utilize other rice mill in Kaliro or others where traders are always standing-by for their business. The management of BRM accepted the advice from the Study team and decided to implement a system of accumulating paddy at the mill and assigning particular day for milling operation from 2006 so that farmers can bring their paddy for milling and traders can visit BRM even in the off season. This operation system will minimize the operation cost including fuel.

This effort can be seen one step forward to the efficient operation of the mill and eventually will lead to the group activity and collective marketing in bulking. BRM also adopted the advice from the Study team to differentiate milling service fee to members and non-members for members' tangible benefits. BRM will charge Ush 50/kg to member farmers and Ush 60/kg to non-members from 2006 operation.

1) Utilization of by-products

The milling machine discharge rice bran and husk separately as the case of ZRM in Zirobwe. However, the usage of rice bran as chicken feed or others are not popular as yet in the area. BRM stocked certain amount of rice bran in 2005. The Study team finally assisted BRM to sell the rice bran to a hatchery in Kampala who purchases rice bran from ZRM. The income from bran selling was low due to the transport cost. In case of ZRM, the bran sales earning was 13.2% of milling service revenue but it was only 2.7% at BRM. BRM should maintain this sales route along with the promotion efforts to other feed companies in Jinja, Iganga and others. Total revenue by rice bran sales was 202,800 Ush in 2005.

The utilization of husk was promoted as fuel of stove or charcoaled, same as in ZRM. But husk still compiled outside of the mill. The Study team introduced the utilization of husk now used in ZRM as fuel for brick burning, poultry litter and so on.

(6) The balance of Income and Expense

Milling service fee is 60Ush/kg, and the sales price of rice bran is 60Ush/kg. The durability of consumable spare parts is very poor. For example, the milling roller can process about 1,000 tons of paddy by Japanese genuine parts but BRM changed this roll after processing 100 tons only. The cost of repair and maintenance fee totaled Ush 1,806,900, which is equivalent to 10% of total machine price though the processed amount was only 180 tons of paddy. Fuel consumption is another major expense for the operation. In 2005, BRM spent Ush 1,979,300, which is equivalent to about 1,100 liter of diesel oil. The paddy amount milled by this 20 HP engine was 180 tons, 6 liters of diesel oil was spent for 1 tons of paddy (1,100 liter ÷ 180tons). This means the fuel cost for 1 kg of paddy is more than Ush 11 and Ush 16 for 1 kg of milled rice (6 liter/tons of paddy x Ush1,890/liter ÷ 1,000. Ush 11 ÷ 0.68). This very high fuel consumption is mainly caused by non-continuous operation. Some farmers ask BRM to mill his paddy less than 50kg. The operator must start engine and adjust the machine for even only 10 minute operation. Cost effective operation system should be established such as accumulating paddy before start milling service or pre-setting the operation day during off-season, say once or twice a week.

The annual depreciation cost of facility and machinery is estimated at about 3 million Ush but BRM is not in a position to save such fee as yet.

Table 4.10 Profit and Loss Account in 2005

	(Jan-Dec,2005)	TOTAL(Ush)
Income		7 558 250
	Milling revenue	7 348 250
	Bran sales	202 800
	PP bag sales	7 200
Expenses		7 193 250
	Lunch	312 400
	Stationary	52 900
	Sundry expenses	105 250
	Office expenses	32 000
	Fuel	1 979 300
	Salaries	816 000
	Wages	1 135 500
	Casual wages	75 500
	Repairs and maintenance	1 806 900
	Security	360 700
	Administration expenses	246 500
	Consumables	85 900
	Transport	148 900
	Communication	5 500
	Trading license	30 000
		0
Profit/Loss		365 000

4.3.3 Results of the Evaluation

(1) Relevance

The project is evaluated relevant from the following viewpoints.

1) Consistency with government policy

The purpose and contents of the project meet the government's present development policy such as PEAP, PMA, MAPS and Rural Development Strategy that stress the importance on post-harvest processing and marketing of agricultural produce. In addition, Kaliro district (former Kamuli district) is also one of the strategic target areas to promote rice production as Luwero district. In this line, the project has high relevance from the viewpoint of the government policy.

2) Appropriateness of the target group

Though there were many difficulties in organizing target group among GISPUB, the selection itself is positively affirmed from the viewpoint of farmers' strong needs.

The target population has long experience to cultivate lowland rice, taking its geographical advantage of swamp area. For marketing, they had two options: 1) to sell by paddy to rice traders directly in their farmland, although they knew sales by paddy could be less profitable than milled rice; 2) to take paddy to the nearest milling facility which is located 30 km far away. Therefore,

rice milling project in the area was so welcomed by them.

3) Complementary effect with other supports

A JICA expert and SG-2000 started a seed distribution program at the area in February 2006, which encouraged farmers to grow more rice in the area. The first distribution provided 2.5 ton to about 300 farmers.

(2) Effectiveness

1) Effectiveness from the viewpoint of Project Purpose and indicator

It is evaluated that the project almost achieved the purpose as of the final phase of the project.

Project purpose	Farmers can gain more profit from sales of milled rice than before the project started.
Verifiable indicator	Total profit including transportation cost to milling facilities exceeds the one before the project started.

Farmers are now able to sell to traders at 700 - 950 Ush/kg[6] at the facility, which is almost the same as offered at another commercial-basis milling facility in Kaliro where most farmers used to go before the project. Milling fee is set at 60 Ush at the BRM, and most of facilities at Kaliro are 40-50 Ush. Considering those conditions and necessary transportation cost, 25 Ush/kg from the area to Kaliro by mini-bus or truck, farmers can gain more profits than processed in Kaliro. In this line farmers in the project reached the situation that the project purpose set.

Table 4.11 Comparison of Costs at BRM and Kaliro

	BRM	Kaliro
Milling fee	60 Ush/kg	40－50 Ush/kg
Transportation cost	Basically zero (bicycle)	25 Ush/kg
Cost total	60 Ush/kg	65-75 Ush/kg
Sales price	Almost the same (existing some fluctuation by months)	

[6] It is the price of “Super”, lowland rice. On the other hand, upland rice “kayiso” is sold at about 450-550 Ush/kg.

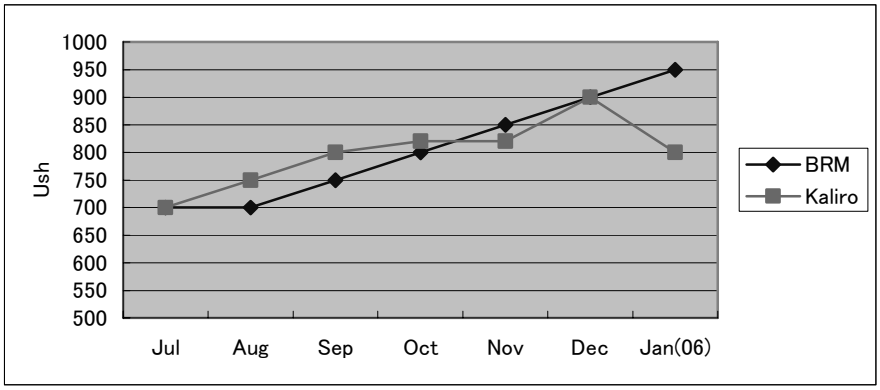


Figure 4.13 Comparison of the Market Price of BRM and Kaliro in 2005

2) From the viewpoint of farmers' satisfaction

On the other hand, the aspect of farmers' satisfaction gives a slightly different view from the achievement of the project purpose.

In the course of the project, the level of farmers' satisfaction shows slight changes. All the 49 farmers at the mid-term evaluation responded "satisfied with the project", but the rate decreased at the final evaluation.

Table 4.12 Satisfaction of the Project (farmers' answers to the questionnaire)

Evaluation	Response	Number	%
Mid-term evaluation	Satisfied with the Project	49	100 %
	Dissatisfied with the Project	0	0 %
Final evaluation	Satisfied with the Project	36	75 %
	Dissatisfied with the Project	12	25 %

Table below shows the "reasons of satisfaction with the project" and the "reasons of dissatisfaction with the project". The results give ideas about the farmers' impression on their benefits and problems regarding the project.

Comparing with the results of the mid-term evaluation, three aspects of "milling fee", "reliability on management", and "expectation of profit share distribution" declined their satisfaction level in the final evaluation.

Table 4.13 Comparison of Benefits Between Mid-term Evaluation and Final Evaluation

Recognition of benefits	Points
Recognition of benefits is the same as before	• Distance to milling facility • → saving transportation cost and time
Recognition of benefits decreased	• milling fee • reliability of project management board • expectation of profit share
Recognition of benefits increased or new benefits	• quality of milled rice • acquisition of bran • acquisition of seeds

Table 4.14 Reasons of Satisfaction (Farmers' Answers to the Questionnaire)

	Mid term evaluation		Final evaluation	
	Number	%	Number	%
Less distance to the milling facility, contributing to saving time and transp. Cost	49	100 %	36	100 %
Cheaper milling fee	21	43 %	2	6 %
Better milling quality	43	88 %	33	92 %
Reliable management of the project (milling operation)	39	80 %	4	11 %
Expectation of profit share from the project by the milling operation	48	98 %	4	11 %
Others	3	5%	10*	28 %

e.g) proud of being a member, received seeds, acquired bran, etc.

In addition, "unstable operation by machine breakdown" and "lower sales price at the facility" are also mentioned as the reasons of their lower impression, which are categorized as "others" in the Table below.

Table 4.15 Reasons of Dissatisfaction (Farmers' Answers to the Questionnaire)

	Mid term evaluation		Final evaluation	
	Number	%	Number	%
Milling fee not attractive	0	0 %	5	42 %
Milling quality not good			0	0 %
No/less reliability on management board			5	42 %
No/less expectation of profit share			4	33 %
Others			7*	58 %

e.g) unstable operation days by machine breakdown, lower sales price at the facility, etc.

Therefore, it is evaluated that the project achieved the project purpose in terms of project indicator, but there remain some unachieved matters from the viewpoint of farmers' satisfaction.

(3) Efficiency

Most input both on material and human resources are evaluated as appropriate in general with a few problems to be addressed.

1) Material/Facility Input

a. Material: Rice milling machine

The project introduced a rice mill machine by diesel type because of unavailability of electricity in the area. The machine operation by diesel was expected to run smoothly, allowing the operation to be free from power cut. The mill operation, however, has faced frequent breakdowns of the machine. It required so often dispatches of engineers to repair from Kampala or other areas, resulting in increased expenses. The major reason of its frequent breakdown is judged as the quality of the machine itself. The selection of the machine was made on the basis of the local procurement as well as technical support/services available in Uganda.

b. Material: Others

Paddy cleaner was introduced in parallel, but it has not been utilized as yet. This is due to the fact that, first of all, farmers do not feel necessary to use the machine and wish to save the cost of operation as the diesel price is hiking now. Introduction of this kind of machine should carefully be examined as it seriously affects the operation cost. The machine is kept at ZRM in a state of new one. In future, when the large volume of paddy are brought in for milling and requires the elimination of foreign matters in paddy, the machine is expected to be utilized. On the other hand, moisture meter is always used effectively.

c. Facility

The size of the milling facility is evaluated as appropriate from the viewpoint of accommodation capacity of incoming paddy. Dry yard for paddy is also judged appropriate, as it has been utilized more often recently than the initial stage of the project. It is mainly because many farmers gradually realized the positive linkage with moisture contents of paddy and outturn ratio of milled rice.

2) Human resources Input

The project had been assisted by a resident advisor dispatched by the Study team during the first year, whose major role was to assist in accounting and daily operation. The Study team also provided technical supports to mill operators by experts of the Study team and others. The trained operator is now able to operate the machine without serious mishandlings and also to deal with minor repairs.

(4) Impact

Following positive impacts have been observed in the project.

cc) Total family income increased owing to sales of milled rice. The impact on family income derived from the project implementation showed slight decline in comparison with the mid-term evaluation, but the project still gives positive impact on their family income growth in general.

dd) Rice cultivation area has gradually expanded in the area. The table below shows the growth of the number of farmers, who actually increased the rice cultivation area since the mid-term evaluation period.

ee) Farmers feel easiness to find sales opportunities of milled rice because there are more rice traders coming to the area than before.

ff) Farmers feel that they acquired more bargaining power with rice traders.

Table 4.16 Family Income Growth by Sales of Milled Rice

		Mid term evaluation		Final evaluation	
		Number	%	Number	%
Income grew than before	Project contributed significantly	11	22 %	0	0 %
	Project contributed a part of them	32	64 %	38	76 %
Income is the same as before		6	12 %	12	24 %
Income decreased		0	0 %	0	0 %

Table 4.17 Plan of Rice Cultivation

	Mid term evaluation		Final evaluation	
	Number	%	Number	%
Already increased	1	2 %	37	74 %
Not yet increased, but have plan to expand rice cultivation area	45	92 %	7	14 %
No plan to expand	1	2 %	6	12 %

1) Changes/Impacts caused in farmers' group

The project gradually made positive changes on farmers' group, BRM. One of the changes is the manager's positive attitude and the growth of his ownership mind towards project's management. As to the technical capacity of machine handling, the operator already acquired skills and knowledge enough to deal with daily operation and repairs.

Growing capacity of those who are in touch with daily operation is confirmed as such, but, on the other hand, those who are away from daily operation, ordinal members and some of management board members, do not show any particular changes in terms of their own capacity as well as ownership mind for the project. The reason of less ownership mind is analyzed by the

project's unique business character, whose existence is regarded as a milling service provider at the area. Under such common perception, people are likely to regard themselves as just a "user of the facility" instead of "one of the owners of the facility".

However, members and ownership mind are expected to grow by newly determined members' benefits in the last general meeting. In addition, seed distribution program made through JICA expert and SG-2000 expectedly will be a driving force for the new members and ownership mind.

2) Changes/Impacts caused in rural society

The project has provided the community with positive changes and impacts. Among those, agriculture in the target area particularly received impacts through the project. Many farmers started to grow rice instead of cotton, whose price fluctuates much more than rice. The implementation of the project also motivated people especially living near the facility to start cultivating rice.

At the viewpoint of household level, increase of income contributed to secure of school fee, and financial resource of new side business.

On the other hand, there are some negative impacts happening in accordance with the growth of rice cultivation. One of them is that children resulted in more absence from school because they were hired to drive birds away from attacking rice in the field. As another impacts are seen in more complaints from cattle breeders about encroachment of rice cultivation area into communal grazing zone.

(5) Sustainability

1) Technical Aspect

The rice mill operator has already handled the machine without serious mistakes and dealt with minor troubles by himself. It is evaluated that he is able to operate and repair machines. On this aspect the project can ascertain sustainability of milling operation.

The transfer of technology is also going to proceed towards two assistant operators in order to reinforce numbers within BRM who can handle a milling machine.

2) Financial aspect

BRM has rather low sustainability in financial aspect, judging from the project's performance until now.

A number of positive prospects can be observed such as i) almost assured rice traders' visits during the season, and ii) stable/favorable market price of milled rice in comparison with other crops. On the other hand, negative concerns remain in i) durability of the milling machine, ii) hiking oil price, and iii) a relatively longer off-harvest season in the area, which directly increase idle business opportunities.

BRM should take following actions to promote more brisk business for its financial sustainability.

a. Promotion/advertisement activities - Competition with other milling facilities at Kaliro

One of the BRM's countermeasures to collect more paddy under competition with Kaliro is to inform farmers of its merits, especially higher outturn ratio than Kaliro's. The favourable ratio functions to mitigate the difference of selling price to traders and milling fee, which makes an influence on break even point of farmers' profits. BRM needs to inform the point through general meeting and notice inside the facility.

b. Fixed days operation (especially off season)

BRM needs to set up well scrutinized operation plan in accordance with the volume of incoming paddy especially during off season.

BRM already tried to reduce and fix the operation days along with smaller volume of incoming paddy from March through May 2006. These cost cutting efforts gave positive impact on BRM's financial condition. Implementation of the fixed date style operation should be assured by informing users well in advance, otherwise, it may influence reliability on BRM's stable operation.

3) Organizational aspect

Although at the beginning of the project the resident advisor shouldered nearly all of the roles from keeping mill records to accounting, daily operation is now handled by the management board and staff.

Although the recent performance of the management board has improved in comparison with the beginning, there still remain challenges to ensure the project's sustainability.

c. To gain management skills and business sense

In the beginning of the project, the management board had tendencies to employ workers as many as they feel necessary, or to prioritize management board's allowance without cost-benefit consideration. These tendencies have now nearly disappeared. Management board has gained

business sense little by little in the process of the project implementation.

However, it is still a bit far from the level of independently operating by themselves. They still need such external support such as local consultants dispatched by the Study team.

d. To increase potential group members

In order to strengthen organization, BRM needs to increase numbers of the members, which count to only 130 at present. Considering that more than 1,300 rice farmers live in the area, BRM should gain more members, which contribute to strengthening organizational capacity and financial basis by increased membership fee.

The management board recently revised the privilege of members, which offers favorable milling fee, 50 Ush for members compared to 60 Ush for non-members. It is expected to attract more new members.

4.3.4 Lessons Learnt

(1) Organizational matters

1) Election of management board members

gg) In selection of management board members, proportional distribution to the number of the members was given attention.

hh) It was an effective election in terms of transmitting information within the area however, the election laid importance more on the geographical distribution with less attention on management capacity of board members.

ii) It is crucial to maintain the balance when electing the board between geographical distribution and individual capacity of management.

jj) There exist possibility that someone may wish to be board members, only for their own benefits. It would be an effective step to firstly elect members as “tentative” management board, and then to determine the “final” management board after a while.

2) Task assignment of management board members

kk) The number of management board members at 6, was appropriate, but each member should have had each specified role such as board member cum marketing in charge. It enhances their responsibilities under clear assignments.

(2) Operation and management

1) Annual Operation Plan

No accurate data on regional paddy production is available. The data from Extension Officer and

District Agricultural Office are sometimes inconsistent. It is necessary to make it accurate by collecting various data from different sources and field survey for planning the annual operation. In case of BRM, a Member of Parliament, District Chairman, Extension Officer and regional UCA officer unanimously reported that the rice production in the area easily exceeded 3,000 tons per year. However, there was no such evidence found. Accordingly, it is important to make flexible operation plan in the initial stage.

Selection of the target area/farmers group needs to be made based on the actual situation of the target group. As the data and information in this respect are limited in Uganda it is hoped to develop a simplified method of the survey on rural community.

2) Training of operator

In general, operator lacks basic knowledge on engineering. He cannot perceive the parts list from the drawings. Repeated practical training on the disassembling and erecting of machines is effective. At BRM, an elderly operator once recruited fiddled around with the machine without knowledge, and caused many mechanical troubles. Then the Board replaced operator by a young one. At ZRM the operator is also in the age of 20s. Generally speaking, younger operator can absorb new technology in a short period.

3) Post-harvest processing technology

ll) Paddy sample brought and milled rice should be analyzed. In case small stones are mixed, rice mill operator should instruct proper paddy drying practice to farmers for the improvement.

mm) Milled rice should be analyzed for every lot and in case the milling recovery is significantly low, rice mill should instruct the farmer to improve the post-harvest processing technologies such as proper timing of harvesting, threshing and drying. Such common post-harvest technology should be disseminated through a newsletter written in local language to every rice farmers.

4) Group collection

Though there exist a very limited case of group paddy collection chartering a small lorry by farmers in most cases, farmers bring their paddy to rice mill individually. There is a need to arrange practical transport services to farmers, such as motorbike commonly being used in South East Asian countries so that daily amount of paddy to be milled can be equalized.

5) Collective marketing

nn) BRM try to follow collective marketing of milled rice successfully implemented at ZRM after their site visit, but BRM could not materialize it as yet. Sales contract with

institutes such as school, hospitals and army will largely contribute the smooth operation and management. Official cooperation and assistance for such institutional contracts with farmers' group will enhance their activities.

oo) As BRM cannot proceed with collective marketing as a whole, group marketing by hamlets or relatives were encouraged but not materialized as yet. Detailed supports to small groups or arrangement to sites visit of good practice would be useful.

6) Utilization of by-products

It is not easy to extend new technology such as utilization of charcoaled husk for soil improvement to farmers. It requires demonstration farm nearby the rice mill with technical assistance from NARO and NAADS to show tangible benefits by such new adoption to farmers.

(3) Facilities and Machinery

1) Facility

A lot of calculation errors were found in B/Q prepared by local architects. Detailed counter-check of B/Q by the Study team is important.

2) Selection of machinery

pp) As planned, the rice machine performed good recovery ratio and better appearance of milled rice. For rice mill project, the combined type of rubber roll paddy husker and milling chamber should be introduced.

qq) The rice machine installed at BRM is Japan origin and copied in China. The machine price is not high but the durability of the machine is very poor due to low manufacturing skill. If fund is available, it is recommend to purchase solid machine made in Japan or South-east Asian countries. The diesel engine from China caused a lot of mechanical troubles. To select solid engine with good records from EU, USA and Japan if the budget will allow it.

rr) The budget for repair and maintenance should be allocated enough (roughly 2 times more than the amount allocated in South-east Asian, i.e. say 5% in Asia but 10% in Uganda of machine cost).

ss) The delivery of machinery was delayed and caused insufficient operational training period. It is important to allocate ample time for the installation work period.

3) Maintenance works

tt) The Study team confirmed the source of spare parts and workshops for repair and maintenance works, which contributed smooth operation and management of BRM's own operation.

(4) Finances and Sustainability

1) Fund-raising

A part of the project cost of rice mill was supposed to be collected from member farmers but the planned amount was not collected. Usually farmers have limited cash and want to avoid cash disbursement. Such farmers' attitude in fund-raising shows their lack of the ownership of the project. Thorough campaign for the enlightenment to farmers/beneficiaries on their ownership, responsibility and participation is important. Other fund-raising system than cash disbursement such as paddy delivery should be studied.

2) Accounting

Accounting is rather simple at the moment, such as cash management on receipts and disbursements. Accountant can be recruited locally, as only the ability to use the table calculator is required.

3) The balance sheet

Their awareness of the depreciation is insufficient. It is necessary to make them fully understand about the additional expenses for renewal of machinery and facility, not only routine repair and maintenance cost.

4) Sustainability

It must be judged that the sustainability of BRM is hard if annual processing amount is kept at low level as 180 tons per year like in 2005. After the Study team arranged the site visit for executives of BRM to ZRM enhanced their attitude to the management of the rice mill. The site visit to successful project would strengthen their attitudes.

As the traditional lowland rice cultivation in this area utilize the shore of Kyoga-lake, rapid increase of acreage is difficult. However, through technical assistance by the Study on Poverty Eradication through Sustainable Irrigation in Eastern Uganda by JICA and the promotion of NERICA upland rice by SG-2000 will increase the rice production in the area. In order to sustain the post-harvest and marketing project, the support from production side is important.

For the assured sustainability of the project, not only development of collective marketing and post-harvest technology, but also development of rice cultivation technologies is very important. Especially those new rice growing farmers need supports on production side from NARO, NAADS and NGO on replant failure, disease and insect damages control, drought management, etc.

5) Farmers' benefits

Some traditional rice farmers in the area understand their benefits as just saving transport cost provided by this rice mill. Further advertising to farmers on their tangible benefits such as better rice recovery obtained by different type of machine should be carried out. Development of their ownership of the project take a long time but need to be carried on through various occasions and showing tangible benefits to farmers.

6) Minimization of initial investment

The facility of this pilot project is rather solid as compared with private small-scale rice mills. It can reduce construction cost of facility. Participatory construction approach by beneficial farmers can further reduce the cost although longer construction period would be required. This participatory approach would strengthen the generation of ownership of farmers.

(5) Training

Local consultants whenever required participated in Management Committee to advise on the organization matters, operation plan and marketing system and contributed commencement and development of this project. Resident advisor dispatched by the consultant also successfully trained local staff mainly on accounting works through On-Job-Training. This employment of local consultant showed significant advantages for farmers' group to start the business.

Local consultants made every effort to source parts and technical information for trouble shooting during the absence of the Study team. He also transferred such information to BRM as training for efficient operation.

(6) Others

The number of rice growing farmers in this area is increasing now partly due to technical assistance by the Study on Poverty Eradication through Sustainable Irrigation in Eastern Uganda by JICA and the promotion of NERICA upland rice by SG-2000. Synergy effects from these activities are expected.

4.4 ACAPROMA Cassava Flour Production and Marketing Project

4.4.1 Outline of the Project

(1) Objectives

The project aims to increase income of small-scale cassava growing farmers through collective processing and marketing of high quality cassava flour.

(2) Operating Body

Agali Awamu Cassava Processing and Marketing Cooperative Society (ACAPROMA) was formed for the project by three farmers' groups: Kiwembi Farmers Group, Eyebikire Kisaalizi Women's Group and Nyikira Okole Cotton Farmers' Primary Cooperative Society (Namika). ACAPROMA covers 181 farmers in total as of December 2004.

Equal numbers of representatives from each group attend the General meeting and Executive Board for the management of the business.

(3) Activities

- Establish new organization for cassava processing and marketing.
- Capacity building for operation and management of the business.
- High quality cassava flour production.
- Establish linkages between markets.
- Demonstration on the use of by-products (e.g. cassava peel).

(4) Project Facility: Initial investment amount 53.6 million Ush

Building of concrete slab floor with plaster, burnt brick wall and colored iron sheet roofing, has total floor area of 265m^2, consisting of 6 areas/rooms; Peeling & washing area, Chip store, Store, Office, Packing & Milling area and Flour store.

(5) Equipment: Initial investment amount 15.8 million Ush

Mill (16HP diesel engine driven), Chipper (engine driven), Chipper (manual), Portable bag closer, Portable generator, Scale, Ox-cart, 2-wheels cart, Items for drying yard, Toilet, etc.

(6) Total initial investment: 69.4 million Ush

4.4.2 Planning and Performance of the Project

(1) Farmers organization

Three existing farmers' organizations, namely two CBO and one Primary Co-operative Society Ltd, formed an Area Marketing Enterprise Co-operative, named as Agali Awamu Co-operative Society Ltd. (ACAPROMA) starting on February 2004 and completed official registration in July 2004.

Organizational structure of ACAPROMA as well as concerned actors in the project are described as below.

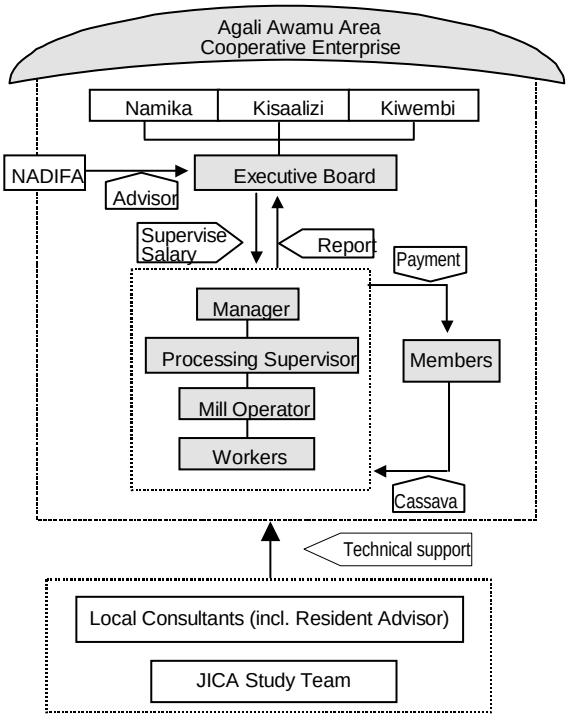


Figure 4.14 Organizational structure of ACAPROMA

Selection/recruitment of operation unit staff, i.e. manager, processing supervisor, mill operator and workers completed in early December 2004. Positions (job opportunities) were shared among 3 member-groups. Selection of mill operator delayed due to lack of appropriate person who has machine expertise. Therefore, the owner (operator) of village mill nearby was employed tentatively on daily basis.

Table 4.18 Roles and Salary/Wage

Actors		Role (Way of recruitment)	Salary/wage
Executive Board		Supervise operation, financial control, operation planning, budget planning. Prepare settlement of account, and recruit personnel	Sitting allowance (3,000 Ush./month)
Operation Team	Manager	Take responsibility for operation, administration and accounting.	5,000 Ush./day + lunch
	Casher (Treasurer of ACAPROMA)	Take responsibility for cash handling (working hours will be 2-3 hours per day)	2,000 Ush./day + lunch
	Processing Supervisor	Supervise processing works, store keeping, quality control	4,000 Ush./day + lunch
	Machine operator	Operate milling machine and chipper, maintenance, record keeping for receiving.	3,500 Ush./day + lunch
	Machine operator trainee		2,000 Ush./day + lunch
	Workers	Assist chipping, milling and packing work. Carry out drying work and other physical works.	2,000 Ush./day + lunch
	Collection sub-groups	Deliver fresh cassava, then peel and wash. About 20 farmers per group	Premium price + 17 Ush./kg for peeling & washing

Formation of collecting groups started from September 2004 and completed in October. In line with the plan, those living adjacently formed the collection groups: 6 groups at Namika, 7 groups at Kiwembi and 6 groups at Kisalizi. During the processing training in November, members and leader of each group were confirmed and ID Code was allotted to each member to simplify the record keeping of received amount. (Instead of this group collection system initially planned, new collection system which prepares a collection schedule based on the available volume of cassava root from individual has been implemented.)

Following systems / rules were prepared for the business operation.

- Collection system, including the way of shared use of ox-cart
- Processing system
- Transparency rule (disclosure of information)
- Communication system (dissemination of information through network and notice boards to the members)
- Price monitoring system (collection of transaction prices of dried/fresh cassava to Kampala traders)
- Cash handling rule and Record keeping system

Preparation of draft constitution, internal rules, operating systems, TOR and wage of the operation unit were made by the Executive Board with advice from the Study team. They were officially approved and became effective by the General meeting in December 2004.

Monthly review of the business by the Executive Board members and disclosure/explanation of the results to the members have been stipulated in their constitution. However, these exercises have not been sufficiently implemented until now.

(2) Facilities and machinery

1) Condition of the facility

There was no serious trouble though some minor repairs were made such as floor surface crack, re-anchor of milling machine and repair of roof damage.

2) Condition of the equipments and tools

a. Milling machine

It has been operated without any serious trouble. Actual processing capacity is about 200 kg per hour with 0.8mm screen, and it is enough to process 18 ton (maximum monthly target volume) in a month. Second cyclone was installed to reduce the dust in the facility.

b. Chippers

Maximum daily target volume (1.6 ton) has already been processed. Work speed will be able to improve by fully utilizing 2units of manual chippers with additional workers. Spare part (blade) is always available at manufacturer's premise in Kampala.

There was a simple fault in the pulley on the drive shaft and the manufacturer repaired it. To increase work efficiency, the blade casing was enlarged.

c. Ox-cart

The members were reluctant to use the ox-cart at the beginning, but it is getting familiar. More than 1/3 of cassava was transported by ox-cart in March 2005. Additional ox-cart was introduced and it was consigned to a member of Namika group in October 2005, on condition that he should provide transport services to other members. He has completed the his ox training by himself and has been in stand-by mode.

d. Dryer (method of drying)

As the result of suitability test of four (4) types of dyers/drying methods in the operation, plastic sheets + wind shield was judged as the best method by the operation staff.

(3) Technical supports

Wide ranges of trainings were conducted as follows;

1) Training Program

a. SYB (Start Your Business) training

5-days SYB training was provided to the Executive Board members and others in November 2004. The number of participants was 16 with 9 women. Major subjects covered by the training are; Business idea, SWOT analysis, Marketing plan, Required staff, Costing, Financial planning and Start-up capital.

b. Processing training

For the purpose to familiarize all the members with processing work procedure, trainings were conducted from 23 to 25 November 2004. As many members participated, same program was repeated 6 times in 3 days. Training consisted of lecture and practice by the local consultant.

c. Milling machine training

Local technician provided operation and routine maintenance training to mill operator on January 2005 at the site.

d. Training on making monthly summary

OJT training on preparing monthly summary was provided to the manager by the local consultant in March 2006.

e. Training on millet cleaning and retail pack production

Traditional method/tools used at the site could not clean millet grain satisfactory. Field trial and training of new method/tools was carried out on February 2006 by the Study team and the local consultant. Additional trainings were provided OJT mode in the actual production of the first consignment during February and March 2006 by the local consultant.

2) Resident advisor

A resident advisor dispatched by the Study team provided OJT through assisting in daily operation from the initial stage.

3) Technology Test Components (Test and improvements of machines/equipment)

a. Determination of solar drying system

Purpose & Contents: Test and determine the solar drying system/method.

Results : As the result of suitability test of four (4) types of dyers/drying methods in the operation, plastic sheets + wind shield was judged as the best method by the operation staff. Durable plastic film for agriculture use is not available in Uganda and it hindered the introduction of enclosed (tunnel) type dryer. (see ANNEX for details)

b. Improvement of workability of local-made manual chipping machine

Purpose & Contents: Improve the workability of local made manual chipper.

Results :Blade casing was enlarged at manufacturer's workshop to eliminate the clogging.

c. Introduction of efficient material-handling system

Purpose & Contents: Purpose & Contents : Introduction and improvement of material handling equipment for efficient processing work.

Results : Push cart and portable hopper were designed and manufactured by local fabricator. Push cart have been well utilized.

d. Trial of collective usage of ox-cart

Purpose & Contents: Introduction of ox-cart and explore the feasibility/system for collective utilization for transportation of cassava to the facility.

Results : The members were reluctant to use the ox-cart at the beginning, because ox-cart is completely new to them, but it is getting familiar to the members. Members evaluate that ox-cart is useful tool. Slow speed (i.e. it can not use for long distance transportation) is the major factor limiting its use.

(4) Processing result

1) Collection and processing of cassava

Operation commenced on 30/12/2004 and a total of 109.1 ton of cassava was processed and 38.2 ton of high-quality cassava flour/chip was produced by 30/04/2006 in the past 16 months. Monthly processing results are as follows.

Table 4.19 Processing Result, Jan. 2005 – Apr. 2006

	Number of operated days (processing cycle)	Collected/Processed volume (material base: peeled root)	Collected/Processed volume (average, per cycle)	Flour production
	Days	Ton	Kg	ton
Year 2005				
Jan	23	12.0	521	4.7
Feb	22	12.6	574	4.9
Mar	23	9.6	417	3.2
Apr	14	5.8	412	1.8
May	18	7.3	404	2.3
June	12	4.6	382	1.5
July	8	8.7 *	1,094	3.5
Aug	17	6.3	369	2.3
Sep	19	11.2	588	4.4
Oct	4	5.3	1,330	1.6
Nov	0	0	0	0
Dec	0	0	0	0
sub total	160	83.3	av. 521	30.2
Year 2006				
Jan	5	6.3	1,251	2.5
Feb	4	6.5	1,618	2.7
Mar	7	10.5	1,501	2.0
Apr	1	2.5	2,525	0.8
sub total	17	25.8	av. 1,515	8.0
Total	177	109.1	av. 616	38.2

* include the collected volume in trial purchase from outside of the project area.

a. Result of Year 2005

Plan and result of processing/flour production volume for the Year 2005 is illustrated in Figure 4.15. Production target in the initial 12 months was set as it started from 25% of the full-scale operation target, then it gradually increased reaching 100% on 12th month.

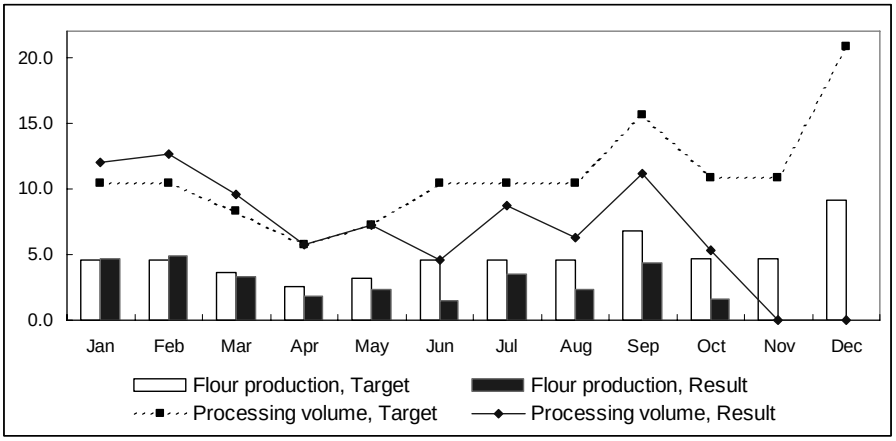


Figure 4.15 Plan and Result of Processing in 2005

Indicators of processing results for the initial 12 months (Year 2005) are summarized in the following table. Collected/processed volume resulted in 64% of the target and flour production remained 52% of the target. Recovery rate from raw cassava to dried chip was lower than originally planned. This might be due to the difference of variety of cassava. In the planning only one variety at the site was tested, while at the actual operation many different varieties of cassava were supplied, and this led to an inefficient peeling operation. A large quantity of cassava peeling at one time also caused increased losses. Seasonal differences in moisture contents are also considered as contributing factor.

Table 4.20 Plan and Result of Processing, Jan. – Dec. 2005

		Plan	Result	% (Result/Plan)
Number of operation days (processing cycle)	Days	166	160	104
Collected/Processed volume, peeled root	Ton	131	83.3	64
Processed volume, average, per day (cycle)	Kg	790	521	66
Flour production	Ton	57.6	30.2	52
Yield (Flour/Peeled root)	%	43 – 44	36.3	
Cost per kg of flour *	Ush/kg	412	480	86

* Cost does not including shipment cost

Collected volume of material cassava was lower than the target and it fluctuated monthly. Various factors have affected the collection (shipment by the members). Reasons/factors for lower and unstable supply are summaries as follows.

- The members had fewer surpluses than expected, especially during initial period of operation.
- Poor rainfall in the project area during the rainy season (April – May) caused a fear of food shortage of farmers, leading many members to stop/refrain selling cassava in June, July and August 2005. Poor rainfall also affected the growth of standing plants and pushed the harvest time forward.

- Cash flow problems: Due to the shortage of cash for purchasing raw cassava, operation stopped for about 5 days in April 2005 and for about 3 months from October to December 2005. Suspension of operation in Oct. and Dec. is also attributed to the decline of market price.
- Market price and price competition between traders: When the market prices goes up, buying price was not very attractive to member farmers.

b. Collection and processing result of year 2006 (Jan. – April)

Although there was 3.8 ton of chip in stock, collection and processing was resumed on 19 Jan. 2006 because the members were in need of cash to prepare for school season starting in February. The Executive Board decided to actively purchase cassava at time of cheaper price to add another 10-11 ton stock, expecting the flour price would go up in March/April due to drought in the region.

Against the immediate target of adding 10-11 ton stock, 17 ton of cassava were collected/processed and 8 ton of dried chip were produced by the end of April.

c. Collection system

Stable collection of material is essential for the success of processing business. Therefore, scheduled collection (delivery) by groups was attempted right from the start of the operation. However, the schedule was not well observed by the members and they delivered randomly. This hindered the optimum use of drying space and paid-labour, leading to increased production cost and reduced profit.

In the Executive Board meeting on 16 Sep. 2005, a new collection schedule was planned based on the actual availability of cassava among the members and other farmers in the project area. It was agreed that collection would be carried out twice a week with target volume of 2 ton of fresh cassava each time. Delivery would be made in the early-evening of previous day of the processing. Peeling and chipping should be completed in one day. Minimum number of labour for drying would be deployed on succeeding day(s).

This new schedule was implemented immediately after the decision. As shown in the Table 4.20, collected/processed volume per cycle in October 2005 and afterwards has been definitely increased though it has not yet fully achieved the target.

2) Retail packs production

A plan to produce cassava-millet composite flour was proposed by the Executive Board and agreed by the members at the General meeting in December 2005.

After collecting about 300kg of millet grain from the members, first trial production was taken place on 23-25 Jan. 2006. Trial product revealed that although taste was fine, dust (milled stone/sand) were got mixed due to insufficient cleaning of millet grain. Traditional method/tools for cleaning millet grain were replaced with new method/tools. Field trial and training of new method/tools were carried out on 05 Feb. Additional trainings were provided by OJT mode in the actual production of the first consignment during February and March 2006.

Table 4.21 Production Result of Retail Packs (First Consignment)

Product		Quantity
Cassava-millet flour	1 kg Pack	800 packs
Cassava-millet flour	2 kg Pack	100 packs
Cassava flour	1 kg Pack	800 packs
Cassava flour	2 kg Pack	100 packs

(5) Marketing Result

1) Sales result of cassava flour/chip

With the intensive efforts of the local consultant, a number of outlets have been identified. The Executive Board members also made effort to sell to shops nearby. Results of the sales in year 2005 are summarized as follows.

Table 4.22 Marketing Result, Jan. 2005 – Apr. 2006

	Flour production	Sales volume	End stock	Selling price **	Sales Revenue
	Ton	ton	ton	Ush/kg	1,000 Ush
Year 2005					
Jan	4.7	2.3	2.4	443	1,015
Feb	4.9	2.2	5.0	459	1,029
Mar	3.2	2.1	6.2	439	919
Apr	1.8	6.6	1.3	456	3,030
May	2.3	3.2	0.4	503	1,626
June	1.5	1.0	0.9	600	617
July	3.5	2.1	2.3	598	1,255
Aug	2.3	0.3	4.3	550	155
Sep	4.4	3.3	5.4	565	1,888
Oct	1.6	3.2	3.8	547	1,758
Nov	0	0	3.8	---	---
Dec	0	0	3.8	---	---
sub total	30.2	26.5	---	av. 502.4	13,297
Year 2006					
Jan	2.5	0.1	6.1	500	50
Feb	2.7	0.1 + 0.7*	8.0	500	45
Mar	2.0	0 + 1.1*	8.8	---	---
Apr	0.8	0	9.7	---	---
sub total	8.0	0.2 + 1.8*	---	av. 500	95
Total	38.2	26.7 + 1.8*	---	---	

* Flour volume used for retail packs production ** Monthly average price

A total of 26.5 ton of high-quality cassava flour/chip was marketed mainly to the customers in Kampala in the year 2005. Marketing results for the initial 12 months (Year 2005) are summarized in the following table. Sales revenue resulted in 48% of the target. Selling price resulted higher than the initial target.

Table 4.23 Plan and Result of Marketing, in 2005

		Plan	Result	% (Result/Plan)
Sales revenue	million Ush	27.65 *	13.30	48
Flour price, average	Ush/kg	480	502	105%

* Planed production volume x assumed selling price (57.6 ton x 480 Ush/kg)

Market price of cassava chip has been in a low range of 280-350 Ush/kg since November 2005 until now, therefore no sales has made yet in the year 2006. Price increase is hoped by ACAPROMA.

2) Sales result of retail packs

Major target outlets of retail packs are supermarkets in Kampla through the distributor, Twaja Kukola Distributors who already have established access and delivery system to various supermarkets as the sales agent of Tilda Rice and Kinyara Sugar.

Price negotiation was started on 30 Jan at Kampala based on the retail prices of the competing products. Following prices were agreed.

Table 4.24 Price Setting of Retail Packs

(Unit : Ush/pack)

Product	Distributor's price (buying price)	Wholesale price	Retail price
Cassava-millet flour 1 kg pack	1,000	1,200	1,500
Cassava-millet flour 2 kg pack	2,000	2,200	2,500
Cassava flour 1 kg pack	800	900	1,000
Cassava flour 2 kg pack	1,500	1,700	1,900

First order was received on 01 Feb.; 1 ton of cassava-millet flour and 1 ton of cassava flour. Delivery was delayed about one month due to difficulty in removing small stones very similar to millet grain and mechanical troubles in milling machine. Delivery was made on 15 March. Payment for the first consignment was made in cash. Retail sales at supermarkets are reported as modest especially for cassava flour.

Table 4.25 Sales Result (First Consignment)

Product		Q'ty	Unit price	Sales revenue
		Pack	Ush/pack	Ush
Cassava-millet flour	1 kg Pack	800	1,000	800,000
Cassava-millet flour	2 kg Pack	100	2,000	200,000
Cassava flour	1 kg Pack	800	800	640,000
Cassava flour	2 kg Pack	100	1,500	150,000
Total		1,800		1,790,000


Photo 4.1 Retail Packs at Supermarket

(6) The Balance of Income and Expense

1) Profit/loss of Cassava flour in the year 2005

Accumulated 12 months' gross profit resulted in 818,618 shillings including the value of end-stock by production cost. Table 4.26 shows the breakdowns of the income and expenditure for Year 2005 account. Purchasing cost of material roots (about 9 million shillings) account for 63% of the expense. Total of wages (variable cost) was about 2.8 million shillings which accounted for 19%.

Table 4.26 Income and Expenditure (Year 2005)

Income		
	Sales of dried chip and flour	13,297,350
Expense		14,528,494
	Fresh cassava purchase	9,176,650
	Cassava purchasing expenses	557,850
	Processing wages and meals	1,929,650
	Administration wages	874,000
	Processing fuel	239,950
	Facility/machinery maintenance and repair	397,600
	Security	460,000
	Delivery transport and expenses	249,000
	Administration expenses (transportation, office expense, etc)	423,244
	Others (Bank charge, trading license, land registration)	220,550
Profit on sales		▲1,231,144
End stock value	Dried chip (3,749kg)	* 2,049,762
Gross profit		818,618

Expense does not include depreciation. * Valued by production cost.

The reasons for this lower profit are i) lower collected/processed volume of fresh cassava, ii) high processing cost, mainly labour cost, due to small volume of processing per cycle and iii) lower processing yield than the plan.

2) Profit/loss of Retail packs

Total profit from the first consignment of retail packs is computed as 300,000 Ush. Table 4.27 shows the profit of each product.

Table 4.27 Profit Result (First Consignment)

Product		Q'ty	Unit price	Production cost	Gross profit
		Pack	Ush/pack	Ush/pack	Ush
Cassava-millet flour	1 kg Pack	800	1,000	789	168,800
Cassava-millet flour	2 kg Pack	100	2,000	1,578	42,200
Cassava flour	1 kg Pack	800	800	701	79,200
Cassava flour	2 kg Pack	100	1,500	1,402	9,800
Total					300,000

4.4.3 Results of the Evaluation

(1) Relevance

The project is evaluated relevant from the following viewpoints:

1) Consistency with government policy

The purpose and contents of the project meet the government's current development policy such as PEAP, PMA, MAPS and the Rural Development Strategy that emphasized the importance on post-harvest processing of agricultural produce. In addition, the project aims at producing high quality cassava flour, which has potential to substitute partially imported wheat. In this line, the project has high relevance from the viewpoint of the governmental policy.

2) Appropriateness of the target group

Cassava is grown as one of the major staple food. Surplus cassava is sold to fishermen at lakeshore in a fresh form and to traders who occasionally come from Kampala mainly in the form of dried chip. Thus, farmers in this remote area had a limited outlets. On the other hand, the climate of this area is relatively dry and suits for sun drying.

Farmers of the selected groups have shown quite positive attitudes from the beginning and they have actively participated in planning and implementation. The results of the questionnaire conducted to the members asking if satisfied with the project showed 96% (45 out of 47 respondents) answer as yes. Table4.28 shows the reasons for their satisfaction. "It is easy to sell cassava now (improved market access)" got the highest mark, followed by "job opportunity" and "income was increased".

Table 4.28 Reasons for Satisfied with the Project

	Number	%
It is easy to sell cassava now.	31	69%
Project provides Job opportunity to the people.	20	44%
Income was increased.	16	36%
Project activity empowered our society (original group).	3	7%
I can expect profit share later on.	3	7%
Selling price + peeling fee is higher than the price sell to traders.	1	2%

Note : Respondents were 45, and they marked all answers that apply

(2) Effectiveness

1) Increase in family income

The processing facility has served as a stable and ready market for cassava. It contributes to income generation of farm households largely, and farmers are increasing cassava production.

In the discussion at the site, the group members explained the improvement of household economic status by citing examples such as payment of school fee, purchase of cloth and essential daily commodities (sugar, salt), etc.

According to the result of questionnaire survey, 72% (34 out of 47) of the respondents answered that their family income increased by the project. All the respondents who shipped large volume answered that income increased, while it is about half in case of the respondents who shipped small volume.

Table 4.29 Increase of Income

	Large	Medium	Small	Kisalizii	Kiwembi	Namika	Total
Yes, increased	14	13	7	14	8	12	34
No, Same (nearly same)	0	7	6	2	7	4	13

Question : Has your family income increased, due to the project implementation?
Note : Large/Medium/Small is a sorting category of the respondents by their total shipment volume since the beginning. Large: total more than 1 ton, Medium: 1 – 0.1 ton, Small: less than 0.1 ton (include none)

The members got 100 – 120 Ush/kg (Price of peeled roots 80 - 100 Ush/kg + Peeling fee 20 Ush/kg) in cash when they delivered cassava to the project facility. In the year 2005, total 9.2 million shillings were paid to the members for raw cassava and peeling fee. If assumed that all the members delivered equally, cash income per member is about 51,000 shillings (28US$).

(3) Efficiency

Most input of the project on both material and human resources are evaluated as appropriate in general. However, a certain input had difficulties to contribute to output.

1) Facility and equipment Input

Most of the material inputs are fully utilized to produce the target product.

The project introduced ox-cart for collective utilization for cassava transportation, as a part of the technology test components. The ox-cart has become familiar tool of collection work for some members. According to the result of the questionnaire, among 47 respondents 29 answered that ox-cart is useful and 14 respondents had actually used ox-cart. However, it is not suitable for long distance transportation.

Since cassava quickly deteriorates after harvest, delivery time was initially set as in the morning of processing day. However, it was confirmed later that previous day's delivery would not affect the quality, and the delivery time limit was changed to the evening of previous day of processing. With this change, area to be covered by ox-cart transport has been widened.

2) Human resources Input

ACAPROMA has been assisted by a resident adviser dispatched by the Study team, whose major role was to provide OJT through assisting in daily operation and accounting. The Study team

also provided SYB training on basic business skills to Executive Board members and maintenance training to mill operator by external human resources.

Those operation staff are now able to operate the processing works and record keeping adequately without assistance of resident adviser.

Monthly review of the business performance by Executive Board members has not implemented. Therefore, the use of knowledge provided by the SYB training needs to be encouraged.

(4) Impact

Following positive impacts have been observed in the project area. No remarkable negative impacts have been observed.

- A new cassava processing project has been formulated by NADIFA with support of NGO Farm Africa at the nearby Nakasongola town. The facility is now under construction.
- Cassava planting area in the target area has increased significantly.
- Women's income and income opportunity has increased.

In the questionnaire survey, 91% of respondents (43 out of 47) answered they have expanded cassava planting area after the implementation of the project. Those who did not increase the planting area answered that they were unable to expand due to limited land, poor soil and shortage of labour.

Table 4.30 Changes in Cassava planting area since Jan. 2005

		Large	Medium	Small	Kiwembi	Namika	Kisalizi	total
Average increase	Acres	3.4	3.1	1.7	2.8	2.6	3.0	
over 10 acres	Number of Respondents	0	1	0	0	0	1	1
9.9 - 5.0		4	2	1	1	4	2	7
4.9 - 3.0		5	8	2	7	3	5	15
2.9 - 1.0		3	6	5	4	7	3	14
less 0.9		1	1	3	3	0	2	5
Same		0	1	1	0	1	1	2
Decreased		1	1	1	0	1	2	3
Total		14	20	13	15	16	16	47

Increased area = [Planted before (standing)] + [New area (plant in this rainy season)] – [acreage for growing cassava at the time of operation started in Jan 2005]

1) Changes/Impacts caused in Farmers' Group

The project gave positive changes and impacts on the farmers' group, ACAPROMA during the project period. The growth of chairman's leadership and reliability on the chairman from other members is regarded as one of the immense changes occurred inside the group. The developed capacity of accountant and supervisor is also distinctive achievement/change since the project started. Those capacity growths led to their own confidence and positive attitudes towards daily

operation.

From the viewpoint of the unity of group, the members feel tighter relationship each others and the growing of ownership mind on the project as well. It is analyzed that those have been nurtured by their direct involvement in operation such as their carrying cassava to the facility, peeling and other processes to cassava flour.

2) Changes/Impacts made in rural society

As the project's ripple effect, similar project to the ACAPROMA, cassava flour processing facility, is now under construction near the site by farmers' association with NGO. Although effects on the ACAPROMA, it is evaluated as positive impact on the community's economy[7].

The growth of family income is confirmed as a positive impact by the project. Moreover, significant and particular impact made by this project is to provide women with opportunities to earn cash income. Before the project started, women had few chances to access the chances to earn cash income. It is unique impact made by this project.

(5) Sustainability

1) Technical aspect

The operation staffs have obtained adequate skill/knowledge to operate the daily works of processing and record keeping. According the questionnaire survey result, most of the members judged the performance of the operation staff (include the manager) good or fair.

Table 4.31 Members' Judgments on Performance of Operation Staff

	Kisalizii	Kiwembi	Namika	Total
Good	8	6	11	25
Fair	8	4	1	13
Not good	0	1	0	1
I have no idea	0	4	4	8

Question: How do you judge the performance of the operation staff in these months? Include the answers of 6 members who have shipped none.

Regarding the technical aspect, following actions need to be taken to ensure the business's sustainability.

- Establish a solid arrangement for order/delivery of machine spare parts from Kampala to secure the timely/quick supply of parts.

[7] Increase in processing total amount of cassava flour at the area may make traders come to the area for the business, directly mitigating transportation tasks on ACAPROMA. On the other hand, there may be competition of purchasing price of cassava between the facilities, and reservation of incoming cassava.

- More careful handling of chips in drying work and quality inspection by cooking and tasting should be practiced.

2) Financial aspect

Despite the higher processing cost and lower production volume than initially assumed, the gross profit for the first 12 months (Year 2005) resulted in 818,618 shillings including the value of end-stock. This result supports the feasibility of high quality cassava processing business. In addition, it was confirmed that the planned facility, equipment and processing method has a processing capacity of 2 ton per day/cycle.

As shown in the table 4.32, processing cost has been reduced by increasing daily processing volume.

Table 4.32 Confirmed parameters

	Parameters based on the Year 2005 result	Parameters to be applied in D/P
Production cost（peeled root base）	174.4 Uhs/kg	165.0 Uhs/kg
Price of peeled root	90.4	85.0
Peeling fee	19.8	20.0
Other costs	64.2	60.0
Recovery rate	36.3%	37.0%
Production cost（product base）	480.4 Uhs/kg	446.0 Uhs/kg
Sales prices	500 – 550 – 600 Uhs/kg	
Gross profit	20 – 70 – 120 Uhs/kg	54 – 104 – 154 Uhs/kg

The members' willingness of shipment has been improved (see table4.33) as well as members' cassava production has been largely expanded. Thus, fundamental condition for the success of processing business, namely stable supply of enough volume of material, have been strengthened.

Table 4.33 Willingness to ship to the Project

	Result at the time of Mid-term evaluation		Result at the time of Final evaluation	
Yes, I will.	29	65%	38	81%
Yes, but it is up to the price.	16	35%	9	19%
No.	0	0%	0	0%

Question: Do you want to continue supplying your cassava to the project?

To assure the economic sustainability of the business (i.e. make profit), continuous efforts should be made i) to raise the profit rate and ii) to improve cash flow and iii) to expand sales outlets.

Following table shows the practical actions taken and/or to be taken for those three issues. An action already taken is contributing to the economic sustainability.

Table 4.34 Progress of the Actions for Assuring the Economic Sustainability

Actions to be taken		Current status
i) Improve profit rate		
Introduce products with higher profit	Production of retail packs	Started
	Production of millet-cassava flour	Started
Reduce production costs	Installation of new collection system to reduce the labour cost	Installed
	Pay wages/salary by daily basis	Installed
ii) Improve cash flow		
Increase the capital	Raise fund by expanding the membership	not yet started
Increase the C.O.D. sales (Find customers who pay C.O.D.)		Started
Identify short-terms loan provider		not yet started
iii) Expand sales outlets		
Find local sales outlets for cassava flour		Accomplished
Sales to supermarkets via distributor		started
Find local sales outlets for retail packs		not yet started
Resume sales to Family Diet by improving the quality control		not yet started

Reduction of processing cost by reducing labour cost through controlling the collection of cassava volume and delivery time was the most important and urgent issue to be tackled. This point was raised at the time of the Mid-term evaluation. New collection system was introduced and has been implemented since late September 2005, and collected/processed volume per cycle has been definitely increased.

3) Organizational aspect

In view of the past management exercises such as i) the decision to increase the stock and ii) the decision to tackle production of high profit product (millet-cassava flour), the management of ACAPROMA has taken a self-sustaining attitude in the operation of their business. Also, they already know what is needed to improve the financial situation of the business.

Regarding the accounting, no serious mismanagement has happened. After the Mid-term evaluation, the management's commitment to the cassava business has been much strengthened.

Considering these points, it is evaluated that the current management has adequate capacity to continue running the business.

However, results of the questionnaire survey have revealed that about half of the respondents have dissatisfaction/complaints to the manager and/or Executive Board.

Table 4.35 Members' Evaluation to the Management

	Mid-term evaluation		Final evaluation	
No particular dissatisfaction/complaints	24	53%	19	40%
Some dissatisfaction/complaints to the Manager	15	33%	11	23%
Some dissatisfaction/complaints to the Executive Board	12	27%	22	47%

Many of the complaints are related to (or caused by) lack of explanations to individual members about the business performance and decisions made in the General meeting.
Due to the basic rule of ACAPROMA that "Equal numbers of representatives from each group attend the General meeting and Executive Board for the management of the business", about half of the members can not attend the General meeting. In case of the respondents of the questionnaire, only 21 out of 47 attended the General meeting held in Dec. 2005.

Executive Board members should understand again that half of the members can not attend the General meeting and such members have no chance to express his/her opinion. Executive Board member's accountability should be improved immediately. Explanatory meeting at each community should be held periodically to improve the accountability.

4.4.4 Lessons Learnt

(1) Organizational matters

1) Selection of target group

Daily supply of 2 ton materials cassava was assured by the group. However, the actual supply was lower and processing volume was lower than the initial plan for first year.
Pre-assessment of supply capacity is very important, and local authorities have no exact figures. Production data such as planting area should be collected from each member of the target group by their own initiative of the group.

2) Setting up organizational structure

a. Organizational setup

Two CBOs and one primary cooperative society located in three adjoining communities were the candidate groups for the pilot project. The leaders of those three groups voluntarily decided that three groups would work together in the pilot project.
In the first assessment, capability of the two CBOs (women groups) seemed to have limited capacity to run a processing business as their activity was saving only. But the human

resources and experiences of the primary cooperative society covered the shortage in capability of the two CBOs.

The leaders of the three groups decided to run the business jointly in equal share. Following this decision, they decided various rules for running an organization smoothly; such as to form the General meeting and the Executive Board with equal number of representatives and to share the profit/loss equally by three groups.
Thus, this decision of the "equal partnership" eased the process of decision making. Perhaps it must have been a key for organizational setup among various groups.

b. Detailed planning process

Leaders of the original groups participated in the detailed planning as the planning committee members. Prior to the discussions on operation system and work procedures, several practical exercises such as demonstration of chipper, drying tests, measurement of peeling speed, etc. were carried out by the Study team and the planning committee. The purpose of the exercises was to obtain the necessary parameters on cassava processing as well as to provide the key members with the clear picture of new methods, and to make them aware of the importance of high recovery rate and efficient work.

Small-scale demonstration was useful to enhance farmers' understanding of new technology/equipment. Moreover, working together in practical exercises strengthened a relationship between support-side (Study team) and farmers' group, also strengthened the farmers' sense of ownership.

c. Organizational structure

It is rather hard to find person(s) who have sufficient experiences in management and accounting in the rural area. Further, it is practically difficult to hire such experienced person from outside due to higher cost, particularly in the initial stage of the business when no steady income is established. Therefore, it is practical to choose the best talented persons in the villages and to provide them with trainings.

Experienced machine operator is also very limited in the rural area. In the project, an owner of the village mill was recruited tentatively on the conditions of daily wage and work only necessary time for milling work. This was the effective and practical solution.

Practical capability in business management and accounting can be acquired through real business activities, not in the class room lecture only. Therefore, provision of OJT-style training by resident adviser was emphasized.

The leader's capability and character affects business success greatly. A typical leader training needs to be implemented in the early stage, followed by the additional ones on the issues found to be necessary afterwards.

d. Delivery and dissemination of information

Delivery/dissemination of information to the members is very important but it is not an easy task. To deliver the information, someone has to visit the members' houses one by one. As in the case of ACAPROMA, the members' residences are scattered in wide area, motorcycle is essential to deliver the information.

e. Accountability and ownership mind

The activities on information and accountability are dull in general.
The executive members and manager are not very conscious of the importance, and lack the incentive and the sense of responsibility to perform these activities.
Also, members have limited sense of ownership; attendants to the meetings are often limited.
Strong sense of ownership can not be expected to each member at the early stage of the project.
In the first General meeting of ACAPROMA, many of the members strongly demanded high cassava price regardless of the market condition. However, after one year of the operation, when poor result of the business and high production cost were explained in the another general meeting they have agreed to lower cassava price.

The members could recognize the importance of project only after having and seeing the concrete result. Then, such recognition generates sense of ownership among farmers, that the project is important ready market of their produce in the area and it should be sustained by them. It may take time to enhance the sense of ownership among farmers and not always easy to materialize the planned benefit.

In case of ACAPROMA, sitting allowance is paid to the participants in the Executive Board meeting as stipulated in the regulation. However, no sitting allowance (compensation) is paid to executive members for their effort to report the discussed issues and/or decisions made in the executive board to other members in each group (community). In order to promote executive's activities, a certain remuneration needs to be paid.

f. Adviser for solving the social problem

Two executive members who had no chance to work in the operation unit as staff members had shown antipathy to other executive member who became staff member. This resulted confusion in the community. To solve the situation, ACAPROMA requested the advisor for the executive

board, to deal with them.

Appointing a person who is respected in the community as the adviser is considered effective in solving the social problems such as friction among members.

(2) Operation and management

1) Processing system

There are three possible methods of dried chips production; Collective method (process in one place), Group method and Individual method.

Quality control in group method and individual method is more difficult than in the collective method. The use of equipment/tools for processing such as chipping machine and sheets for drying need to be shared among members of the group and individuals by rotation. Coordination and scheduling of equipment usage and in maintenance of equipment are considered as unavoidable problems under current tradition/culture of the villages.

Thus, collective method is considered better than the group and individual methods from the viewpoint of quality control and risk management.

2) Collection system/method

- Cassava collection should be controlled in terms of volume and delivery time. From the failure of the scheduled collection by the groups, following facts are confirmed.
  - It is not possible and practicable to rely on the person appointed as group leader to voluntarily conduct adjustment among his members (urging to increase or decrease) of delivery quantity in his responsibility without remuneration.
  - Without strong incentive or necessity among all members, group activity will not work.
  - Sense of observing the agreed rule on time and volume is poor.
  - The supply capacity of each member is not uniform and not well known by other members.
  - Seasonal fluctuation of supply capacity is significant.
- To implement the scheduled collection based on the declared delivery volume of each member, motorcycle is essential to carry out the coordination among the members as the members' residence are scattered in wide area.
- Various factors such as rainfall, members' needs of cash, market prices, affected the shipment of material cassava by the members, and the delivery volume fluctuated seasonally. The market price of cassava flour/chip is interlocked with prices of other food crops such as maize. Collection plan should be prepared based on these seasonal trends.
- Trial procurements of material cassava from outside of the project area were carried out several times when the delivery volume from members was insufficient. Purchasing cassava based on the size of field is common method. As accurate estimate is difficult, it

is judged too risky to buy cassava by the field size.

3）Peeling work

Peeling work is done by the members who deliver cassava roots to the processing facility. 80-100Ushs/kg is paid for peeled roots and 20Ush/kg for peeling work. The advantages of this method are;

- Increases the cash amount to be paid to the members.
- Provides the members with chances to participate in the processing activities, it may deepens the understanding of the project and the sense of ownership of the project.
- Eliminates the risk of cost increase. The weight rate of peels differs by cassava type/variety.
- Payment of amount by the weight of peeled cassava reflects more accurate quantity of cassava.
- Eliminates the work of arranging workers for most laborious peeling work. Peeling cannot be mechanized.

4）Quality inspection

There are chances of contamination with very small dust in dried chip, and it is hard to find such contamination by visual inspection. Cooking and tasting is a practical measure for quality inspection. This should be introduced in the initial stage and be practiced periodically.

5) Production of millet-cassava composite flour

Cassava flour is a cheap commodity among staple food items, and added-value (processing profit) by improved quality is rather small. Project has achieved higher prices than ordinary quality chip/flour. However, the market price of high quality chip/flour follows the trend of ordinary cassava flour.

By mixing millet flour with cassava flour, commodity value increases greatly. Production of cassava-millet flour should be considered right from the beginning.

6) Method/tools for cleaning of millet grain

High quality (dust free) millet flour is indispensable for production of high quality composite flour. Removing small stones similar size and shape to millet grain is the most difficult part in the cleaning work.

Gravity separator is not available in Uganda and it is too expensive for small business to import. In the factory of relatively large milling company in Kampala, skilled ladies are removing manually such stones by using flat-round basket.

In the project, those ladies were invited to the project site as trainer to provide OJT-style training

to female members. This OJT-style training was effective.

7) Recovery rate

Uncontrollable factors such as varieties and harvest seasons affect the recovery rate, then the product cost. Recovery rate should be monitored (calculated) each time of processing, batch by batch. Calculation in the recovery rate may result in finding the mistakes in weighing and record keeping.

8) Support for development of sales outlets

Currently, demand for high quality cassava flour is not significant in the local markets and establishing sales channels to Kampala market is indispensable. However, farmers who are in villages far from Kampala, do not have information/human network to reach the potential customers in Kampala. Moreover, it is practically difficult for the small business to hire a person for marketing work, especially in the initial stage due to limited fund available.

Therefore, it is very necessary to provide support for development of sales outlets for the project products, concrete information and match-making to introduce the potential customers.

9) Wages

Expenses on wages can be reduced by adopting daily payment system to all staff. Almost all staff are farmers and they have their farming work to do. It is not necessary nor practical to force them to work solely for the project.

(3) Facility and Machinery

1) Equipment

a. Solar drying system

As a result of tests on drying method/system, followings lessons were learnt.

- Tunnel (enclosed) type of drying shelf using transparent film, was found to be not applicable because the weather proof plastic films for agricultural use is not available in Uganda.
- A drying method using plastic sheets and wind shield was judged as the best one for workability and cheapest in initial cost, although it can not eliminate the possibility of dust contamination. Wind shield need to be made with locally available materials such as papyrus mats. Planting hedge tress (choose a kind of trees whose fallen leaves should not pose a problem) to form the wind shield is recommended. Planting grasses to cover ground to prevent dust fluttering is also recommended. Drying yard should be apart from unpaved roads, where vehicles cause dust, as far as possible.
- If it is difficult to grow grasses and/or hedge trees due to soil/climate condition, plastic sheets should be placed on the simple table (wooden frame with 2 inch wire mesh screen,

60cm height).

2) Facility

a. Land for the project facility

A member's land was provided for the facility site. Price of the land was decided at the time of land selection, but the landowner demanded a price raise afterward.

It is important that the agreed price and exact boundary should be documented immediately after the land selection to prevent future troubles.

(4) Finance and sustainability

1) Countermeasure for cash flow problems

Operation was halted several times due to shortage of working capital to pay for material cassava to the members. Deferred payment for material cassava is hardly acceptable to farmers, because of the urgent need for cash, and their unpleasant experiences in deferred payment in the past.

Viable short-term loan services scheme are advisable for the smooth operation of the project.

2) Reduction of initial input capital

Cassava processing facility is mainly composed of spaces for peeling, milling and storing products, without any unique or special one. Project facility (building) has stronger walls and foundation than ordinary facility of mills and warehouses in rural area. Construction costs will be reduced by changing the materials and finish of walls and specification of foundation and floor.

Construction costs vary depending on the procurement methods. Lump-sum contract system on turn-key basis was adopted for the pilot project. However, the reduction of the cost should be considered by using another method such as labor contract system or provision of labors by the beneficiary group.

(5) Others

1) Suitable varieties for flour production

It was observed that drying speed and recovery rate varies by the type/variety. The difference in moisture content of fresh roots affects the recovery rate and drying speed. The difference in peel weight/thickness greatly affects the recovery rate.

The suitable variety for flour production means a variety of high processing efficiency and recovery rate. Easiness in peeling, peel/root weight ratio, speed of drying (moisture content) serves as selection criteria. On the other hand, suitable variety for cultivation differs by place; depending on soil, climate and damage by mosaic virus disease. Therefore, a most suitable

cassava variety for flour production may be selected from among the varieties currently under cultivation with the above criteria.

With the limited experiences in the pilot project, we observed that the best variety for flour production is NYALUBOKE (pink peel) which is popular at Kigumba, Masindi District. However, production of this variety is rather limited in the project area. This type is easy to peel, dry fast and good recovery rate (thin peel and less water content).

Although the difference of the quality and taste of the flour by variety may exist, so far no specific comments has been obtained from the customers.

4.5 Kangulmira Fruit Processing and Marketing Project

4.5.1 Outline of the Project

(1) Objectives

The project aims to increase incomes of fruit growing farmers through improved collective processing and marketing of fruit products (pineapples).

(2) Operating Body

Natural Taste Food Processors (NTFP) is the organization carrying out the fruit processing and marketing business. NTFP is a partnership company formed for the business by the members of High Quality Farmers' Association, which was selected as a representative group of Kangulumira Area Cooperative Enterprise (KACE) from among 14 member groups.

(3) Activities

- Capacity building for operation and management of the business.
- Processing of fresh pineapple to juice, wine and dried fruits.
- Establish linkages between markets.
- Introduction of appropriate processing methods and new products.
- Technology transfer to other farmers' groups in the area.

(4) Project Facility: Initial Investment amount 52.9 million Ush

The building is of concrete floor with plaster, wall of burnt brick with plaster and colored iron sheet roofing. Total floor area is 175 m^2 with 7 parts consisting of Changing room, Store (raw materials), Store, Office, Preparation room, Stove room, Storage (wine & product) and Verandah & Corridor.

(5) Equipment: Initial investment amount 17.8 million Ush

Aluminum pans, Kitchen utensils, Tanks/jerry cans for wine making, Fruit press, Slicer, Solar dryers, Heat sealer, Brix meter, Thermometer, Alcoholmeter, Hydrometer, Scales, Water filter unit, Foot pump, Firewood stove, Sink, Work tables, Shelves, Toilet, etc

(6) Total initial investment: 70.7 million Ush

4.5.2 Planning and Performance of the Project

(1) Farmers' organization

Farmers' organization (High Quality Farmers' Association) was selected among 14 farmers' groups of KACE in November 2003. Since the number of the members was smaller than the minimum requirement (30 members) for the Primary Co-operative Society, the members of HQFA decided to acquire a Partnership status. Official registration as Partnership organization was completed in August 2004 with the name of Natural Taste Food Processors (NTFP).

Internal rule regarding membership status, profit and loss sharing and others were made and stipulated in their partnership agreement concluded in August 2004. Land Lease Offer for the facility site (approx. 1 acre) was obtained in August 2004.

Administration Manager and 2 Processing Supervisors and 3 Working Group's Leaders were selected in November 2004. 6 workers were selected from 10 candidates in December 2004 after assessing their performance in the 5-days processing training in November 2004.
Opening bank account, obtaining trade license and health inspection of processing staff were completed from December 2004 to January 2005. Accounting forms were finalized in March 2005. Following figure shows the structure of the organization.

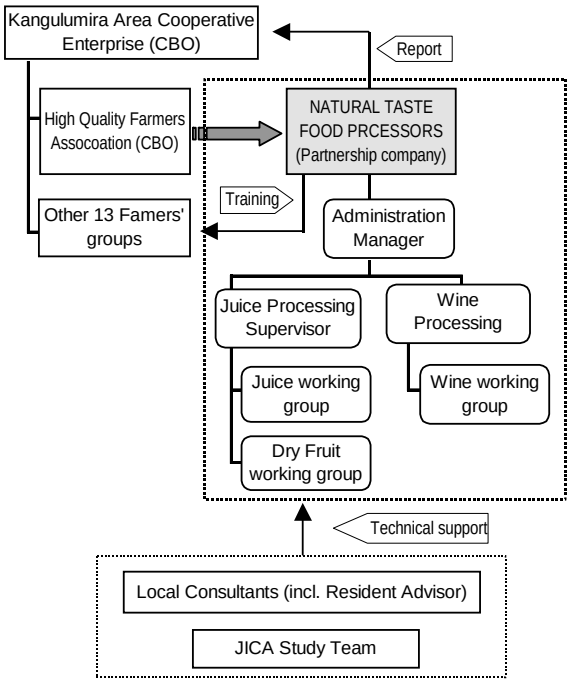


Figure 4.16 Organizational structure of NTFP

(2) Facilities and Machinery

1) Conditions of the facility

There was no serious trouble. Some improvements were made such as installation of hood and chimney, reducing sunshine penetration in the wine store, installation of wire mesh in the wine store and fencing around facility yard.

2) Conditions of the equipments and tools

- Kitchen utensils : Good condition and well utilized.
- Instruments for quality control and weighing : Good condition and well utilized.
- Fermentation tanks : Good condition and well utilized.
- Solar dryers : Locally made transparent PE film was worn out very quickly and it was replaced with imported film.
- Motorcycle cart : Not well utilized.

(3) Technical Supports

Wide range of trainings were conducted as follows;

1) Training Program

a. SYB (Start Your Business) training

5-days SYB training was provided to the members in November 2004. Major subjects covered are; Business idea, SWOT analysis, Marketing plan, Required staff, Costing, Financial planning

and Start-up capital.

b. Processing trainings

A series of processing trainings were provided to the core members and employees before/after starting operation.

i) At first, 5-days intensive training session on juice/wine/jam processing was held using the newly furnished project facility on November 2004. Training focused on the practical knowledge/skills of the pineapple processing, emphasizing practices of actual producing. After the intensive training, 2-days self-practice was taken place on the members' own initiative in December 2004.

ii) Follow-up trainings were provided by the same trainer for wine racking on December 2004 and March 2005.

iii) One-day training focusing on sanitation management was provided on April 2005.

iv) In the real processing works, OJT style trainings were provided by local consultant and the Study team quite a number of times on the exercises of recipe development and sample production of juice products as well as on the works for wine racking, clarifying and bottling.

v) At the time of Mid-term Evaluation, following points were identified as an immediate issue.

- Improvement of wine quality, particularly preventing acetic acid bacteria infection
- To develop practical skill/knowledge for blending and adjusting wine taste.

Therefore, additional training on wine making focusing above issue was provided by the same trainer. Training was carried out in a style of regular visit during September to November 2005, in total of 6-days/times.

vi) There were opinions that sediment, even very small amount, could affect consumer's selection negatively. To respond this issue, a filtering tool with manual pump was introduced to remove the sediment at the time of bottling. During March to April 2006, local consultant provided the training on the use of the pump as well as the better use of Bentonite to clarify wine.

2) Resident adviser

A resident advisor dispatched by the Study team provided OJT for daily operation from the initial stage of the operation. Marketing training was planned to implement in a mode of OJT by the resident advisor. However, slow progress of the business made it difficult to implement.

3) Provision of processing training to other farmers of KACE

Provision of OJT style training on pineapple processing technique to other member farmers of Kangulumira Area Cooperative Enterprise (KACE) was planned initially. However, the plan has been suspended due to the slow progress of the business.

(4) Processing Results

1) Collection of fresh fruits (material)

For the collection of fresh fruit (material), 2 wheel cart pulled by motorcycle was introduced to enable the transport of fruit from the member's home/field to the facility. However, as the amount of fresh fruit used for each time were limited such as 10 - 20 pieces in the initial stage, member farmers carried fruit by their bicycle or motorcycle. In addition, as the required fruit for processing were very limited compared to available amount from the members, systematic collection such as allotment to each member has not been implemented.

2) Product items

Three products; pineapple wine, juice and dried fruit were identified for commercial production taking into consideration of the market access, profit rate and required processing skill.

Processing flows for pineapple wine, juice and dried fruit are as follows.

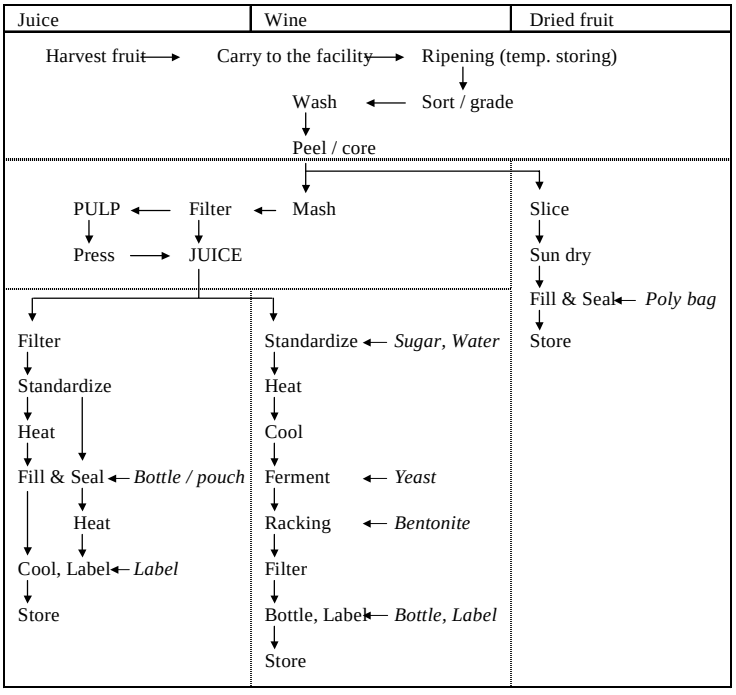


Figure 4.17 Principle Processing Flows

3) Wine Processing

First batch of wine was made in January 2005. After two months suspension, 14 batches (each 50liters or 100liters) were made consecutively in March, April and May 2005.

First batch turned into good taste and was bottled in late May 2005. Quality (taste) check of 8

batches (No. 2 to No.9) was conducted in September 2005. Out of the 8 batches checked, 2 batches were evaluated as bad, 4 batches were OK (need adjustments) and 2 batches were good. Taking this subtle result into consideration, additional training in a style of regular visit by consultant was provided during September to November 2005 to improve quality of products (i.e. prevent acetic acid bacteria infection) as well as to develop practical skill for blending/adjusting wine taste. Total of 4 batches were made in this training period.

The stock volume reached to 1,000 liters in May 2005. Since then the production were carried out very deliberately and major efforts were shifted to marketing to identify the solid outlets. Marketing channel to the supermarkets in Kampala has been realized in March 2006. As the stock volume has reduced to about 450 liters in May 2006 and steady sales is expected, production was resumed in June 2006.

Table 4.36 shows the monthly processing volume of wine.

Table 4.36 Wine Processing Results, Jan. 2005 – May. 2006

	Must making	
	Liter	number of batches
Jan. - Feb. 2005	50	1
March	255	5
April	490	6
May	247	3
June	0	0
July	0	0
August	0	0
September	100	1
October	180	2
November	100	1
December	0	0
Jan. - May 2006	0	0
Total	1,422	19

4) Juice Processing

NTFP tackled to develop two types of juice products namely “ready to drink juice” and “dilute to taste juice”. As mentioned, two types of juice products were taken up. However, the project faced serious difficulty in developing/identifying the solid market, leaving the juice production only to the test production/marketing. Table 4.37 shows the monthly production for each product. Total production was 635 liters for “ready to drink juice” and 121 liters for “dilute to

taste juice".

Table 4.37 Juice Processing Results, Jan. 2005 – May. 2006

Products	Ready to drink juice		Ready to drink juice		Dilute to taste juice	
	100 ml pouch		500/300 ml bottle		1 liter jerry can	
	Pcs	liter	Pcs	liter	Pcs	Liter
Jan. & Feb. 2005	288	*30				
March	2,177	347				
April	1,611	215				
May						
June						
July					n/a	*60
August						
September						
October						
November						
December			61 + 42	43	61	61
Jan. – May 2006						
Total	4,076	592	103	43	61	121

* Trial / sample production

a. Ready to drink juice 100ml pouch

Juice recipe for "ready to drink juice" was finalized through the test production in February 2005. After a series of works such as practice exercise for pouch sealing, making samples, design/ordering pouch and market sounding, production of ready to drink juice (100 ml pouch) started in March 2005.

Ready to drink juice has targeted at kids in the local area who are accustomed to cheap artificial juice (100Ush/200ml pack, retail). To compete with this cheap juice, retail price was made to the same 100 Shillings per pack but volume was set at 100ml (half of the artificial one). It was expected that people prefer better taste than volume. However, market response was not favorable, due to the higher price of the product. A series of trial were made to bring cost down by increasing the volume to 130-140ml and by altering the recipe. However, market response remained unfavorable, and production of ready to drink juice was stopped in May 2005. Total production was about 3,800 packs (530 liters).

Photo 4.2 Ready to Drink Juice (100ml)

Photo 4.3 Training of Heat Sealing

b. Ready to drink juice 500/300 ml bottle

Based on the bitter lessons of the pouch juice, development of new product, ready to drink juice packed in PET bottle for the local market was carried out in December 2005. This action was initiated by the juice section leader without any support of the local consultant.

In the course of the product development, they faced such difficulties as the deformation of PET bottle by heat of pasteurized juice. But they could find out a countermeasure by themselves; to keep PET bottle in cool water bath when hot juice is poured. Another difficulty was outer carton boxes for delivering the products to local shops. It was impossible to order their own carton boxes as the minimum number of order required from the factories are too big. So, improvised measure of utilizing second-hand carton boxes was taken by reversing inner side of no printing to outer side. Packing materials such as PET bottles, labels were all prepared by themselves, without support of the local consultants.

c. Dilute to taste juice 1 liter jerry can

Recipe for "dilute to taste juice" was finalized in late February 2005 and test batch was prepared in March. After confirming the shelf life of more than two-month, small volume of product was prepared for test marketing in July 2005.

Photo 4.4 Dilute to taste juice

5) Dried fruit processing

Dried fruit was produced only once in March 2005 as a sample for marketing work to the potential customer. However, as the customer changed his mind to buy the product, the production of dried fruit has been temporary suspended.

Photo 4.5 Sample of Dried Fruits

Photo 4.6 Processing of Dried Fruits

(5) Marketing Result

1) Marketing result of Wine

Wine has reached to the maturation and first batch of commercial product was bottled in late May 2005. Product name was decided as "VINTA" by the members.

Photo 4.7 "VINTA" and "MODO"

Quality check of stocks conducted in September revealed that not all of the batches were at satisfactory level. Therefore, in addition to "VINTA", it was decided to launch a brand "MODO" for second grade product targeting to the local outlets.

Table 4.38 shows the sales result of wine products since the beginning of operation until May 2006. Total sales was 2.4 million shilling and VINTA account for 96% of the total. In terms of volume, 1,694 liters of wine were sold in total and VINTA account for 89% of the total.

Table 4.38 Wine Sales Result, Jan. 2005 – May 2006 (Summary)

Products	Produced		Sold	Sales value	Note
	Bottles	Liter	Bottles	Ush	
"MODE" wine	211	70	189	93,300	Average unit prices: 494 shs/btl
"VINTA" wine	1,601	565	1,505	2,300,200	Average unit prices: 1,524 shs/btl
Total	1,812	635	1,694	2,393,500	

Initially, marketing works were made to the local shops and bars but had little success. In July 2005, market sounding was carried out visiting the bars/hotels/shops in Jinja, Kampala and Mukono towns with samples. Resident adviser assisted this exercise.

However, NTFP could not continue further efforts to enter these markets and sales remained only

to the outlets near the project site.

Target price for VINTA wine was 1500-2000 Uhs/bottle, which was fairly high for the local clients. For the second grade MODO wine, target price was initially set at 700 - 800 Uhs/bottle; a little bit higher than the price of rival products in the local outlets. Therefore, it was decided to lower the selling price to the level of competing products (400 Uhs/bottle, same price with ROMI wine) to boost the sales of MODO wine after the Mid-term evaluation.

Photo 4.8 Wine at Supermarket (1)

Photo 4.9 Wine at Supermarket (2)

It is practically impossible for the small farmer's group, who are in the rural area far away from Kampla, to manage the daily works of deliveries and sales service to many outlets in Kampala. Therefore, it is considered that sales via the distributor, who already has established access and delivery system to various outlets, would be appropriate way to access to market including supermarkets. With the efforts of the local consultant, a distributor, Twaja Kukola Distributors who is the sales agent of Tilda Rice and Kinyara Sugar, was identified.

Business talk on VINTA wine with the distributor started on late January. Prices were discussed referring the retail prices of competing products such as Banapo (3,500 Ush/300ml) and Kingfisher (3,500 Ush/300ml). After the several negotiations, price for the first consignment was agreed at 1,500 shs /bottle. First order was in February 2006 and shipments started from March. Total of 1,200 bottles (408 liters) have been sold by end of April 2006.

Table 4.39 VINTA Wine Prices for Supermarkets in Kampala (unit: shilling)

	NTFP's selling price	Wholesale price	Retail price
Price setting for the 1st consignment	1,500	2,000	2,500 – 3,000

Table 4.40 shows the monthly sales of VINTA and MODO wine since the beginning of the operation.

Table 4.40 Wine Sales Result, Monthly Detail

Month	Number of bottles packed	Sales Result					
		"Vinta" wine		"Mode" wine		Total	
	Bottles	Bottles	Sales value	Bottles	Sales value	Bottles	Sales value
May	125	-		-		-	0
June	-	-		-		-	0
July	-	76	114,000	-		76	114,000
August	-	2	3,000	-		2	3,000
September	82	-		-		-	0
October	-	5	9,500	-		5	9,500
November	-	6	11,500	-		6	11,500
December	-	96	134,200	-		96	134,200
January	357	-		4	7,200	4	7,200
February	-	-		27	12,600	27	12,600
March	216	168	300,000	86	44,700	254	344,700
April	1032	1,152	1,728,000	72	28,800	1,224	1,756,800
Total	1,812	1,505	2,300,200	189	93,300	1,694	2,393,500

Bottle size 340ml. Stock at end of April 2006 is 60 bottles. About 60 bottles were used as sample.

2) Marketing result of Juice products

Table 4.41 shows the sales result of juice products since the beginning of operation until May 2006. As a solid market has not been identified, the total sales resulted in only 377,700 shilling.

Table 4.41 Juice Sales Result, Summary

Products	Produced	Sold	Sales value	Month of sales
	pcs	pcs	Ush	
Ready to drink juice				
100-140 ml pouch	3,788	3,232	231,400	March-April 2005
500 ml bottle (1)	n/a	22	11,000	March 2005, Sample sales
300 ml bottle	42	15	5,800	Jan 2006
500 ml bottle (2)	61	1	500	Jan 2006
Dilute to taste juice				
1 litter jerry can (1)	60	45	67,500	July 2005
1 litter jerry can (2)	61	38	61,500	Nov 2005-Jan 2006
Total			377,700	

As stated previously, first trial marketing for ready to drink juice (100-140ml pouch) was made in March and April 2005. Due to the market response was unfavorable, production was stopped

in May 2005. Total production was about 3,800 packs (530 liters).

In July 2005, market sounding for dilute taste juice was carried out in towns such as Mukono/Kampala together with wine. Same as wine, NTFP could not follow up the efforts of the market sounding.

In September 2005, there was a business inquiry for bulk supply of fresh juice from the juice processor in Kampala. The final offer from the juice processor was 1,250 Ush/liter for 12 jerry cans (about 240 liters) per week. It was not accepted by NTFP due to low price. NTFP intended to produce final products by themselves rather than producing semi-final products.

In parallel to wine product, business talk for "Dilute to taste juice" with the distributor in Kampala started in late January 2006. NTFP proposed 3,000 – 3,500shs for supermarket retail price for 1 liter jerry can at first meeting. This price is higher than other dilute to taste juices which contain artificial flavor/color such as Quencher (2000 Ush/liter) and Cheers (1500 Ush/liter). As NTFP's product is a natural juice, production cost is higher.

Current offered prices on cash on delivery basis from the distributor are as follows.

Table 4.42 Offered Prices for Supermarkets Sales in Kampala

Products		NTFP's selling price(Ush)	Wholesale price (Ush)	Retail price (Ush)
Dilute to taste juice	1 liter jerry can	2,000	2,500	3,000
Dilute to taste juice	2 liter jerry can	2,500	3,000	4,000

Offers were made in Feb. 2006

NTFP has been insisting 2,500 shs for 1 liter jerry can. This price is observed as not realistic because retail price will become 3500-4000 Ush, while competing products are 1500-2000 Ush on the shelf of supermarkets. In case NTFP keeps insisting their price, it is recommended to do trial sales on consignment basis.

Table 4.43 shows the monthly sales of juice products since the beginning of the operation.

Table 4.43 Juice Sales Result, Monthly Detail

Month	Products		Q'ty	unit price	Sales value	Note
			pack	shs/pack	Ush	
Jan. & Feb.			-		0	
March	Ready to drink	Pouch	1559	av. 72	111,900	
		500 ml bottle	22	500	11,000	sample sales
April	Ready to drink	Pouch	1673	av. 71	119,500	
May			-		0	
June			-		0	
July	Dilute to taste	1 liter jerry can	45	1500	67,500	sample sales
August			-		0	
September			-		0	
October			-		0	
Nov – Dec	Dilute to taste	1 liter jerry can	29	1500	43,500	
January	Ready to drink	300 ml bottle	15	av. 387	5,800	
		500 ml bottle	1	500	500	
	Dilute to taste	1 liter jerry can	9	2000	18,000	
Feb – May			-		0	
Total					377,700	

3) Marketing result of dried fruit

In the first business meeting with Fruit of the Nile on 23 March 2005, Fruits of the Nile once appreciated the quality of the sample and told that they could buy with the price of Ush4,000/kg on the condition of using plastic film supplied by them. However, no films were provided and they changed their mind to buy the product saying that they had too much supply at the moment.. No alternative buyers have identified yet.

4) Reasons for slow takeoff of the business

Unlike the processing of food crops such as rice milling and maize milling, start-up of the business on fruits processing requires time and efforts in the process of product development (namely, establishment of the original processing method) corresponding to the taste of target outlets and to the available resources.

Further, products are exposed to the severe competition with similar ones to penetrate into market.

(6) The Balance of Income and Expense

In the year 2005, sales remained very small but the expenses were required for the start up, recipe development, test/sample production and wine making. Profit/loss since the beginning of operation until end of April 2006 is shown in Table 4.44.

Income was about 2.8 million shillings from sales of the products. Packing materials (about 1.8 million shillings) account for the largest portion in the expenditure, followed by the cost for processing consumables (about 0.9 million shillings). Total of wages (including security) was about 1.1 million shilling. Including the value of end-stock, the account for this period is

barely break even.

Table 4.44 Income and Expenditure (January 2005 - April 2006)

Income	**2,776,200**
Sales of juice products	377,700
Sales of wine products	2,393,500
Sales of fried fruit	5,000
Expenses	**4,413,550**
Pineapple fruit	330,900
Processing wages and lunch	400,800
Admin wages and Supervisor wages	175,000
Security wage	500,000
Fuel and Electricity	89,500
Processing consumables	895,500
Packing materials	1,797,900
Office and Admin expenses	7,500
Others (license, bank charge, site cleaning, etc.)	216,450
Profit / Loss	**▲1,637,350**
End stock value (as of end-April 2006)	**1,620,000**
Wine 480 liters	1,620,000

4.5.3 Results of the Evaluation

(1) Relevance

The project is evaluated relevant from the following viewpoints:

1) Consistency with government policy

The purpose and contents of the project meet the government's current development policy such as PEAP, PMA, MAPS and the Rural Development Strategy that emphasize the importance of post-harvest processing of agricultural produce.

In this sense, the project has high relevance from the viewpoint of the government policy.

2) Appropriateness of the target group

Project site is located at Kangulumira sub-country in Kayunga district, nation's center of pineapple production. Target group was selected unanimously by the farmers' groups in Kangulumira as a representative group.

The members of the selected group have shown quite positive attitudes from the beginning and they have actively participated in the planning and implementation. In this line, the project purpose and activity contents have met their strong needs.

(2) Effectiveness

1) Effectiveness from the viewpoint of farmers' satisfaction

The results of the questionnaire survey conducted to the target group members asking if satisfied with the project showed 86% (12 out of 14 respondents) answers as yes. Table 4.44 shows the reasons for their satisfaction. "Developed our products" and "Pride of having processing facility" got the highest mark, followed by "Acquired knowledge / skill".

Table 4.45 Reasons for Satisfied with the Project

	Number	%
Developed our products	9	75%
Pride of having processing facility	9	75%
Acquired knowledge / skill	8	67%
Project activity empowered the NTFP (HQFA)	6	50%
Project provides job opportunity	5	42%
I can expect profit share later on.	4	33%
Management of the business is reliable / transparent.	3	12%
Others	0	0%

Note: Respondents were 12, and they marked all answers that apply

2) Effectiveness from the viewpoint of project purpose: Increase in family income

Since the nature of fruit processing business, larger efforts and higher skill/technology are required compared to the other pilot projects. Therefore, it requires a considerable period of time to achieve successful result. It seems rather difficult to evaluate the effectiveness of the project from the view point of income increase at this early stage of project implementation.

However, the effectiveness of farmers' wine business for profit making was confirmed during the limited project period. Therefore, it is assumed that the business will increase the members' income in a long run.

For other two processing items, juice and dried fruit, effectiveness for profit making was judged as follows.

- Compared to wine, juice has lower profit margin under current market condition. In general, consumers has not yet ready to pay more money for the 'natural' product. Therefore, 'natural' juice needs to compete with the artificial juice with less production cost. Profit margin is less but demand is very large in any place.
- Dried fruit has still very limited outlets. In case of domestic outlets, possible outlets are specific supermarkets/groceries where foreigners come. But many of such outlets are occupied by the products of other processors, after connected to exporters.

Thus, possible buyers of dried fruit are limited to the exporters such as Fruit of the Nile and AMFRI, who have their own production system using out-growers. A firm pre-agreement

on purchase is essential to enter into the production.

(3) Efficiency

Most inputs of the project on material aspect and human resources aspect are evaluated as appropriate in general. However, certain material inputs have not been well utilized as expected.

1) Material/Facility and equipment Input

a. Initial inputs

Most of the initial inputs are utilized to produce the target products.

Solar dryers have been used for the sample production of dried pineapple. However, due to lack of outlets for product, production of dried fruit has been temporary suspended.

Motorcycle cart was locally fabricated for pineapple collection and delivery of products to local outlets. Due to the carrying volume of juice/pineapple were limited, cart has not utilized yet. It is expected that it will be used soon due to launching the sales of wine.

2) Human resources Input

Before the start of operation, a number of trainings were conducted. These include ILO's SYB training to the members and processing trainings to the core members and employed workers were provided. In addition, a resident adviser has been dispatched by the Study team to support daily operation and accounting of the project.

According the result of questionnaire survey at the Mid-term evaluation, trainees evaluated the 5-days intensive processing training as good/fairly good.

Table 4.46 Trainee's Evaluation of the Processing Training

Items	Good (useful)	←	→	Bad (not useful)
Content (Juice making method)		3		
Content (Wine making method)	1	2		
Content (Sanitation/hygiene)	1	2		
Handout	1	2		
Schedule		2	1	
Trainer		3		

Numerical values indicate the number of answers.

(4) Impact

Following positive impacts have been observed. No remarkable negative impacts have been noticed.

- The Project is probably the first fruit processing business operated by farmer's group in Uganda and NTFP has received quite many visitors. In this line, the project has been playing already a role as a model.
  To arrange the visiting, district agriculture staff such as DAO and extension officer often come to the Project site and it is strengthening the linkage between the local governments.
  However, there were many sudden visits and it was often too much burden for the management to accommodate such visits.
- There was a proposal for joint implementation of Community Development program from NGO RTC （Reach The Children Uganda） to NTFP.Proposed idea was to make profit by producing and marketing sun-dried fruit and to generate the profit for the use of Community Development activities; mainly to look after orphans in the community. RTC proposed to provide solar dryers and marketing assistances. However, various points of the proposal such as management and ownership, etc. were not clear. Discussion between NTFP and RTC is still on-going.

1) Changes/Impacts caused in Farmers' group

Capacity building of technical aspect on making wine, juice, and dry fruit is confirmed during the project implementation period owing to training supports. Not only the aspect of making product but also the techniques related to management are confirmed such in book keeping work.

On the other hand, it is difficult to confirm the positive changes in their organizational capacity. As to the leadership, the chairman is still gaining respects from farmers as a leader, however, the capacity as a leader has not changed a lot as expected. It is because he had difficulties to exert his leadership roles, as he had to engage in marketing work which was the first experience for him. Members also had few chances to experience their own organizational works under the unique condition of the beginning phase of this project, which had to focus on training and marketing work.

However, after the beginning phase, wine and juice are now showing positive business prospects, which entail many more opportunities to demonstrate their own organizational work and capacity.

2) Changes/Impacts caused in rural society

Significant changes and impacts have not been occurred yet at the level of community. In the near future household will receive positive impacts derived from the project.

(5) Sustainability

1) Technical aspect

Fruit processing business requires the members to acquire more skill/knowledge compared to other pilot projects. Under such circumstances, members have been improving their processing skill/knowledge through the practical exercises and have developed the marketable products. Marketing capability also have been improving by the practical lessons in real business.

In the discussion of the Field evaluation for the Mid-term evaluation, the group members acknowledged that the trainings by the project had provided sufficient processing skills for them to continue production.

The Study team assessed their current skill/knowledge level as follows.

Table 4.47 Skill/Knowledge Level of Wine Group (Study Team's Assessment)

Process	Must preparation	Racking & clarification	Tasting & adjustment	Bottling	Quality control (general)	Costing
Mid-term evaluation	2	2	n/a	n/a	2	3
Final evaluation	2	1	2	1	1	3

Table 4.48 Skill/Knowledge Level of Juice Group (Study Team's Assessment)

Process	Squeezing juice	Standardization	Sterilization	Packing	Quality control (general)	Costing
Mid-term evaluation	1	2	2	2	2	3
Final evaluation	1	1	1	1	1	1

1 : sufficient, 2 : generally sufficient but need some improvement, 3 : not sufficient
n/a : Not applicable because the work has not yet done without assistances

It is evaluated that the processing staff have sufficient processing skills to continue production even after the end of the Study period. Current practices on record keeping of recipe and works made for each batch need to be improved a little more. Cost analysis on wine production needs to be improved, hopefully with the help of juice group.

2) Financial aspect

Financial sustainability of the project shows positive prospects.

Finding market is always a key issue for the success of business. However, it is practically quite a challenge for small farmer's group, who are in the rural area far away from Kampala, to find outlets without any supports. Therefore, Study team (local consultant) has identified the distributor to the supermarkets in Kampala for NTFP. As the result of these match-making,

wine sales to supermarkets has started. Sales of stock have eased the shortage of working capital.

According to the questionnaire result, 12 out of 14 respondents answered that they could contribute additional capital to their business (see table 4.49). Many respondents answered that it was possible to contribute up to 200,000 shillings (see table 4.50).

Table 4.49 Members' Opinion on Providing Additional Fund

		Number	%
A:	Yes	12	86%
B:	No	1	8%
C:	No idea	1	8%

Question : Can you contribute additional fund to the business, if necessary?

Table 4.50 Possible amount of Additional Fund

		Number	%
A:	Less Ush100,000	7	58%
B:	Ush100,000 to 200,000	4	33%
C:	Ush200,000 to 300,000	0	0%
D:	Over Ush300,000	1	8%

Question : How much can you contribute? (If above answer is A)

3) Organizational aspect

a. Ownership and self-sustaining attitude

In the discussion of the Mid-term Evaluation, the group members acknowledged that they had an attitude to wait Study team's guidance due to lack of understanding on project ownership.

This passive attitude has changed to more positive one in view of the followings;.

- The development of new juice product was carried out with their own initiative without any support of the local consultant in December 2006.
- Key member expressed his opinion that "Fruit processing business is sophisticated and it requires to tackle actively with patience. Although the business has not yet taken off, I think that there is potential to make larger profit than other pilot project", in the workshop in January 2006.

The first wine sales to supermarkets via the distributor was achieved. This success surely have raised the motivation of the members. Moreover, continuous success in sales will strengthen their self-confidence and then self-sustaining attitude.

b. Consensus on juice business

Although the juice business is at a standstill, the leadership expressed their continued commitments to juice business in the pre-meeting for the final evaluation.

The results of the questionnaire survey conducted to all members showed that 10 out of 14 respondents were willing to continue juice making (see table 4.51). These results corroborate the opinion of the leadership.

Table 4.51 Members' Opinions on Continuing the Juice Production

		Number	%
A:	Yes, we shall continue it.	10	71%
B:	No, we had better stop it.	1	7%
C:	No idea, Difficult to judge	3	21%

Question: Do you think that NTFP shall continue producing juice?

c. Capability to manage the business and organization

Technical aspect:

Accounting and record keeping have been carried out by two supervisors. It is observed that their capacity is sufficient.

Transparency:

As NTFP is a small group of 14 members, formed by the members of High Quality Farmers Association (HQFA), they know and trust each other very well and have quite strong relationship.

Leadership:

It is observed that leaders are influential / instrumental in the group and have played important roles in decision making. Regarding the organizational management their capability are judged as well sufficient, but for business management, more flexible way of thinking seems to be acquired.

4.5.4 Lessons Learnt

(1) Organization

1) Selection of target group

Wine product was important item for the project because of its high profit rate and the target group members agreed to undertake wine making at the time of group selection. However, after several months, some members opposing to wine production based on their religious belief decided to leave the project and it made the target group to recruit new members and changed the

structure of operation unit.

These problems relating to the religious issues should carefully be assessed and analyzed in advance. Not only the religious issues but also the indigenous social issues in the project area and in target group have to be studied and solutions/countermeasures for predictable problems should be prepared in the stage of planning.

Group of small membership was intentionally selected in the pilot project due to;

- Small scale of the processing, i.e. necessary volume of fruit was limited.[8]
- Wine and juice as non-essential grocery items. There are many competing products, and quick response to market needs/changes is required in the business. Generally it is easier for smaller group to make decisions, and quick actions.

2) Setting up organizational structure

NTFP has acquired the status of partnership entity since the membership was less than the minimum requirement of 30 members for co-operative society. Partnership agreement and internal rules need to be formulated for the registration. The supports on registration are necessary and should be considered in the planning.

Working groups were organized for each product with fixed staff members as the necessary processing knowledge/skills vary by the product. This method is judged to be effective for quick learning of processing skills/knowledge, as responsible person(s) will be definite and the quality/taste of products could be maintained.

A successful farmer in the area is not necessarily a good business leader with rich entrepreneurship. Capability of the leader affects the performance of business greatly, but it is difficult to discern the capability/character in the stage of organization selection. It is desirable to provide training to the leader in the initial stage of operation, and supplemental training afterwards.

Fruits processing was a new and unknown subject for the farmers. Prior to the detail planning members were given opportunity to visit small-scale wine processing and juice processing business. However it was not enough for them to initiate business and continued support for business planning was indispensable.

(2) Operation and management matters

1) Technical support

[8] Planting density of pineapple is 7000 to 9000 trees/acre. But necessary volume of pineapple fruit for processing in the initial stage was assumed only about 30pcs.

Generally start-up of the fruit processing business requires a considerable time in developing product (i.e. establishment of original recipe, processing method and packages), corresponding to the taste preferred in target market, competing products in the area and to the available resources. Considering this nature of the business, it is necessary to provide intensive and persevering supports.

It is also important to have a success or a feeling of achievement, even small, in the early stage to maintain and increase the farmers' motivations.

2) Marketing support for the farmers

It was observed that marketing of products was more difficult than the production.

As market in the rural area is limited, development of market channels in big towns such as Kampala is essential. However, farmers do not have information/human network to reach to potential customers. And it is practically difficult to hire a person for marketing work in the initial stage due to limited fund.

Therefore, Study team provided the match-making support targeting the supermarkets. A support for identifying and match-making with potential customers is indispensable.

3) Selection of products

There are many fruit processed products other than juice, wine, and dried fruit. To determine suitable products for the pilot project, marketability and required level of processing technology were examined. Marketability of the selected products are as follows;

a. Juice

In Uganda, consumers are not yet ready to pay more money for natural/healthy food especially in the local/rural area, and real fruit juice faces the competitions with cheaper juice products made of artificial sweetener /flavor /color.

Efforts to lower the production costs (produce large volume in cost effective way) is always required. It should be considered to shift the focus on the "Dilute to taste juice" (product of higher value) from on the "Ready to drink juice".

b. Wine

Wine market is generally good. There are always some lower quality wine produced but can be sold in the rural market. Rural markets prefer the cheap products, and the price should be set at similar level to the competing products. As for the first grade (good) products, sales in Kampala outlets has started with a little lower price than the competing products (3000 Ush/bottle), and high profit rate has been achieved.

e. Dried fruit

Domestic demands are few, and direct customers will be the exporters. It is important to assure the sales before starting production, if possible in documents.

Considering the limited capital and human resources in farmers' business, it is better to concentrate the efforts on one product in the beginning. It should be remembered that profit rate of juice products is not so high.

4) Wage

Expenses on wages can be reduced by adopting daily/hourly payment to all staff. Most of staff are farmers and they have their farming works to do. It is not necessary or practical to force them to work solely for the project.

(3) Facility and Machinery matters

1) Equipment

a. Packaging materials

Outer cartons and crates boxes are necessary for delivery of products. These items are not available in the shops and need to be order to the factories. The factories do not accept small orders. Therefore, improvised measure of using second-hand carton boxes was adopted by reversing inner side of no printing to outer side.

Thus, ideas and efforts were necessary to utilize available materials. Availability of packaging materials such as bottles and pouches are limited in type/size/quality in Uganda, and it takes time to procure. In the process of the product development, it is very important to explore and confirm the sources, stocks and ways of procurement of packaging materials.

b. Processing tools

Many of the tools for the fruit processing are kitchen tools and available in the markets. Measuring instruments such as digital scale and thermometer are available in scientific equipment dealers in Kampala. Specific tools and consumables for wine making are available at only one shop in Kampala. Once the stock is sold-out it takes time to have next stock. It is advisable to check the stock of consumables regularly and to buy them in advance. Work tables and fruit press can be manufactured in the workshops in Kampala, but difficult to make by themselves.

Following items are recommended for fruit processing project. As most of them are imported items, but are useful for quality control.

- Refractmeter: This is not very expensive (about USD125), but not yet popular even in the private fruit processors. It is indispensable for cost and quality control. Very easy to use and no consumables are required.

- Wine filter kit: NTFP members often failed to perfectly separate the sediment in tanks from wine with a plastic tube, and small amount of sediment often remained in the final products. This difficulty of clarifying wine was solved by introducing a filter kit. Since the consumable (filter pad) is imported, unstable supply was feared and the idea of using this filter kit had been abandoned once in the initial stage. Fortunately, so far there is no problem in the supply of filter pad.

2) Facility and utility

Consideration on hygiene issues is indispensable for the fruit processing. In concrete, for processing room in which water is used tiled floor, tiled wall in lower part, drainage, and ceiling must be installed. From the experiences in the pilot project, some recommendations on design and specifications are indicated;

- Cooking space should be inside of the facility with efficient exhaust of heat/smoke. Large opening window on the walls with flip open type cover may be better than the fume food plus chimney to enhance the natural ventilation (exhaust).
- Since the facility equip the rain gutters to collect water, scar cement around the building can be changed from concrete slab to gravels or grasses to cut costs, although it is not popular in Uganda.
- Perforated concrete blocks for natural ventilation should be reduced as much as possible and wire nets should be installed to prevent small lizard and insects entering.

Water of drinkable quality is essential for fruits processing. The roof with catchments facility plus filter system can supply sufficient volume/quality of water.

In case plastic pouch is used for packaging, a heat sealer and electric power supply are needed. If only bottles are used, power supply is not necessarily required.

(4) Finance and Sustainability matters

1) Effectiveness of fruit processing for increased income

Income and expense in the project period (17 months after starting operation) was almost equal including end-stock value, and the business have not made definite profits as yet. However, it was convinced that the farmers' group could produce marketable products and profits could be gained if appropriate supports are provided. Large demand and profit rate of wine products has also been confirmed as expected.

2) Fund requirement

Many of the members of NTFP are large scale pineapple growers in Uganda, and they are comparatively rich. In response to the questionnaire survey, many of them answered that they could contribute additional capital.

However, the case of NTFP is somewhat special. In general, it is assumed that the needs for fund for working capital are high, because the products development needs time and money for some period.

3) Reduction of initial input capital

Due to hygiene issues related to fruit processing facility, a large reduction of construction costs by changing the specification and design of the facility is basically difficult.

Construction cost varies depending on the procurement methods and who pay for the construction. Lump-sum contract system on turn-key basis was used for the pilot project. However, it should be considered to reduce costs by using other methods such as labor contract system or provision of labors by the beneficiary group.

(5) Training

1) OJT for processing skill/knowledge

Intensive training was provided in the beginning of the operation, and then OJT was conducted aiming at the improvement of the skills in the real processing work. OJT was planned to be provided by a resident adviser, but be could not provide sufficient OJT due to his limited skill and knowledge in fruit processing.

It was impossible to recruit a specialist in fruits processing (or graduate who has background in fruit processing) in the remote village for long period. Therefore, it is practical to provide OJT in a mode of periodical visits by a fruits processor expert in the private sector.

Training schedule as well as budget needs some flexibility in amount and effective period of use.

4.6 Overall Evaluation of the Pilot Projects

Through the implementation of the pilot project, it was confirmed that the collective agro-processing and marketing by farmers' organization is feasible and effective by increasing benefit to member farmers, including higher selling price and others. However, it was noted that there exist issues to be tacked for their sustainability.

These are summarized as follows;

(1) Issues on organizing farmers group for collective marketing

Advantages of farmers' group/ organization include the realization of merit of the economy of

scale by collective actions such bulk purchases, bulk marketing and sharing information. To realize the merits, member farmers are definitely required to take collective actions towards the common objectives. In general, though most of the farmers understand these conceptually, they often do not follow the decision on collective actions, partly due to their limited trust in and sense of belonging on the organization. On the part of the organization, for smooth and efficient operation, implementation in line with the established plan and quick decision, all of these require the commitment of member farmers.

Advantage of collective agro-processing and marketing is the increased selling price of the products through collecting optimum lot and improving the quality. Basically, farmers know the merit but it requires significant effort to realize their active participation in collective marketing. As mentioned above, this might be due to limited trust in and sense of belonging to the organization of member farmers. Therefore, in addition to increase better understanding by the enlightenment effort on the cause of the project, it seems to be important to realize substantive economic benefit to member farmers as early as possible. At the same time farmers organization which implements agro-processing and marketing activities are required to respond assuredly to the customers needs on quality, quantity and the time of delivery with quick decision. Further, member farmers need to be assured on information related to the management of the business activities of the organization.

(2) Current situation of the farmers' organization

Most of the farmers' organizations in Uganda fall under the following categories;

National:

- Cooperative Unions. Formed in the 1960's to market Uganda's cash crops. eg. Busogo Growers Cooperative Union.
- National Associations. Formed to support a specific commodity. eg Uganda Bee Keepers Association.
- Uganda National Farmers Federation.

Local:

- Community Based Organizations. CBO's formed mainly as a response to Government policy for farmers to associate to ease the provision of Government services and the work of NGO's. Mainly registered at Sub-County level.
- Primary Cooperatives and Area Marketing Enterprises at Sub-County level. These were also mainly formed due to a drive by UCA to revitalize cooperatives.
- Farmers organizations formed under the NAADS program.
- District Farmers Associations under UNFF.

1) Major issues to be addressed

The farmers' organizations for this project fall under categories 4, 5 and 7. Many of these groups were formed opportunistically in the hope of accessing assistance from the government, donors or NGO's. The fact that these organizations were not spontaneously formed by farmers as a vehicle for collective action in order to overcome the limitations of individual effort means that they were weak without strong internal mechanisms for management and operation or coherent strategy on action to uplift the standard of living of their members.

This posed a big challenge for this program whose basic approach is collective action by existing farmers' organization.

Following key issues need to be addressed.

i) Creating strong leadership and internal democracy.
ii) Designing and implementing an effective internal decision making system and communication system for members to be informed of decisions made, what is going on and as well as feed back from members to the management. Organizing regular planning and management meetings.
iii) Formulating a clear strategy that is well understood by members to improve on their household income.
iv) Developing management capacity of the leadership to effectively supervise and control the activities of the organization.
v) Cultivating a strong sense of ownership by the members to improve on attendance of organization meetings and activities, accepting assignments and handling them responsibly.
vi) Fully understanding the advantages of collective action so that members consider the common goal before personal interest and change their attitude to decision making.
vii) Registering as an entity that can legally engage in commercial activities.

2) General Meeting and Executive Board

One of the key management tools is the General meeting in which all members of the organization are expected to participate, for strategic decision making including the election of Executive Board Members. From the Executive Board a Manager to oversee operations and cashier to handle money have been chosen for day to day operations. This system has faced the problem of irregular meetings of the Executive Board as well as poor attendance of general meetings due to poor mobilization and members complacency to attend. This has left management decisions in the hands of a few individuals resulting in dissatisfaction among the members due to limited information flow.

3) Human resources development within the organization

In implementation of collective post-harvest processing and marketing by farmers' organizations, such personnel within the organization are essential who have the basic capacity on clerical works, operation and maintenance of machine and equipment, quality control of the products and marketing. As it is extremely difficult to find these personnel in the rural area, training and recruiting of such personnel should be considered in advance to the project implementation.

4) Outsourcing staff for operation and management

Though management is invariably in the hands of Executive Board members, staff have been recruited mainly as machine operators and casual workers. In one case a bookkeeper has been employed. The capacity of the Executive Board members has been improved through experience and OJT mainly in the areas of bookkeeping, record keeping and operations. However development of analytical skills to make decisions that improve business efficiency for profit assurance is still deficient.

5) Processing and Marketing Operation Plan

The capacity by management to formulate and implement processing and marketing operation plans that result in operation efficiency was quite limited at the initial stage of the project. One of the successes has been the recognition by management of Zirobwe Rice Mill and Nakasongola Cassava Project of the importance of matching processing operations to raw material availability and supply as well as market demand to efficiently utilize installed capacity and manpower. These two projects have now adopted operation systems that are more efficient and result in lower costs per unit output.

(3) Agro-processing Technology and Physical Facilities

Agro-processed products and its processing methods are diverse. In the pilot project, taking into consideration of the limited time, fund, and human resources available, particular products/methods were selected in implementation. As for the level of processing technology, readily available one in Uganda with high prospect of adaptation to farmers was given priority as a basis of selection. Demand/marketability for these products was another basis of selection of the kinds of products. Continued efforts to improve the processing methods were required in the course of project implementation, from the viewpoint of efficiency and marketability.

As a future subject, development of new products and introduction/improvement of processing facility/equipment; such as introduction of de-stoner for rice milling, developments of products substituting import wheat flour with cassava flour etc., are important.

However, such development/introduction is often difficult to tackle for each project (farmers business). Therefore, research institutes such as NARO and Makerere University as well as NGOs are expected to carry out this task. Futher, formation of information network, which links the projects to these research bodies/NGOs, needs to be created.

(4) Financial Issues

1) Fund for Physical Investment

For post harvest processing and marketing the initial investment in buildings, machinery and equipment can be fairly high and often beyond the means of farmers or farmers groups. The lack of strong farmers groups also means a low capacity for collective resource mobilization. It is therefore difficult to expect the farmers to finance all the physical investments by themselves, and this will call for the support by the Government and/or development partners.

2) Mobilization of Fund for Operational Cost

While recognizing the limitation of farmers to finance the physical infrastructure for a processing facility, it is essential that a strong feeling of ownership is developed among the members of the organization. To achieve this some contribution by the farmers organization must be made in areas like provision of building materials, voluntary construction labor or operating capital. Mobilization of this fund by farmers can be expected as a big challenge for the project.

3) Payment for raw materials

So far in these projects, collective marketing has consisted of members supplying their produce as raw material to the processing facility and being paid on COD (cash on delivery) basis. This means that the organization takes up the role of bulking the produce and marketing it. The related finance costs can be very significant because of high interest rates.

Further to this, as seen in many cases once the project is implemented at one price the farmers expect this artificially fixed price for their produce irrespective of the seasonal price fluctuation in the market. This imposes an extra burden of price risk on the organization.

In order to overcome this problem, there is a need to develop the trust of the members so that they can accept deferred payment. This will relieve the heavy burden of loan interest COD. Those requiring immediate cash may be asked to take up the related finance cost.

To ensure stable supply of raw materials, it would better be considered to estimate the expected amount of supply from individual farmers at the stage of planting, and to make a provisional contract between farmers and organization on the quantity and timing of supply of raw materials.

(5) Economic Performance

The financial performance of the projects is still relatively poor for the following reasons;

- Seasonality of agricultural production and general low production in the year resulted in limited and intermittent supply of raw material and hence low capacity utilization of the facility with related high costs.
- Failure of management to initially react to the raw material supply situation. There was a need to limit operation to days when available raw material quantity would result in efficient operation of the machine.
- Introduction of new products on the market takes time to develop distribution channels and promote the products.
- Introduced products are at a premium price because of improved quality in the generally price sensitive market. However, it needs longer time to penetrate the market.
- The level of business is still too low to support aggressive product promotion. Therefore, there is a need to rely on product quality and word of mouth to market the products.
- The location of the projects is in the rural area geographically remote from the main markets in the major towns and cities. The project beneficiaries are also not used to the hustle and bustle of city life and may not be comfortable to spend the time necessary to be fully involved in servicing the markets from delivery, distribution, debt collection etc. A solution to this has been to identify a distributor to partially take up this role and also provide the necessary storage.

CHAPTER 5 DEVELOPMENT PLAN

5.1 Basic Concept of the Development Plan

Agro-processing and Marketing is one of the seven pillars of the Plan for Modernization of Agriculture (PMA) with its overall objective of increasing the ability of the poor to increase their incomes, as embedded in the Poverty Eradication Action Plan (PEAP).
Marketing and Agro-processing Strategy being prepared by Sub-committee of PMA emphasizes the collective agro-processing and marketing by farmers' organization as one of the priority areas to be focused for the improvement of agro-processing and marketing.

It is now urgently required that farmers/ farmers' organization should actively be involved in collective post-harvest processing and marketing of their produce. However, as most of the small farmers have limited access to the resources to initiate these collective activities, supports by the government are essential both in technical and financial aspects.
Therefore, this Development Plan proposes the implementation of the program considered to be feasible within the framework of the development policy.
Logical frame of the Development Plan with the comprehensive policy framework and development strategy of Uganda is shown in the chart.

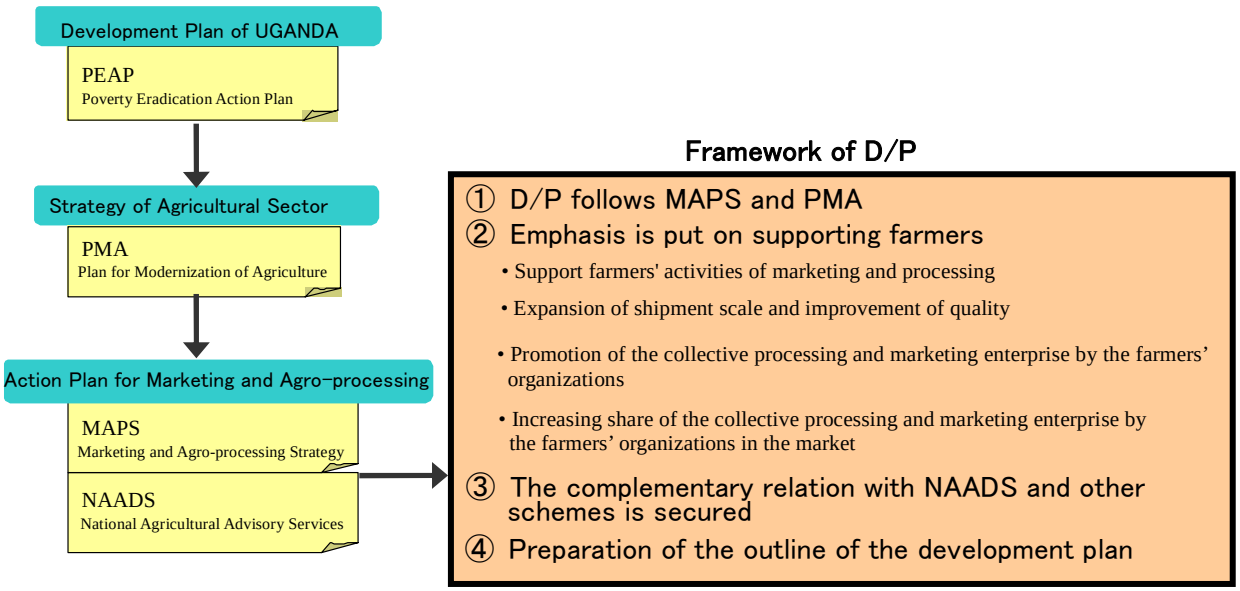


Figure 5.1 Development Policy of Uganda and Basic Concepts of D/P

5.2 Basic Approach of the Development Plan

5.2.1 Promotion of Collective Post-harvest Processing and Marketing by Farmers' Organization

Major focus is placed on the promotion of collective actions by farmers' organization, aiming at increasing farmers' incomes, as emphasized in PEAP and PMA.

The issues related to improvement of post-harvest processing and marketing are wide ranging and involves many stakeholders. In the distribution of commodities, from the producers/ farmers to the final consumers, there exist various intermediaries such as collectors, wholesalers, retailers and forming various channels variation of commodity.

As small-scale farming is dominant in Uganda, they usually grow many kinds of products with small amount, and have limited individual supply capacity to market. To increase incomes of these farmers, they need to strengthen bargaining power, through delivery of the optimum lot of commodity with improved quality and value addition required by the customer/market.

This can not be done by small-scale farmers individually and thus the collective actions by farmers' organization are called for. Farmers thus need to establish organization to tackle these venture by their own initiatives.

To encourage and strengthen the farmers' organization is a priority area to be addressed for achieving efficient operation of the collective processing and marketing. To realize this, it is important to enhance the trust and the sense of ownership of member farmers to the organization, together with the transparency and free access to information related to the management of the organization.

Collective processing and marketing enables to increase incomes of member farmers through higher prices, but it requires assured delivery of the produce/materials according to the planned schedule of delivery/processing by member farmers. Payment to member farmers are not by COD(cash on delivery) and made later after as it takes some time for finalizing the sales contract. This may hinder the smooth delivery of the materials by member farmers as they often need cash immediately. To avoid these problems, the farmers' organization may procure short-term fund, incurring the interest to farmers who wish COD payment.

5.2.2 Commodity Based Approach/ Target Districts for Identified Commodities

It is true that almost all farmers grow various crops or raise animals without concentrating on any specific commodity. However, in the market economy, farmers who supply the produce need to respond to the needs of market. The requirements of market differ by commodity, thus the

measures need to be taken in line with the market demand. Therefore, as a practical way, the concentrated action on specific commodity was selected. Their experience obtained will be introduced to other commodities for improved agro-processing and marketing further.

Five (5) commodities are taken up as target commodities, particularly in consideration of the pilot projects, implemented under the Study.

Target districts related to the identified commodity (commodity group) follow the categorization of the Study area as discussed earlier.
Target commodities and districts in the Study area are summarized in the table below.

Table 5.1 Categorization of the Study Area

Category	Commodity	District
I	Maize, Beans, Soybean	Bugiri, Mayuge, Iganaga, Kamuli Jinja, Kiboga
II	Rice	Bugiri, Iganga, Kamuli, Luwero
III	Cassava (flour)	Iganga, Kamuli, Mayuge, Kiboga Luwero, Nakasongola
IV	Fruits	Kayunga, Mukono, Wakiso, Luwero Mpigi, Mubende
V	Livestock (milk)	Kiboga, Luwero, Mpigi, Mubende Nakasongola

5.3 Target of the Development Plan

Based on a series of assumptions, short, medium and long-term goals are tentatively prepared.
The major goals are the increased share of collective post-harvest processing and marketing by farmers' organizations for selected commodities
Expected increase in income will also constitute the goals of the plan.
Thus, the goals of the development plan are set as;

i) To increase the share of the collective marketing by farmers' group
ii) To increase in farmer's income through improved marketing

Following are the summary of the exercises of setting goals for these short (2007), medium (2012) and long-term basis on selected commodities.

5.3.1 Projection of Production and Market Supply

Projection of future demand supply on commodity basis is in itself important and challenging exercises.

Although production projection of any commodity requires consideration of various factors, in this exercise production was simply estimated with annual growth rate of 3-5%, depending on the commodity. Market supply was estimated using fixed rate for each commodity, as explained in the remarks.

Table 5.2 Production and Market Supply

Commodities	生産量 (ton) *, **				総流通量 (ton)			
	Base-year 1998-2000	2007	2012	2017	Base-year 1998-2000	2007	2012	2017
Maize*	228,334	264,702	306,862	355,737	125,584	145,586	168,774	195,655
	1,166,394	*1,352,170*	*1,567,536*	*1,818,204*	*641,517*	*743,694*	*862,145*	*999,462*
Rice**	11,594	14,797	18,885	24,103	8,116	10,358	13,220	16,872
	105,318	*134,415*	*171,552*	*218,949*	*73,723*	*94,091*	*120,086*	*153,264*
Cassava*	1,175,164	1,499,840	1,914,218	2,443,082	587,582	749,920	957,109	1,221,541
	5,210,667	*6,650,278*	*8,487,627*	*10,832,602*	*2,605,334*	*3,325,139*	*4,243,814*	*5,416,301*
Fruits ** Pineapple	17,250	22,016	28,098	35,862	14,663	18,713	23,884	30,482
	28,500	*36,374*	*46,423*	*59,249*	*24,225*	*30,918*	*39,460*	*50,362*
Papaya**	12,200	15,571	19,873	25,363	10,370	13,235	16,892	21,558
	19,000	*24,249*	*30,949*	*39,500*	*16,150*	*20,612*	*26,307*	*33,575*
Citrus**	5,700	7,275	9,285	11,850	4,845	6,184	7,892	10,072
	15,840	*20,216*	*25,802*	*32,930*	*13,464*	*17,184*	*21,931*	*27,991*
Mango**	4,100	5,233	6,678	8,524	3,845	4,448	5,677	7,245
	21,800	*27,823*	*35,510*	*45,321*	*18,530*	*23,649*	*31,138*	*38,523*
Milk* (mil.litre)	189	219	254	294	95	110	127	147
	800	*1,021*	*1,303*	*1,663*	*400*	*511*	*652*	*832*

Remarks :1) Commodity with * are assumed annual growth at 3%, ** are assumed at 5%
2) Ratio of market supply to production is assumed as; Maize: 55%, Rice: 70%, Cassava: 50%, Fruits: 85%, Milk: 50%
3) Figures show that of the Study area while Italics show that of the national total.

5.3.2 Increase in Market Share of Collective Marketing

Market supply will depend not only upon production but also upon demand, either of the domestic or export market. The methods taken here simply use the fixed rate to the production for each commodity.

Table 5.3 Supply of Commodities and Target Share of Collective Marketing

(Unit:ton)

Commodity		Base-year 1998-2000	**2007**	**2012**	**2017**
			10%	**20%**	**30%**
Maize	Supply	125,584	145,586	168,774	195,655
	Collective Marketing		14,559	33,755	58,262
Rice	Supply	8,116	10,358	13,210	16,872
	Collective Marketing		1,036	2,642	5,062
Cassava	Supply	587,582	681,169	789,661	915,434
	Collective Marketing		68,117	157,932	274,630
Fruits (pineapple)	Supply	14,663	18,713	23,884	30,487
	Collective Marketing		1,871	4,777	9,146
Milk	Supply	95	110	127	294
	Collective Marketing		11	25	118

As shown in the table, gradual increase in share of collective marketing is planned, 10% in 2007, 20% in 2012 and 30% in 2017. By increasing the share collective marketing, in addition to increased income, farmers will have strengthened bargaining power in commodity markets.

5.4 Model Project

5.4.1 Outline of Project

To realize the above, comprehensive efforts will be required. To encourage and promote collective agro-processing and marketing by farmers' organizations extensively, implementation of the model projects in the Study area is proposed.

Program consists of a number of the model projects to be spread all over the Study area, with commodity-based approach in respective district.

The model projects are, in principle, to be owned and operated by the farmers' group.

Model projects will be planned and implemented in each district for the identified commodities, by commodity-based approach with support by the government on the capacity building and initial investment.

Additionally, private sector's involvement/investment in post-harvest processing and marketing should be encouraged wherever as appropriate.

Model projects will be selected among those identified commodity groups for each district, reflecting the request of the beneficiaries.

(*Tentative list of the model projects is deprived from the preliminary study as follows)*

Bugiri	Maize/beans/soybean, Rice
Iganga	Maize/beans/soybean, Rice, Cassava
Jinja	Maize/beans/soybean
Kamuli	Maize/beans/soybean, Cassava, Rice
Kayunga	Fruits
Kiboga	Maize/beans/soybean, Cassava, Milk
Luwero	Rice, Cassava, Fruits, Milk
Mayuge	Maize/beans/soybean, Cassava
Mpigi	Fruits, Milk
Mubende	Fruits, Milk
Mukono	Fruits
Nakasongola	Cassava, Milk
Wakiso	Fruits

In total, 27 projects are considered as the tentative number of model projects, though these are subject to the response/reaction from the farmers' group.

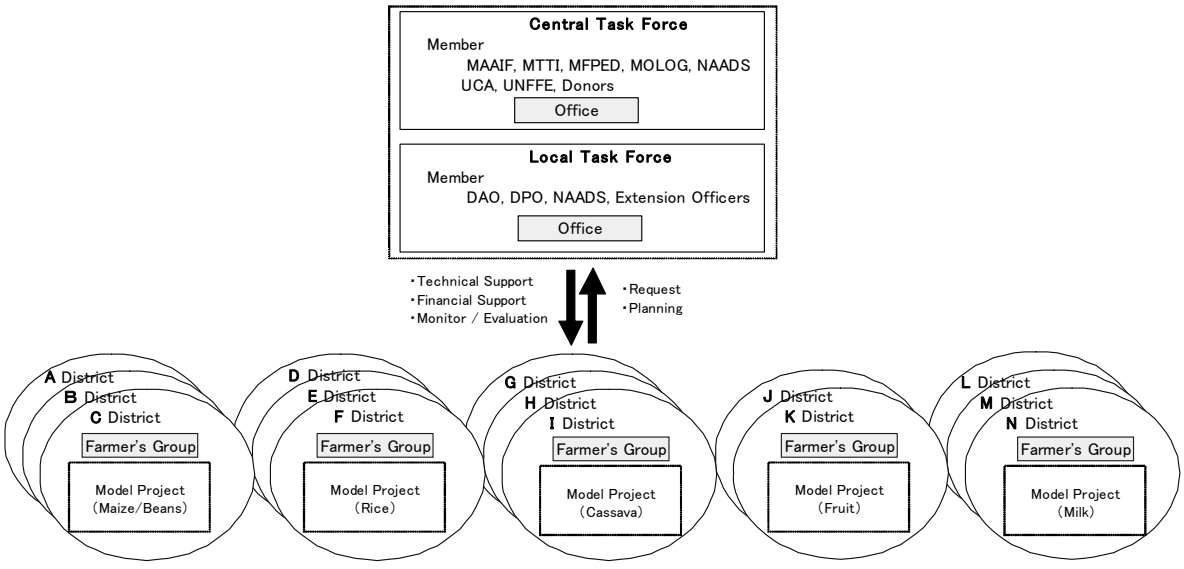


Figure 5.2 Outline of Model Project

5.4.1.1 Types of the Model Projects

Type of the Model Project is expected as follows.

(1) The objectives of the enterprise

The model projects will be formulated, owned and managed by farmers' organizations, specializing in collection, processing and marketing business on specific commodity.

The business aims at increasing incomes of member farmers through the following activities.

- increased sales volume by bulking
- improved quality of the product
- value addition by processing
- increased bargaining power
- increased access to market and clients
- increased awareness on importance of market information

(2) Type of the enterprise

Type of the enterprise includes cooperatives and others with legal entity as follows..

However, as many farmers' organizations lack the business expertise on agro-processing and marketing, participation of the private sector such as traders, processors/exporters, NGOs and other development partners who have expertise and interest on the project would better be invited whenever as appropriate.

- Farmers organizations

  Organizations with legal entity such as primary cooperative society, area cooperative enterprise, farmers association or the companies owned by farmers/ farmers groups

- Joint venture of farmers organization and private company

  Existing farmers' organization and a company establish a new company for the project. Expertise and fund of the private sector will be expected.

- Establishment of the linkage with particular company

  Based on the long-term contract with particular company specialized in processing and export, farmers' organization will supply raw material as well as primary and secondary processed materials.

Introduction of the small scale agro-processing enterprises

Agro-processing enterprises by farmers' organizations are rather limited in Uganda.
Following are the cases of collective marketing on maize, cassava and fruits (pineapple).

Case 1

Name of Organization	Nakisenhe Adult Literacy Group (NALG) / Iganga
Members	850 in Iganga, Kamuli, Bugiri and Mayuge districts（60% are female）
Activities	Collective maize marketing. As a part of the activities of NALG established in 1993, collective maize marketing was conducted. Performance in 2003 was 1,367 tons of maize.

	Members deliver maize to 16 designated warehouse located in Iganga, Kamuli, Bugiri,and Mayuge districts. Receipts are issued to members here after quality inspection. NALG sold those maize meeting required standard to WFP and remaining to local flour mills. NALG takes 10% commission
Support	Supported by Investment in Developing Export Agriculture (IDEA)

Case 2

Name of organization	Bugiri Commercial Farmers Association /Bugiri
Members	45 (male 30, female 15) as of Oct.2003
Activities	Collective maize and cassava marketing by member farmers of Nawanduku and Buteebe villages. Products are collected and stored in the warehouse borrowed in Bugiri town. Maize was sold to WFP and Cassava was sold to traders and schools nearby. Performance in 2003 was, 200 tons of maize and 10 tons of cassava
Support	Investment in Developing Export Agric and SG-2000

Case 3

Name of Organization	Isegero Farmers Group
Members	40 farmers
Activities	Collective maize marketing. Group was said to have been organized by the call of extension officer. Performance in 2002 was 320tons of maize, all sold to WFP.
Support	Investment in Developing Export Agriculture (IDEA) and SG-2000

Case 4

Name of Organization	High Quality Farmer's Association
Members	15 farmers
Activities	Collective marketing of fresh pineapple. The group was organized in 2003, by relatively large-scale pineapple growing farmers. Performance in 2003 was 40 tons. Since then the marketing activities are suspended.

In addition to the above, apart from the farmers' organizations, 123 small scale enterprises are registered to Uganda Small Scale Industry Association (USSIA), dealing with foods and beverages in the Study area.
Commodities dealt and the concerned enterprises are roughly as follows;

Bakery	11
Coffee mill	12
Feeds	2
Honey	2
Dried fruits	1
Maize flour	26
Sugar	2
Tea pack	1
Brewery(sprit)	1
Fruit wine	4
Snack	2
Others	59
Total	123

5.4.1.2 Business Model/ Commodity Specific Plan

The scale and contents of the model projects need to be considered based on the actual situation of the said project. However, as a reference for planning exercise of the model projects, presentation of the prototype for the projects will be useful.
Based on the experience and lessons learnt from the pilot projects implementation, prototype business model for 5 commodities are shown below.

(1) Maize and Beans

1) Basic approach of collective marketing

In general, maize grain quality is not seriously considered in ordinary marketing channel. Only such specific buyers as WFP and UGT set a premium price far high quality maize based on the specification. In these cases, delivery by bulking is required in addition to the quality specification. UGT requires 10tons per lot and WFP 50tons per lot for each contract. Collective marketing of maize should aim to enter into such contract with quality and quantity.

One of the value additions of maize is to process maize to Posho, one of the stable foods in Uganda. There exist a lot of maize millers in cities/towns and marketing routes of raw materials and of Posho are well established, including a numbers of maize mills in villages. Therefore it is very difficult for farmers' group to enter into such business of maize. The direction of collective marketing of maize should focus to such premium market by delivering quality and quantity by bulking.

Though bean-processing factories in Kampala such as soybean flouring after roasting for baby foods exist, the market size is rather small. Normally beans are consumed as a side dish just after boiled. So the collective marketing of beans should also address bulking sales to preferred markets by quality control.

Returns by bulking activity focused on WFP or UGT are not high due to limited value additions. So the target location of this project site should be the area where existing warehouse are available for the activity. New investment for warehouse construction should not be considered.

In bulking, same varieties of maize and beans with high quality standards should be aimed at. Once such bulking sales will become sustainable, new collection system using transporting cart towed by cow or motor bicycle, etc should be established by the farmers group.

2) Improvement of quality control

a. Improvement of drying

Farmers normally dry maize in the form of ear corn on the ground. Crib (drying shed cum storehouse) by natural ventilation is sometime used but not so popular because the drying speed is low and the construction cost is rather high for small farmers. To improve this situation, following measures should be taken:

- Use of plastic sheets for thorough drying by farmers individually
- Quality checks by the collection center (moisture contents, damaged grain, broken grain and foreign maters) when receiving maize.
- Re-drying at the center on plastic sheets if the drying is not sufficient.
- Drying maize to the level to meet required specification. Farmers should be trained in sensory knowledge by checking the moisture contents using the meter and at the same time farmers counter-check the hardness of maize grains by biting. Co-relation between the hardness and the moisture contents for each variety, if established, will be a great help to farmers.

b. Improvement of shelling and cleaning method

Shelling is usually done manually, by beating maize in a bag by stick or simply removing grains by hand though equipment sometime utilized. In order to improve the shelling efficiency, each farmer should use manual type Maize Sheller. Cleaning is done by natural wind separation but for effective operation and for quality control, engine driven cleaner should be introduced.

c. Thorough quality control

The quality control is indispensable for sales to stable buyers such as WFP and UGT. In some cases the bulked grains were rejected by WFP, because the quality did not meet the required standard. The moisture content is a crucial item of quality control. Therefore, moisture meter should be introduced. The meter costs around US$600 in Kampala.

3) Contents

Objectives:

- To target WFP and UGT as a buyer who procures maize by set specification by bulking of same variety at high quality standard. WFP procure maize at 800-1,000tons per lot but they have special scheme to purchase maize from farmers group directly at 50tons as a minimum lot. This collective marketing should target this scheme. For UGT, minimum lot is be set as 10tons because of the economical transporting by 10ton lorry. The price premium by WFP and UGT is expected to be 50 Ush per kg.
- As for collective marketing of beans, the target buyers should be wholesalers in large cities. Cleaning and quality control should be thoroughly carried out. Minimum amount for the delivery would be

one tons per lot and this bulking sale would give 100 Ush/kg price premiums.

Operating Body: Farmers group independently or joint management with NGO or private sector. The management board to be established in the operating body will be responsible to the whole activities.

Location: The area where surplus of maize and beans are available and existing warehouse is available.

Activities: Collective marketing of maize and beans with bulking and quality control.

Scale of Operation: - Annual marketing amount is set to 300tons for maize taking into consideration of the minimum capacity of maize cleaner available in Uganda.However, by increasing operation hours per day or operation period, maximum 600tons of maize per year can be achieved. The number of member farmers is considered to be 100 as a standard, based on the average size of farmers. This number may range from 50 to 150.

- For collective marketing of beans minimum amount should be 10tons per season and 2 seasons per year (20tons per year) or average with around 100kg per farm.The size of warehouse and working space should be 150M^2 warehouse with capacity to store 200tons of maize and 50M^2 workshop (10 x 5 meter).

Operating staff: - Staff and their roles for collective marketing work and administrative work are as follows.

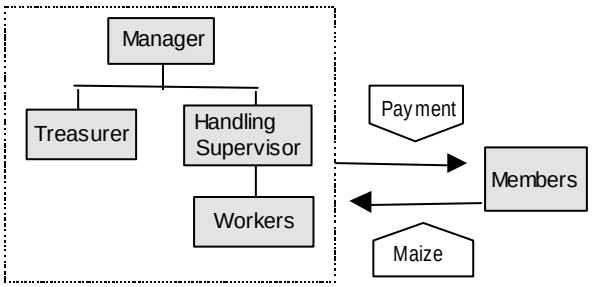


Figure 5.3 Organizational Structure of Operation Unit (Maize and Beans)

Table 5.4 Role and Wage of Operating Staff (Maize and Beans)

Job title	Role	Wage / Fee
Manger	Management of operation, sales, accounting	10,000 Ush./day
Treasurer	Book keeping, cash management	6,000 Ush./ day
Processing supervisor	Supervision of processing work, record keepings, store management, quality control	6,000 Ush./ day
Workers （about 3 persons）	Processing	2,000 Ush./ day

Technical Aspects:
- Current drying method by sun drying on the ground for both maize and beans should be changed to use plastic sheets. By doing so farmers can dry products more efficiently and evenly and can prevent mud and dust contamination.
- Farmers should use a manual type Maize Sheller for better quality and efficient operation. The operation board of this project should arrange the purchase of Sheller for member farmers.
- Thorough cleaning of maize and beans should be carried out using a maize/bean cleaner to keep standard quality.

Initial Investment: Approx. 5.35 million Ush (US$2,890), which includes Cleaner, Moisture Meter, Table Scale and Plastic Sheets (details is shown in following table)

Operation Funds: Approx. 10.2 million Ush (US$ 5,520), which covers rental fee of warehouse/workshop, depreciation cost of equipment, salary and wages, fuel and oil cost, plastic woven bags for the commodity, repair fee and other expenses.

Annual Income: Income and expenditure for collective marketing service（Annual handling volume maize 300 tons and bean 20 tons）

	Ush	US$
Annual income	20,200,000	10,900
Operation cost	4,188,000	2,260
Depreciation cost	3,300,000	1,780
Profit	12,712,000	6,860

Benefits of each farmhouse: Approx. 99,900 Ush (US$54) in average

(2) Rice

1) Basic approach collective marketing

Rice production in the Study area can be categorized into two systems; i) Lowland & wetland

rice in swamps in the eastern part, with relatively long history and big share in production, ii) Upland rice in the Eastern and Central part, rapidly expanding in recent years.

Farmer's marketing of their rice differs by the access to rice mills. Farmers who have no access to rice mills have to sell their products in the form of paddy. Then, their incomes are less compared to those selling as milled rice. (Average paddy price was 350-400Ush/kg and milled rice price was 800-900Ush/kg as of Feb.2006).

- To shift the paddy sale to milled rice sale to increase farmers' income.
- The management body of rice mill is formed basically by member farmers. However, the investment or joint management by NGO and/or private sector will be considered.
- To encourage attention on improving the quality management in post-harvest processing as well as pre-harvesting stage through the operation and management of rice mill.
- The type of rice machine to be installed should be the combined type with rubber-roll husker and milling chamber, which has superior milling performance.

＜Types of small scale rice mills and their performance＞

Folling 3 different types of small scale rice mill s are available

i) Engerberg type. Basically this is same structure with maize huller. Price is low but broken rice ratio is very high and milling recovery is very low. Some countries in South-east Asia prohibit the use of this rice mill.

ii) Friction type. This is originally developed in Japan for milling brown rice after husked. The milling performance is better than that of Engerberg type but lack of husking process causes high breakage of milled rice.

iii) Combined type of rubber roll paddy husker and milling chamber. The paddy husking section and milling section is separated and the performance is excellent. By-products, unlike to above two types, husk and rice bran are discharged separately. Therefore husk can be utilized as burning fuel or soil improvements and nursery bed for vegetable after carbonized. Rice bran is valuable feeds for poultry and aquaculture. The rubber roll is a consumable part and need to be exchanged to new one at around every 50 ton of paddy husking.

The interview survey conducted by the Study team revealed the performance of those 3 types as following table. The combined type shows significant advantages.

Type	Milling Recovery (Average)	Broken rice ratio (Average)
Engerberg type	56-60%	±50%
Friction type	58-62%	±40%
Combined type	67-68%	±30%

- The flexible operation plan responding to the varied of production and harvest timing. For example, 24 hours operation system for the peak season and fixed operation day

system during off-season. Proportional payment system to operators should be established during off-season.

- To accelerate paddy collection by introduction and establishment of transport-cart to equalize paddy delivery to rice mill. If a transport lorry can be introduced to rice mill, it can be utilized for milled rice delivery and paddy collection services. Owning lorry enables the management to stabilize paddy collection and milled rice delivery and thus to minimize the transportation costs.
- To start from the provider of milling services. Though rice mill aims at collective marketing of milled rice, consensus among member to do so is essential. Therefore rice mill will start as milling service provider to member farmers.
- Introduction of differed payment for collective marketing. In case the differed payment is not acceptable by members, short-term loan for rice purchase for collective marketing will be necessary. The purchase prices should be differentiated for the cash payment and differed.
- At the stabilized stage of collective marketing of milled rice, direct purchase of paddy by the mill will be made for efficient mill operation and marketing. Paddy price should be fixed to 55-60% of milled rice prices purchased by the rice mill for the benefit of farmers. This should aim to establish the advantage of price and quality competitiveness in the market.
- To explore clients, such as universities, colleges and high schools. Developing retail-bags of 1-5kg bags to explore supermarkets and retailers' markets will be considered.

2) Improvement of quality control

Retail shops in Kampala market offer various kinds of rice by weight (both local and imported). Supermarkets sell small rice packages of 1-2kg with reasonably good quality. To maintain certain level of quality is essential to access the market. The target quality for rural rice mills should be 15-25% broken rice with stones and husk chips being eliminated. In order to fulfill such needs, following measures should be applied.

a. Improvement of paddy drying methods

Farmer dry paddy by sun drying on the plastic sheet and on paved road without proper management, such as periodical moisture checking and turning paddy layer. As a result, number of cracked grains increase, then broken rice also increases after milling. Stones and sand are also mixed to dried paddy when sacking.

In a collective operation of rice mill, paddy drying should be carried out in two stages. First stage is sun drying on plastic sheet with proper management by individual farmers at their own farm or yard. Second stage is a supplementary sun drying at the rice mill after checking the

moisture contents using a moisture meter.

Checking the moisture contents using a moisture meter at individual farms is very difficult as the equipment costs more than Ush 900,000. Rice farmers in Asian countries can check the moisture contents by his hand. Or he removes the hull by fingers then checks the moisture by biting de-husked rice (brown rice). It is recommendable to rice growers in Uganda to be trained for checking the moisture contents using a moisture meter equipped at rice mill and at the same time farmers counter-check the moist of paddy by hand or the hardness of brown rice by biting. Such sensory knowledge should be propagated.

＜Importance of paddy drying＞
It is important to dry paddy immediately after harvest to the appropriate level of moisture contents by following reasons. i) Grain being put at breezy shade is dried by natural air to the level of equilibrium moisture content. The Crib for maize drying in Uganda utilizes this phenomenon. Generally speaking, the equilibrium moisture content of paddy is 14.0%±0.5%. If paddy of more than 15% moisture contents is sacked and stored in non-ventilated place, grain temperature increases by its own respiration heat and molds start generating. This heat damages rice by changing the color and generating odor. ii) Rapid paddy drying causes physical stress to grain inside by generating hard portion and soft portion. This stress generates cracks to rice grain. Those rice once cracked become broken rice during milling process and this leads to lower milling recovery rate and lower market value. During sun drying, the mixing works of upper portion and lower portion of paddy layer is very important to prevent the generation of physical stress to grain by one-side drying. This physical stress of grain is also generated during pre-harvest stage if paddy is over dried on the farm. Therefore appropriate timing of harvesting is important.

b. Introduction of technique for adjusting the broken rice ratio in the milled rice

It requires devices to adjust the percentage of broken rice ratio to maintain the rice quality same as the imported rice at 15-25%, in order to fulfill the consumers' various needs. Imported rice is cleaned by removing broken rice, using the Length Grader that can categorize milled rice by the length. However, this machine is not suitable to small-scale rice mills. Therefore, removal of broken rice should be conducted by manual operation using various sizes of steel sieves.

c. Removal of pebbles/stones mixed in milled rice

African countries including Uganda promote local rice production as a substitution of imported rice. However some rice consumers reject local product due to the mixture of stones in mills rice. Stone separator should be introduced to rice millers in Uganda by importing a unit or by local assembly using partially imported essential parts such as blowing fan blades and separating

screens. The other parts can be manufactured locally.

＜Elimination of pebbles/stones mixed in milled rice＞
Some rice consumers in Uganda reject local product due to the mixture of stones in milled rice. There is no stone mixed in imported rice and Tilda rice. These rice mills equip stone separator (De-stoner) in milling process and thus eliminate stones/pebbles. In Uganda, farmers carry out paddy drying on plastic sheets or paved road and when they collect dried paddy for packaging, stones accidentally mixed with paddy. Some rice retailers eliminate stones manually at their shops. Stones mixed in rice should be separated by introducing and small size De-stoner in order to compete with imported rice.

d. Elimination of husk chips in milled rice

Some time husk chips mix in milled rice. To minimize such contamination, proper operation of husking work is required. In order to separate such husk chips mixed in milled rice, a blower being commonly used in maize mill or manual blowing are recommended. A Chinese type manual winnower is also effective.

3) Utilization of by-product

Although the combined type rice mill of rubber roll husker and milling chamber has been introduced in Uganda, husk and rice bran are not well utilized as yet. Husk can be used as fuel or soil improvement materials after carbonized and bran can be consumed as poultry and fish feed. Rice bran is rich in oil but oil extraction requires fresh one of huge volume. So the introduction of rice bran factory in Uganda is not economical at this stage. Following utilization of by-product should be disseminated.

- Introduction of husk-fuel stove and kitchen furnace
- Development of utilizing methods of husk such as brick burning and litter in poultry house
- Development of carbonized husk making methods and its utilization such as nursery bed, soil improvement material, odor eliminator, water filter, etc.
- Sales contract with Feed Company for rice barn and utilization as feed for poultry and fish culture.

Photo5.1 Carbonized Husk Making Methods

Photo5.2 Husk-Fuel Stove

(4) Contents

Objectives: To implement collective rice milling and marketing of rice. For the access to stable markets/customers and to compete with imported rice, the rice mill aims at improving the quality and stable supply.

Operating body: Farmers group independently or joint management with NGO or private sector

Location:
- The area where Government and/or NGO promotes rice cultivation (both lowland & upland) but no rice mill available in the area.
- Though a rice mill is available but the machine is old and quality of milled rice by this machine is inferior and difficult to sell in markets.
- Though rice mill(s) is available but those processing capacity is insufficient.

Activities:
- Final target of rice mill operation by farmers is that farmers deliver their paddy at differed payment system to their rice mill for collective processing and marketing with quality control both pre-harvest and post-harvest stages. But until such consensus is agreed, following steps should be taken.
  i) Milling service: Farmers utilize the rice mill as milling service provider at fee. Milling service is carried out to each farmer individually and farmers sell the milled rice to buyers or local shops individually.
  ii) Collective marketing of milled rice: Rice mill purchases milled rice from individual farmers and store it until certain amount is accumulated for favored market/buyer. At the same time, rice mill tries to establish regular markets for such purchased rice.
  iii) Commercial rice mill: Rice mill purchases paddy from individual farmer then process paddy continuously for better control of the rice quality. Rice mill should assure farmers' profits by offering paddy price at 55-60% of current rice prices.
- Number of farmers to be participated should be around 150.

Scale of operation:
- Annual processing amount should be 300 tons (daily amount is 3 tons on average and 100 days operation per year) with due consideration of the availability of smallest size of combined type rice mill (hourly capacity is 0.6-0.7 tons/hour) in Uganda. However, by increasing operation hours per day or operation period per year, 500 tons of paddy can be processed by the rice mill.
- The number of member farmers differ by each paddy production but

150 farm households is targeted as a standard, based on the average size of small scale rice farmers (Acreage: 1-2 acres, Production yield: 0.8 tons/acre or 2.0 tons/Ha).

- The size of machine house should be similar to that of Zirobwe rice mill through the lessons/learnt by the pilot project. 100 M^2 machine house (10x10 meter) with office space of 2.5x5.0 inside. 3 meter width veranda is useful.

Operating staff:

- Staff and their roles for processing work and administrative work are as follows.

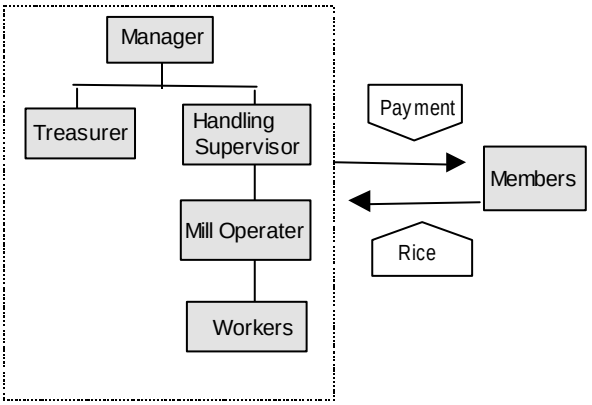


Figure5.4 Organizational Structure of Operation Unit (Rice)

Table 5.5 Role and Wage of Operating Staff (Rice)

Job title	Role	Wage / Fee
Manger	Management of operation, sales, accounting	10,000 Ush./day
Treasurer	Book keeping, cash management	6,000 Ush./ day
Operator	Operation and maintenance of milling machine and sewing machine, Record keeping	6,000 Ush./ day + lunch
Workers （about 3 persons）	Milling	2,000 Ush./ day + lunch

Technical aspects:

- Extension of post-harvest processing technologies; Such technologies as paddy drying, understanding the appropriate moisture contents, prevention of un-even drying, separation of impurities and stones need to be enhanced.
- Milling technologies: By acquisition of proper milling techniques such as better husking and whitening adjustment, husk chips mixed in milled rice should be minimized and the appearance of milled rice should be attractive with minimum broken rice.

- Utilization of by-products: Utilization of husk and rice bran should be studied and promoted.
- Retail packaging of rice: Higher quality rice should be produced for retail bags by eliminating small broken rice using wire screens.
- Invitation of public participation to the brand naming; such as "our rice" " ○○ rice" "new rice" so that producers and consumers feel their affection and recognition.

Initial Investment: Approx. 27.6 million Ush (US$15,000) which includes building facility, rice mill machine, moisture meter, table scale, spare parts, stationery, advertising poster and printing for retail bags. (Detail is shown in following tables)

Operation Funds: Approx. 10.5 million Ush（US$5,700）excluding paddy purchase funds including marketing cost, fuel, salary and wages and depreciation cost, etc.

Annual Income: Income and expenditure for rice milling service（Annual processing volume 300 tons）

	Ush	US$
Annual income	13,100,000	7,000
Operation cost	7,900,000	4,300
Depreciation cost	2,100,000	1,100
Profit	3,100,000	1,600

Benefit of member farmers: 20,700 Ush (Dividend by the enterprise)
192,000 Ush (Income from the shift to milled rice from paddy)

(3) Cassava

1) Basic approach of collective marketing of cassava

As cassava is perishable, heavy and bulky by nature, the farmers who live in villages faraway from Kampala have constraint in marketing of fresh cassava. In addition, local demand for fresh cassava is limited. In such areas, processing to dried chips and flour is an effective measure for marketing since it reduces weight and becomes highly storable.

Usually dried chip is produced by farmers individually. However, a collective processing is more efficient and appropriate from the viewpoints of better quality control and marketing.
Basic approach for collective processing and marketing of cassava chips/flour is summarized as follows.

- Rational utilization of processing facility by efficient material collection
- Produce high quality cassava chips/flour by improving the drying methods
- Explore stable market outlets in Kampala

- Produce and market composite flour with higher market value.

<Market Demand for High Quality Cassava Flour>
The demands for high quality cassava flour in Kampala are mainly as the material of composite flour with millet and that of retail packs for export. Currently, cassava flour is generally seen as "low price " food, but it is one of important staple food in Uganda and demand for high quality cassava products is considered significant. In the pilot project, the sale of retail packs at supermarkets in Kampala has started in March 2006. Regarding the composite flour with millet, a number of products have already been sold at supermarkets and it is apparent that there exists solid demand for this commodity. Profit from cassava processing increased greatly by mixing with millet. At the farmers' show in Nakasongola District in May 2006, this mixed flour was displayed for sale and the demand in rural area was also confirmed. From the experiences in other countries, it is assumed that cassava flour can be used for breads/biscuits, partially as a substitution material of wheat flour. In the pilot project, a trial was made to explore the possibility of this substitution by offering sample flour of cassava to some biscuits manufacturers for trial of replacement wheat flour. However, as they needed product development process to use cassava flour as materials, the idea is not realized yet. Further, use of cassava flour for chapattis and mandajis (dried dough) was conducted on trial basis, by providing sample flour with various mix ratio of cassava and wheat flours to stall keepers. It was confirmed that to explore the possibility of utilizing cassava flour as a partial substitution of wheat flour, thorough process of product development is indispensable. It is hoped that these product development effort be made by research organizations, such as NARO and/or Makerere University.

2) Collection and processing operation

a. Collection and transportation

Stable and scheduled supply of raw materials is very important for success of processing business.

The collection method used in the pilot project can be applied; to prepare a collection schedule based on the declared supply volume of each member by adjusting supply to achieve the target volume per day. Delivery is to be made in the early-evening of the previous day of processing. Transportation of fresh cassava is done by bicycle or ox-cart for short distance (about 10km). Share use (hiring) of truck is to be encouraged for long distance transportation.

b. Processing and drying

Important points in chips production are to prevent dust contamination and to shorten the drying

time. To shorten drying time, it is essential to cut/slice roots into thin pieces.

Cassava flour is cheap commodity and profit margin by quality improvement is relatively limited. Therefore, sun drying is appropriate, and solar dryers used for fruit are not applicable to cassava due to relatively high initial investment cost.

Based on the results of the pilot project, following methods are proposed for high quality cassava flour/chips production.

Peeling: Peeling is done manually by the members who deliver cassava roots to the processing facility.

Water for washing peeled roots is collected from roof catchment. Minimum of 20 m^3 water tank volume is required.

Weightinig: Use a table scale (weighing capacity more than 100kg). A hanging scale (spring scale) is common in Uganda, but a table scale has better workability and accuracy.

Chipping : Use a engine driven chipper (TONET made or similar type). Manual chippers are used to supplement the capacity of engine driven chipper.

Drying : Sun drying on the plastic sheets. To reduce the risk of dust contamination, wind shield will be needed, made with locally available materials such as papyrus mats and plant hedge tress. It is important to choose a kind of tree, leaves of which should not pose a problem. Plant grasses to cover ground to prevent dust fluttering. Drying yard should be apart as far as possible, from unpaved roads, where vehicles pass and cause dust..

If it is difficult (too slow) to grow grasses and/or hedge trees due to soil/climate condition, plastic sheets should be placed on the simple table (wooden frame with 2 inch wire mesh screen, 60cm height).

Indicative volume of wet chip on the plastic sheet is 4-5 kg/m^2. Fold the sheets and put weights during the night and rain.

Milling: A hammer mill is used for milling. Power source (diesel engine driven or motor driven) depends on the availability of electricity at the site. Since power supply is unreliable in rural area, diesel engine driven is recommended. Processing capacity of 0.3 to 0.5 ton/hour is sufficient.

Milling is done after receiving order since some of the customers may prefer chip than flour. An additional cyclone may be installed to improve the working environment in the facility as well as to increase the milling recovery.

Quality control: There are risks of contamination with very small dust in dried chip during drying, and it is hard to find by visual inspection. Quality inspection by cooking and tasting should be practiced periodically.

Dried chips are temporarily stored in plastic bags. Amount of chips should be limited to about 80% of bag capacity to enable folding the upper part to prevent

insects and dust from entering during storage. If the long storage period is expected, it is recommended to seal the bag by stitching. Particle size of flour should be adjusted in accordance with customer's needs, by changing the screen of milling machine.

Handling: Introduce a 2-wheel cart to carry wet and dried chips (order made at workshops in Kampala). Large durable plastic pans to keep wet chip are indispensable.

Others : - Chips and flour attract honey bees, especially in dry season. As it is impossible to prevent bees coming to the facility, it is suggested to challenge to utilize this opportunity for bee keeping. .

- Drying time can be shortened by pressing bagged wet chips and decreasing water contents, although this method was not used in the actual operation. It is believed that this method is effective in the rainy season. If pressed too much, the quality of chips/flour must be affected because the extracted water contains starch. Starch in the extracted water can be collected by precipitating starch in a bottom of plastic container.

c. Cleaning of millet grains

Cleaning is done by the combination of husking, sieve separation, wind separation, de-stoning (oscillating with flat-round basket) and washing.

Most difficult part in the cleaning work is the de-stoning; removing small stones of similar size and shape to millet grain. Such stones should be removed by using flat-round basket manually. Necessary skill for separation of stones may be acquired from the skilled ladies in the milling factory in Kampala by the OJT-style training.

d. Shipping (Truck transportation)

Use the transport services of private carriers. Transportation cost shares high portion in the total production costs. Efforts to collectively deliver, such as shipping the orders of several customers in one time, should be made to lower unit cost of shipment.

3) Contents

Based on the above, the contents of the model project on collective production and marketing of high quality cassava flour/chips is summarized as follows;

Objectives :
-Increase incomes of a participating farmers by production and marketing of high quality cassava flour/chips
-Identify and establish the channels to large-scale customers and wholesalers in Kampala markets
-Develop a new product and expand markets of the commodity

Operating body : Farmers' organization with/ without cooperation of the private sector

Conditions on the location : -Areas with sufficient material supply capacity constantly throughout the year, Supply capacity of raw cassava to be 2.0t per day

-Road access to market is to be secured throughout the year.

-Access by mobile phone is indispensable.

Activities : - Production and sale of quality cassava chips/flour

- Production and sale of a quality cassava / millet mixed flour

A sale place and a selling form

- Sell by bulk as repack materials to large flour mills
- Sell by small pack to local stores and retailers in Kampala
- Sell a retail pack to a supermarket through a wholesaler.

Business scale: - The amount of cassava material 2.0 mt./day (1.75mt after peeling)

- Production of chips /flour 60 mt.
- Retail pack production 4,800 pack s(4.8t).
- Member farmers, at about 200 as maximum. (Member farmers are better to be located within the distance of one hour on foot)

Operating staff: Staff and their roles and wages for processing work and sale/administrative work are as follows. Wages are paid on daily basis.

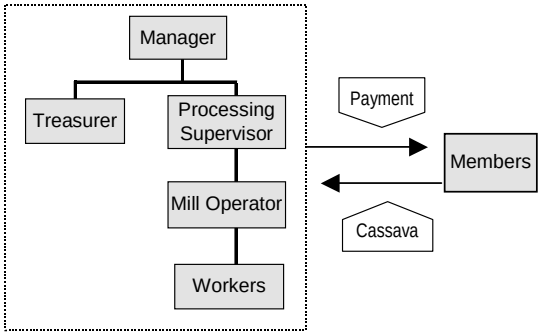


Figure 5.5 Organizational Structure of Operation Unit (Cassava)

Table 5.6 Role and Wage of Operating Staff (Cassava)

Job title	Role	Wage / Fee
Manger	Management of operation, sales, accounting	5,000 Ush./day + lunch
Treasurer	Book keeping, cash management	3,500 Ush./ day + lunch
Processing supervisor	Supervision of processing work, record keepings, store management, quality control	4,000 Ush./ day + lunch
Operator	Operation and maintenance of mill, chipper, sewing machine Record keeping	3,500 Ush./ day + lunch

Job title	Role	Wage / Fee
Workers （about 3 persons）	Assist in milling and chipping work, Drying chips, Other labor works	2,000 Ush./ day + lunch
Workers (female) for millet clearing	Cleaning millet grain, Packaging of retail packs	2,500 Ush./ day + lunch
Member farmers	Harvesting, transporting and peeling of material cassava	Peeling fee（15-20 Ush/Kg）

Initial investment : Building 28.4million Ush （15,350 US$）

Building is composed of Peeling works space, Milling space, Chips store, Product store, Office space, Store for equipment/tools. Total 250 m2

Utilities： Rain catchment, Water tanks, Toilet

Drying yard： 1000～1500m2

Depreciations 977,000 Ush （annual）

Equipment 14.2million Ush （7,650 US$）

Engine-driven chipper, Engine-driven Milling machine, Platform scale, Bag closer, Portable generator, Plastic sheets, Containers for material handling, 2-wheel cart, Ox cart, Materials for fence, wind shield and drying shelves, Office furniture, etc.

Depreciations 2,878,000 Ush （annual）

Operation fund : - 2.5 - 3.0 million Ush （1,350 – 1,620 US$）

-Material cassava purchasing, Fuels, Wages, consumables, etc. targets based on the determined conditions, and it is the one in which. In accordance with the results of pilot project, the conditions are determined as follows.

Annual income : -Income and expenditure including depreciations are balanced (Annual processing volume 163 tons in peeled material)

	Ush	US$
Annual sales	35,336,000	19,101
Annual production cost	31,465,000	17,008
Annual profit on sales	3,871,000	2,092
Depreciations	3,855,000	2,084
Annual profit	16,000	9

Benefit to the member farmers: (assume that 150 farmers participate in the business and material supplies are divided equally)

Amount of cassava shipped	1.1 tons per member (peeled root weight)
Income from cassava sales	86,800 Ush(47 US$) per member
Income from peeling work	21,700 Ush (12 US$) per member

(4) Fruits (Pineapple)

1) Basic approach of collective marketing

In fruits processing and making, many kinds of fruit are considered such as pineapple, banana, passion fruits, citrus and mango.

In this plan, collective processing and marketing of pineapple is taken up particularly of pineapple wine as an example, mainly focusing pineapple wine production and marketing.
Generally, it takes considerable time and energy to put the fruit processing business on track, as it requires the process of developing products corresponding to the market needs and utilizing their own resources for production. Development of market channels of their products competing with others is also challenging one.

Following are basic approach on collective post-harvest processing and marketing on pineapple wine products.

- Strengthening members' business mentality
  As an enterprise, business risk is unavoidable. Member should fully understand this and be active in participation, including the initial fund contribution.
- Early decision of major products(market needs and production system)
  Commodity to be produced, type of the product should be decided based on the market needs, technical difficulty of the processing methods and profitability.
- Efficient operation of the facility throughout the year
  To be a profitable enterprise, maximizing the utilization of the facility is required. To this end, plan to stably secure material fruits is important.
- Thorough quality control
  To secure food safety, thorough quality control should be practiced.

2) Processing

a. Processing methods and tools/equipment

Processing methods and tools/equipment are similar level and type to the ones used by small-scale private processors of fruit. However, measuring instruments such as refract meter, thermometer, precise scale, etc. should be used for better quality control and cost reduction. To remove very fine sediments in the wine, use of a filter kit is recommended.

b. Processing facility and utilities

Consideration on hygiene issues is indispensable for the fruit processing facility. In concrete, tiled floor and tiled wall in lower part, drainage, ceiling must be installed in the processing room in which water is used.

Changing room, store spaces for raw materials and products would better be separated. Toilet is indispensable and should be separated from the facility. Water of drinkable quality is essential for fruits processing. Roof with rain collection with filter system can supply sufficient volume/quality of water.

In case plastic pouch is used for packaging, a heat sealer and electric power supply are needed. If only bottles are used, power supply is not necessarily required.

c. Packaging materials

Preparations for procuring packaging materials should be started at an earlier stage in the product development. Details should be clarified on sources of containers and their terms/conditions of purchasing, and on sources of designing and printing of labels.

For the outer carton boxes, it is required to find out available materials in the area and how to utilize them.

d. Utilization of by-products

Peels and pulp after juice extraction are to be utilized for animal feeds.

3) Contents

Based on the above, pineapple wine business propose is as follows.

Objectives:	-Increase fruit farmers' incomes by collective processing and marketing of pineapple. -Establish a sound basis on wine production and marketing as a business and gradually expand products by identifying a best products mix. - Expand products gradually by identifying a best product mix in view of material available and possible products. - Establish the marketing channels to retails outlets in Kampala and other towns through wholesalers
Operating body:	Farmers' organization in a form of company and / or in cooperation with private sector
Conditions on the location:	- Access to Kampala and/or other towns with all-weather road. Good access to mobile telephone network (indispensable for marketing work). - Stable supply of drinkable quality water, including water catchments

system.

- Stable supply of material fruit all around year.
- Power supply is available throughout the year.

Activities : Production and marketing of wine products and other fruit processed products.

Sales outlets

- Direct sales to local bar and shops
- Sales to supermarkets and shops in towns through wholesalers

Business scale : -Processing volume (material base) : about 3 tons of pineapple fruit per annum

-Production and sales volume : 7,670 liters (22,560 bottles/340ml)

-Membership : 10 – 30 farmers

Operating staff : Staff and their roles and wages for processing work and sale/administrative work are as follows. Wages are paid on daily basis. Processing staff for each products should be fixed because the necessary processing knowledge/skills varies by the product.

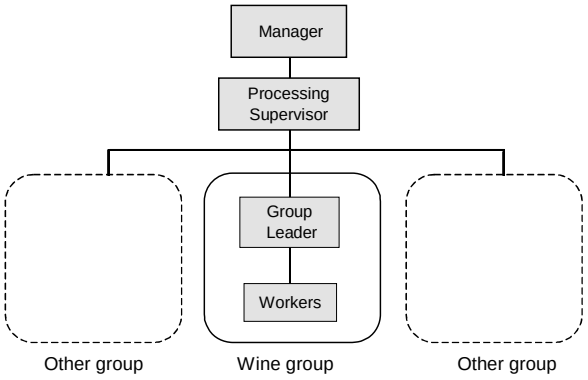


Figure 5.6 Organizational Structure of Operation Unit (Fruits)

Table 5.7 Role and Wage of Operating Staff (Fruits)

Job title	Role	Wage *
Manager	Management of operation, Sales, Accounting	10,000 Ush./day
Supervisor	Supervise of processing work, Recordkeeping, Store management, Hygiene and quality control	6,000 Ush./day + lunch
Workers (3 persons)	Processing work	2,000 Ush./day + lunch

*Wages may differ by cases.

Initial investment: Building 50.5 million Ush (27,300 US$)

Building is composed of processing room, changing room, material store, office space, cooking space and wine store. Total area 160 m2.

Utilities: Rain catchment, water tanks, water supply and drainage, toilet.

Depreciations 1,031,000 Ush per annum

Equipment 9.9 million Ush （5,340 US$）

Aluminum pans, knives (Kitchen utensils), Water filter unit, Refractometer, Thermometer, Table-top scale, Table scale, Charcoal stoves, Work tables, Sink, Shelves, Juice press, Plastic tanks for wine, Filter kit, Tools for racking, Crown sealer, Office furniture, etc.

Depreciations 1,254,000 Ush per annum

Operation fund : 3.0 - 4.0 million Ush（1,620 - 2,160 US$）

Packaging materials, Consumables, Wages, Fuel, Material fruit, etc.

Annual income : Annual production 7,670 liter (22,560 bottles/340ml)

	Ush	US$
Annual sales value	30,117,600	16,280
Annual costs	21,657,600	11,707
Annual profit on sales	8,460,000	4,573
Depreciations	2,285,000	1,235
Annual profit	6,175,000	3,338

Benefit to the member farmers: (assume that 15 farmers participate in the business and material supplies and profits are divided equally)

Amount of pineapple fruit shipped 205 kg per member

Income from pineapple fruit sales 56,300 Ush（30 US$）per member

Dividends of profit 411,700 Ush（223 US$）per member

(5) Milk

1) Basic approach of collective milk marketing

Milk production in the Study area is divided into two types by husbandry systems; the one under zero-grazing system, practiced nearby Kampala and the district towns, and another under the semi-nomadic system in the “cattle corridor”.

There exist a number of dairy farmers groups in zero-grazing system, but none in the latter case.

Milk producers under the semi-nomadic system have more limited access to the markets than those under the zero-grazing system. However, there exists difficulty in organizing nomadic farmers.

In this plan, milk production around the towns in cattle corridor is taken up as a target for the collective milk marketing by farmers’ organization, regardless of zero-grazer or semi-nomad.

At present, milk is collected by local milk assemblers from individual farmers and carried by bicycle to milk assembly points located along national road, usually under the shade of tree, in the morning hours. Then it is carried to Kampala in milk cans by normal truck without refrigerator. Therefore, the risk of quality deterioration is considerable.

At each assembly point, there are many milk assemblers. Each of them has specific farmers from whom to collect milk. Farmers are generally paid about a week after the delivery of milk. They have complaints about assemblers as they consider often underpaid, beaten down price or refused to pay under the pretext of alleged deteriorated quality. As the transportation to Kampala is done by un-refrigerated truck, only milk within a limited area (distance) from assembly point can be shipped.

Taking into account of the current circumstances above, to establish a milk collection center equipped with milk cooler by farmers' organization is planned to increase incomes from milk production.

Basic approach of collective marketing of fresh milk for the purpose of increasing farmers' incomes is summarized as follows;

- Farmers should establish a reliable collective marketing system of their own
- Hygiene condition in milking should be improved to reduce possible loss
- Milk cooler be introduced to maintain quality of milk and reduce possible loss through the distribution process.

Milk cooler to be installed has advantages such as;

- To maintain quality of collected milk until shipment
- To reduce the risk of quality deterioration in the delivery to Kampala as milk is refrigerated before the shipment
- To enable more farmers (farmers who live far away from assembly point) to deliver their milk to Kampala
- To allow farmers' organization more flexibility on sales of their milk as they will not always have to sell all milk immediately after collection

Large scale consumers such as schools and hospitals in Kampala need to be explored as possible clients.

In local area, possibility to include milk in luncheon program of the schools would also be considered. In this case milk cooler is not necessary since local schools would be not far from the milk collection center. It is just enough to deliver pasteurized milk in milk cans to the school

before lunchtime. A locally made jacket-type large pan (combined with fire wood stove) is used for pasteurization.

Production of pouched milk is not adopted in this plan as it requires the facility (building) conforming to the hygienic standard and hence the higher investment cost and, manual packaging requires huge manpower.

2) Operation

Work method for the collective marketing is shown in the following table in comparison with the current method.

Table 5.8 Work Method

Works	Current method	Planned method	Tools/equipment
Milking	Farmer	Farmer Improve sanitary condition in the milking work	Buckets, Jerrycans
Carrying to assembly point	Milk assemblers + bicycle *	Milk assemblers + bicycle ** Farmer＋bicycle （Scheduled collection＋donkey cart）	Jerrycans （donkey cart）
Temporarily store at assembly point	Ambient temperatures / Milk cans	Cooled / Milk cooler	Milk cooler
Quality check	Check the smell, color, specific gravity, etc. By Trader	Check the smell, color, specific gravity, etc. By Manager (Farmer group)	Hydrometer, Thermometer Litmus paper
Volume measurement	By milk cans	By milk cans	
Sales	Farmer Deferred payment	Collective Deferred payment	

* Rural traders who collect milk from farmers by bicycle with order/request from a trader of Kampala.
** Existing milk assemblers are to be utilized as collection service providers to the member farmers.

a. Milk collection from the group members

Members themselves carry milk to assembly point by bicycle. However ,carrying works could be entrusted to milk collectors.

b. Quality control

Deteriorated milk quality can never be improved again. Improvement of sanitary condition in the milking work is indispensable. Milk quality is checked at the assembly point upon receiving, by the method/tools such as hydrometer, thermometer, reagent which is widely practiced in Uganda.

c. Operation of milk cooler

Electric fee and wages occupy major portion of the operation cost of milk cooler. These costs do not fluctuate by changes in collected volume of milk in a day. It is very important to maximize the collection volume corresponding to the cooler's capacity.
In dry season milk production decreases considerably and it will be hard to collect enough milk to run the cooler economically. Intermittent operation needs to be considered according to the volume of milk to be collected.

It is not economically feasible to run the cooler with generator power due to high fuel cost in Uganda. Thus, it is not possible to use a cooler in the area where the power supply is poor and not reliable.

3) Contents

Contents of collective milk marketing is summarized as follows.

Objectives :	- Increase milk farmers' income by collective marketing system of fresh milk.
	- Improve hygienic condition in the milking to supply good quality of milk.
	- Introduce milk cooler into assembly point to maintain milk quality and to sell at a higher price
Operating body :	Farmers' organization with/ without cooperation with private sector
Conditions on the location :	-Stable power supply
	-Access to Kampala with all-weather road
	-Good access to mobile telephone network (indispensable for marketing work)
	-Stable supply of drinkable quality water, including water catchments system
	-Stable supply of targeted volume by the member farmers
	-Sufficient numbers of milk farmers are located within area (distance) accessible to the facility on time
Activities :	-Collecting, cooling and marketing of fresh milk
	-Improving hygienic conditions in the milking, Quality control
	Sales outlets
	Direct sales to large consumers in Kampala such as private schools, hospitals, etc.
	Local schools luncheon program
Business scale :	-Annual handling volume : 170,900 liters
	-Annual sales value : 56,856,000 Ush
	-Memberships : about 50 milk farmers
	-Operating staff : 2 persons (manager, worker)

Table 5.9 Role and Wage of Operating Staff

Job title	Role	Wage *
Manager	Management of operation, Sales, Accounting, Quality control, Coordinating the collection	7,000 Ush/day + lunch
Worker (1 person)	Receiving, measuring, quality check, cleaning cooler and equipment	2,500 Ush/day + lunch

* Wages are paid on daily basis

Initial investment : Building Rent fee 500,000 Ush per annum

Rent a existing building/room (50-60 m2) at town alongside of national road.

Utilities 4.5 million Ush (2,430 US$)

Rain water catchments and water supply : Rain gutters, water tank (10 m3), elevated tank (500 liters) and piping. Assume that drainage and toilet are equipped at existing building/room.

Depreciations 450,000 Ush per annum

Equipment 20.1 million Ush （10,860 US$）

Milk cooler (600 liters), Hydrometer, Thermometer, Table-top scale, Buckets, Sink, Office furniture, etc. Jerrycans and containers for hygienic improvement in the milking

Depreciations 2,315,000 Ush per annum

Operating fund : 3.0 million Ush （1,620 US$）

Wages, Electric fee, Consumables, etc.

Total deficits value in dry period (4 months) is accounted for the operating fund.

Annual income : Annual collection / sales volume of milk 170,900 liters

Benefit to the Member Farmers: (assume that 50 farmers participate in the business and equal volume of milk are shipped by each farmer)

Annual shipped volume of milk 3,418 liter per member

Incremental benefit/ member 168, 320 Ush. (91 US$)

5.4.2 Implementation Plan

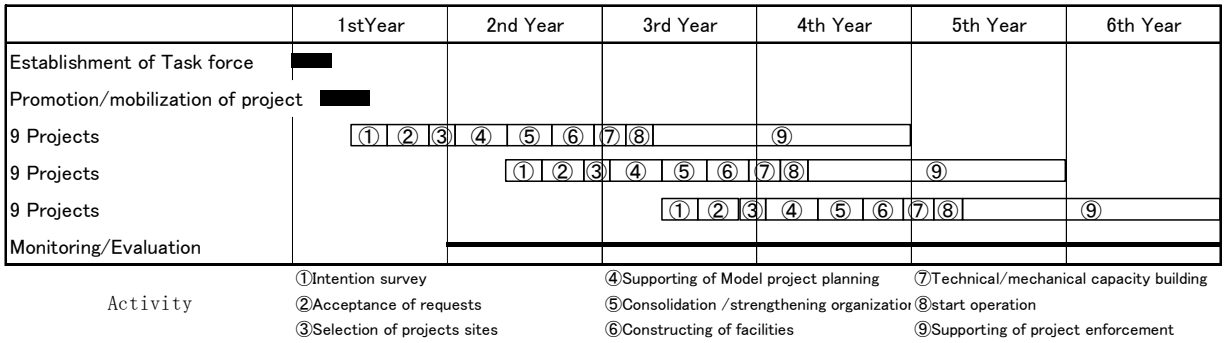
The plan elaborates, through the implementation of the model projects, the procedures for developing ways and means of promoting collective post-harvest processing and marketing by farmers' organizations, as well as the support system of the government at national level in future.

It is important that the government should coordinate the implementation of the plan to other existing development schemes such as NAADS and Model Sub-county Development Plan. The plan could be implemented as a part of the above existing schemes.

5.4.2.1 Implementation Period

The model projects will be implemented in 6 years. Work schedule of yearly basis are presented in the following chart.
In the early part of the first year, preparatory works, such as establishment of task force and various logistic works for starting the projects will be conducted.
Tentatively, 27 model projects are considered, based on the assumption of the priority commodity groups of each district. Therefore, in each year, 9 projects are taken up in three years. Period for each project is around 3 years and half, including the planning and construction period of the project. Actual operation period supported by the government will be 2 years after the construction and installment of the facility of the project.

Table 5.10 Implementation Period of the Model Projects



5.4.2.2 Implementation and Support System

For the smooth and efficient implementation of the Model Project, farmers' organization responsible for the project implementation and the supporting structure of the government need to be well organized.
Following are proposed

(1) .Farmers' organization

Farmers' organization for the model project might better be selected among existing organizations or formed based on these, avoiding unnecessary duplication of the organizations in the specific area.

These include cooperatives (primary cooperative society, area cooperative enterprise etc.) farmers groups, community based organization and others.

In selecting farmers' group for model project, opinion and idea on project of all members of the organization should be confirmed at the initial stage. In many cases, the decision making by limited circle of core members led to the lack of full understanding among members and hence the limited participation in collective activities by members.

Structure of the farmers' organization is proposed, based on the experience of the pilot project implementation, as shown below;

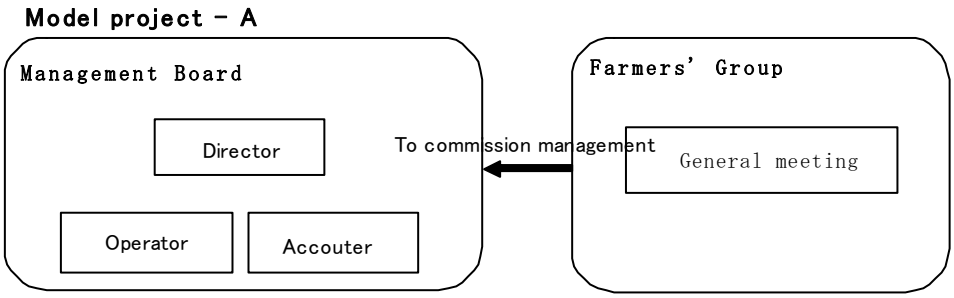


Figure 5.7 Organizational Structure of Farmer's Group

General Assembly (General Meeting: GM) consisting of the all members is the supreme organ of the organization, which decides the fundamental issues of the organization.

By the GM, Executive Board (EB) Members will be selected for management and operation of the post-harvest processing and marketing business.

EB will prepare operation plan, and subject to the approval of GM the plan, establish operation team, consisting of manager, treasurer, operator and other. Team members will be recruited among members/ members' family or from outside the organization.

The transparency and accountability need to be assured for the smooth operation of the business.

(2) Task force

For the management of model projects, there should be task force both at central and local levels. The model project will be implemented under the Task Force chaired by MFPED and composed of the representative from MAAIF, MTTI, MOLOG, NAADS and others.

Secretariat Services of the Task force will be provided by NAADS.

Task Force at national level (NTF) will, in coordination with local task force

- Formulate yearly plan (selection of the project, budget allocation for support etc)
- Provide support, both financial and technical one through local task force (In addition to the technical support, subsidy of up to 70% of the initial investment will be made by the account. For remaining portion microfinance will be utilized, if appropriate.)
- Review of the progress
- Monitor/ evaluation

At local level, local task force (LTF) will be organized to support the model project at the local level. It will be composed of the District Agriculture Officer (DAO), District Production Officer (DPO), District NAADS Coordinator and Sub-county NAADS coordinator or extension officer. Secretariat will be located district NAADS coordinator's office/

Function of the Local task force will cover wide range of issues but essential actions include the following in line with the implementation procedure proposed later;

- To motivate of the framers' group to join the program
- To advise the preparation of the proposal
- To receive and scrutinize the proposal and submit the proposal to NTF with comments
- Based on the decision by NTF, start to assist selected organization in their implementation planning and execution
- To review the progress and report to the NTF
- Support NTF in monitoring and evaluation

As for NTF, Planning Committee of each district will be considered to be in charge.

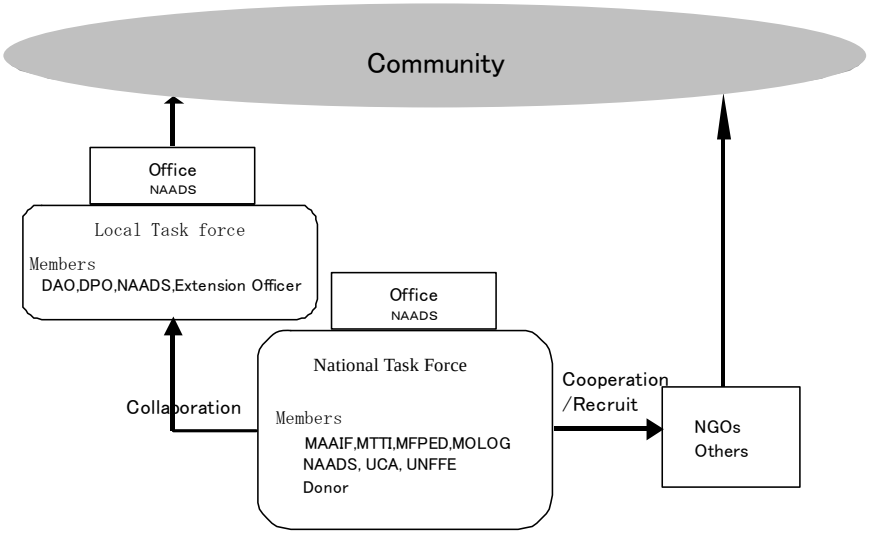


Figure 5.8 Task Force

5.4.2.3 Implementation Procedure

For the smooth and efficient implementation of the Development Plan, procedures as shown below are considered.

(1) Promotion/motivation of the farmers/farmers group

To initiate the proposed model project, first of all, farmers/ farmers' organizations need to be informed of the objectives and contents of the proposed model project. In this context, for the promotion and motivation of farmers to the model project, dissemination of information on model project is essential. Brief leaflet for easy understanding of the model project for farmers need to be prepared, introducing the cases of pilot project and others.

These dissemination will be conducted by LC5, LC3 officers, particularly NAADS Coordinator/ extension officers.

(2) Request from farmers' organization

As stated earlier, the proposed model project is the agro-processing and marketing business to be implemented by farmers/farmers' organization, based on their initiatives. Therefore, their commitment to the project implementation is essential with their own risk, though support will be provided by the government.

In this sense, as a first step, farmers/farmers' organization shall submit a request/proposal of the model project to the local task force. Support or suggestion will be provided by local task force if required.

Format of request/ proposal will include such information as follows;

- Name of organization with address, phone number etc.
- Name of the representative, with address, phone number etc.
- Number of the members
- Major commodity targeted
- Outline of the intended business activities
- Operation and management system and plan (tentative idea)
- Processing/ marketing plan (tentative idea)
- Financial plan
- Required technical/financial support
- Capacity of members to mobilize the fund to the project
- Others

Upon receiving the request/proposal from farmers' organization, the local task force will scrutinize and with comments on that, submit to national task force for consideration and decision. If request is positively evaluated, this will be transmitted to the farmers' organization

through local task force that the model project may go into the planning stage with the support and guidance of the local task force.

(3) Model project planning

Planning will be made by respective farmers' organization with the supports of LC3, LC5 and local task force.

Task force will help the farmers' organization for their formulation of the implementation plan, mobilizing the expertise of service providers available in the respective area.

(4) Model project implementation

Various technical supports are required at the implementation stage.

Prior to the actual operation of the business activity, following support will be provided by the local task force (LTF) through hiring the service providers.

Major supports expected to be required are;

- Establishment of management and operation system (by service provider)
- Training on accounting and financial management (do)
- Training on physical operation, maintenance and management (do)
- Training on Marketing (do)

Operation and management of business activity thereafter is expected to be self reliant by farmers' organization. However, support by local.

The activities for support mentioned above include similar training components being executed in other programs particularly in NAADS program. Therefore, coordination with other programs/projects is essential to avoid duplication.

After the project period of 3.5 years, technical support by the Program will be terminated, in expectation that each project is to be self-reliant in principle. However, various issues seems to remain difficult to be solved by farmers themselves. Door needs to be open for consultation support on ad-hoc basis.

(5) Monitoring/ Evaluation

Monitoring and Evaluation will be conducted by National and Local Task Force (NTF, LTF) with the cooperation of concerned staff of LC5 and LC3.

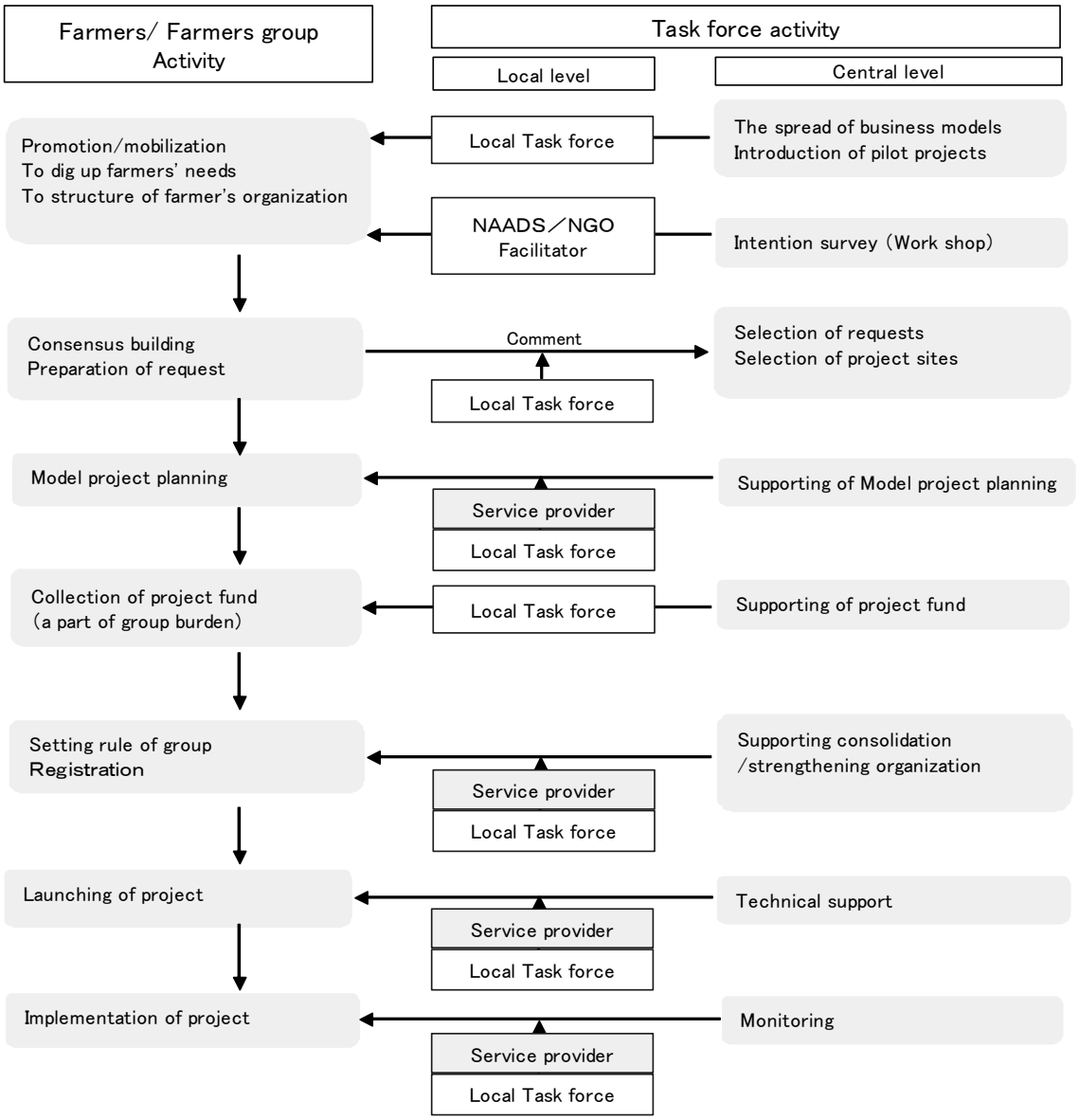


Figure 5.9 Implementation Procedure of the Model Project

5.4.2.4 Financial Plan

Total cost includes direct cost of the Model projects and the cost for related activities (Program Promotion Cost).

(1) Direct cost of each project

Direct cost of the model projects consists of physical investment (buildings, facilities, machinery, equipment etc.) and operation cost at initial stage (salary and wages, power and fuel, consumables)

Total amount of the direct cost for all pilot projects are computed at around US$563,000 based on the model presented in Chapter 5.4.1.2.

Direct cost of the model projects

Initial investment （facility・equipment/ machinery）			(1,000 US$)
	Maize/beans	6 projects	17.4
	Rice	4 projects	59.7
	Cassava	6 projects	138.2
	Fruits	6 projects	195.9
	Milk	5 projects	66.5
		Subtotal	477.7
Operation & management			
	Maize/beans	6 projects	33.2
	Rice	4 projects	22.7
	Cassava	6 projects	9.7
	Fruits	6 projects	13.0
	Milk	5 projects	8.1
		Subtotal	85.7
Total			**563.4**

(2) Program promotion cost

Promotion cost consists of administrative cost of the Central Task Force (CTF) and Local Task Force (LTF) for program and projects, and the cost for projects support activities.

Administration cost of the Task Force	(1,000 US$)
Central Task Force	
Personnel cost	490
Procurement of the Office	360
Operational cost of the office and consumable	65
Local Task Force	
Personnel cost	576
Procurement of the Office	324
Operational cost of the office and consumable	90
Cost for Project support activities	
Training for Local Task Force	
Sitting allowance	6
Training materials	2
Instructor	27
Support cost for Model projects	
Support to project planning (by service provider)	54
Technical training on respective subject (do)	130
Marketing research support and advice (do)	41
Others	432
Subsidy of initial investment	334
Total	**2,931**

The total cost of program promotion is estimated at US$ 2,931,000. For the physical investment at the initial stage, subsidy with upper limit of 70 % for the total cost is proposed, as most of the farmers are unable to mobilize required fund. Based on the assumption, the required fund for subsidy for direct cost of the project is estimated at US$ 334,000.

CHAPTER 6 RECOMMENDATIONS

Improvement of Post-harvest Processing and Marketing, the subject of the Study, is one of the major pillars of the Plan for Modernization of Agriculture(PMA), aiming at rural development and eradication of poverty. Active and direct involvement of farmers to post-harvest processing and marketing will contribute not only to eradicate poverty by increased incomes of farmers, but also will provide sound basis for rational commodity flow (bulk trade and improved quality) and export, and revitalization of the economy as a whole.

The Study emphasized, therefore, among broad dimension of the subject, the importance of collective actions by farmers' organization on post-harvest processing and marketing. To verify the efficacy of these actions by farmers' organization, pilot projects have been implemented based on the initiatives of respective organizations.
Based on the results of the pilot projects implementation, the development plan is prepared consisting of model projects for collective post-harvest processing and marketing by farmers' organizations, to be implemented in the Study area.
It is proposed that the plan be implemented by the government as early as possible, with attention to the following.

1. The plan should be implemented in full coordination and collaboration with other related schemes, such as NAADS Program, Model Sub-county Development Program and other related programs supported by development partners and NGOs.

2. In advance to the implementation of the model projects, following actions should be taken by the government to further ascertain the effectiveness and practicality of the model projects
   - Support to the pilot projects, for their follow-up and further improvement, if required
   - Project implementation on trial basis for Mize/ beans and Milk, for which pilot projects were not implemented
   - Monitoring and evaluation of the above
   - Arrangement for mobilization of the required fund

3. Collective post-harvest processing and marketing enterprises by farmers' organization under the plan should basically be implemented by wishes and initiatives of farmers. However, for the effective implementation as model projects, the government should support on the following;
   (1) Technical support on project planning and operation

Information, advice and counseling on planning and operation

(2) Subsidy for initial investment
Maximum 70 % of the initial investment

(3) Training of personnel for project implementation
Training on management and technical issues

4. Improvement of post-harvest processing and marketing is closely related to the various issues at the production stage of individual farmers. Selection of better crop varieties, appropriate production technologies, adjustment of the time of harvesting and delivery are the important issues for effective implementation of the collective marketing. Therefore, the government should coordinate the programs related to the production(introduction of better varieties, improved farming system and pest and disease management) to the plan of collective marketing.

5. For the improvement of post-harvest processing and marketing, institutional/legal issues such as UCE and WRS, and physical infrastructures such as road, electricity and market facilities are important issues to be addressed. UCE and WRS are legally approved and being operational. Development of the financial and market information service and the physical infrastructure such as road, electricity and market facilities should further be accelerated.

6. The government should, by utilizing the experiences and lessons to be learnt through the monitoring and evaluation of the model projects, develop the ways and means, including support system for promoting collective agro-processing and marketing by framers' organizations in future more in a broad term at national level.