CHAPTER 5 PRESENT SITUATION OF RICE MARKETING

5.1 Rice Marketing Quantity

Rice production has increased about 150% from 162,000 to 237,000 ton during 1994 to 2004 in parallel with increase of the cultivation area from 80,000 to 120,000 ha. However, it could not meet the national rice consumption which was supplemented by rice importation. Importation of rice has continuously increased and reached more than 800,000 ton in terms of paddy. Total supply of paddy and rice is estimated at about 1,000,000 ton and 600,000 ton, respectively.

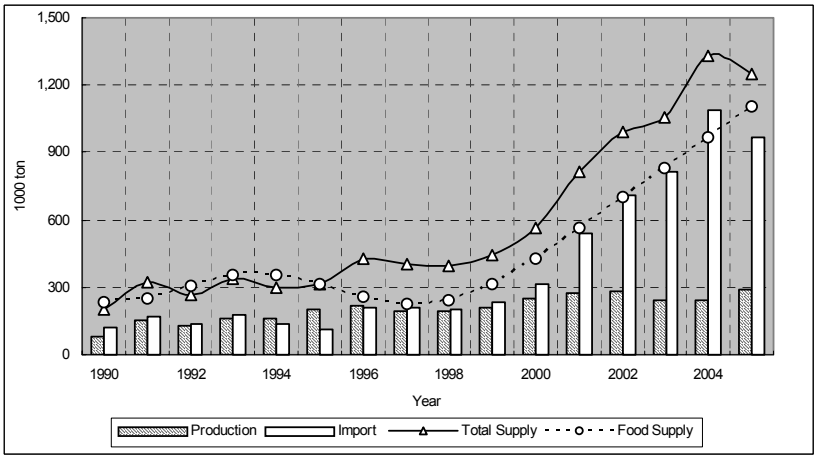


Figure 5.1 Rice Production and Import (paddy equivalent)
Source : FAOSTAT September 2007
*:Total supply - seeds, losses, etc.

Actual quantity of rice marketed (113,000 ton) is estimated after deducting the quantity of farmers' own consumption (43,000 ton) from around 156,000 ton of total rice supplied (average from 2000 to 2003). According to the field survey, sales share of product including paddy and rice accounts for more than 50% at irrigated farmers or large scale farmers and its share becomes smaller according to farmers' scale of produce, especially in rain-fed areas. According to "Ghana Living Standards Survey" made by GSS in 1999, the sales share of product is estimated at 42% on average. Based on this figure, self-consumption is estimated at 66,000 ton, and domestic rice marketed is estimated at around 47,000 tons which accounts for 11% of total rice marketed (409,000 ton) considering imported rice (362,000 ton) in the country.

Table 5.1 Rice Distribution Quantities (2000 - 2003)

(Unit: '000 ton of milled rice)

Rice	Production	Seed, loss, etc.	Self-consumption	Distribution	Rate %
Local	156	43	66	47	11
Imported	-	-	-	362	89
Total				409	100.0

Source: FAOSTAT

5.2 Balance of Rice Supply and Demand

Rice supply and demand status was studied by various agencies. FAO made a rice balance study on the basis of the official demographic and agricultural statistics. The Study Team also made a rice balance study referring FAO study. During the period from 2000 to 2003, total supply of rice in the country reached 514,000 ton comprising domestic rice of 156,000 ton and imported rice of 362,000 ton, and its self-sufficiency rate is around 30%. Per capita consumption of rice becomes 23.3 kg.

Table 5.2 Rice Balance Sheet in Ghana

Unit: 1,000 ton/milled rice

Year	Production Quantity	Import Quantity	Stock Variation	Export Quantity	Domestic Supply	Seed, Loss, etc.	Food Quantity	Food/Capita/ Year (kg)
2000	149.2	193.0	0.0	3.2	339.0	35.0	304.0	15.5
2001	164.8	328.0	0.0	2.5	490.2	38.7	451.5	22.5
2002	168.0	430.4	0.0	3.3	595.1	48.8	546.3	26.7
2003	143.3	497.1	0.0	7.5	632.9	47.9	585.0	28.0
Average	156.3	362.1	0.0	4.1	514.3	42.6	471.7	23.3

Source: FAOSTAT

(1) Assumption

A rice demand and supply study was made on the basis of the results of JICA baseline survey. Assumptions of the Study are as follows:

- Year for estimation : Estimation made for the year 2003 since discrepancy among the information was observed in 2004 and 2005.
- Population : Urban and rural population by regions in 2003 is estimated based on the Population Census in 2000, GSS.
- Per capita consumption : Results of the baseline survey
- Production : Crop production records SRDI, MOFA

(2) Per Capita Consumption of Urban Population

In the baseline survey, frequency of weekly rice consumption was interviewed for 25 consumers in the major four cities, i.e. Accra, Kumasi, Tamale, Takoradi･Sekondi. The result shows 4.2 to 4.3 times / week and 4.3 times on average there was no significant difference among the cities. In addition, the volume of rice consumption per one intake was interviewed for 10 consumers per city randomly and the results are as follows:

- Adult: Margarine can (500g) / 2 persons → 250g / person
- Child: less than the above adult consumption, age 6 to 16 years old

  Example : 5 family members (parents + 3 children) 2 cans 1,000g → 200g / each).

Per capita rice consumption of the urban population ranges from 150 to 200 g/person and its annual consumption is estimated from 33.5 kg to 44.7 kg, and 38 kg (182 g / meal) on average.

Table 5.3 Frequency of Rice Consumption per Week for Urban Consumers and Estimation of Average Per-capita Consumption

Number of Times of Eating Rice in One Week	City								Total 4 Cities	
	Accra		Kumasi		Tamale		Takoradi, Sekondi			
	Reply	%	Reply	%	Reply	%	Reply	%	Reply	%
One	1	4.0	0	0.0	1	4.3	2	8.0	4	4.0
Two	2	8.0	2	8.0	5	21.7	6	24.0	15	15.0
Three	8	32.0	9	36.0	3	13.0	5	20.0	25	26.0
Four	5	20.0	2	8.0	6	26.1	1	4.0	14	14.0
Five	1	4.0	6	24.0	2	8.7	3	12.0	12	12.0
Six	1	4.0	0	0.0	0	0.0	0	0.0	1	1.0
Seven	7	28.0	6	24.0	6	26.1	8	32.0	27	28.0
Total	25		25		23		25		98	
Average in One Week	4.4 times		4.4 times		4.2 times		4.2 times		4.3 times	
Per Capita / Year (@0.15 kg/time)*	34.1 kg		34.7 kg		32.6 kg		32.5 kg		33.5 kg	
(@0.20 kg/time)*	45.5 kg		46.3 kg		43.5 kg		43.4 kg		44.7 kg	

Note: *Rice Consumption unit
One time / person (adult): 0.25kg
One time / person (all age): 0.15 to 0.20kg

Source: estimation based on the interview survey by the JICA Study Team, 2006.

(3) Estimation of Per capita Rice Consumption in Rural Population

Average per capita rice consumption in rural population is estimated at 9.2 kg per year on the basis of the average per capita consumption in urban population, the total rice supply 453,000 ton, and the urban and rural population as follows:

Table 5.4 Estimation of Rice Per-capita Consumption of Rural Population

Area		Urban	Rural	Whole Country
Population		9,170,000	11,360,000	20,530,000
Yearly Consumption	Per Capita (kg)	38.0	9.2	22.1
	Total (1,000ton)	348.5	104.8	453.3
	Consumption Ratio	76.9	23.1	100.0

Source: estimation based on the interview survey by the JICA Study Team, 2006.

According to the results of the interview surveys, rice producing farmers often take rice, however other farmers mainly consume traditional dishes such as yam, cassava, plantain and maize rather than rice. The urban population consumes around four times the rice intake of the rural population.

(4) Regional Balance of Rice Supply and Demand

1) Rice consumption by regions and cities

Based on the per capita consumption above, rice consumption of the rural population accounts for less than one fourth of the total consumption. The two regions, Greater Accra and Ashanti, are big consumption areas in Ghana, sharing about 50% of the total rice consumption and 30% of the total population as follows:

Table 5.5 Estimated Rice Consumption by Urban and Rural in Each Region (2003)

Region	Rural		Urban		Whole Region		
	Population (1,000)	Milled Rice Consumption (1,000 t) *1	Population (1,000)	Milled Rice Consumption (1,000 t) *2	Population (1,000)	Milled Rice Consumption (1,000 t)	%
Ashanti	1,863	17.1	2,131	81.0	3,994	98.1	21.7
Gt. Accra	408	3.8	2,898	110.1	3,306	113.9	25.1
Eastern	1,438	13.2	759	28.8	2,196	42.1	9.3
Western	1,348	12.4	768	29.2	2,115	41.6	9.2
Northern	1,452	13.4	526	20.0	1,978	33.3	7.4
Brong-Ahafo	1,224	11.3	731	27.8	1,955	39.0	8.6
Volta	1,264	11.6	467	17.7	1,730	29.4	6.5
Central	1,059	9.7	637	24.2	1,696	33.9	7.5
Upper East	802	7.4	149	5.7	951	13.0	2.9
Upper West	500	4.6	106	4.0	606	8.6	1.9
Total	11,358	104.5	9,171	348.5	20,529	453.0	100.0
Distribution Rate		23.1%		76.9%			

Source: GSS, Based on 2000 Population Census
Note: *1 Annual consumption per capita: 9.2 kg
*2 Annual consumption per capita: 38.0 kg

2) Regional balance of rice supply and demand

Regional balance of rice supply and demand is assessed on the basis of rice consumption in rural and urban areas and regional rice production.

Rice demand deficit is about 300,000 ton which was compensated by importation. Two regions, namely Northern and Upper East, have a surplus which is distributed to other regions. The Volta region is almost balanced. The Eastern and Western regions reach a self-consumption level. From a marketing point of view, domestic rice was distributed from rural area in the above five

regions and the rest of the five regions are rice consumption areas. The Greater Accra and Ashanti regions were prominent area consuming about 50% of the total rice consumption. Of the total shortage of rice (around 300,000 ton), the Greater Accra and Ashanti regions require more than 200,000 tons of rice (190,000 ton in urban areas of these regions).

Table 5.6 Estimated Rice Balance by Each Region (2003)

Region	Milled Rice Consumption(1000ton)				Milled Rice Production (1,000 ton) *3	Balance		Filling to Rural Consumption (%)	Condition *4	
	Rural *1	Urban *2	Total	%		Volume (1,000 ton)	Filling (%)		Rural	Whole Region
Western	12.4	29.2	41.6	9.2	13.3	-28.3	32.0	107.3	▲	×
Central	9.7	24.2	33.9	7.5	0.0	-33.9	0.1	0.0	×	×
Gt. Accra	3.8	110.1	113.9	25.1	2.0	-111.9	1.8	52.6	×	×
Volta	11.6	17.7	29.3	6.5	28.1	-1.2	95.9	242.3	○	▲
Eastern	13.2	28.8	42.0	9.3	16.4	-25.6	39.0	124.2	▲	×
Ashanti	17.1	81.0	98.1	21.7	7.0	-91.1	7.1	40.9	×	×
Brong-Ahafo	11.3	27.8	39.1	8.6	3.6	-35.5	9.2	31.9	×	×
Northern	13.4	20.0	33.4	7.4	56.4	23.0	168.9	420.9	○	○
Upper East	7.4	5.7	13.1	2.9	16.7	3.6	127.5	225.7	○	○
Upper West	4.6	4.0	8.6	1.9	2.3	-6.3	26.7	50.0	×	×
Total	104.5	348.5	453.0	100.0	145.7	-307.3	32.2	139.4	▲	×

Note: *1 Annual consumption per capita: 9.2Kg
*2 Annual consumption per capita: 38.0Kg
*3 Source: SRDI, Milled Rice Production is equivalent to 60% of Paddy Quantity
*4 Legend: ○: Surplus, ▲: Balanced, ×: Deficit
Source: JICA Study Team

5.3 Rice Distribution Channels and Quantity

(1) General Condition of Three Areas

There is no statistical data on rice transactions and marketing quantity. Rice marketing in the southern, central and northern areas of Ghana was assessed on the basis of the results of the baseline survey, market surveys in major cities and towns, and regional supply and demand studies as follows:

Basic Assumptions

- More than 300,000 tons of imported rice sharing 70 % of the total supply in Ghana is landed mainly from the Tema Port.
- Domestic rice production is about 150,000 ton which account for about 30% of the total supply of rice.
- Marketing quantity of domestic rice excluding home consumption of farmers is 10 to 20% of the total marketing rice including imported rice.
- Self sufficiency of rice in the rural area of Ghana is about 140% with surpluses of about 40,000 tons which account for 13% of the quantity of imported rice.

Southern Area（Greater Accra, Central, Western, Eastern and Volta Regions）

- Imported rice overwhelms the markets in the southern area near the Tema Port.
- Domestic rice is rarely sold in the markets of the southern areas. In the market survey in

July to August 2006, only one retailer in Sekondi selling local rice was found.

- Imported rice consumptions in the Greater Accra and Central regions are estimated at 10,000 ton and 30,000 ton, respectively.
- The Volta region is at a rice self -sufficiency level. The middlemen from other regions such as Accra and Kumasi procure a good quality of rice such as perfumed rice and red brown rice in the irrigated areas and the areas under the projects. On the contrary, local domestic rice is rarely in the regional center, Ho and other cities. About 10,000 ton of imported rice is consumed in the Volta region.
- In the Western and Eastern regions, imported rice is popular in the urban areas. Annual consumption of imported rice in two regions is estimated at about 60,000 ton. Domestic rice produced in the rural areas is locally consumed in the area. Some of them may be distributed to the neighboring regions or other regions' rice may be brought in, but the quantity is small.
- Imported rice is predominant in the southern areas under the limited production and marketing of domestic rice. A limited volume of local rice is traded beyond the regions by some middlemen who have information on production sites of marketable rice. These trades look like a thin line from one point of production area to a point of market, not like wide marketing stream. Actually, marketable surplus of local rice is limited and a little domestic rice remains in the local markets after distribution of local rice to other regions.

Central Area（Ashanti and Brong-Ahafo Regions）

- These two regions are large rice consumption areas, the same as the Greater Accra and Central regions.
- The central areas are neighboring to the northern areas which are major surplus areas of domestic rice.
- About 32,000 ton of surplus rice in the northern areas is brought to the central areas and accounts for 25% of the deficit of about 130,000 ton in the central areas.
- Considering strong preference for quality rice in the urban population, rice from the northern area may be mainly consumed in the rural area.
- In addition to domestic rice from the Northern, Upper East and Volta regions, about 90,000 ton of imported rice is brought to the central areas.
- Kumasi is a large consumption area for domestic rice from the northern areas and from the Western and Volta regions. Kumasi is located at the center of domestic rice trading as a crossing point between the vertical distribution flow from the northern areas and the horizontal distribution flow from/to the Volta and Western regions.
- Based on the information from retailers, rice made in the U.S.A. and Thailand brought through Cote d'Ivoire was sold in Kumasi central market. Its credibility and quantity are not certain.

Northern Area（Northern, Upper East and Upper West regions）

- The Northern and Upper East regions are rice surplus areas and the surplus quantity is estimated at more than 25,000 ton.
- The Upper West region is a rice deficit area with about 6,000 ton which is supplied by about 4,000 ton from the rest two regions and about 2,000 tones of imported rice from southern area. Rice imported from Burkina Faso is in Wa market, but its quantity cannot be estimated without any information.
- The urban population even in the major domestic rice producing areas tends to consume imported rice. Many rice shops in the markets of the northern areas sell imported rice, but the number of shops and rice varieties sold are not many as in the markets of southern areas. The results of the rice preference survey in the baseline survey show the consumers in Tamale have same preference and dietary habit on rice as the consumers in Accra, Kumasi and Sekondi of the central and southern areas. It could be concluded that imported rice is popular even in the surplus areas of domestic rice.
- In the northern areas, people traditionally consume parboiled rice and the majority of rice locally produced is processed to parboiled rice. However, most restaurants and hotels consume ordinary imported rice, and many imported rice including a little imported parboiled rice can be seen in the urban markets. Consumption of imported ordinary milled rice may increase mainly in urban consumers.
- After supply for rice deficit of the Upper West region, surplus quantity of domestic rice in the northern areas is estimated at about 32,000 ton which may be distributed to the central areas.

(2) Assessed Rice Distribution Channels and Their Quantity

Based on the assessment above, the major rice distribution channels and their quantity are shown in Figure 5.2. The distribution quantity in each region is as follows:

Table 5.7 Assumption of Distribution Quantity by Region

(Unit: 000 ton of milled rice)

Region	Production	Balance	Imported Rice			Local Rice		
			In	Out	Balance	In	Out	Balance
Western	13.3	-28.3	30	0	**30**	1.0	2.7	**-1.7**
Central	0.0	-33.9	60	30	**30**	3.9	0.0	**3.9**
Greater Accra	2.0	-111.9	97	0	**97**	14.9	0.0	**14.9**
Volta	28.1	-1.3	10	0	**10**	0.0	8.7	**-8.7**
Eastern	16.4	-25.7	30	0	**30**	1.0	5.3	**-4.3**
Ashanti	7.0	-91.1	110	40	**70**	21.2	0.0	**21.2**
Brong-Ahafo	3.6	-35.5	40	20	**20**	15.0	0.0	**15.0**
Northern	56.4	23.3	20	5	**15**	4.7	42.7	**-38.0**
Upper East	16.7	3.7	3	0	**3**	0.0	6.7	**-6.7**
Upper West	2.3	-6.4	2	0	**2**	4.4	0.0	**4.4**
Total	146.7	-307.3			307	66.1	66.1	0.0

Source: JICA Study Team

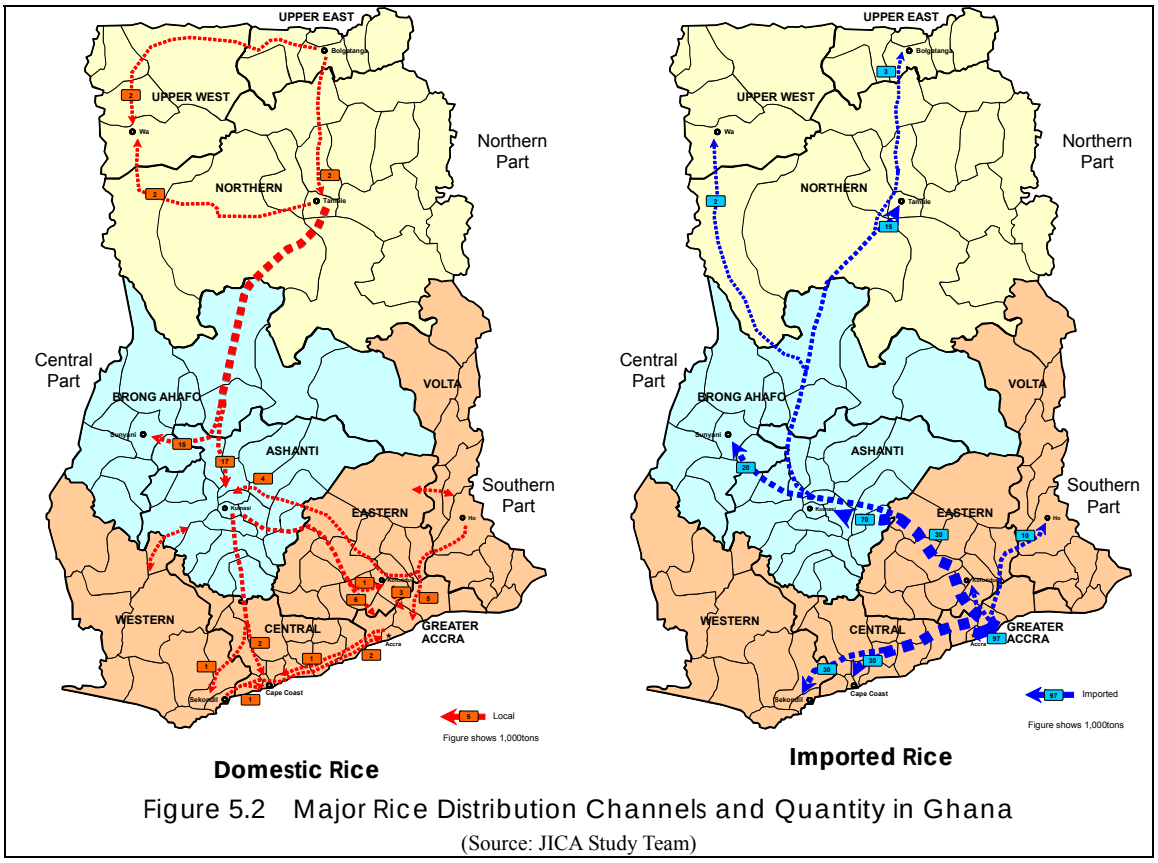


Figure 5.2 Major Rice Distribution Channels and Quantity in Ghana

(Source: JICA Study Team)

5.4 Rice Traders

(1) Traders for Imported Rice

More than 300,000 tons of rice is imported by ten or more importers. The major four importers are CCTC, Taj Inv. Ltd., IMEXCO and OLAM which share more than 70% of the total imports. Imported rice accounts for 80 to 90% of marketing rice in Ghana. Most of rice traders especially in urban areas engage only in imported rice. A limited traders engage in handling both imported and domestic rice or only in domestic rice.

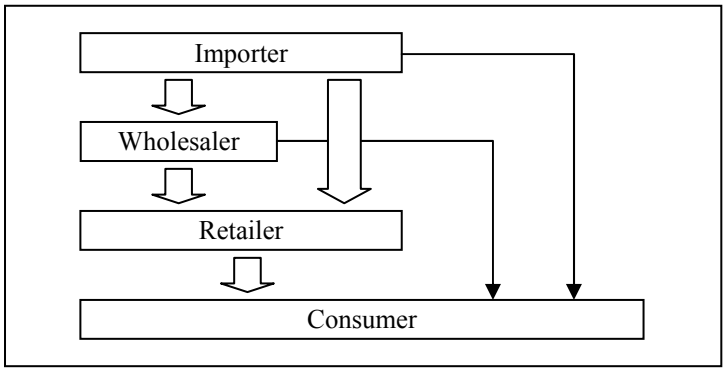


Figure 5.3 Various Distribution Channels for Imported Rice

Most of rice importers have their offices in Tema and Accra near the Tema Port where imported rice is landed. Marketing of imported rice starts from Tema area. Basic marketing channels comprise of

"importers" to "wholesalers" to "retailers" to "consumers". However, these basic steps are flexible and not exclusive for all trading participants. Various bypaths exist vertically and horizontally such as consumer may buy rice from importers and wholesalers buy rice from other wholesalers. Large importers have not organized any affiliated channels among other traders yet.

Under such irregular distribution channels of imported rice, characteristics of traders are as follows:

Wholesaler: Wholesalers are based in the big cities in Ghana and function as intermediates of rice trading to retailers in the surrounding areas. The wholesalers are used to owing 2 to 3 weeks' grace of payment to importers, but no exclusive relations exist. Big consumers such as restaurants and hotels buy imported rice from the wholesalers or importers, no domestic rice. The wholesalers have their shops with storages outside market areas and sell to consumers directly as well as to retailers who have their shops in the market area.

Retailer: Retailers procure rice from wholesalers and sell to consumers. Some retailers go to Accra and procure rice from importers occasionally.

The minimum unit of retailing of rice is margarine can with 500g. Imported rice is transported and handled by a 25kg or 50 kg plastic bag. Importers and wholesalers do not sell rice of less than a unit of a 25 kg bag. Even consumers can buy rice from wholesalers and/or importers, but they have to buy more units of 25 kg or 50 kg.

Wholesaler in Bolgatanga

Retailer in Kumasi

Wholesaler in Cape Coast

Retailer in Ho

(2) Traders for Domestic Rice

1) Condition of small scale production areas

Local collectors buy paddy from producers, mill it at rice miller and sell milled rice to consumers by themselves in market, to local retailers and/or to middlemen. Producers sometime mill paddy and sell milled rice by themselves to consumers in the nearest market.

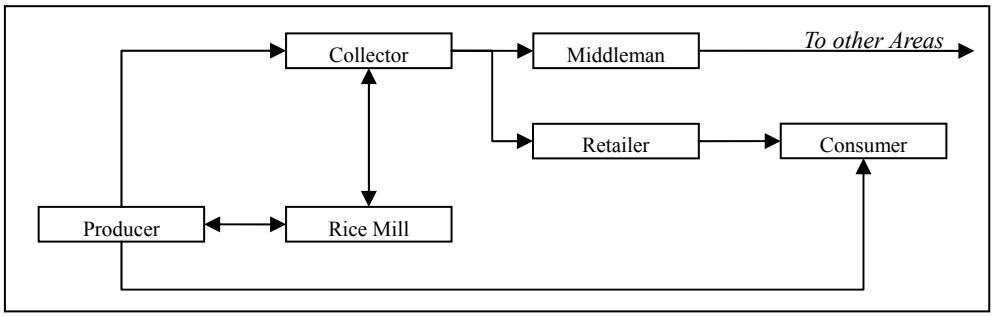


Figure 5.4 Distribution Condition of Local Rice (1)

2) Condition of irrigated areas and project areas producing rice

Irrigated areas and project areas produce a large quantity of unified and better quality of rice including some special varieties such as perfumed and red brown, therefore the middlemen come from other regions and procure the rice.

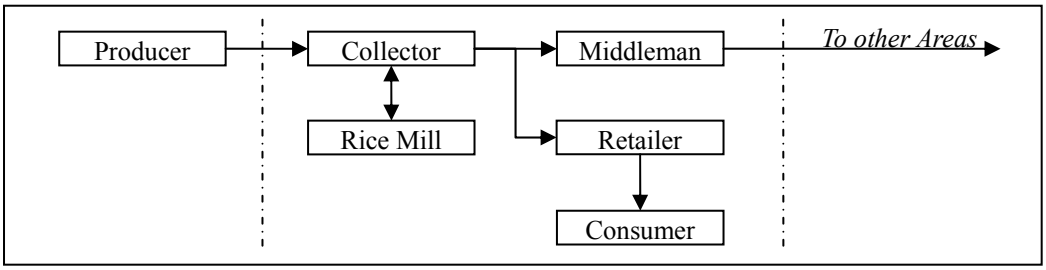


Figure 5.5 Distribution Condition of Local Rice (2)

The photo in the right is a shot of the entrance of a rice mill in Kumasi. The middlemen using this mill are used to procure qualify paddy from other regions such as Volta and Upper East. After they mill the paddy procured, they display the milled rice in bags for sale to local retailers and middlemen coming from Western and Eastern regions. The places are one of the intermediate markets of distribution channel for domestic rice.

3) Activities by "market mammy"

In the northern area in Ghana, the trader called "market mammy (women traders in the rice producing area)" has an important role for domestic rice trading. Their activities are shown in the figure below: Paddy trading of market mammy extends to the neighboring regions. For example,

the market mammies in Wa often go and procure paddy in the Northern region. There are same activities in the other regions except parboil processing.

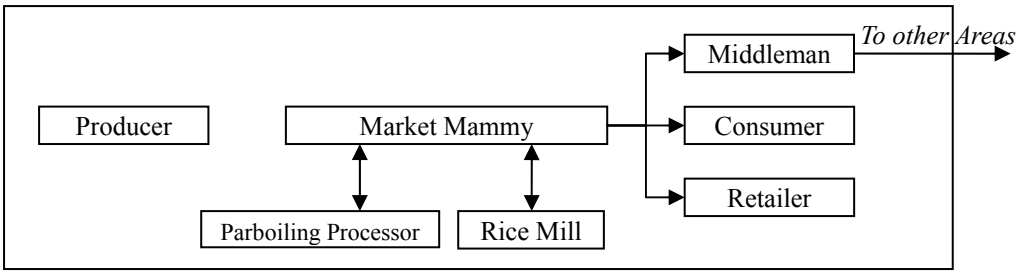


Figure 5.6 Distribution Condition of Local Rice (3)

Retailers in Tamale Market

Market Women at Rice Mill in Bolgatanga

Domestic rice with a limited quantity is traded at the areas in rice producing areas and their neighboring areas. The following domestic rice is dealt by inter-regional traders:

Special variety	:	Such as perfumed rice and red brown rice
A large quantity of paddy	:	Rice produced in the irrigated and project areas
Relatively better quality	:	Unified quality with less impurity

4) Containers of rice

Various sizes of cloths or vinyl woven cross bags are used for paddy containers which holds paddy from 70 kg to 110 kg. Traders and millers judge their weight by watching and using their experience without using scale (See photo below). Milled rice is usually displayed in bulk in the bowl and sold by various cans, buckets and bowls as a measuring unit. Filling up condition in these containers is varied by sellers. Inaccuracy of these measuring devices is a basic problem for commercial trading.

Various Sizes of Bags

Vessels for Measuring Milled Rice

5.5 Consumer's Needs and Trend

(1) Objectives and Method

1) Objectives

As mentioned above, the major rice consumers are the urban population in Ghana. To grasp their need and trends on rice, the Study Team carried out the Consumer's Preference Survey on Rice by the Evaluation Grid Method together with a supplemental interview survey covering a hundred consumers in the four biggest cities.

2) Method

"Evaluation Grid Method (EGM)" is the interviewing method for organizing the factors of the interviewees' preference on rice. EGM was applied through repeating simple questions of "Which do you prefer?" to interviewees by comparison of a couple of samples among all fifteen samples.

3) Number and place of interviewee

Twenty five consumers were interviewed at respective cities of Accra, Takoradi, Kumasi and Tamale. Total number of samples is hundred.

4) Condition of interviewee

General condition of selected interviewees is shown as follows:

Table 5.8 General Condition of Interviewees

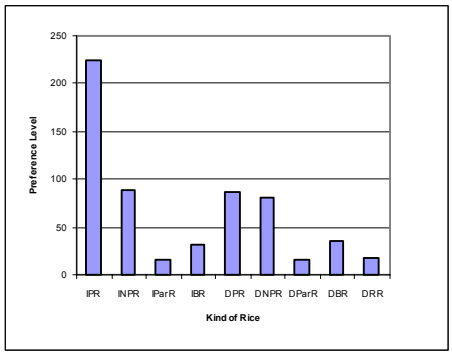
Item	City				Total
	Accra	Kumasi	Tamale	Sekondi	
Gender					
Male	7	5	6	3	21
Female	18	20	19	22	79
Age					
Below 19	3	2	2	2	9
20-29	21	3	11	9	44
30-39	1	12	9	8	30
40-49	0	5	3	4	12
50-	0	3	0	2	5
Marital status					
Married	2	19	10	12	43
Widowed	0	0	0	0	0
Single	23	6	15	11	55
Others	0	0	0	2	2
Occupation					
Salary	13	0	6	15	34
Trader	4	7	8	8	27
Self-employed	4	9	4	1	18
Food processor	0	3	3	1	7
Student	3	0	3	0	6
Others	0	5	1	0	6
Income source					
Salary	16	9	10	17	52
Profit from sales	2	12	11	7	32
Other	7	4	4	1	16

Source: Interview Survey by JICA Study Team

(2) Result of Survey

1) Imported perfumed long grain is the best

Preference orders of kinds of rice were (1) Imported perfumed (225 points), (2) Imported (88), (3) Domestic perfumed (87), (4) Domestic (80). Imported perfumed rice got the highest rank. In the view of grain shape, long grain perfumed rice is most preferable followed by long grain ordinary rice. Short grain rice, even though perfumed rice is not preferable.



Item	Code	Content
Imported	IPR	Perfumed
	INPR	Ordinary
	IPaR	Parboiled
	IBR	Broken
Local	DPR	Perfumed
	DNPR	Ordinary
	DPaR	Parboiled
	DBR	Broken
	DRR	Red

Figure 5.7 Preference on Kind of Rice

2) Rice consumption a week is four times more.

Respondents who consume rice more than 7 times are biggest with 28% of the total followed by three times with 26%, and 4.25 times on average. There are no significant differences among the four cities ranging from 4.2 to 4.3 times (Refer to Table 5.3). It seems that the consumers in urban area have their common preference and need beyond the respective regional circumstance.

3) Looks is important

Selection factors in rice purchase in order are no stones (22%), uniformity of grains (18%), less broken rice (15%), taste (12%) and price (10%). The factors of uniformity and less impure rice share a half and more, and the share including the factor of taste becomes 60%. Respondent consumers prefer the quality of rice rather than the price of rice.

Table 5.9 Factors Considered for Choice of Rice

Code	Factor	Number of Reply					Ratio
		Name of City				Total	
		Accra	Kumasi	Tamale	Skd-Tdi		
1	Packaging	9	5	2	2	18	6%
2	Advertising	6	1	0	1	8	3%
3	Price	12	5	5	8	30	10%
4	Availability in the market	4	4	0	5	13	5%
5	Quality (absence of stone)	12	19	13	19	63	22%
6	Quality (less broken rice)	6	15	10	11	42	15%
7	Quality (uniformity)	10	16	12	13	51	18%
8	Texture of cooked rice	7	7	7	5	26	9%
9	Taste	5	12	14	4	35	12%
Total						286	

Source: Baseline Survey, JICA Study Team. Sept. 2006.

4) Rice consumption becomes more frequent than traditional dishes.

The frequency of rice consumption a week was asked together with the traditional dishes as Fufu, Banku, Ampesi and TZ. The respondents in Kumasi consumed Fufu at 2.6 times, ones in Accra consumed Banku at 2.8 times and TZ consumption in Kumasi and Accra is rather less at 2.0 times. These averages in four cities are 2.1 times for Fufu, 2.3 times for Banku and 3.5 times for TZ, which have less rice consumption at 4.3 times a week. Any difference among difference income level of respondents was not found from the results of the survey.

Table 5.10 Consumption Frequency per Week for Major Foods

Name of Food	Consumption Frequency in A Week				
	Accra	Kumasi	Tamale	Skd-Tdi	Average
Fufu	1.6	2.6	2.2	1.9	2.1
Banku	2.8	2.2	.2	2.0	2.3
Tz	2.0	2.0	3.9	3.0	3.5
Ampesi	1.7	2.4	2.0	2.0	2.0
Rice	4.4	4.4	4.2	4.2	4.3
Others	3.0	1.5	4.0	3.7	2.5

Name of Food	Consumption Frequency in A Week			
	Monthly Income per Capita (Cedi)			
	<300,000	301,000-500,000	501,000-700,000	>700,000
Fufu	2.0	1.7	2.6	2.0
Banku	2.3	2.9	2.4	2.1
Tz	2.2	2.7	2.3	1.5
Ampesi	4.0	4.3	3.0	3.0
Rice	4.3	3.8	4.4	4.4
Others	1.7	0.0	1.7	3.4

Source: Baseline Survey, JICA Study Team. Sept., 2006.

Material and Cooking Method:

Name of Food	Material	Cooking Method
Fufu	Cassava＋Plantain	Stuffs are steamed and pounded
Banku	Maize	Flour is mixed with water, fermented, stirred with heat, and kneaded.
Tz	Maize	Flour is mixed with water, stirred with heat, and kneaded.
Ampesi	Yam or Plantain	Stuffs are boiled (Ampesi in photo is yam)

Fufu (Light soup with goat meat)

Banku (Okura stew with fish)

TZ (Tuo Zafi) (Okra soup with chicken)

Ampesi (Palba sauce)

(3) Result of Rice Preference Survey by Evaluation Grid Method (EGM)

The Study Team prepared 15 Samples for the Consumer's Preference Survey by EGM which were selected in more than 20 samples collected at nine major markets in Ghana. Each sample was placed in plastic bags without its brand name. The photos with basic information of 15 samples are presented in the following page. The samples consist of nine kinds of imported rice and six kinds of local rice.

Table 5.11 List of Samples used for EGM Survey

Label	Trade Name	Origin	Country of origin Production Area	Price (cedi/kg)	Procurement Market	Region
A	Ashante Broni	Domestic		6,000	Kumasi	Ashante
B	Uncle Sam	Imported	Thailand	10,000	Cape Coast	Central
C	Bolga Rice	Domestic	Upper East	6,000	Tamale	Northern
D	Eagle	Imported	U.S.A.	8,000	Sekondi	Western
E	Stallion	Imported	Vietnam	8,000	Ho	Volta
F	Viwonor	Domestic	Hohoe	7,200	Hohoe	Volta
G	Chinese Rice	Imported	China	6,000	Ho	Volta
H	Rising Sun	Imported	Thailand	8,000	Bolgatanga	Upper East
I	Justice	Imported	Vietnam	5,000	Cape Coast	Central
J	American #5	Imported	U.S.A.	7,000	Hohoe	Volta
K	Brown Rice	Domestic	Northern	8,000	Tamale	Northern
L	Local Perfumed	Domestic	Hohoe	8,000	Hohoe	Volta
M	Jasmin Rice	Domestic		7,000	Kumasi	Ashante
N	AAA	Imported	Vietnam	5,000	Cape Coast	Central
O	Parboiled Rice	Imported	Via Brukina Faso	8,000	Bolgatanga	Upper East

The result is as follows:

No.	Name	Origin	Note*1	Sampled at
Preferable five samples				
1	Uncle Sam	Thailand	157	Cape Cost
2	Eagle	USA	95	Sekondi
3	Parboiled Rice	imported from Burkina Faso	68	Bolgatanga
4	American#5	USA	67	Ho
5	Justice	Vietnam	64	Cape Cost
Inferior three samples				
1	Chinese Rice	China	-19	Ho
2	Stallion	Viet Nam	-16	Ho
3	Ashanti Broni	Ashanti	1	Kumasi

Note*1: The number indicated after the Origin shows evaluation score for preference

The most preferable sample was a Thai rice named Uncle Sam. Imported Chinese rice of a short grain was the most inferior sample for consumers. All other local rice samples were placed from middle to lower preference between the above two kinds. Construct on rice preference based on the survey is summarized below:

1) Consumers seem to think that rice is convenient for processing and cooking material (short time, less water and fuel consumption and easy eating) and good for health (giving strong body, long life and good skin).

2) Consumers prefer good appearance of rice with well polished and unified grains. They avoid the rice containing many impurities such as stones, dusts and broken rice that impede convenience of rice processing and cocking.

3) In addition, they prefer the long grain and perfumed rice because of enlarging volume after cooking and its taste.

No.1, Justice
Imported from Viet Nam
5,000 cedi/kg
EGM=I

No.2, AAA
Imported from Viet Nam
5,000 cedi/kg
EGM=N

No.3, Chinese Rice
Imported from China
6,000 cedi/kg
EGM=G

No.4
Imported from USA
7,000 cedi/kg
EGM=J

No.5, Eagle
Imported from USA
8,000 cedi/kg
EGM=D

No.6, Stallion
Imported from Viet Nam
8,000 cedi/kg
EGM=E

No.7, Parboiled Rice
Imported from Burkina Faso
8,000 cedi/kg
EGM=O

No.8, Rising Sun
Imported from Thailand
8,000 cedi/kg
EGM=H

No.9, Uncle Sam
Imported from Thailand
10,000 cedi/kg
EGM=B

No.10, Ashanti Broni
Domestic
6,000 cedi/kg
EGM=A

No.11, Bolga Rice
Domestic, Upper East
6,000 cedi/Kg
EGM=C

No.12, Jusmine Rice
Domestic, Upper East
7,000 cedi/kg
EGM=M

No.13, Viwonor
Domestic, Hohoe
7,200 cedi/kg
EGM=F

No.14, Local Perfumed
Domestic, Hohoe
8,000 cedi/kg
EGM=L

No.15, Brown Rice
Domestic, Northern
8,000 cedi/kg
EGM=K

No.1～9 Imported Rice
No.10～15 Domestic Rice

These rice are used as samples for "Consumer's Preference Survey on Rice by the Evaluation Grid Method (EGM)"

Amounts shown are retail prices in market.

Exchange rate (December, 2006)
US$1.00=9,200Ced=¥116
100cedi = ¥1.26
79.3cedi = ¥1

Alphabet puts for EGM means label shown in Table 5.11.

Domestic and Imported Rice Sold in Ghana

5.6 Market Price and Cost and Margin Structure

The baseline survey contains the interview to traders including importers but they did not disclose their financial condition so that the Survey could not collect enough and reliable information. Market prices and structure of cost and margin on rice marketing in Ghana were assessed by using limited information as follows:

(1) Imported Rice

1) Prices of imported rice

The import levy on rice importers in Ghana is 20% of FOB price same as the other countries surrounding Ghana according to the recommendation of the Economic Community of West African States (ECOWAS). Procurement cost of imported rice in Ghana was estimated on the basis of current international prices of rice as follows:

Table 5.12 Breakdown Cost of Rice Import

Item	Unit	High Grade	Low-grade	Remarks
FOB Price	US$ / ton	320.0	250.0	
Freight	US$ / ton	80.0	80.0	
Insurance	US$ / ton	4.8	4.0	(FOB+Freight) x 1.2%
Subtotal	US$ / ton	404.8	334.0	
Import Levy	US$ / ton	81.0	66.8	20%
Inspection Charge	US$ / ton	4.0	3.3	1%
ECOWAS Levy	US$ / ton	2.0	1.7	0.5%
EDIF Levy*	US$ / ton	2.0	1.7	0.5%
Subtotal	US$ / ton	493.9	407.4	
VAT / NHIL**	US$ / ton	74.1	61.1	15% (12.5+2.5)
Handling to warehouse	US$ / ton	15.0	15.0	
Subtotal	US$ / ton	582.9	483.5	
Financial cost	US$ / ton	30.4	25.0	3 months at CIFx30% of interest
Marketing cost	US$ / ton	29.1	24.2	5%
Total	US$ / ton	642.4	532.8	
	US$／bag	32.1	26.6	bag=50 kg
	cedi / bag	**295,523**	**245,074**	
	cedi / kg	**5,906**	**4,894**	

* Export Development and Investment Fund Levy ** National Health Insurance Levy
Source: Custom Excise and Preventive Service (CEPS) and Baseline Survey, JICA Study Team

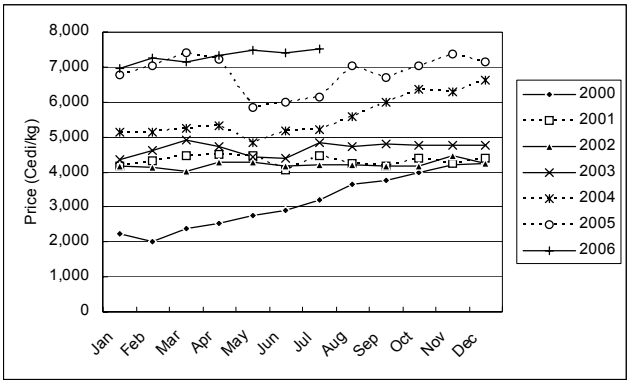
It is about US$650 per ton for high grade rice such as low broken rice content rice or perfumed rice from the U.S.A. or Thailand, and US$530 per ton for low grade rice such as 25 to 30% broken rice content of Vietnam or China.

2) Retail price and costs and margin for distribution

Various kinds and grades of imported rice are sold by different prices in the market. The Study Team collected 131 samples on retail prices from July to November 2006 including 55 samples for the Sample Analysis Survey in the baseline survey. The average retail price was 6,556 cedi ranging from the highest at 12,900 cedi of Sultana (Thailand) in Tamale and the lowest at 4,500 cedi Chinese and Vietnamese rice in Cape Coast and Takoradi.

The average monthly retail prices of imported rice have proceeded since 2000 as in Figure 5.8. The average price during January – July in 2006 was 7,300 cedi / kg.

The imported rice cost for importers is as follows:



Source: SRID, MOFA

Figure 5.8 Retail Price of Imported Rice

Table 5.13 Imported Rice Cost Estimation

(unit: cedi)

Unit	High Grade	Low Grade	Average
50 kg Bag	300,000	250,000	275,000
Per kg	6,000	5,000	5,500

Source: Estimation by the JICA Study Team on the basis of Table 5.12

The balance between the average retail price in the first half of 2006 and above average cost is 1,800 cedi that is about 25% of the retail price. Its total cost and margin are shared by all traders concerned in the rice marketing from importer to retailer. If importers secure five percent of margin to sales price, the cost and margin in subsequent distribution can be calculated in as follows:

Table 5.14 Costs and Margin of Imported Rice

	cedi / kg	% to Retail P.	Remarks
Importer's Cost	5,500	75%	
Importer's Margin	290	4%	5% to sales price
Costs and Margin remained	1,510	21%	21% to retail price
Av. Retail price	7,300		

Source: Estimation by the JICA Study Team on the basis of Table 5.12

Rice distribution flow is diversified and there are many bypasses. Margins of retailers according to the interview survey do not exceed more than 10% of the retail price.

3) Regional variation in market price

Regional variation in the market price is assumed, i.e. price in far distant place from the importers warehouses in the surrounding area of Tema Port as landing place of imported rice might be higher due to the transportation cost. Of 131 samples of retail prices of imported rice, seven representative brands that were collected from more than four regions were selected. These price samples (50 samples) are show as follows:

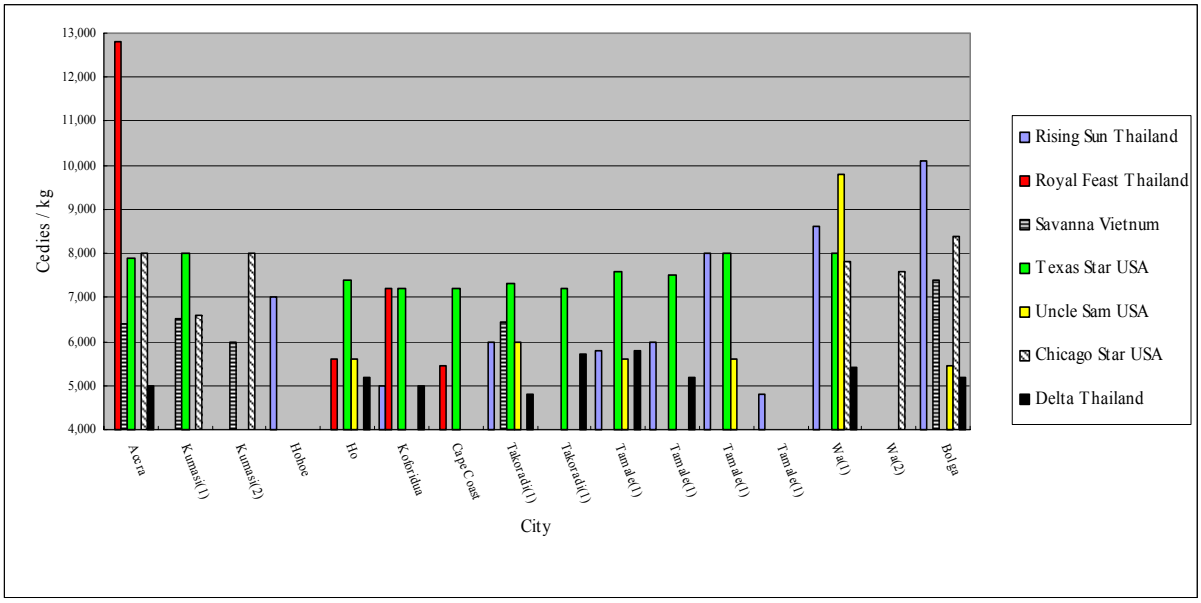
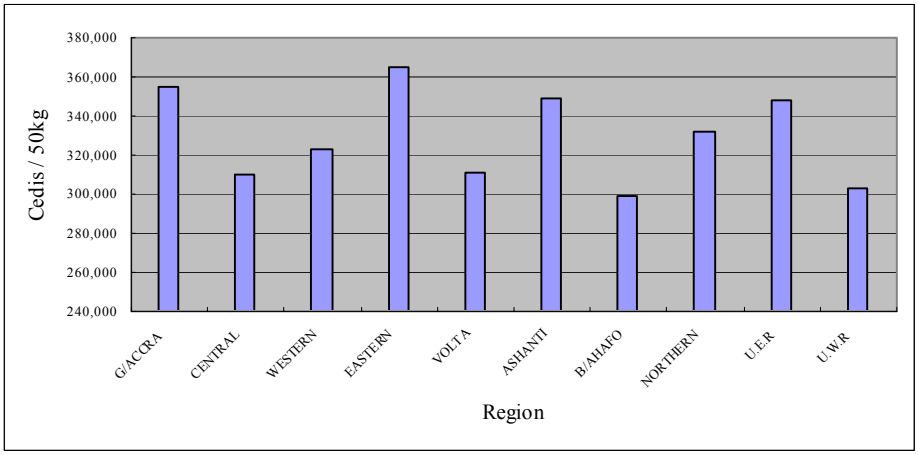


Figure 5.9 Retail Price of Imported Rice on 7 Brands

From the above, there is no trend to increase retail prices according to the distance from the imported site. The prices in Wa in the Upper West region and Bolgatanga in the Upper East region seem relatively high. But the prices of Accra are higher and the prices in Cape Coast in the Central region and Sekondi in the Western region seem low.

The following figure shows the average regional wholesale price of imported rice in 2005. Low prices in southern areas and high price in northern areas could not be identified. The wholesale prices in 2005 in the Greater Accra, Eastern, Ashanti and Upper East regions are higher than these in the Central, Volta, Brong Ahafo and Upper West regions.



Source: SRID, MOFA

Figure 5.10 Average Wholesale Price of Imported Rice in 2005

The following causes of the above situation might be considered:

- Various brands of imported rice, from low to high grades are distributed and sold in markets. Difference of prices becomes three times. High grade rice shall be consumed more by urban consumers in the Greater Accra and Ashanti regions and average prices become higher. In

the regions with low wholesale prices, urban people shall consume lower grade rice. The wholesale prices might be affected rather than difference of transportation cost.

- It is often explained by many persons concerned that local rice is mixed with imported rice, repacked and sold as the imported rice. In this case, the imported rice could be sold cheaper. The lower prices in the northern areas with surplus rice production might be affected.

(2) Local Rice

1) Producer's Price

The sales prices were collected from 218 farmers in three villages in the five regions under the baseline Survey. The results are as follows:

Table 5.15 Sales Price of Rice Producers

Region		Ashanti	Western	Volta	Northern	Upper West	Average
No. of Producers		42	44	45	45	42	218
Paddy (84kg)	**Average**	**308,036**	**238,636**	**285,000**	**208,333**	**220,000**	**252,001**
	Highest	350,000	280,000	290,000	280,000	240,000	308,000
	Lowest	250,000	200,000	200,000	150,000	200,000	200,000
Milled Rice (50kg)	**Average**	**306,071**	**293,636**	**306,333**	**250,000**	**260,000**	**283,208**
	Highest	350,000	350,000	378,000	300,000	280,000	331,600
	Lowest	280,000	250,000	250,000	200,000	240,000	244,000

Source: Baseline Survey, JICA Study Team

Sales prices of farmers collected in the Statistics, Research and Information Directorate (SRID), Ministry of Food and Agriculture collects are as follows:

Table 5.16 Farm Gate Price of Rice

(Unit: cedi 1,000 / 100kg milled rice)

		2005							2006									Ave-
Region	District	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	rage
Western	Tarkwa	650							750	500							620	630
Central	Mankessim	600						653	630		640	660	650	650		660	660	645
Volta	Hohoe	600		600		640	640	800	500	600	640		660	700		700		644
Eastern	Asamankese		450	350	400	410	420		550	550	550	550	400	400	520	530	500	470
Ashanti	Ejura	600	600	600	600		520		570	600	620	620	640	640	630	630	620	606
Brong-Ahafo	Techiman	600			505			450	450	360	480	340	367	460	450	400	400	439
Northern	Tamale	475	470	505	520	460	340	540	506	423				400	420	360		452

Source: SRID, MOFA

Average sales price of farmers is 250,000 cedi in bag (84 kg) and 280,000 cedi in bag (50 kg). Since 50 kg of milled rice is averagely produced from 84 kg of paddy in Ghana, 30,000 cedi as the balance of their prices is the milling cost. And the price differs among regions, high in the Ashanti and Volta regions and low in the Northern region. The price in the Volta region seems to be affected by the production of perfumed rice and red rice that are sold at higher price. A large demand of rice in the Ashanti region, might affect the prices.

2) Wholesale Price

Based on the wholesale prices of rice in 14 cities of Ghana prepared by SRID, MOFA, the

average wholesale price from July 8 to November 18, 2006 was about 630,000 cedi per 100 kg. The highest average price was 766,000 cedi at Obuasi in the Ashanti region followed by 751,000 cedi at Kumasi in the Ashanti region and Cape Coast in the Central region. The lowest price was 410,000 cedi at Tamale in the Northern region followed by 480,000 cedi at Techiman in the Brong Ahafo region, 562,000 cedi at Koforidua in the Eastern region and 565,000 cedi at Accra in the Greater Accra region.

The difference between 560,000 cedi per 100 kg of the average sales price of farmers and 630,000 cedi of the average wholesale price is only 70,000 cedi and 11% to the wholesale price. The following table shows the differences between average sales price of farmers and average wholesale price in the five regions from the baseline survey:

Table 5.17 Sales Price of Producers and Wholesale Price in 5 Regions

cedi / milled rice	Unit	Western	Volta	Ashanti	Northern	Upper West	Average
Producer's Sales	50kg	293,636	306,333	306,071	250,000	260,000	283,208
Wholesale Price	100kg	656,000	634,000	750,000	410,000	625,000	626,000
Difference	100kg	68,727	21,333	137,857	-90,000	105,000	59,584
	%	10.5	3.4	18.4	-22.0	16.8	9.5

Source: Baseline Survey, JICA Study Team and SRID, MOFA

The regional supply and demand of rice could be observed. In the Northern region having surplus of rice, limited buyers and traders of rice result in a rice trade with less margin or without sales profit. Actually, market mammy and middleman transport rice to the Ashanti or Upper West region where more margins is expected. Farmers in the Northern region face difficulties to find buyers at local markets. It could be understood that the rice of the Volta region flows in Kumasi, the Ashanti region.

The average wholesale price in the Greater Accra region is low. It is assumed that most domestic marketable rice in Accra flows toward Kumasi because the consumers in Accra prefer more imported rice and the rural population in Accra shares only 8% comparing with a half in the Ashanti region.

As explained above, the markets in the area from Kumasi and Obuasi in the Ashanti region to Cape Coast in the Central region are profitable for the surplus domestic rice in northern areas and the marketable rice in the Volta region.

3) Retail Price

There are irregular retail price data in SRID statistics such as sudden drop. The market information collected and processed by SRID contains many artificial mistakes in typing and processing. Careful utilization of these data is necessary.

The average retail price from July 8 to November 18 is about 6,600 cedi per kg, the highest price is 8,000 cedi at Cape Coast in the Central region and the lowest price is 4,500 cedi at Tamale in the Northern region. Anyhow, the retail price at Obuasi and Kumasi in the Ashanti region is high

together with at Cape Coast in the Central region, and the price at Sunyani and Techiman in the Brong Ahafo region is low trend following Tamale that is the same trend as the wholesale price. The 6,600 cedi of the average retail price is only 300 cedi higher than 6,300 cedi of the average wholesale price. It is about 5% of the retail price.

Same as imported rice, there is no clear demarcation between wholesalers and retailers for domestic rice trade in Ghana. One sample is the activities of market mammies. Most of them engage the rice trading business from procurement of paddy -like collectors, sales to retailers like wholesalers and sales to consumers like retailers. Some of them transport rice to other regions like middlemen.

On the other hand, there are the shops handling relatively large amount of domestic rice beside a market. They sell rice to consumers and also sell to small retailers in a market. The margin of small retailers is 5-10% according to the interview survey.

4) Costs and Margin

Various traders such as market mammies are participating in the trade of domestic rice. Costs and margin structure from the producer's sales price in five regions to retail price is analyzed as follows:

Table 5.18 Cost and Margin Structure on Local Rice Distribution

Stage	Milled rice	Unit	Western	Volta	Ashanti	Northern	Upper West	Average
1	Producer's Price**	84kg	238,636	285,000	308,086	208,333	220,000	252,001
2	Producer's Price	50kg	293,636	306,333	306,071	250,000	260,000	283,208
3	Wholesale price	50kg	328,000	317,000	375,000	205,000	312,500	313,000
4	Retail price	50kg	400,000	345,000	395,000	225,000	337,000	340,400
C+M	**Trading 1→3**	50kg	89,364	32,000	66,964	-3,333	92,500	60999
	Rate of C + M	%	27.2	10.1	17.9	-1.6	29.6	19.5
	Trading 1→4	50kg	161,364	60,000	86,964	16,667	117,000	88,399
	Rate of C + M	%	40.3	17.4	22.0	7.4	34.7	26.0
	Trading 3→4	50kg	72,000	28,000	20,000	20,000	24,500	27,400
	Rate of C + M	%	18.0	8.1	5.1	8.9	7.3	8.0

Source: JICA Study Team
* C+M: Costs + Margin

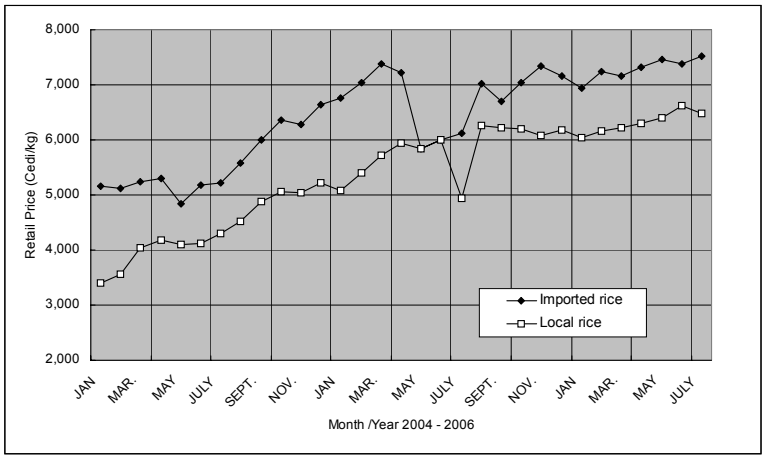
The traders procuring rice from farmers get 20% of costs and margin to the sales price on average when they sell to wholesalers and 26% when they sell to consumers. These rates vary by regions. The traders get smaller costs and margin in the Northern region and more costs and margin in the Ashanti and Upper West regions. The small retailers in the market get 8% of costs and margin to the sales price but receive more in the Western regions.

(3) Relation between Imported Rice and Domestic Rice

The average price of imported rice is 290,000 cedi per 50 kg including importer's margin and the price of low grade imported rice is 260,000 cedi per 50 kg. The average sales price of domestic rice farmers is 283,000 cedi per 50 kg. Both average prices are almost the same in the entry point of rice marketing

in Ghana. However, these styles of market entry are different, i.e. imported rice is stored in importers' warehouses and domestic rice is stored at farmers' storage being spread out in the production area over the country.

The following figure shows the average monthly retail price of imported rice and domestic rice from 2004 to 2006. The data was prepared by SRID and has also some irregular figures. Basically, the price of domestic rice always followed the price of imported rice constantly. The price of domestic rice was 17% lower than those of imported rice. It means that the range of the costs and margin in imported rice is 17% larger than of domestic rice when the entry price of imported and domestic rice is same in rice market. The imported rice is more profitable than domestic rice for traders. On the contrary, the costs and margin of domestic rice could be increased at about 17% more if the rice quality is improved to be the same as imported rice.



Source: SRID, MOFA 省

Figure 5.11 Comparison of Monthly Retail Price between Imported Rice and Local Rice

It was recognized that some rice even at a limited quantity such as the perfumed rice and red rice in the Volta region and rice produced in the Upper East region was sold at 8,000 to 10,000 cedi per kg almost same as of high grade imported rice. In addition, the domestic rice was sold at a higher price than some imported rice in Hohoe rural market. It is suggested that the domestic rice could get same price as high grade of imported rice if the quality rice preferable to consumers is produced and marketed.

(4) Market Information

SRID, MOFA solely collects, processes and stores the market information of rice and agricultural products.

Market price data is collected periodically by the enumerators assigned at the regional agricultural offices. Regional agricultural office assembled and compiled the data and submitted to SRID in Accra. The commodities of market price are 32 agricultural products. In addition, various information such as transportation costs, price of agricultural inputs, hiring charge of tractor and bullock, labor charge and tenant fee of land is also collected. The 133 markets are selected for data collection and 14 markets are designated as the main markets. The list of commodities and the markets for collection of market price are shown, respectively as follows:

Table 5.19 Commodities List for Market Data Collection

No.	Commodity	No.	Commodity	No.	Commodity
1	**Maize**	11b	**Plantain (Apem)**	22	**Groundnuts (red)**
2	**Millet**	12	Orange	23	**Cowpeas (white)**
3	**Guinea corn (Sorghum)**	13	Banana	24	Groundnut oil
4	**Rice (local)**	14	Pineapple	25	**Palm oil**
5	Rice (imported)	15	Mangoes	26	Beef
6	**Yam (white)**	16	**Tomatoes**	27	Pork
7	Cocoyam	17	Garden eggs	28	**Smoked herrings**
8	**Cassava**	18	Onion	29	Salted dried fish
9	Gari	19	Ginger	30	Eggs
10	Cassava chips (Kokonte)	20	Dried pepper	31	Live birds
11a	**Plantain (Apentu)**	21	Unshelled Groundnuts	32	Anchovies

* Bold letter: Major commodities, Source: SRID, MOFA

Table 5.20 Market List for Market Data Collection

Region	Urban	Rural	Main markets
Western	4	10	Sekondi, Takoradi
Central	4	10	Cape Coast, Mankesim
Greater Accra	8	8	Accra
Volta	6	6	Ho
Eastern	8	9	Koforidua
Ashanti	4	11	Kumasi, Obuasi
Brong Ahafo	8	11	Sunyani, Techiman
Northern	2	11	Tamale
Upper East	3	4	Bolgatanga
Upper West	3	3	Wa
Total	50	83	14

Source: SRID, MOFA

The market prices of major commodities at 14 main markets are compiled and sent by facsimile or courier to SRID soon after collection. SRID processed the data in the next week. The rest of information of all commodities and items are sent later to SRID and these data process are monthly made. There is no periodical publication of the compiled market information other than annual report named “Facts and Figure” and no dissemination in public except occasional provision to a private weekly newspaper named “Business and Financial Times”. A mass-communication program though a radio was made before, but does not exist now due to a lack of budget.

Proper dissemination system of the market information stored in SRID has not established yet or has malfunctioned now. It could be used for private persons concerning rice industry. Sources of market information for farmers and traders are limited at verbal information from friends or others. Data processed in SRID may have mistakes in typing and processing and a lack of data. Reliability and accuracy for this data is low. Careful data utilization is required.

CHAPTER 6 SUPPORTING SYSTEM FOR AGRICULTURE

6.1 Agricultural Research

Council for Scientific and Industrial Research (CSIR) under the Ministry of Environment, Scientific and Industrial Technology (MEST) is responsible for the following eight agricultural research institutes:

1. Crops Research Institute (CRI), Kumasi
2. Savannah Agricultural Research Institute (SARI), Nyankpala and Wa
3. Food Research Institute, Accra
4. Water Research Institute, Accra
5. Animal Research Institute, Achimota and Accra
6. Soil Research Institute (SRI), Kumasi
7. Oil Palm Research Institute、Kusi and Kade
8. Plant Genetic Research Centre, Accra

In addition, Kpong Agricultural Research Station attached in the National University of Ghana operates basic research on rice and maintains foundation rice seeds[1].

6.2 Agricultural Extension

The Directorate of Agricultural Extension Services (DAES), MOFA is in charge of agricultural extension. Subject Matter Specialists (SMS) are assigned at the regional level and Agricultural Extension Agents (AEA) at the district level for extension activities. Around 2,300 AEAs are assigned for 2,770,000 farm households nationwide as follows:

Table 6.1 Regional Agricultural Extension Agents (AEA)

Region	No. of AEAs	No. of Farm Households	No. of Households Under One AEA
Upper West	120	70,910	591
Upper East	148	271,324	1,833
Northern	281	375,416	1,336
Brong Ahafo	298	296,443	995
Ashanti	364	450,300	1,237
Eastern	337	353,811	1,050
Volta	206	339,208	1,647
Western	190	272,493	1,434
Central	210	183,071	872
Greater Accra	132	158,989	1,204
Total	2,286	2,771,965	1,213

Source: Directorate of Agricultural Extension Services (DAES), MOFA

1 National University of Ghana has Kade Agricultural Research Station (Citrus) and Ashale Botwe Agricultural Research Station (Animal).

Number of households under one extension agent varies by region and extension services are not provided equally such as 591 households per agent in the Upper West region and 1,833 households per agent in the Upper East region (three times that of the Upper West region).

AEA conducts routine activities to contact each farmers group once every two weeks to consult about their issues. However these duty activities are only conducted with one agent per 1,200 households on average due to a short of extension budget in the regions. Strengthening extension services and improving the extension system are necessary for development of the rice sector.

MOFA coordinates with the Council for Scientific and Industrial Research (CSIR) to link research, extension and farmers through exchange of information for effective adaptive research and extension activities.

MOFA implements private extension programs on a pilot basis under Agricultural Support Services Investment Program (AgSSIP) at eight districts in six regions (Volta region; Hohoe, Central region; Assin North, Ashanti region; Adansin South, Eastern region; Suhum Kraboa Coaltar and Kwahu South, Upper East region; Bakiku East and Garu Tempara, Upper West region; Jirapa Lambussie). Around 130 farmer organizations participate in the pilot extension program.

The following three farm institutes and five colleges of agriculture are established for education and training for agricultural extension agents. The Farm Institutes have a one year training program and short term programs requested from the regions. The colleges of agriculture educate extension agents in three years.

Table 6.2 Education and Training Institutes for Agricultural Extension

Farm Institute (1year)	College of Agriculture
(1) Wench Farm Institute Wench, Brong Ahafo Region	(1) Kwadaso Agri College Ohawu, Kumasi, Ashanti Region
(2) Asuansi Farm Institute Asuansi, Central Region	(2) Ohawu Agric College Ohawu, Volta Region
(3) Adidome Farm Institute Adidome, Volta Region	(3) Ejura Agric College Ejura, Ashanti Region
	(4) Damongo Agric College Damongo, Northern Region
	(5) Pong-Tamale Veterinary College Northern Region

Source: Directorate of Human Resources and Management, MOFA

6.3 Agricultural Finance

Agricultural Development Bank (ADB) and rural banks are formal institutions for agricultural and rural financing. Rice millers and traders are sometimes providing informal funds to farmers to collect paddy from them. The eligible conditions for ADB loan is membership of farmers organization and evaluation of the borrower. ADB loan approval and fund release to farmers are time consuming process and delayed for timely release. Informal lending from rice millers and traders is

obligated to sell farmers' products to their financers.

ADB loan disbursement in agricultural sector accounts for 85% of the total loan amount nationwide. ADB provides the following financial services. In addition to ADB, private rural banks are operating agricultural financing.

Table 6.3 Terms and Conditions of Agricultural Development Bank

Scheme	Eligible Items	Conditions
Short-term	Agricultural production, marketing, etc.	Repayment in 18 months, with annual interest; 25% (depending on kinds of crops and loan amount)
Middle-term	Procurement of agricultural machinery, livestock, farm inputs	Repayment in 18 to 36 months, with annual interest; 25% (depending on kinds of crops and loan amount)
Long-term	Initial investment of new projects	Not specified depending on the purposes and loan amount

Source: Agricultural Development Bank

6.4 Production and Distribution of Certified Seeds

Foundation seeds and certified seeds are maintained and produced at the research stations, National University of Ghana, and Irrigation Development Centre (IDC) of GIDA as follows:

Table 6.4 Seed Production and Maintenance

Institutes	Kind of Seed	Variety
Crops Research Institute: CRI, Kumasi	Foundation seed	Rain-fed lowland and upland rice
Savannah Agricultural Research Institute: SARI, Tamale	Foundation seed	Rain-fed lowland and upland rice
University of Ghana, Kpong Agricultural Research Station	Foundation seed	Rain-fed lowland and upland rice
Irrigation Development Centre: IDC, Ashaiman	Foundation seed, certified seed	Irrigated lowland rice

Source : Plant Protect Regulatory Services、Crop Services, MOFA

IDC has a production capacity of 10 ton/year of certified seed. However, its seed production is limited at 2.5 ton due to scarce demand. Certified seed distribution system is not organized. Certified seeds are not sold in the farm inputs dealers and only available at the regional and district agricultural offices, Crops Research Institute, or Savanna Agricultural Research Institute. They are far and not accessible for farmers and do not have sufficient seed quantity. Exchange of seeds among rice farmers and using former products as seeds are common.

Such projects as "Inland Valley Rice Development Project", "Food Security Rice Producers' Organization Project" and "NERICA Rice Dissemination Project" have seed production component and farmers could purchase certified seeds.

6.5 Procurement and Distribution of Agricultural Inputs

Farmers buy farm inputs such as fertilizer and agro-chemicals at the shops nearby or using loans from ADB and private traders. Dealer shops are located at regional and district centers and far from farmers.

Farmers' constraints are high prices, long distances, time consumption process and a shortage of funds for procurement.

6.6 Related Organizations

Such related organizations as the Ministry of Food and Agriculture (MOFA), local governments of regions and district, and Inland Valley Rice Development Project are shown below:

(1) Ministry of Food and Agriculture (MOFA)

The chief director is the technical and administrative head of MOFA and the chief advisor to the minister on all policies and other matters in the agriculture sector. Under the chief director, there are eight technical service directorates such as the Crop Services Directorate, the Agricultural Engineering Services Directorate, the Extension Services Directorate, and Statistics, Research, and Information Directorate. There are other directorates which deal with policy and management as well, and all are as shown below: The technical service directorates are implementing projects by multilateral and bilateral assistance as well as normal recurrent activities. In relation to the rice, the Crop Services Directorate is the implementing agency of NERICA Dissemination Project, Lowland Rice Development Project, Inland Valley Rice Development Project, and so on.

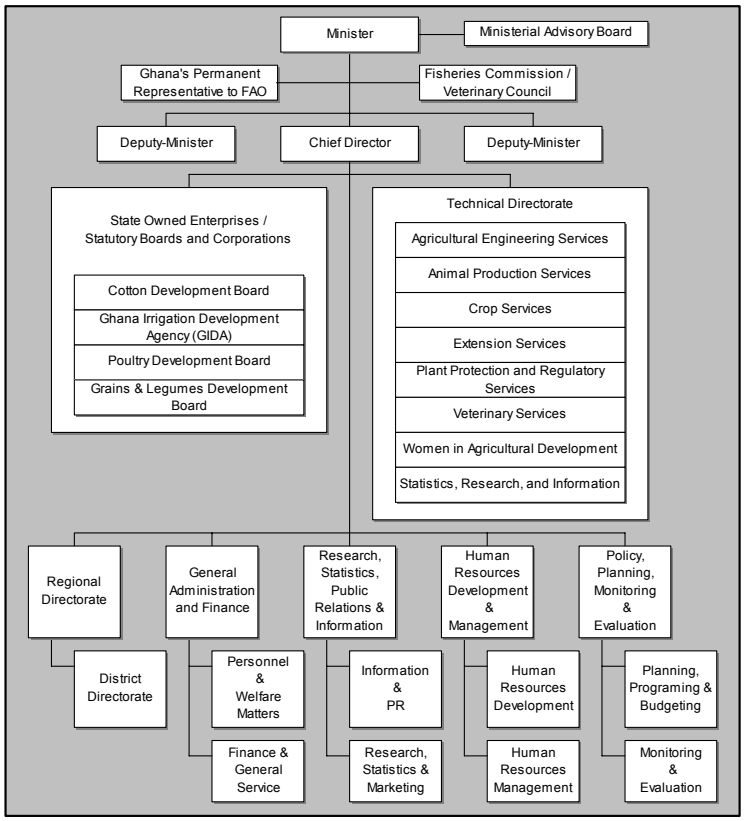


Figure 6.1 Organization Chart of Ministry of Food and Agriculture

(Source: JICA Study Team)

The Agricultural Engineering Services Directorate is in charge for the grant assistance for underprivileged farmer (the former the grant assistance for Increase of food production: 2KR) which mainly provides agricultural machineries. Ghana Irrigation Development Authority (GIDA) is the independent authority under MOFA. However, it is examined in new National Irrigation Policy which is now under preparation whether GIDA becomes one of the directorates under MOFA.

The Policy, Planning, Monitoring and Evaluation Directorate are in charge for the preparation and coordination of policies in MOFA, and for monitoring of the implementation of policies and projects including multi- and bilateral projects, too.

(2) Regional and District Government

The regional minister is the head of the administration in the regional government. There are several offices under the deputy regional minister, which are implementing their works under the national government. In the district government, the district chief executive is the top under the regional government, and there are the assemblies, coordinated by the district coordinator.

Under the district assemblies, councils at urban, town and area levels are responsible for the lowest level local administration. In entire Ghana there are 124 districts under 10 regions, and the average population of each district is about 75,000. Urban councils are set for units in a district, of which population is more than 15,000. Town councils are for ones which has population more than 5,000, and units with population less than 5,000 have area councils. In the country, there are 34 Urban councils, 250 Town councils, and 826 Area councils. Under these councils, a Unit committee is organized, covering population of 500 to 2,500.

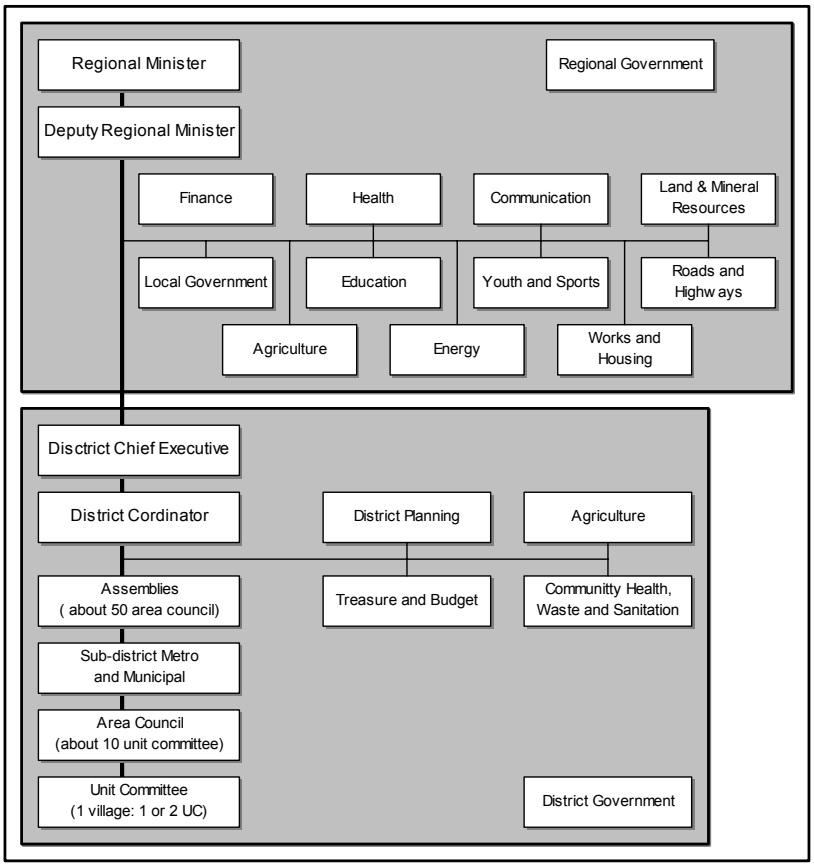


Figure 6.2 Organization Chart of Regional and District Government

(Source: JICA Study Team)

There are three metropolitan assemblies in the large cities, namely Accra, Kumasi, and Shama Ahana Ease, in addition to districts. Furthermore, 10 Municipal Assemblies are set under big cities.

(3) Regional Office of Ministry of Food and Agriculture

Under MOFA, the regional offices are located in each region and the district offices in each district as the operational arm to implement and monitor the agricultural policies. The Regional Director of Agriculture is the head of the regional office, and the District Director of Agriculture is the top of the district office, both responsible for the financial, administrative, technical management, supervision, and monitoring of agricultural programs and activities. Organization charts of regional and district offices of MOFA are shown in Figures 6.3 and 6.4, showing organizations of the Zabzugu district and Tamale municipality in the Northern region, as examples.

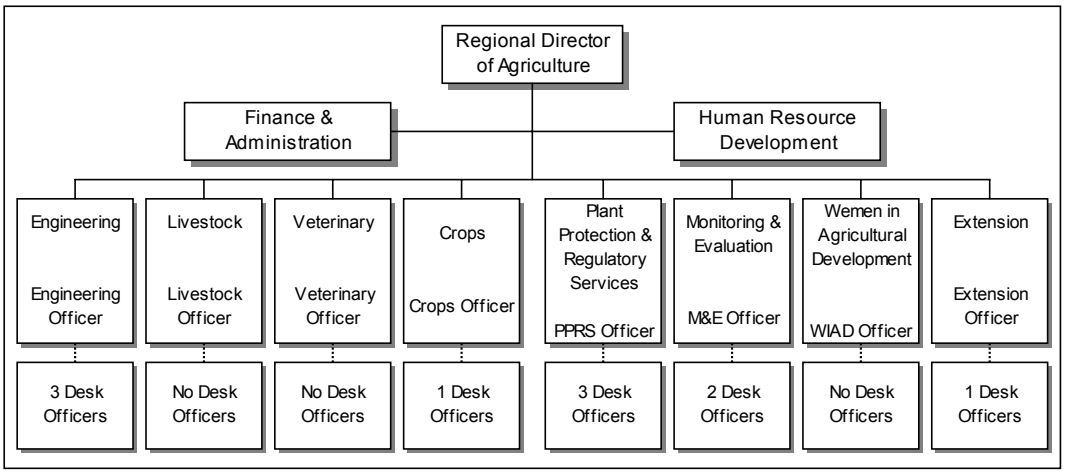


Figure 6.3 Organization Chart of Regional Office of Ministry of Food and Agriculture (Northern Region)

Agricultural Extension Agents (AEAs) attached to the District Office are conducting extension work through direct contact with farmers. Numbers and specialties of these officers differ depending upon districts. Regarding of the rice cultivation, some of AEAs received the training in GIDA and others were trained under JICA program in Egypt. Some AEAs attended the site survey with the Study Team have enough capacity to guide farmers' leaders. Such projects under implementation like the Inland Valley Rice Development Project and NERICA Rice Dissemination Project under implementation include project components to strengthen guidance activities to farmers by involving AEAs in the district office in collaboration with Crops Research Institute in Kumasi and Savannah Agricultural Research Institute in Tamale.

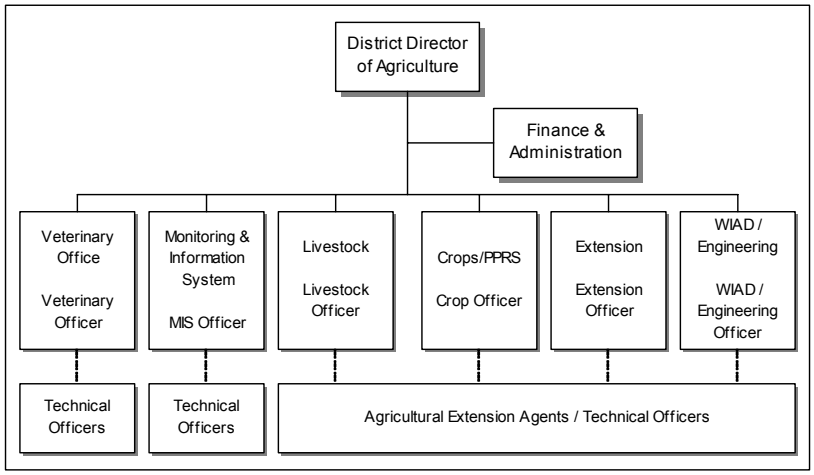


Figure 6.4 Organization Chart of District Office of Ministry of Food and Agriculture (Zabzugu district and Tamale municipality in Northern Region)

(Source: JICA Study Team)

(4) Inland Valley Rice Development Project (IVRDP)

Some projects are implemented under the multi and bilateral assistance, and the project offices are established under the implementing agencies of respective technical services directorates. Under the Inland Valley Rice Development Project, the National Project Coordinating Unit, established in the project office located in Kumasi, are implementing the project activities in the five regions of Ashanti,

Brong Ahafo, Central, Eastern and Western. In the project office, the project coordinator is appointed to take responsibility for project implementation, and three personnel are in charge for water management, crop cultivation, and post harvest.

Regional directors of agriculture are appointed as the Regional Rice Development Officers in each regions, and District Agricultural Development Units are established in each district where the project sites are located. In the District Agricultural Development Units, the scheduled officers are appointed to coordinate the extension activities and supervise the AEAs.

Extension agents are extremely busy because their duty is not only the project tasks but also their normal extension activities. Therefore, the project employs NGOs support the activities of rice millers and beneficial farmers, and the Extension Agents supervise NGOs. Organization chart of IVRDP project office is shown in Figure 6.5.

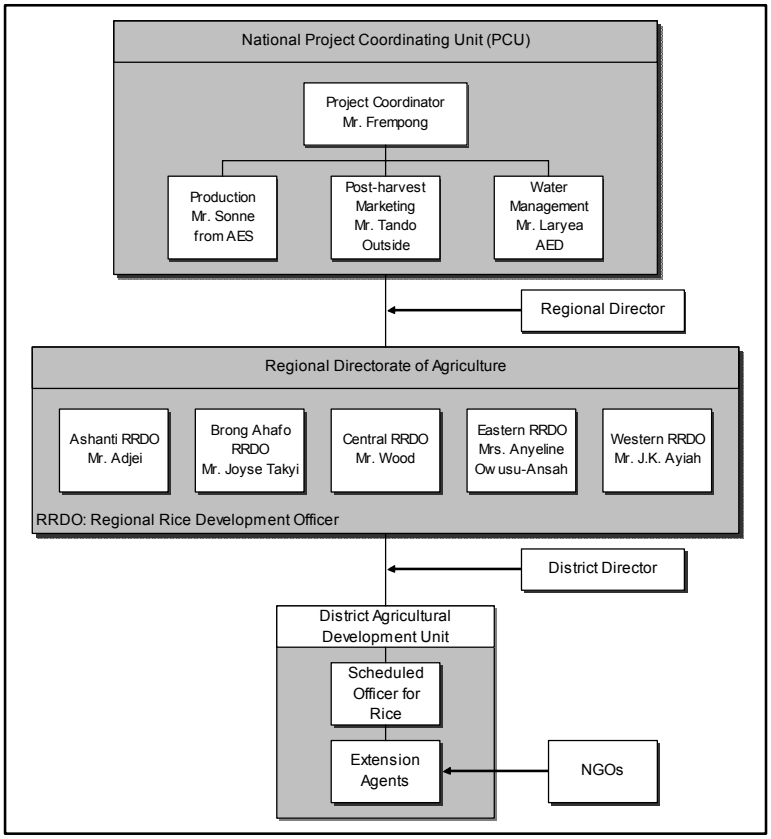


Figure 6.5 Project Office of Inland Valley Rice Development Project

(Source: Interview by the JICA Study Team)

6.7 Support to the Rice Sector by GRIB

(1) Background about Establishment of GRIB

The Lowland Rice Development Program (LRDP) was implemented in the Northern region from 1999 to 2003 under the assistance of the French Development Agency (Agence Frensase Development: AFD) and developed around 1,200 ha of 1owland paddy fields (Refer to Table 2.4 and Sub Chapter 3.4). For the follow-up of LRDP, AFD implemented the Food Security and Rice Producers Organization Project (FSRPOP) has been implemented under the AFD assistance from 2003 to 2007, and currently AFD is implementing the Support to the Rice Sector in Northern Ghana, which targets to develop of 6,000 ha of lowland rice and support the farmers' organizations in four regions of Northern, Upper West, Upper East and Volta from 2007 to 2012.

In Lowland Rice Development Project, rice production was increased but the produced rice was put under severe competition against the imported rice in terms of distribution and consumption. In this sense, improvement of whole process such as production, post harvest, distribution and consumption

was planned by introducing of the concept of the "value chain" including the aspects from production to consumption of rice. In order to improve the process in the value chain, the Ghana Rice Inter-Profession Body (GRIB) was established in October in 2004 by FSRPOP under the initiative of the Crops Services Directorate of MOFA as a main body to organize the stakeholders in the private sectors related to the rice value chain, and the GRIB's secretariat is located in MOFA. GRIB envisages to stimulate activities of the rice sector by creation of favorable environment in the rice value chain for all the stakeholders to obtain benefits at every steps of the rice value chain from production to consumption.

(2) Member and Activities of GRIB

Members of GRIB have been increasing and reached to 8,000 people including 20 farmers' organizations, 10 groups of rice millers, five women's processing groups, 15 brokers and dealers as of November 2006. GRIB has been conducting dissemination of information to increase both production and consumption of rice, guidance of farming practice, trial operation of color sorter to improve rice quality, strengthening of business capacities of rice millers and establishment of rice development fund. Its activities expand to whole nation starting from northern three regions and the Volta region.

(3) Coverage Area of GRIB

GRIB has been expanding its organization by dividing the rice growing area of the country into 14 zones (refer to Table 6.5). These zones include the GIDA irrigation schemes as well as schemes assisted by other agencies. In assisting the rice sector in Ghana, collaboration with the GRIB network would be important to cover the wide special area and the broad activities covering production, post harvest, milling, distribution, and consumption.

Table 6.5 Coverage Area of GRIB

Zone		Region	Rice Growing Area	Area Council / Unit Council
1.	Zone 1	Volta	Afife (GIDA)	Avalavi, Aveyime, Ada
2.	Zone 2	Greater Accra	Asutsuare	Akuse Dawhenya (GIDA), Kpong (GIDA), Ashiaman (GIDA), Gemini
3.	Zone 3	Volta	Hohoe &Worawora	Jasikan, Gbambila
4.	Zone 3b	Northern & Volta	Damgbai & Nkwanta	Krachi, Bimbila
5.	Zone 4	Upper East	Navrong, Vea & Fumbisi	Sandema, Bolga, Zuarungu
6.	Zone 5	Upper West	Wa	Wichau, Dorimo, Bulonga
7.	Zone 6	Ashanti	Asante Akyem & Aframso	Nobwam (GIDA), Odumasi, Teacher, Kobriti
8.	Zone 6b	Brong Ahafo	Atebubu	New Kokrompe, Jatozonjo, Techiman, Subrisu
9.	Zone 7	Central & Eastern	Okereko	Assin Fosu, Kade, Oda
10.	Zone 7b	Western	Shama Ahanta	(no indication)
11.	Zone 8	Western	Sefwi Wiawso	Tanoso (GIDA), Aferi, Asafo, Ahokwea
12.	Zone 9	Northern	Tamale	Tolon, Kumbungu, Savelugu, Nanton, Nasia, Bontanga (GIDA)
13.	Zone 10	Northern	Salaga & Buipe	(no indication)
14.	Zone 11	Northern	Yendi, Gushiegu & Karaga	(no indication)

Source：GRIB Secretariat, Accra, November 2007

CHAPTER 7 PROBLEM ANALYSIS

7.1 Objectives

This problem analysis was made on the basis of analytical results of the present conditions of paddy production, post harvest, distribution and marketing, and supporting system described in Chapters 3, 4, 5, and 6, respectively.

The Ministry of Food and Agriculture (MOFA) stipulated the development constraints against the rice sector of Ghana in a Cabinet Information Paper issued on 15th April 2005. The rice sector of Ghana faces such constraints as (i) insufficient water control on low-lying paddy fields especially floods and droughts, (ii) shortage of farm mechanization, (iii) insufficient post-harvest facilities, i.e. mills, grain moisture meters, weighing machines, parboil vessels, etc., (iv) limited access to micro-finance for farmers, (v) weak farmer organizations, (vi) insufficient financial supports to middlemen and traders under weak marketing systems, and (vii) shortage of grain sorters and bagging machines.

The Study takes the above-mentioned points and the findings through the participatory workshops into consideration. Furthermore, the Study made a structural analysis in order to identify the development constraints against the rice sector of Ghana.

7.2 Results of Workshop for Participatory Problem Analysis

Workshops involving relevant stakeholders were held to search improvement directions for solving constraints in rice sector of Ghana. Workshops were held in three sites covering Accra (December 19th to 21st, 2006), Tamale in the Northern region (January 10th to 12th, 2007), Ho and Hohoe in the Volta region (January 16th to 18th, 2007). Participants in the workshop were comprised of the government staff concerned, rice producers, consumers, rice millers, traders and retailers. The number of participants was 225 persons in total consisting 6 rice importers, 40 producers, 20 rice millers, 40 traders, 30 retailers, 52 consumers and 37 government staffs are as follows:

Table 7.1 Outline of Workshop

(Unit: Person)

	Accra	Tamale	Ho and Hohoe	Total
Rice importers	6	-	-	6
Producers	-	12	28	40
Rice millers	-	12	8	20
Traders	6	14	20	40
Retailers	-	15	15	30
Consumers	16	16	20	52
Government staff	8	9	20	37
Total	36	78	111	225

Source: JICA Study Team

Problems clarified in the workshop are summarized by respective stakeholders as follows:

1) Rice importers : ・Against rice importation, competition among importers become serious.
2) Producers : ・Due to difficulty in rain-fed management, production is unstable.

・Price of product is cheap.
・Financing is not timely provided.

3) Rice millers :
・Original spare parts are hardly procured.
・Paddy with many foreign materials affects rice mills and results in break down of mills.
・Traders often do not buy low quality of rice.

4) Traders :
・Quality of domestic rice is lower than imported one.
・Domestic rice is not popular and has a limited merit for trading.

5) Retailers :
・Consumers do not prefer domestic rice due to a wrong understanding of domestic rice.
・Domestic rice is not profitable compared with imported one.
・Domestic rice quality is lower than imported one.

6) Consumers :
・Feature of domestic rice with impurity and many broken rice is bad.
・Preparation and cooking of domestic rice are time consuming compared with imported one.
・Price of domestic rice is higher than imported one.
・Enlarging volume of domestic rice after cooking is small compared with imported one.

7) Government staff :
・Wrong information on domestic rice is prevailing.
・The government policy is not certain.
・Protection of domestic rice is not sufficient.

In addition to the above problems, analysis of supplemental survey shows the following subjects:

1) Insufficient marketing of domestic rice in the urban areas

It is difficult to find domestic rice in Accra and Kumasi. The majority of rice sold in those markets is imported. Domestic rice traded is low quality and inferior to imported ones, consumers prefer imported rice than domestic one.

2) A shortage of information on domestic rice

Under a lack of high quality of domestic rice in the markets, consumers' knowledge on domestic rice is none or biased. Domestic rice campaign is made by GRIB and other NGO, however their effects are limited. Prevailing consumer understanding such as the bad flavor of domestic rice compared with imported one shall be corrected.

3) Consumers do not strain imported rice

Based on the results of the workshop, consumers prefer a good flavor of rice and not stick to imported rice and producing areas. Many consumers in the workshop have opinions on the selection of domestic rice with affordable prices because of its certainty and safety compared with no certification of imported one.

4) Tastiness of rice is an important factor for selection of varieties

Results of the workshop and supplemental survey on tasty of rice show consumers' interests with

regard to rice are not only the features and fragrance but also taste. For example, Jasmine 85 is famous for its stickiness and most of consumers like its taste. This variety will compete with high quality imported rice. Ongoing projects select rice varieties from the producers' view points. But it is necessary taking consumers' preference. Present characteristics of rice varieties focus on productivity, however taste indicators such as amylase content are not available. Inland Valley Rice Development Project plans selection of varieties through taste testing by consumers. It is necessary to expand these kinds of activities nationwide.

5) Importance on growing eating habit

The workshop shows prevailing rice eating of participants' children. In 2005, school lunch with domestic rice is introduced. This is important for expansion of domestic rice consumption in the future.

7.3 Structural Assessment on Development Constraints in Rice Sector of Ghana

The results of the above workshops show the constraints based on the own benefits for the respective stakeholders. In order to achieve a competitive domestic rice sector, structural assessment on development constraints based on the current condition of respective stakeholders and technical analyses will be indispensable. A Master Plan shall be formulated taking the following structural problem assessment in production, post-harvest and marketing fields into consideration.

7.4 Problems in Paddy Production

A diversity of problems is identified in both rain-fed rice farming and irrigation rice farming. The Study firstly made an attempt to discuss the problems of rain-fed rice farming which provide the livelihood to over 90% of rice farmers in Ghana.

The Government of Ghana has directed their efforts to improvement of rain-fed rice farming. Various experiences have been accumulated through LRDP. It is also expected to encourage the rain-fed rice production through IVRDP. The problem structure was analyzed for the core problem "low progress of rain-fed rice development" on the basis of lesson learnt from the above-mentioned programs. The analytical results are presented as a problem tree in Figure 7.1.

The development constraints comprise five major aspects such as social constraints, natural factors, insufficient government support, weak incentives among the private sector and lack of nation-wide development plan for rain-fed rice farming. The social constraints are represented by the traditional land tenure system. Prior to implementation of inland valley development, land lease contract cannot be easily signed between a land owner and tenant farmers. The delay of land mobilization resulted in lower progress of the development programs as a whole. In addition, farmers' capacity on literacy and numeracy is insufficient.

Unfavorable natural conditions include large fluctuation of rainfalls during the crop seasons and low soil fertility. Without perennial water sources and water control facilities, paddy yield is strongly governed by rainfall pattern of the year. Farmers have reconciled to such given conditions.

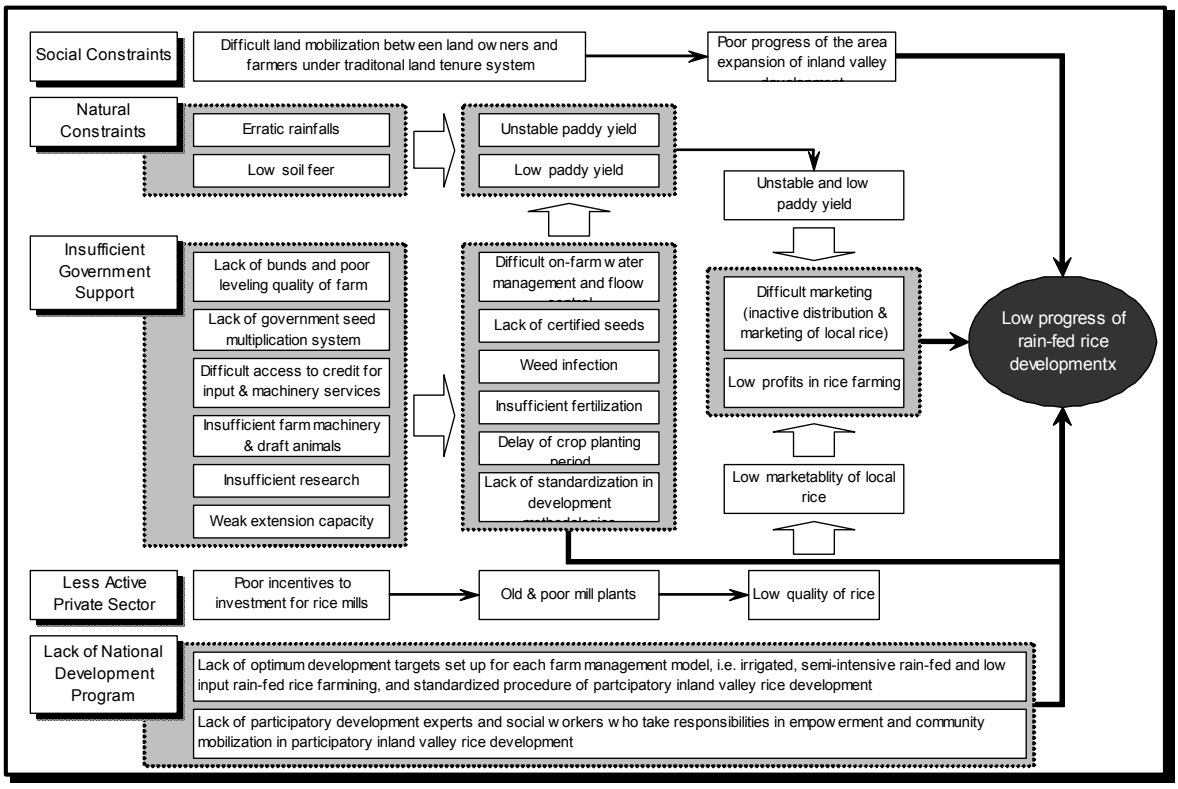


Figure 7.1 Structural Problems in Rain-fed Rice Development

Insufficient government supports make several causes of low paddy yield. Major aspects are (i) low land leveling quality of paddy fields and lack of bunds to retain rain water, (ii) shortage of certified seeds, (iii) difficult access to agricultural credit, (iv) shortage of fertilizers and agro-chemicals due to lack of funds, and (v) delay of crop planting period. Delay of crop planning period is accelerated by a shortage of farm machinery and draft animals. Weak institutional set-up for rice research and extension linkage is also a negative factor.

The incentive of the private sector is another constraint as mentioned in Chapter 4. Rice millers provide milling services on the demand of farmers and middlemen. The milling charge is fixed and not related to the quality of milled rice, which the millers process. Consequently, the millers are less serious to improve rice quality and do not direct their investment to appropriate maintenance and replacement of mill plants. The low quality of domestic rice makes its price lower and marketing difficult.

Constant supply of rice is also a key factor to maintain market channels to urban consumers. Due to lack of grain storage, paddy is milled within the short period after being harvested and released to the markets in a few months. Price decreases affect farmers' revenue.

It is also noted that development efforts are not effectively directed due to a lack of nation-wide development strategy and plan for the rain-fed rice farming. Coordination among donors and government agencies concerned is utmost important. Under the rationalized plan accepted by the Government optimum development target has to be set up for each farm management model, i.e.

irrigated, semi-intensive rain-fed and low input rain-fed (including upland rice) rice farming. The procedure of participatory inland valley rice development shall be standardized. The capacity building program will also be required to train up development experts and social workers who take responsibilities in empowerment and community mobilization in participatory inland valley rice development.

7.5 Problems in Post Harvest

The problem analysis was made to identify prevailing causes of low quality of milled rice. The study paid special attention to low quality of paddy due to delay of harvesting and low incentive of rice millers to improvement of milled rice quality from both technical and management points of view.

(1) Low Quality of Paddy due to Delayed Harvesting and Threshing

Large-scale farm machinery has been decreasing in number under the restructuring programs in 1980s and 1990s. Table 7.2 presents the comparison of the numbers of farm machinery in 1980s and 2002.

Table 7.2 Comparison of Number of Farm Machinery between 1980s and 2002

Farm machinery	Number (1985-1990)	Number (2002)	
		Total Numbers	Operational (No.)
Wheel tractors	4,120	3,500	2,100 (60%)
Crawler tractors	40	4	4
Combine harvesters	200	21	21
Power threshers	none	90	90
Rice mill plants	50	300	300
Hand tillers	200	4,500	1,800 (40%)
Reaper	120	200	200

Source : Special Task Force Report on Strategies for Improving the Rice Industry in Ghana, Ministry of Food and Agriculture, April 2003.

Although combine harvesters are replaced by reapers to a limited extent, a hortage of machinery forces rice farmers to undertake manual harvesting. Considerable portions of paddy fields are not harvested in the right period. In addition, shortage of threshers results in delay of harvesting and threshing practices. Even if paddy hills are cut by sickles and knives, they are left on the farm for an unnecessarily long period. Under strong sunrays, paddy grains are often over-dried and cracked. On the contrary, paddy grains are often damaged by high moisture with irregular rainfalls. Colored grains are thus caused by malts and bacteria under high humidity. They are sometimes rotten or germinated.

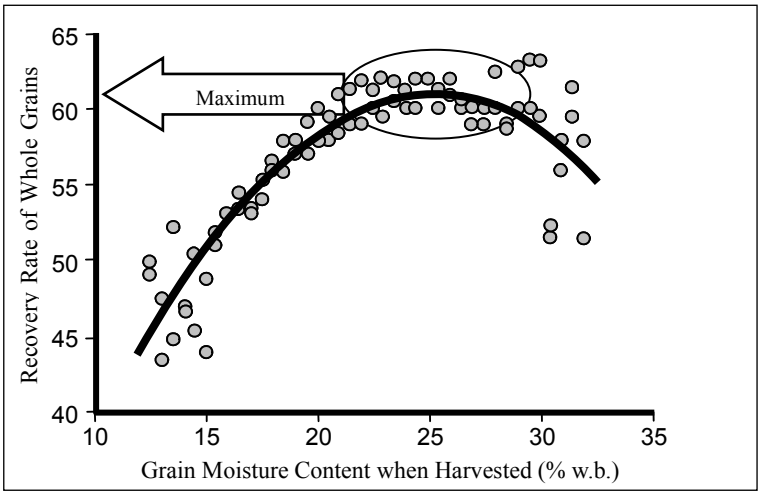


Figure 7.2 Relationship between Grain Moisture Content when Harvested and Whole Grain Recover Rate

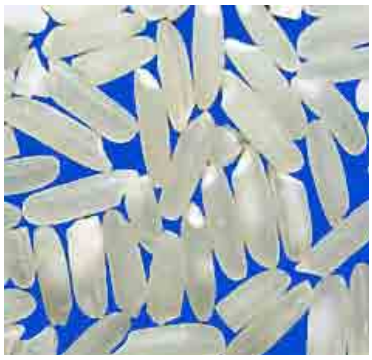
The relationship between moisture contents and recovery rates of whole grains when harvested is illustrated in Figure 7.2. The whole grains recovery rate is at maximum when

moisture content is around 25% at harvesting period. It is highly important to harvest paddy grains within the optimum periods by paying special attention to moisture contents of grains. Delay of harvesting results in sharp decrease of moisture contents and lower recovery of whole grains.

Over-dried grains are often cracked as seen in the photographs below. They are not same samples but referred to show the typical problems of over-drying. The photo on the left shows the sample of bran rice after carefully removing husks by hand. They are kept on farms unnecessarily for long period and over-dried. Grains are already cracked before milled. The photo on the center shows the typical broken rice after milled. Even though sophisticated modern rice mills are introduced, recovery rate of whole grains will not be able to be improved. Quality control of milled rice should be started before paddy grains are transported to the rice mills. This fact has to be known by all the stakeholders, namely farmers, millers and middlemen, who share value of improvement of rice quality.

Bran rice already cracked before milled due to over-drying。

Broken rice content is increased and milling recovery rate is decreased when cracked paddy grains are milled



Whole grains from paddy grains under strict moisture control on farm and during stored.

The following shows the result of the sample analysis conducted with the baseline survey of this study. Samples were procured at retail shops in 5 target regions of baseline survey.

Table 7.3 Result of Analysis of Domestic and Imported Rice

Origin	Q'ty of Samples	Mean Value						
		Retail Price (Cedi/kg)	Moisture Content (% wb)	Ratio of Broken Rice (%)				Ratio of Colored Grain (%)
				Total	Large Broken	Medium Broken	Small Broken	
Domestic	92	4,719	13.6	49.9	10.0	14.6	25.3	1.5
Imported	55	6,728	12.8	26.0	5.9	6.2	13.0	0.5

Source: Baseline Survey 2006, JICA Study Team

The result of classification of above samples based on Milled Rice Quality Standard (GS765, 2003) which was established by Ghana Standard Board is shown below. As the classification, 1st grade means the highest quality and 5th means the lowest. The table shows percentages of each grade against the total of each origin.

Table 7.4 Result of Classification of Domestic and Imported Rice by Milled Rice Quality Standard

Origin	1st Grade	2nd Grade	3rd Grade	4th Grade	5th Grade	Out of Grade
Domestic	0.0%	4.3%	6.5%	5.4%	82.6%	1.1%
Imported	5.5%	50.9%	16.4%	10.9%	16.4%	0.0%

Source: Baseline Survey 2006, JICA Study Team

From the above analysis, it is regrettable that the quality of domestic rice is clearly lower than the imported rice. It is considered that the largest cause of low quality of domestic rice may occur prior to the paddy husking and milling process, such as harvesting, threshing, drying and storage of paddy, such as;

- Excessive drying caused by inappropriate harvesting time and threshing time (usually, too late timing),
- Disorders by high moisture content by shortage of drying of paddy, and
- Deterioration of paddy by inappropriate storage.

From the result of analysis of domestic and imported rice above, contamination ratio of broken rice of domestic rice is indeed double that of imported ones. And it can be concluded that broken rice is triggered before husking and milling process. Of course, broken rice can be separated from the whole grain, but it reduces the yield of whole grain, and total sales amount becomes lower.

(2) Lower Quality of Milled Rice as a Result of Use of Mills of Lower Standard

Large portions of millers use Engelberg type rice mills. Engelberg type mills are characterized by their simple mechanism to husk grains by a rotating iron screw bar. Milling recovery rates tend to be lower, while broken rice contents to higher. This is the first constraint to make rice quality improvement difficult.

Apart from the technical constraints mentioned above, the structural constraints derived from the business interests of rice millers are identified through the interviews to the millers.

1) Business situation and low financial capacity of rice millers

The rice millers of Ghana are basically service providers for contract milling on demand of farmers and middlemen. The business situation of the millers often causes several problems. The problem structure is summarized as follows:

Table 7.5 Cause-Effect Analysis of Lower Quality Rice (Management)

No.	Causes of Low Quality Rice	Problems
1	Milling charges are not directly linked with the quality of their services	• Milling charges are paid upon quantity of paddy to be milled. • The rice millers are not motivated to improve rice quality by introducing better rice mills.
2	Lack of quality standard of paddy and rice	• The existing quality standard of paddy is not substantially applied. • No quality standard of rice is enacted although price of rice is affected by quality in local markets.
3	Rice mill business is basically profitable.	• The rice millers are satisfied with current profits and have low incentive to further investment for rice mills.

Source: JICA Study Team

The rice miller in Aduiyama of the Ashanti region was interviewed in order to prepare the financial balance sheet of rice milling business. The preliminary results are summarized below:

Summary of rice mill management

- The owner of the rice mill is a large farmer and installs the mill for processing of his paddy. Milling services are also done for villagers. Milling charge is 300 cedi/kg (The result of baseline survey shows that mean amount of milling charge by Engelberg type mill is 278 cedi/kg in all surveyed area and 542 cedi in the Ashanti region).
- The equipment consists of Engelberg rice mill and 24 hp engine (second-handed). The initial investment amounted to 19.0 million cedi in total, i.e. 7.0 million cedi for the mill and 12.0 million cedi for the engine.
- Processing capacity is 250 kg/hour. Fuel consumption is 4.5 liter/hour. Fuel for one kg of paddy is 140 cedi.

Preliminary financial analysis

Conditions : The life span of the equipment is estimated to be five (5) years. Annual operation period is 120 days selected from October to next May.

i) Revenue

- Paddy processed : 250kg paddy/hour x 5hr/day x 120 day/year = 150,000kg paddy/year
- Milling charge : 300 cedi/kg paddy
- Annual revenue : 150,000kg paddy/year x 300 cedi/kg = 45.0 million cedi/year……(1)

ii) Cost

- Initial cost : 19.0 million cedi, Annual depreciation: 3.8 million cedi/year (5 years)
- Fuel : 140 cedi/kg x 150,000kg = 21.0 million cedi/year
- Other costs : labor wages, consumables, spare parts, repairs, others (50% of annual depreciation): 3.8 million cedi/year x 50% = 1.9 million cedi/year
- Annual cost : 3.8 million cedi/year + 21.0 million cedi/year + 1.9 million cedi/year = 26.7 million cedi/year……(2)

iii) Balance

- Annual reserve : (1) revenue - (2) cost = 18.3 million cedi/year……(3)

The initial investment requires an amount of about 41.9 million cedi consisting of 19.0 million cedi and 22.9 million cedi. On the other hand, the revenue during five years amounts to 90 million cedi. The analysis shows that the initial investment of 41.9 million could be recovered by the revenue of the first year, i.e. 45.0 million cedi. Ongoing rice mill business is profitable in

principle. This may be one of the reasons why the rice millers are less interested in further investment for improvement of the rice mill plant.

Usually, milling charges are paid according to volume of the milled paddy, and milling charges are not paid according to the quality of milled rice or milling yield. Since rice miller receive milling charges from the client based on only volume of the paddy to be milled, and usually milling charges are not affected by the milled rice quality, rice millers may not have any incentive to improve the milled rice quality.

Of course, on the market, high quality rice, milled by skilled miller, is sold at a high price. However, for rice producers, it is very difficult to get general market information, for example, which rice miller has the technique to mill high quality rice. Even if rice producers get such information, it is also difficult to transport the paddy to the mill due to poor road infrastructure, etc.

In future, if market information can be obtained easily and infrastructure will be developed, many producers will bring their paddy to such mills. And rice millers will be motivated to improve their milling technique, etc.

2) Technical problems causing lower quality rice

The quality of domestic rice is lower than one of imported rice. Its causes and effects are summarized as follows:

Table 7.6 Cause-Effect Analysis of Lower Quality Rice (Technical Issues)

No.	Present condition	Causes to be considered
1	Sand or stone are mixed	• Harvested by combined harvesters • During drying and threshing work on the field • Pre-Cleaner or Destoner are not equipped in rice mills
2	Many impurities such as straw are mixed	• During paddy is dried and threshed at field. • Pre-Cleaner is not equipped in rice mill.
3	Head rice yield is low (many broken rice) Many cracked grain	• Rice is not harvested at with its appropriate moisture contents. • Increase of cracked grain because of excessive drying. • Lack of appropriate paddy storage • Broken grain caused by high pressure at the event of milling. (By Engelberg rice milling machine or maladjusted rubber roll type milling machine)
4	Uneven broken rice ratio	• Length Grader or Separating Sieves are not equipped in rice mill.
5	Other rice varieties	• No seed control • Width grader and/or Length Grader are not equipped in rice mill.
6	Other grass seeds etc.	• Lack of preventing grasses during growing at rice field. • Pre-Cleaner is not equipped in rice mill. • Width Grader or Sieves are not equipped in rice mill.
7	Much colored grain	• Insufficient drying • High temperature and/or high humidity during storage. • Lack of appropriate storage facilities.

Source: JICA Study Team

(3) Management Problem of Modern Rice Mill

In the preceding clause, the problem of comparatively small scale mills is studied. In this clause,

management problems of modern rice mills are studied.

1) Cost accounting at establishment of the milling charge

As mentioned in Chapter 4, milling charge of modern mills where high quality rice is produced is very low compared with ordinary small scale mills. The reasons are:

- All small scale mills are privately managed and are not subsidized. All investment costs of milling facilities including prime movers etc., expenses for light and fuels, maintenance costs such as cost for spare parts, and labor cost etc. should be collected from the milling charge, and
- It is considered that all modern rice mills have some connection with the government. The rice mill facilities which were constructed by governmental subsidy or grant-aid from other donor countries may be practically transferred to previous management organizations without compensation. And since depreciation of initial investment may not be included in their milling charge, the milling charge can be kept at such a low level.

If the above modern mills need to be operated, there is no fund for maintenance of the mill. Without carrying out management improvement, milling operation is not sustainable because of lack of maintenance and replacement fund.

2) Milling capacity of modern rice mill

Some modern rice mills have excessive large processing capacity. This is difficult for continuous daily operation, because collection of enough volume of paddy is quite difficult at present.

In irrigated areas developed by GIDA, large quantity paddy with same quality is produced. Some modern rice mills are located in those irrigated areas. Originally, such a large quantity of paddy with the same quality shall be milled by modern rice mills and make into high quality milled rice.

However, since most traders, who procure paddy and contract rice millers to mill, do not have enough procurement funds, and so traders cannot procure a large quantity of paddy at one time. Even when large quantity paddy of the same quality is available, it shall be bought in small lots. In order to ensure full performance of the mill, enough volume of paddy needs to be procured. However, because of the above situation, only small lot of paddy is brought in at a time. Some modern rice mills cannot process such small lot of paddy, and are being under utilized (less usage).

7.6 Problems in Rice Marketing

In due consideration of the present condition of the rice industry in Ghana, the problems in the field of rice marketing and the subjects to be considered concerning each problem are clarified and compiled in the table below:

Table 7.7 Problem Analysis of Rice Distribution and Marketing

Problem	Contents	Subject to be considered
Less local rice sold in markets	Local rice is hardly found in the markets of cities in the Southern region especially during lean period, even though imported rice is sold constantly in volume and varieties through a year..	Production of marketable rice Market system Market information system
Local rice is generally bad quality and evaluated low by consumers.	Urban consumers sharing 3/4 of national consumption prefer the qualified rice without impurities, but the quality of local rice cannot meet their requirement.	Practice of cultivation and post-harvest processing. Machinery and technology for rice milling
Volume of long distance distribution for local rice is limited.	Little intensive production area such as irrigation area where a limited number of middlemen procure and distribute to market.	Market information system Intensive production of marketable rice
No domestic rice with brand name	Imported rice with band name is packed in plastic bags for sale. Most of domestic rice has no brand name with its certificate.	Lack of marketing technology and strategy with commercial sense
Small scale of domestic rice trade	All people and firms concerned cannot have enough funds for expansion and improvement of their business.	A short financing program for trade
Vague quality standard of rice	There is no practical adaptation of quality standard including weights and consumers tend to judge it by the brand. It may be disadvantage for the qualified local rice without brand.	Application system of rice standard and weight measurement

Source: JICA Study Team

The relational structure of problems in view of marketing was considered and analyzed placing "Rare Domestic Rice in Urban Market" as the targeted problem. The result is shown in Figure 7.3 on the next page. As mentioned before, most of urban consumer's needs are satisfied by imported rice and on the contrary the share of domestic rice is very limited in the market. The imported rice is relatively high quality with uniform grains, and displayed and sold in the market being packed in smart plastic bag of 25kg or 50kg by each commercial brand. The extreme propaganda that the big advertisement boards are seen here and there along major road in the big cities of south is being promoted for American rice.

Even in such condition, some domestic rice such as perfumed rice and red rice produced in the specific limited areas gets consumers' needs and is traded in the market. But its distribution volume and sales period is very limited. The quality inquired by the consumers should ensure the easiness of rice cocking. It means rice can be boiled easily after simple washing compared to the cooking of traditional Fufu and Banku which needs a long time and hard work. However, most domestic rice needs more processing to remove foreign materials and washing before boiling because of many impurities such as stones, sands and other seeds. Additionally, high broken rice contamination and irregular shape of grains result in unattractive taste of boiled rice. As a consequence, domestic rice receives a lower preference and less demand than imported rice and is valued at a lower price.

Looking for the cause in the rice production stage, small and segmented rain-fed cultivation areas are prevailing and large-scale production areas as irrigation fields are limited, where sales unit of each producer is relatively small and rice qualities among producers are varied. It results in increase of cost for collection and irregular quality of rice.

Furthermore, most of producers aims at self-consumption rather than commercial sales and has no

appropriate measures for quality improvement due to a shortage of commercial sense. Regarding the quality of rice, constraints in rice milling facility are involved

As mentioned above, domestic rice without meeting the consumers' needs is mainly distributed in rural markets in the production areas and their surrounding areas. Traders' margin and attractiveness on domestic rice business are low due to high cost for rice collection and their low price in the markets that result in limited trade of domestic rice.

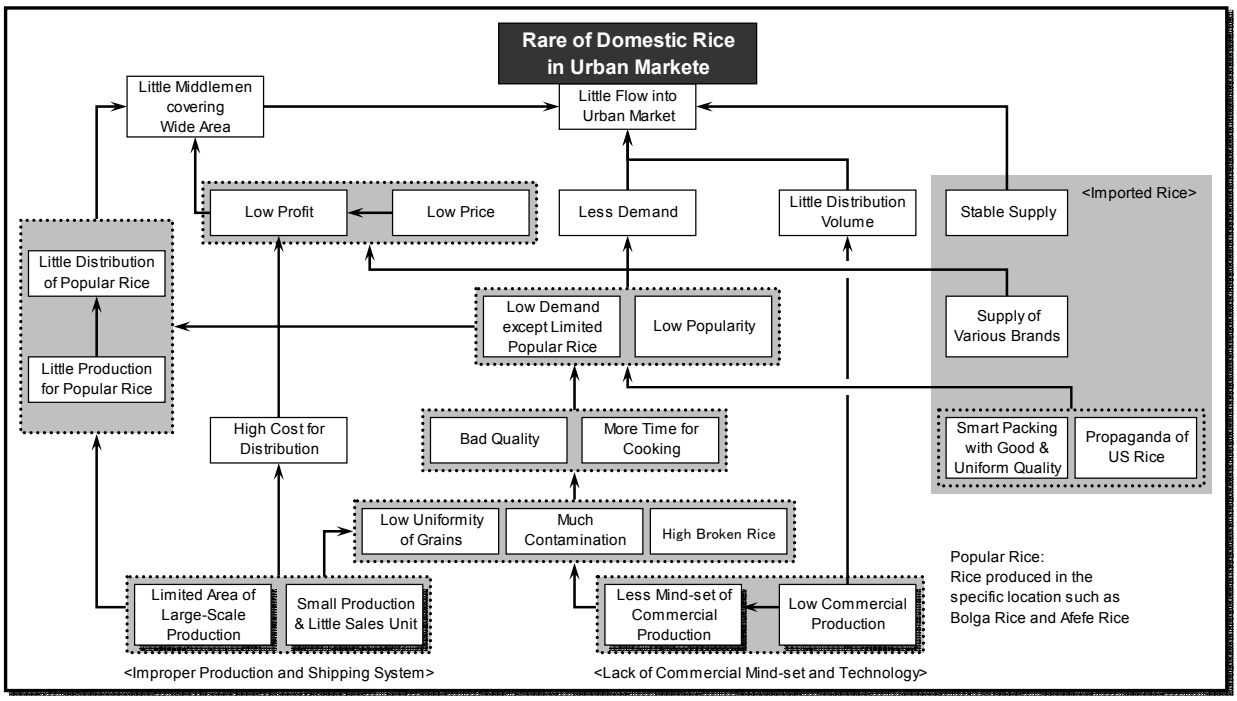


Figure 7.3 Structural Problems in Rice Distribution and Marketing

CHAPTER 8 RESULTS OF WORKSHOP ON STUDY PROGRESS

8.1 Outline of the Workshop

The workshop aims at sourcing the views of the stakeholders with regards to the progress of the project. The focus of the workshop is the presentation of an analysis leading to the development of the draft Master Plan, consisting of three integrated development programs for rice, namely 1) a marketing driven rice enhancement program for rice farming system Type 1: irrigated rice farming system, 2) a Rain-fed rice promotion program Type 2: semi-intensive rain-fed farming system and 3) a support program for poor rice farmers for Type 3: extensive rain-fed farming system,.

Four sessions of the workshop were held at Kumasi on the 27th and 28th, and at Tamale on the 30th and 31st of August 2007 for regions and districts respectively, as shown below:

Table 8.1 Four Sessions of Workshop

Date	Workshop	Venue	Participants
August 27	Regional Workshop for Western, Volta and Ashanti Regions	Kumasi	20 participants from - MOFA, Accra - RAO officers of Ashanti / Volta / Western Regions - Rice Projects - Research Institutes
August 28	District Workshop for Ashanti Region	Kumasi	21 participants - MOFA, Accra - RAO officers of Ashanti Region - Rice Projects - DAO officers - Land Administration Office
August 30	Regional Workshop for Upper West, Upper East and Northern Regions	Tamale	18 participants - RAO officers of Upper West/ Upper East/ Northern Regions - Rice Projects - Research Institutes
August 31	District Workshop for Northern Region	Tamale	14 participants - RAO officers of Northern Region - Rice Projects - DAO officers - Land Administration Office

Source: JICA Study Team

8.2 Regional Workshop in Kumasi

The main points discussed in the workshop are: 1) collaboration among stakeholders concerned, 2) land availability, 3) Environmental Impact Assessment (EIA), 4) improvement of access roads, as summarized below:

(1) Collaboration among Stakeholders Concerned

Most participants agreed that there was collaboration between institutions and stakeholders as well as positive collaboration between projects, Small Scale Irrigation Development Project (SSIDP), Inland Valleys Rice Development Project (IVRDP), Lowland Rice Development Project (LRDP), Upper West Agricultural Development Project (UWADEP), and Land Consolidation and Rehabilitation Project (LACROSREP) to share experiences with respect to data availability and the procedures for the project implementation.

(2) Land Availability

The approach adopted by the SSIPP where there must be a legal documentation on land being released for the purpose before funding was projected as an example.

Experience from the IVRDD indicated that similar views were perceived at the onset of the project. In this case, the demand driven approach infers that the beneficiaries in the community sustain the initial approach for the land acquisition.

(3) EIA

As far as the IVRDP is concerned, the project procedural activities were very erratic. With one year left for the project to end, many of the feasibility and design documents have not been done. This implies that, there have not been any Environmental impact documents done for the project. All the participants indicated that EIA should be done for the proposed projects.

(4) Improvement of Access Roads

In the case of the IVRDP, it was indicated that, there is no need for any other standard to be prepared for the design of access roads. Meanwhile all feeder roads as well as those under the Community Rice Development Project (CRDP) have been developed under the Department of Feeder Roads in the Ministry of Works and Housing.

However, other projects might not be very much concerned with roads because swampy and lowland areas need more laterite filling, and thus are more expensive to construct.

8.3 District Workshop in Kumasi

The main points discussed in the workshop are: 1) land availability and the unpaid compensation concepts, 2) seed production and distribution, 3) training for extension staff and farmers, as summarized below:

(1) Land Availability and the Unpaid Compensation

Most of the participants emphasize that major problems revolve around the lack of payment of compensation to land owners.

Meanwhile, the participants from the stool lands indicated that in Ashanti's custom and culture, all lowland and swampy areas belong to the stool. As such the chief has authority over it and it could be

given out for development which benefits his subjects. It is only proper that the appropriate channels and approach for their release and the documentation of legal papers are followed to their conclusive end.

(2) Seed Production and Distribution

It was widely accepted that there were various bottlenecks which mitigated against the availability of quality seeds to the farmers. Some districts have seed, from research institutions, however, most of the participants indicated that there were no rice seeds available. This was attributed mainly to the breakdown of the structures and policies that should ensure adequate production and distribution of quality seeds.

It was also suggested that seeds to be produced should be directed towards the demand in the market, to ensure sustainability of the industry.

The seed industry is not in need of any particular or expensive equipment at the moment. Adequate land preparation and efficient water management practices are sufficient enough for seed production.

(3) Training for Extension Staff and Farmers

Extension staff and farmers concerned need training programs for rice cultivation. The Bok – Na – Kim Samuel Training Institute Farms at Kpong was recommended. It was suggested that related curriculum and training programs should be developed for the project purpose.

Meanwhile, it is instructed that AESD has the capacity for the development of curricular and training module of tractor operators and rice millers within the mechanical engineering field.

8.4 Regional Workshop in Tamale

The main points discussed in the workshop are 1) production and distribution of quality seeds, 2) land availability and related issues, 3) EIA, 4) rice and other crops, and 5) component technologies and NERICA as summarized below:

(1) Production and Distribution of Quality Seeds

There are many varieties of rice being cultivated. And even though there are seed growers associations and institutions, farmers use their own seeds, since rice is self cultivated and farmers are comfortable with their seeds for as long as 5 to 6 seasons. Further to this, some of the farmers have been trained in seed production and can source seeds from closer stations at reduced price.

The trend therefore is to identify the varietal needs of the consumer to produce seeds accordingly. As far as the distribution is concerned, seeds in the warehouse are too expensive for the farmers, resulting in losses to the producers. A system of preordering to produce on demand was suggested. The collaboration among the relevant institutions would also be strengthened.

(2) Land Availability and Related Issues

It is worth knowing that land has a communal ownership in Northern Ghana. Experience has shown

that land is always released for projects but problems arise after some time especially when the activities on the project wane, land owners invariably demand the return of their lands. Another participant interjected that that they were able to overcome the problem by bringing all the stakeholders together at the district assembly to resolve the issue by signing an MOU to commit to each other.

(3) EIA

An EIA has not been undertaken for the LRDP. However, it is very vital for any project to be undertaken. The scope and intensity could be variable depending on the scale of the project. The Environmental Protect Agency (EPA) is not mandated to conduct the study but rather do the monitoring.

(4) Rice and Other Crops

Participants were of the view that it is not easy to influence the farmers to take to rice since it is not one of their staple food crops and even if the opportunity arises for intercropping, their attention would be on other crops. Experience from other countries as Mali and Cote D'Ivoire is to extend some supplementary support to the other crops to help boost the introduction of the rice.

(5) Component Technologies and NERICA

Participants still inferred that the fertilizer issue should rather look at soil fertility with all its allied components including organic matter e.g. chaff from the mill.

Others were also wondering why NERICA alone is being specified and promoted and not other equally good local varieties. It is essential to promote varieties that will be suitable for the market. However, a participant submitted that under the current dispensation, there is no upland rice variety especially in Northern other than NERICA and therefore under the cropping system being postulated, it is only NERICA that has the physiological properties to withstand the harsh condition.

8.5 District Workshop in Tamale

The main points discussed in the workshop are 1) a seed production system, 2) collaboration between institutions, 3) land availability and issues, and 4) credit facilities, as summarized below:

(1) Seed Production System

There are too many varieties and the master plan should consider squeezing them down to a few marketable varieties. Things that interfere with this are that there are no quality seeds available, and even when they are available they are invariably too expensive.

The best approach to overcome the bottleneck is to put more farmers under community based seed production with strict supervision and collaboration of the relevant institutions.

(2) Collaboration between Institutions

The collaboration is mostly on paper, but in reality the linkages for efficient operation are rather weak.

(3) Land Availability and Issues

The issues about land are similar. The need for legal documentation and the recognition of the land owner through periodic rental payments is absolutely necessary.

(4) Credit Facilities

Generally, the timing of the release of credits to FBOs is late, and thus the late credit seriously affects the crop production. Due to the legal recovery rate of the revolving funds, credit is not usually available at the bank. It was proposed that a credit line should be part of the project activities and that collective marketing should be set up for the groups.

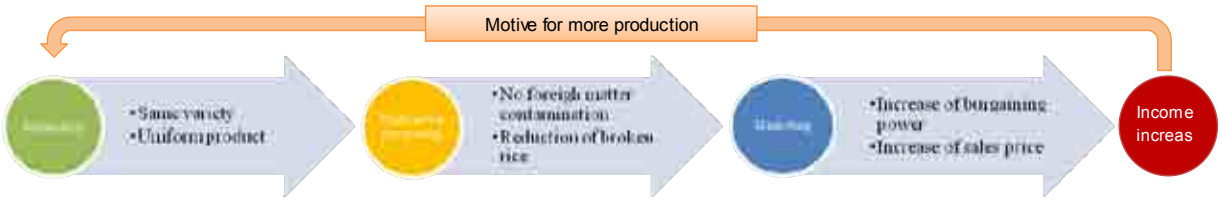
CHAPTER 9 MASTER PLAN

9.1 Objectives

The Study aims at preparation of a Master Plan for the rice sector of Ghana around concepts of food security and poverty reduction. The Master Plan will consist of development programs essential for improvement in self-sufficiency in rice towards 2015. The Action Plans will also be studied and set up with short-term targets for priority programs to be selected under the Master Plan. On the basis of the problem analysis mentioned in Chapter 6, the Master Plan is to be prepared with the following particular objectives:

- To promote sustainable rice cultivation for increased rice production and poverty reduction,
- To encourage quality improvement of local rice to be supplied to anticipated urban markets, and
- To improve economic environments to ensure smooth distribution and marketing of local rice.

From the viewpoints of rice producers, the above objectives are interpreted to the cycle of activities, illustrated below.



Three objectives mentioned above are interrelated. Therefore, integrated approaches are required to realize expected performance and results envisaged under the Master Plan. Paying particular attention to integrated approaches, the basic strategies set up for the master plan formulation are as described in the following paragraphs.

9.2 Basic Strategy for Master Plan

9.2.1 Basic Strategy

Food security is achieved and maintained by a wide range of efforts of stakeholders, namely the government, private service providers and individual farmers. The key issue is how to encourage the private sector to direct all their efforts to increased production and smooth distribution and marketing of rice. The government takes full responsibility to create and develop the economic environment to ensure the above-mentioned by rationalizing policy, law and regulation, and order concerned. Furthermore, the government is expected to exert that they develop a social safety net for vulnerable farmers whose performance is keen to achieve rice self-sufficiency. The Study will prepare development programs which directly contribute to increased rice production and poverty reduction attaching the development priority to rice farmers. Rice farmers are categorized into three on the basis of the purposes of rice production. It is apparent that government services required are also different by category. The rice distribution channels are generalized as illustrated in Figure 9.1. Three typical flows are recognized from farmers to consumers. They are summarized below.

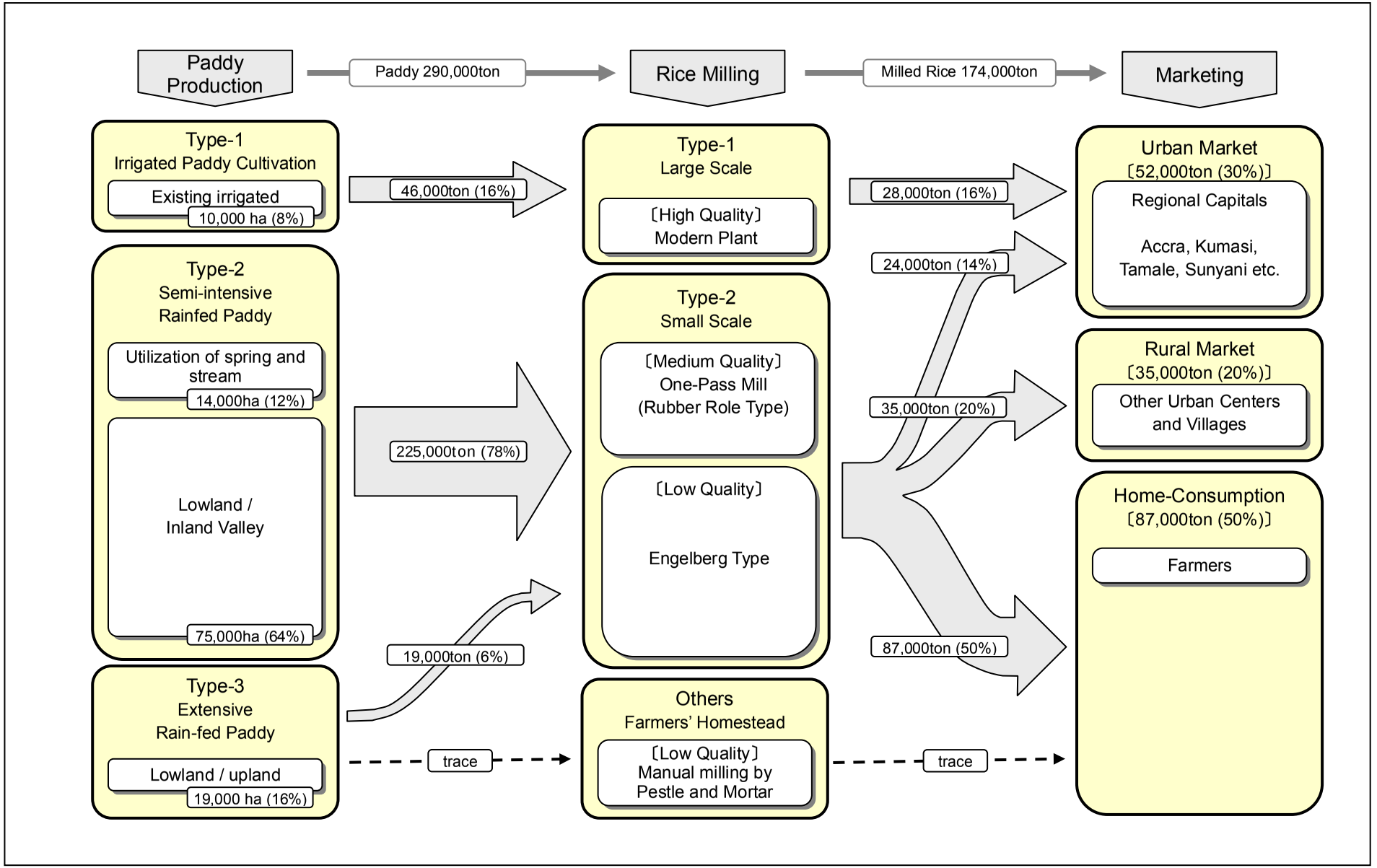


Figure 9.1 Generalized Rice Distribution Flows from Producers to Consumers

Type-1 : Irrigated rice farmers, who produce market-oriented high quality rice for urban consumers

Type-2 : Rainfed rice farmers, who produce rice mainly for home consumption, and sell surplus of rice of relatively good quality rice to urban and rural markets

Type-3 : Rainfed rice farmers, who produce rice with low inputs mainly for home consumption

In order to sell rice in the market channel, rice quality needs to satisfy the market demand, regardless of the types mentioned above. For example, different marketing strategies are be applied to such surplus regions like the Northern region and shortage regions located in Southern Ghana. In order to increase the profits of rice producers, marketing strategy in the surplus area is more important, since sales opportunity is quite low in the local market.

Rice farming system are classified into the above three types, and the strategies and plans for production to marketing should be formulated based on the market situation particular to the target area.

Figure 9.1 presents the estimated amounts of paddy and rice at each step of distribution and marketing flows from farmers to consumers. As seen in the left side of the figure, over 80% of paddy produced is processed at small mills, while only 16% of paddy produced in the irrigation schemes is transported and processed at large mills. In the right side of the figure, some 30% of milled rice is marketed in the urban areas and 20% in the rural area. It is noteworthy that 50% of milled rice in Ghana is consumed by rice farmers.

The basis strategy of the Master Plan is preliminarily set up for each of three flows. As mentioned above, all the development components are integrated under each strategy. They are summarized below.

Basic Strategy-1: (Type-1) Production and marketing of quality rice, which is competitive to imported rice in both price and quality, will be integrally promoted. To produce quality rice constantly, quality control of paddy grains on farm will become a crucial issue in the irrigation schemes. Expansion of irrigation area is also a prerequisite for increased rice production. Possible government support to private rice millers will be studied to ensure improvement of their service quality.

Basic Strategy-2: (Type-2) Integrated program for semi-intensive rain-fed paddy cultivation, which covers 78% of whole domestic rice production, will be set up. Profitability of farmers will be stabilized and expanded. Firstly, physical works to improve the quality of lowland paddy field will be considered paying special attention to water control measures and leveling of soil surface. Secondly, yield improvement and production cost saving will be focused.

Basic Strategy-3: (Type-3) Rice farming for home consumption will also be assisted. Although the extent is limited to 16% of the total paddy fields of Ghana, some farmers continue ‘low input - low return’ rice cultivation at subsistence level under marginal agro-ecological conditions. The development approach required is to mobilize low yielding rice cultivation for the

purposes of food security at individual farmers' level. The program will promote introduction of drought-resistant varieties such as NERICA and promotion of simple paddy storage.

In order to improve the profitability and poverty alleviation, a series of market-oriented activities covering production to marketing is required as a marketing program for all the rice farming types according to the production scale and conditions of local market. This program would be a marketing strategy to cross-cut the above basic strategies for production types.

9.2.2 Basic Consideration for Formation of Master Plan

(1) Different Consumption Patterns in Urban and Rural

The rice demand has been drastically expanded. Imported rice has been sharply increased from 75,000 ton in 1997 to 300,000 ton in 2002 to make up shortages of local rice supply, giving a self-sufficiency ratio from 20 to 30%.

Per capita consumption of rice in Ghana is estimated to be 23.1 kg a year in 2003. However, rice consumption patterns change across the country. Demand is rapidly increasing especially in Accra and urban centers. The demand and supply balance has to be projected taking into consideration not only the gaps between urban and rural areas but also regional difference.

Furthermore, rice quality required in urban areas is different from one in rural areas. In urban markets, local rice has to be competitive with imported rice in both quality and price. Some varieties of rice such as Bolga rice and red rice are highly marketable in urban areas. On the other hand, rural consumers are keener on price setting. Such differences have to be carefully analyzed and reflected to the Master Plan.

(2) Verification of Profitability for Stakeholders

Under integrated development among paddy production, rice processing and marketing, all the stakeholders will be aware of their roles and responsibilities in the rice sector of Ghana. Every effort of the stakeholders will be directed to improvement of the rice quality. However, the value added by those efforts has to be understood and shared among them. The establishment of 'value chain' is thus important. To motivate each of the stakeholders to this direction, it is necessary to prove individual profits to be generated from the efforts for quality improvement.

The following subjects should be noted.

1) Rice Producers:

In Ghana, rice is cultivated both for home consumption and as a cash crop of which importance is varied by region. Rice farming and its purposes are changed according to local conditions such as natural conditions surrounding rice cultivation, infrastructure, and farming techniques of farmers. Additional investment for their improvement has to be carefully discussed.

For instance, introduction of micro-finance to rainfed rice farming, of which paddy yield is as low

as 1 ton/ha or below, will expand financial risk and burden.

The production cost is estimated at a high level between 7.6 million cedi/ha and 10.0 million cedi/ha in the Tono irrigation scheme. The break-even point is calculated to be in the range between 3.5 ton/ha and 4.5 ton/ha with a paddy farm gate price of 2,200 cedi/kg. If unpredictable reduction of yield is experienced, farmers might bear a load of debt.

2) Rice Millers:

Almost all rice millers earn from milling charge, not selling milled rice, regardless of size of rice mill. Rice farmers as well as traders transport paddy into rice mills, and rice millers collect only a milling charge from them. The current milling charge is not related to the quality of milled rice, thus rice millers' incentive concerning quality improvement is quite low. This low incentive is a crucial limiting factor against promotion of quality improvement of milled rice.

3) Marketers:

Under the restructuring program, financial support to traders for the purpose of paddy purchasing was terminated in 1991. As a result, for instance, the NASIA rice mill lost proper amount of paddy received. Traders seek the government to resume the financial support to ensure paddy purchase. However it should be carefully reviewed whether marketing shall be motivated or not through revival of procurement of paddy by traders. Furthermore, retail price of imported rice is still lower than one of local rice. In addition, transportation cost of milled rice from NASIA in Tamale to large markets such as Kumasi and Accra tends to be escalated due to sharp increase of fuel price in recent years.

The system of direct delivery from producers to consumers will minimize intermediate profit margin, and improve profitability of producer. Furthermore, early settlement of marketing outlet could have a good impact for farmers. Market information is not enough for farmers, and there are no places to link producer and consumer.

(3) Bottom-up Approach to Rain-fed Rice Development

The Ghana Soil Research Institute (SRI) assessed that 2.86 million ha (12% of the national land) is suitable for paddy cultivation based on agro-ecological zoning. On the other hand, existing paddy fields in Ghana accounted for 123,000 ha (4% of potential area for paddy cultivation). There is huge development potential from the viewpoint of natural conditions. However, there are some cases that rental fee of farm land has not been properly settled after development and thus consensus-building between land owner and cultivator became difficult. Consequently, development of rainfed paddy has been far below expectation.

Beneficiary farmers are requested to bear the obligation for land settlement in new development according to the Support Plan for Domestic Rice Production (2006 - 2010) by Ministry of Food and Agriculture (MOFA). The Study will sustain this guideline of MOFA. The Study will make further analysis for rental fees in order to accelerate the consensus-building.

Regarding selection of the development area, agricultural extension workers and opinion leaders of community are important information sources. However it might be more pragmatic to disseminate the bottom-up approach in inland valley development. A wide range of farmers will access opportunities for rainfed development being assisted by local NGO support in preparation of proposal to the government. Meanwhile, the local government will prepare some criteria for evaluation and decision.

(4) Import Tax

The import tax of rice is being reviewed by government agencies and other stakeholders. There is a proposal to increase it from 20% to 30% to protect local rice. Careful discussion will be continued to optimize benefits for local farmers as well as consumers from several viewpoints of policy decision and national economy. Further in-depth study will be required to make appropriate decision on it.

The Study will pay more attention to technical proposals than economic rearrangement to protect local rice farmers. Regardless of the import tax issue, appropriate measures are to be required for further value-added to the rice sector of Ghana. A Master Plan will be prepared regardless to the import tax of rice.

9.3 Rice Demand Projection in 2015

9.3.1 Rice Consumption Trend

The import amount of rice in the international market has been gradually increasing by 80% from 25 million ton (grain) in early 1990s to 45 million ton in 2004. During the same period, African countries have been increasing rice imports by 140% from 5 million tons in early 1990s to 12 million tons in 2004, equivalent to one fourth of world imports (Figure 9.2). Import value reached US$2.5 billion. This increase of rice imports is partially caused by population increase, and mainly sustained by favorable economic growth which accelerated rice consumption but domestic production cannot grow at the same rate of demand increase.

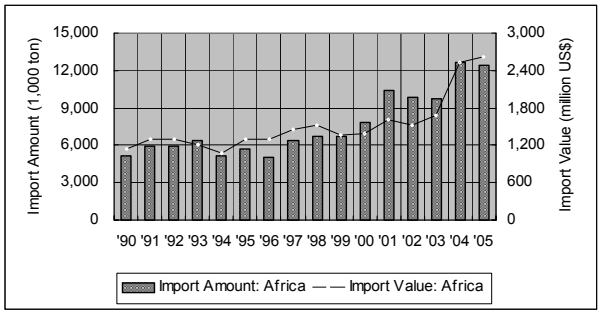


Figure 9.2 Rice Import by African Countries
(Source: FAOStat)

Western African countries show the same increasing trend of rice imports, increasing to 4 million tons (import value of US$0.8 billion) in early 1990s to 8 million (US$1.6 billion) in 2004 to 2005, accounting to two thirds of African rice import.

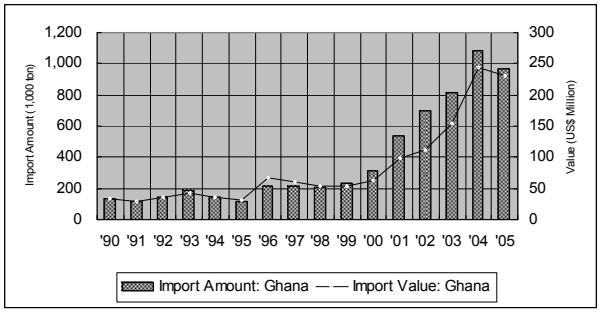


Figure 9.3 Rice Imports by Ghana
(Source: FAOStat)

Rice imports in Ghana, as shown in Figure 9.3, have been increasing from 200,000 tons (grain,

equivalent to 120,000 ton of milled rice) in early 1990s to 800,000 – 1,000,000 ton (500,000 – 600,000 ton in milled rice) in 2003 – 2005, and the import value exceeds US$200 million. This is mainly due to higher economic growth, beginning in the early 2000s.

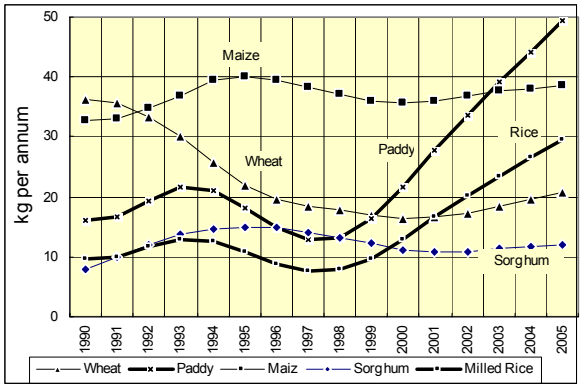


Figure 9.4 Per capita Consumption of Cereals in Ghana (source: FAOStat)

Regarding the per capita consumption of staple food in Ghana, a historical trend is shown in Figures 9.4 for cereal grains and 9.5 for starchy root and plantains. Although per capita consumption of cereal grains has decreased in early to middle 1990s, it has been increasing after 2000. This increase is mainly caused by rice consumption since only rice shows a rapid increase while other grains are almost stagnant (wheat shows a slightly or negligibly increasing trend). Already, rice is the largest grain in food consumption, more than maize in 2004 – 2005.

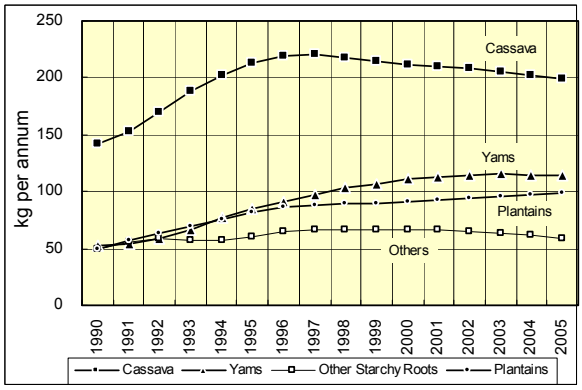


Figure 9.5 Per capita Consumption of Starchy Root and Plantain in Ghana (Source: FAOStat)

On the other hand, tradition staple foods of such starchy roots as yams and coco yams and plantains, per capita consumption show different trends. Per capita consumption of these foods increased in the early to middle 1990s but they show stagnant or decreasing trends after the late 1990s, particularly cassava and yam.

As shown in the above, only rice shows an increasing trend while other staple foods are decreasing. This is mainly due to the two main factors of (1) high demand in urban area where people prefer easy-cooking, and (2) preference by the younger generation which dominates the total population at about 50%. Unless the economic growth slows down at the present level, this situation will continue.

In addition, it is assumed that per capita consumption of rice will increase in the certain period if the economic growth remains at or above the present level. However, experience in other countries indicates that food preference of the people may move from rice to such other food as wheat, proteins, snacks, etc. after reaching the per capita GDP of US$1,000 (target of the national development plans: GPRS-2 and FASDEP II).

9.3.2 Rice Demand Projection

Annual per capita rice consumption during 1999 to 2001 was 17.5 kg on average that was increased at 22.6 kg on average during 2002 to 2004. In the same period, per capita rice consumption grew at around 8.9% per annum, higher than the population growth at 2.5% per annum. Assuming the same trend continues, per capita rice consumption will increase to 41.1 kg per annum in 2010 and at 63.0 kg per annum in 2015, equivalent to 2.8 times of 22.6 kg in 2002 - 2004.

Table 9.1 Basic Indicators and Rice Demand Projection

Average Rice Consumption per annum		Growth Rate (moving average, 1999/01 – 2004/03)	
1999 - 2001	17.5 kg per capita	Rice Consumption Growth	8.93% per annum
2002 - 2004	22.6 kg per capita	Population Growth	2.48% per annum
Estimation of Rice Consumption per capita			
Per Capita Growth (8.93% per annum)		30% of Per Capita Growth	
Year 2010	41.1 kg per capita	Year 2010	26.3 kg per capita
Year 2015	63.0 kg per capita	Year 2015	30.7 kg per capita
Total Rice Demand Projection			
Population Increase with Per Capita Growth		Population Increase 30% of Per Capita Growth	
Year 2010	980,000 ton	Year 2010	630,000 ton
Year 2015	1,680,000 ton	Year 2015	820,000 ton

Source: Estimation by the JICA Study Team

Future rice demand projection was made on the basis of the basic indicators above and population projection in the Ghana Statistical Service. Considering the population growth only, the current demand of around 470,000 ton will increase to around 600,000 ton (around 1.3 times) in 2015. Under both growth of population and per capita consumption above, it will increase at around 1,680,000 ton, accounting for more than 3 times the current demand. Price fluctuation and supply volume in the international rice market, and purchasing power of domestic consumers will influence the domestic rice demand significantly. Applying the assumption of per capita consumption growth at 30% of the trend growth of 8.9% per annum, domestic rice demand in 2015 will be around 820,000 ton equivalent to 1.7 times of the current demand.

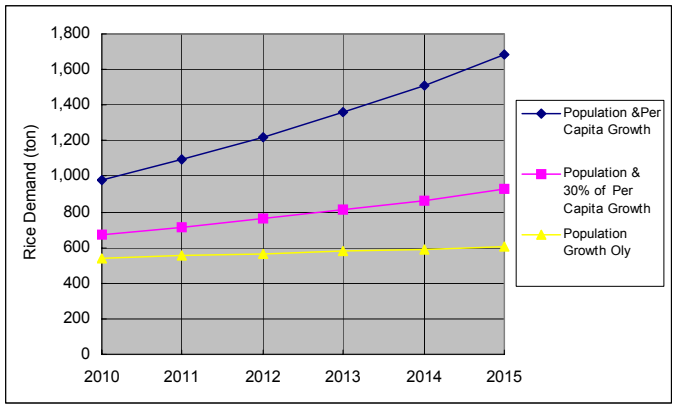


Figure 9.6 Rice Demand Projection
(source: JICA Study Team)

Under the above assumption, demand of rice in urban and rural areas in 2015 is estimated based on the population projection by Ghana Statistical Services. Since the future population by urban and rural is not available, the same proportion as the present is applied in future. The population may show a higher proportion in the future, therefore, this assumption brings the conservative level of demand.

Table 9.2 Rice Demand Projection in Urban and Rural Areas

	Annual Average in 2002 – 2004			Projection in 2015		
	Population	Per capita Consumption	Total Demand	Population	Per capita Consumption	Total Demand
Urban	9.2 million	38.9 kg per annum	360,000 ton	11.9 million	52.8 kg per annum	630,000 ton
Rural	11.3 million	9.4 kg per annum	100,000 ton	14.8 million	12.9 kg per annum	190,000 ton
Total	20.5 million	22.6 kg per annum	460,000 ton	26.7 million	30.7 kg per annum	820,000 ton

Source: Estimation by the JICA Study Team

Based on the above projection, rice production is estimated from the supply side. Rice productivity is assumed to increase from the present 2.5 ton/ha to 3.0 ton/ha in 2010, and reach 3.5 ton/ha in 2015. Taking the government plan, rice production area will increase by 36,000 ha, consisting of 6,000 ha for irrigated rice farming system (Type 1), 19,000 ha for semi-intensive rice farming system (Type 2), and addition of 11,000 ha for extensive farming system under rain-fed and upland (Type 3). The result is shown below:

Table 9.3 Future Supply – Demand and Requirement of Rice Development

Iem	Annual Average in 2002 – 2004	Projection in 2015 Population Growth only	Projection in 2015 Population + Per Capita Growth (30%)	
			Import Amount at the Present Level (2nd Stage)	Import Ratio at the Present Level (1st Stage)
Rice Demand				
・ Rice	460,000 ton	600,000 ton	820,000 ton	
・ Paddy grain equivalent	770,000 ton	1,000,000 ton	1,370,000 ton	
Import (paddy grain)	480,000 ton	480,000 ton	480,000 ton	830,000 ton
(import ratio)	(62%)	(46%)	(35%)	(61%)
Domestic Production				
(self-sufficiency)	(38%)	(54%)	(65%)	(39%)
・ Paddy production	290,000 ton	520,000 ton	890,000 ton	540,000 ton
・ Average yield	2.5 ton/ha	3.5ton/ha	3.5ton/ha	3.5ton/ha
・ Production Area	118,000 ha	149,000 ha	254,000 ha	154,000 ha
(area increased)	(-)	(31,000 ha)	(136,000 ha)	(36,000 ha)

Note: Total production area and unit yield in 2015 is 1) 16,000 ha at 5.0 ton/ha in Type 1 (intensive: irritation), 108,000 ha at 4.0 ton/ha in Type 2 (semi-intensive: inland valley and lowland), 30,000 ha at 1.0 ton/ha in Type 3 (extensive: lowland and upland under rain-fed). Overall production of 540,000 ton (grain) comes from 154,000 ha in production area at the average unit yield of 3.5 ton/ha.

Source: Estimation by the JICA Study Team

In the case of future demand by "population increase" only, domestic supply can maintain the present rice import amount through yield increase, resulting that self-sufficiency will increase from the present 38% level to 54% in 2015. On the other hand, future demand by "population increase" and "per capita increase", production area will require another 100,000 ha of rice production area in addition to the present government plan in order to sustain the present rice import amount (without increase of import). In all cases, it is required for extension of modern technology, land development as well as support services, in parallel with improvement of milling by changing into One-Pass type from Engelberg type.

The current government plan for expansion of 6,000 ha in irrigation and 19,000 ha of inland valley and lowland is targeted in 2012, additional expansion of cultivated area may be expected. Even though, it is not realistic to assume to expand the rice production area to 254,000 ha in 2015 (more than 2 time of the present level) taking the current performance into account. In this case, it is proposed to take 2 steps for the attainment, the 1st Stage: sustain the current self-sufficiency level of about 40% in future, and the 2nd Stage in near future: improve the self-sufficiency level to approach near to the 65% level in 2015.

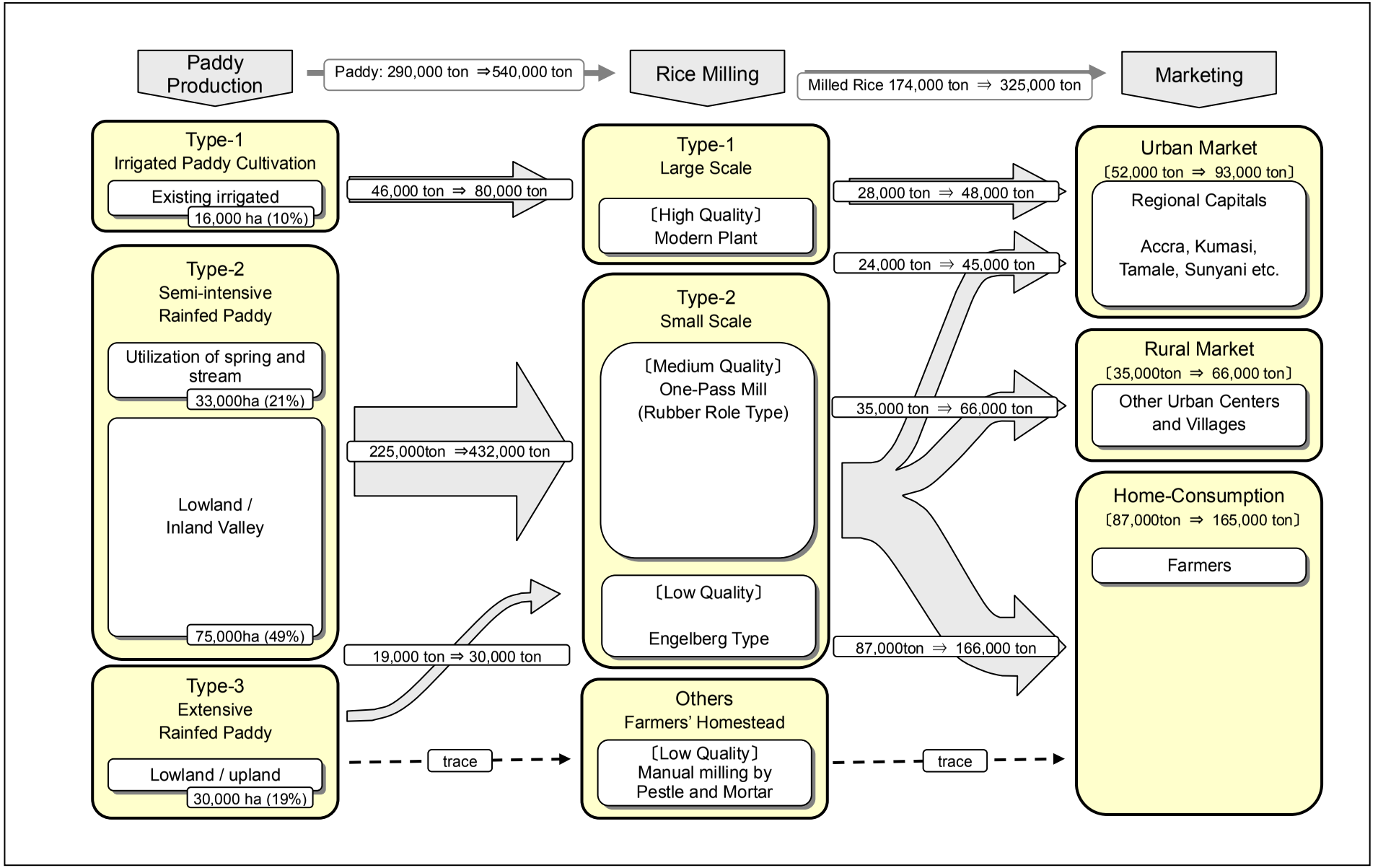


Figure 9.7 Generalized Type-wise Concept from Production to Consumption

9.4 Integrated Development Programs and Components

Various components for development promotion according to the basic strategy described above are defined as development components. In the Master Plan, it is required that various development components under each strategy are proposed as comprehensive development program. Comprehensive development program and development components are shown in Table 9.4.

Table 9.4 Integrated Development Programme and Development Components

Program	Target Group	Development Components
1. Marketing Driven Rice Enhancement Program	- All rice farmers (9,400 households) in eight irrigation projects out of the existing GIDA irrigation projects - Newly participated farmers for irrigated rice cultivation - High efficiency rice mill plants or one-pass rice mills (rice mills, which are located in the eight irrigation projects described above and nearby rice millers) - Brokers selling and collecting paddy grains harvested from the irrigated paddy fields	1-1 Rehabilitation and expansion of existing irrigation schemes (including optimization of cultivation right and land rent) 1-2 Participatory irrigation development (including support service for activities of farmers groups) 1-3 Improvement and extension of appropriative farm mechanization 1-4 Production cost saving of paddy 1-5 Production and distribution of quality rice seeds 1-6 Quality improvement of milled rice 1-7 Improvement of rice marketing information network 1-8 Enlargement of domestic rice consumption and marketing
2. Rain-fed Rice Promotion Program (Semi-Intensive Rain-fed)	- Farmers, who manage rainfed rice cultivation in lowland and inland valley areas (estimated 75,000 households) - One-pass rice mill (Engerbarg rice mills are not targeted) - Brokers selling and collecting paddy grains harvested from rain-fed paddy fields	2-1 Field improvement for semi-intensive rainfed rice farming (including optimization of cultivation right and land rent, and support service for farmer group activities) 2-2 Improvement of semi-intensive rain-fed rice farming 2-3 Community-based rice seed production and distribution 2-4 Capacity development of extension staffs 2-5 Support for maintenance and replacement of rice mills 2-6 Improvement of access to rice field
3. Support Program for Poor Rice Farmers (Extensive Rainfed)	- Poor rice farmers, who produce rice mainly for home consumption (estimated 19,000 households)	3-1 Field improvement for extensive rainfed rice farming 3-2 Improvement of extensive rain-fed rice farming 3-3 Production and distribution of quality rice seed 3-4 Farm tools improvement 3-5 Simple grain storage extension 3-6 Livelihood improvement

9.5 Marketing Driven Rice Enhancement Program

9.5.1 Rehabilitation and Expansion of Existing Irrigation Schemes (Component: 1-1)

In 2002, MOFA organized National Rice Development Committee (NRDC), aiming at early achievement of rice self-sufficiency. In the NRDC workshop held in June 2006, six schemes for rice production were selected from 22 schemes in order to increase the rice cultivation area from the present 4,200 ha to 7,000 ha by 2010. Development targets are set at a rice yield of 6 ton/ha from the present 4 to 5 ton/ha and the double cropping of 200% from the present 70% to 150%. Six schemes selected are ICOUR, Afife, Dawhhenya, Bontanga, Aveyime, and Kpong with the total area of 7,716 ha, 88 % of the whole irrigated area in GIDA. The program aims at improvement of the following constraints:

i. Degraded facilities:

Sedimentation and leakage in canals, poor leveling, leakage of pump, frequent breakdown, blackout, etc.

ii. Improper water management:

Cropping season in the existing irrigation schemes is not unified. Irrigation water is discharged throughout the year resulted in low cropping intensity (annual cropping intensity is just 70% to 150%).

iii. Shortage of farming cost:

Decrease in quantity of farm inputs arises from a shortage of agricultural financial services, especially in Bontanga and Tono schemes.

iv. Decrease in profitability of rice cultivation:

Diversification to profitable horticulture crops is prevailing.

v. Collection of irrigation service fee

Unpaid service fee arises from abandon of cropping in rainy season.

On the other hand, GIDA has been implementing rehabilitation of the following nine irrigation projects under the AgSSIP financed by the World Bank:

Table 9.5 Rehabilitation of Nine Irrigation Schemes

Ranking	Name of Scheme	Area (ha)	Year Constructed	Main Rehabilitation Required	Cost Estimate (US$000)
1.	Tanoso	64	1975	New pump and main pipe system	369.7
2.	Akumadan	65	1974	New pump and main pipe system	502.3
3.	Afife	880	1978	Dam repairs, main canal and drain	580.7
4.	Bontanga	450	1980	Leaking valve, main canal and drain	529.6
5.	Kpando-Torkor	40	1974	New pump and main pipe system	661.3
6.	Subinja	60	1973	New pumps and pipe system	626.5
7.	Aveyime	150	1960	New pumps and main canal	522.7
8	Sata	14	1992	Canal alignment and drain	303.9
9.	Weija	220	1982	New pumps, main pipe system and main canal	734.5
Total		1,943			4,831.2

Source: GIDA

This component covers rehabilitation of the existing irrigation schemes except the above schemes and expansion of area in all GIDA irrigated schemes. In addition, MOFA has the rice enhancement program in 2005 to 2010 for expansion of 6,000 ha in Aveyme (the North Tongu district, the Volta region) and Kpong (the Kpong district, the Greater Accra region).

Development target in 2015 shall be decided considering the progress of the on-going development projects and macro-frame of rice supply. The following rehabilitation and expansion program of the existing schemes is planned at present:

Table 9.6 Rehabilitation and Expansion of the Existing Irrigation Projects

Item	Outline of Component
Target	Irrigated area of the existing irrigation schemes will be extended and rice production be increased.
Outputs	1. The existing irrigation schemes will be rehabilitated. 2. The existing irrigation schemes will be expanded.
Activities	Activity-1: Rehabilitation of the Projects Phase-1: Optimization of implementation procedure and formulation of rules 1) Baseline survey, problem analysis, grouping of problems, selection of model area, and PRA in the selected area 2) Planning of rehabilitation in GIDA (Clarification of responsibility of government and farmers) 3) Consensus-building between GIDA and farmers 4) Implementation of rehabilitation (order to contractor for part of rehabilitation) 5) Preparation of rehabilitation manual for the existing irrigation project 6) Preparation of training program for water users' association Phase-2: Implementation 1) Capacity development for GIDA staff 2) Expansion of rehabilitation, according to rehabilitation manual for the existing irrigation project 3) Monitoring and Evaluation Activitiy-2: Planning and Implementation of Expansion Program Phase-1: Development study for implementation plan 1) Review of GIDA's planning for Aveyme and Kpong 2) Expansion porgram and estimate of implementation cost 3) Consensus-building between GIDA and Farmers 4) Annual plan for project implementation 5) Estimation of benefit and project evaluation Pahse-2: Project implementation 1) Implementation of expansion works (partly ordered to contractor) 2) Monitoring and evaluation
Execution System	Execution：GIDA Supporting：MOFA

GIDA instructs beneficiaries basically to operate, maintain and rehabilitate the existing irrigation facilities. Accordingly clarification of responsibility between the government and farmers on rehabilitation including cost sharing is necessary. Optimization of organization and procedure for project implementation need to be initiated. Implementation organization in GIDA shall be established though training of engineers with basic participatory development philosophy and social workers with knowledge on irrigation agriculture. In the rehabilitated schemes, strengthening of water users associations as well as increase in their management capability shall be required together with provision of farmers training.

9.5.2 Participatory Irrigation Development (Component: 1-2)

GOG will embark on a program of irrigation development for 3,360 ha in 48 schemes over a decade, applying a farmers' participatory approach. In the program, farmers shall obligate to shoulder a part of construction cost and full responsibility for operation and maintenance of irrigation facilities. In Phase-1 of the program, 6,000 farmers with 2,590 ha are targeted covering creation of appropriate implementation process and rules at selected model areas for participatory small scale irrigation development. In Phase-2, preparation of development plan and implementation for 3,360 ha in the 48 schemes are made. The following components are proposed in the Master Plan:

Table 9.7 Participatory Irrigation Development

Item	Outline of Component
Target	Small scale irrigation scheme will be developed and thus paddy is produced.
Outputs	1. Farmers' participatory small scale irrigation development will be conducted. 2. Paddy will be cultivated in small irrigation scheme.
Activity	Activity-1: Creation of appropriate implementation process and rules 1) Baseline survey, problem analysis, classification of problems, selection of model area, and PRA in the selected area 2) Planning Small Scale Irrigation Project by GIDA (Clarification of responsibility of government and farmers) 3) Consensus-building between GIDA and farmers 4) Implementation of participatory construction (order to contractor for a part of rehabilitation) 5) Preparation of manual for the participatory irrigation development 6) Preparation of training program for water users' association 7) Capacity development of GIDA staff Activity-2: Formation and Implementation of farmers' participatory small scale irrigation development 1) Preparation of development plan for 3,360 ha in 48 sites by two phases 2) Project implementation according to manual 3) Monitoring and evaluation
Executing System	Execution : GIDA Supporting : MOFA

9.5.3 Improvement and Extension of Appropriative Farm Mechanization (Component 1-3)

In the existing irrigation schemes, relatively big-scale farm machinery was introduced promoted in the past. Currently service fees for land preparation by tractor and for harvesting by combine harvester occupy major part of production cost. Farm machinery is expensive and financial burden for replacement is heavy for farmer organizations and custom service providers. In the future, operation scale of farms will be decreased and the size of farm machinery needs to be smaller.

This component aims at optimization of farming practices and its extension from the viewpoints of cost saving and increase of unit yield, focusing on urgent subjects such as land preparation and harvesting works. Firstly, the staff of GIDA and ICOUR as well as leaders of farmers shall be trained on mechanized rice farming. Secondly, suitability test of land preparation for direct sowing and transplanting depending on the combination of tractor and instrument shall be made at typical areas based on the soil type in Ghana. Through the test, selection of farm machinery, work performance, inhibited weed growth by field leveling, water saving, protection of salt damage, etc. shall be verified.

Harvesting services using combine harvester shall be reviewed. O&M cost as well as procurement

and replacement for a large scale combine harvester is expensive. Due to decreasing number of combine harvester, timely harvesting services are hardly made. Extension of sustainable harvesting system is required. Effective harvesting using reaper and thresher instead of combine harvester could be recommended. Considering the above, review and extension of appropriate mechanized rice farming including farm machinery services shall be implemented.

Table 9.8 Optimization and Dissemination of Mechanized Farming Practices

Item	Features of Component
Target	Mechanized farming practices to be suitable for paddy cultivation in Ghana will be formulated and disseminated.
Outputs	1. Human resources, who have knowledge and experience on mechanized paddy cultivation, will be trained. 2. Farming practices (direct sowing, transplanting) for mechanized paddy cultivation will be standardized. 3. Technical advice for hiring service of farm machinery will be carried out. 4. Tariff for hiring service of farm machinery will be established. 5. Number and coverage area for reaper and thresher will be increased.
Activity	Activity 1: Training program on mechanized farming practice for paddy cultivation 1) Systematic training program for GIDA, ICOUR, and leaders of farmers Activity 2: Optimization of preparatory work (land preparation, ploughing, harrowing, puddling, etc.) 1) Demonstration trial for mechanization of paddy cultivation 2) Optimization of leveling work 3) Optimization of specification of tractor 4) Effect of leveling and puddling on water saving and weeding on reduction of production cost 5) Preparation of educational video and manual Activity 3: Extension of reaper and thresher 1) Extension of reaper and thresher in producing area and irrigation schemes 2) Technical support and training of mechanics 3) Dissemination and Monitoring
Executing System	Execution： MOFA（AESD） Supporting：GIDA, ICOUR, private manufacturers, private sector for hiring service for farm machinery

9.5.4 Production Cost Saving of Paddy (Component: 1-4)

For reduction of production cost, optimization of fertilizer application, which occupies more than 20% of the total cost, is necessary. According to the guideline of MOFA and SARI, the recommended basal dosage is 5 to 8 bags per ha (250 to 400 kg) of compound fertilizer (15:15:15). Top-dressing is given with 2 to 3 bags per ha (100 to 150 kg) of Sulfate Ammonium (SA). The total nitrogen mounts to 59 to 92 kg per ha. Fertilizer cost per ha is estimated at 1.46 million cedi to 2.30 million cedi per ha at the unit prices of fertilizers, i.e. 4,400 cedi/kg of compound fertilizer and 3,600 cedi/ha of SA.

Review of the following items shall be required:

i. Potash (K) is one of major three elements, but its effect to rice cultivation shall be verified.

ii. Some farmers apply compound fertilizer as top-dressing. Effect of element of K and P in compound fertilizer is negligibly small for top-dressing.

Effect of Urea and DAP shall be confirmed for extension.

iv. Fertilizer application needs review to optimize especially time and amounts of top-dressing.

Compound fertilizer with 59 kg to 92 kg per ha of is equivalent to urea with 128 kg to 200 kg. Cost of urea is as low as 640,000 to 1,000,000 cedi per ha at the retail price of 5,000 cedi/kg. Even if DAP will be used, it is possible to reduce the cost of fertilizer up to 50%.

Further it is necessary to check effect of compound fertilizer (15-15-15) and also its cost performance, while it is important to confirm effect and cost performance of ammonium sulfate (SA) and urea. According to the fertilizer experiment for maize cultivation in the Northern region made by JAICAF, compound fertilizer (15-15-15) with high content of sulfur is relatively effective for maize production. Further it is reported that SA is more effective rather than urea in paddy field with high pH. Production cost saving for rice cultivation shall be made by the improvement of fertilizer application of as follows:

Table 9.9 Production Cost Saving of Paddy

Item	Features of Components
Target	Production cost for irrigated paddy cultivation will be reduced.
Outputs	1 Specification of fertilizer application will be established to maximize effect to cost of fertilizer. 2. Specification to be confirmed will be disseminated to farmers. 3. Research work on farming technologies will be initiated to improve financial balance of rice farming.
Activity	Activity-1：Fertilizer test for production cost saving of paddy 1) Fertilizer test (comparison study of various fertilizers, dosage, time for application, etc.) 2) Application of sulfur Activity-2：Research for production cost saving of paddy 1) Identification of appropriate farming technologies which are possible to reduce production cost 2) Technical and financial evaluation on technologies for production cost saving, and identification of priority development means 3) Research and development on priority technologies for production cost saving 4) Evaluation of research results Activity-3：Extension of technologies for improvement of profitability in rice production 1) Demonstration on recommended technologies (around 10 demonstration plots) 2) Study tour and field day for farmers 3) Technology transfer to extension officers 4) Monitoring and evaluation of farmers applying recommended technologies
Executing System	Execution：GIDA, MOFA Supporting：CRI, SARI, SRI

9.5.5 Production and Distribution of Quality Rice Seeds (Component: 1-5)

In Ghana, no production and distribution system of rice seeds is established. Most of rice farmers use their own seeds from previous harvest. Rice production projects have seed production components and distribute their own beneficiary farmers. For instance, ICOUR irrigation scheme with 1,200 ha has allocated 40 ha for seed production of 120 ton of certified seeds.

In irrigation schemes aiming at production of marketing driven quality rice, selection of promising varieties preferable for consumers and production of quality seeds are required. Some of domestic rice is able to get same quality and price in the rice markets with imported rice. Specifically, Jasmin varieties with perfume are popular in the urban areas and expected to enlarge its market in the future. This component aims at establishment of quality seed production and distribution system with rehabilitation and expansion of the existing irrigation projects.

On the other hand, farmers outside the projects hardly procure quality seeds. Considering publicity of the irrigation projects, irrigation schemes under GIDA have a role for seed production in the rice sector of Ghana. In the future, seed production and distribution in the irrigation schemes shall expand their target areas from the irrigated area to the outside rainfed areas. An outline of this component is as follows:

Table 9.10 Production and Distribution of Quality Rice Seeds

Item	Features of Components
Target	Quality variety seeds preferable for consumers are produced.
Outputs	1. Organization and staff for seed production will be trained in the irrigation project. 2. Varieties suitable for consumers' preference are selected. 3. Seeds required in the irrigation projects are produced and delivered. 4. Quality seeds produced in the irrigation schemes will be distributed to surrounding areas of the irrigation schemes.
Activity	Activity-1: Establishment of organizations and training of staff for seed production and distribution 1) Verification of seed production and distribution system and clarification of organizational responsibility 2) Introduction of inspection machinery on quality seed 3) Training of human resources for seed production and inspection 4) Training of seed growers Activity-2: Seed Production and Distribution 1) Introduction of equipment for seed production (rough separator, length separator, gravity separator) 2) Construction of simple seed storage 3) Distribution of paddy seed
Executing System	Execution： MOFA(CSD), GIDA Supporting：CRI, SARI, NGO, etc.

9.5.6 Quality Improvement of Milled Rice (Component: 1-6)

This component aims at establishment and dissemination of rice processing technology for domestic rice, which is competitive to imported rice in terms of quality. Quality control of seed from harvesting and storage to milling shall be required and those appropriate technologies be transferred to farmers and rice millers. Farmers and rice millers are required properly to control paddy moisture applying timely harvesting and proper storage. Consequently deterioration of paddy caused by over drying and/or over wet shall be protected and rates of milling recovery and whole grain content be improved.

Quality influence to trading prices shall accrue from the deep understanding of farmers, traders, and rice millers on the importance of quality control. Traders shall try to procure quality paddy for getting more quality milled rice. Farmers could earn more profit from quality paddy. At the same time, traders shall give their attentions to milling technology and conditions of rice mills. As a result, rice millers without capacities to produce quality rice shall be eliminated.

This component consists of two activities for improvement of quality of milled rice. One is to transfer post harvest technology to rice farmers. The other is training on rice milling and improvement of milling facilities including large scale mills beside the irrigation schemes and one-pass type mills. A large scale existing rice mills have no separators, de-stoners, length separators,

sieves, etc., therefore they have difficulties for improvement of rice quality. This component covers technical investigation and financial validation of existing rice mills and support for procurement of required facilities above.

Table 9.11 Quality Improvement of Milled Rice

Item	Features of Components
Target	Quality of domestic rice will be improved and profit of rice producers and millers will be increased. Consumers can get high quality domestic rice.
Outputs	1. Harvesting and drying of paddy will be done properly and degradation of quality will be prevented. 2. Paddy will be properly stored. 3. Milling technology of rice millers will be improved. 4. Rice mill facilities will be improved.
Activity	Activity-1: Training of farmers for proper harvesting and threshing Activity-2: Training of farmers for paddy storage Activity-3: Training of rice millers for technology on milling high quality rice Activity-4: Supporting of facilities of rice mill (provision of loan for procurement)
Executing System	Execution：MOFA(AED) Supporting：GIDA, ADB

9.5.7 Improvement of Rice Marketing Information Network (Component: 1-7)

In order to increase self-sufficiency of rice, marketing of domestic rice shall be rationalized and marketing condition for supply to consumers shall be properly improved. It is important that each stakeholder such as farmers, rice millers, and traders be able to access market information. Farmers need information on the quality of rice demanded, seasonal demand and quantity, wholesale and retail prices, etc. Rice millers and traders need information on preferable variety, harvesting season, and production estimate. Each stakeholder shall receive information on production and marketing, etc., shall result in activation of economy and value added in rice sector. It is important to consolidate management information on paddy production to marketing for various policy decision and preparation of laws for food security.

In Ghana, there is no system for improvement, management and reporting of market information of agro-products. Marketing information system for irrigation areas shall be useful for producers, marketers, and rice millers.

Table 9.12 Improvement of Rice Marketing Information

Item	Features of Components
Target	Rice marketing for milled rice in the irrigated schemes will be activated. Profit of producers, rice millers, and marketers will be increased.
Outputs	1. Information on paddy production (variety, harvesting time) will be integrated and supplied to traders and rice millers. 2 Price of milled rice (by consuming areas, variety, or quality, etc.) will be monitored and supplied to producers.
Activity	Activity-1: Monitoring and reporting information of paddy production in the irrigated area Activity-2: Monitoring and reporting price of milled rice in major consuming area
Executing System	Execution：MOFA(SRID, CSD), GIDA Supporting：RADU

9.5.8 Enlargement of Domestic Rice Consumption and Marketing (Component: 1-8)

As explained in Section 5.4 of Chapter 5, marketing quantity of domestic rice is small compared with imported rice and traded at the producing areas and/or their surrounding areas. However, the following domestic rice varieties with specific characteristics are traded by regional traders:

- Special variety : Aromatic rice (perfumed rice) and red rice
- Rice to be produced stably : Rice to be produced in the irrigated areas
- Better quality rice : Uniformed with less impurities

In order to enlarge consumption of domestic rice, marketing of rice mentioned above needs to be increased. Development of marketing channels to certain buyers and consumers to assure markets shall be required instead of wait and see marketing depending only on traders. In addition, farmers need to produce rice acceptable to consumers.

One of the movements is a direct delivery system outside the ordinary marketing. Advantages of the direct delivery are (i) to minimize marketing cost, applying direct dealing between farmers and consumers (or consumers' groups), (ii) to supply quality rice, which is reliable and safe, and (iii) to receive incentives from improvement of rice quality directly by farmers.

There are feeding programs for school, army camps, hospitals, etc. Especially the Ghana School Feeding Program, which was launched in September 2005, is one of the successful cases for the mass supply of domestic rice. Moreover, Savanna Agricultural Research Institute (SARI) affiliated with Council for Scientific and Industrial Research (CSIR) has supplied milled rice from Tono Irrigation Project (the Upper East region) to staff of the CSIR in Accra, Kumasi, etc. SARI makes a contract with a middleman in Tamale in order to arrange procurement of paddy, rice milling, and transportation. This case is not a typical direct delivery system, but consumers take the initiative in dealing with marketing milled rice.

The points are how producers (or producers' groups) could make a series of marketing activities such as shipping-in and shipping-out of paddy, rice milling, transportation, arrangement of fund for their activities, and also answer consumers' needs in quantity and quality. The direct delivery is a big challenge for farmers who have no skills and no fund. In the current situation, in which domestic rice marketing is not organized and not stable, farmers' marketing initiation and creation of certain buyers and markets shall be a driven horse for increase of domestic rice production. Understandings and cooperation of consumers as well as the government support are indispensable for this initiation.

In addition, domestic rice is neither broadly recognized nor available in big consumption areas. Consumers could not buy domestic rice even though they want to buy it. Presently marketing quantity of domestic rice is limited. Together with increase of domestic rice production, advantage of domestic rice needs to be informed to consumers through campaign and advertising activities.

Table 9.13 Enlargement of Domestic Rice Consumption and Marketing

Item	Features of Components
Target	Marketing channels of domestic rice will be diversified by developing direct delivery system which leads sustainable and profitable production of domestic rice. Domestic rice will be recognized and its market value be increased.
Outputs	1. Direct delivery system between producers and consumers will be established. 2. Advantage of domestic rice will be recognized by consumers, and demand of domestic rice be increased.
Activity	Activity-1 : Case study on progressive and similar activities and system modeling Activity-2 : Identification and matching of farmers' and consumers' groups(including middleman, if necessary) Activity-3 : Trial and expansion of direct delivery system (promotion of dealing activities between farmers' and consumers' groups) Activity-4 : Implementation of campaign and advertisement for promotion of domestic rice
Executing System	Execution : MOFA, Ministry of Social Welfare Supporting : NGO

9.6 Rain-fed Rice Promotion Programme (Semi-Intensive Rain-fed)

9.6.1 Field Improvement for Semi-intensive Rain-fed Rice Farming (Component: 2-1)

The Ghana Soil Research Institute (SRI) assessed that 2.86 million ha (12% of the national land) is suitable for paddy cultivation based on agro-ecological zoning. On the other hand, existing paddy fields in Ghana accounted for 123,000 ha (4 % of potential area for paddy cultivation). There is huge development potential from viewpoints of natural condition. However, there are some cases that rental fee of farm land has not been properly settled after development and thus consensus-building between land owner and cultivator became difficult. Consequently, development of rain-fed paddy has been far below expectation. Preparation of manuals (or specifications) for development of inland valleys and low lands taking into considerations of development cost and current ecosystem.

Beneficiary farmers are requested to bear the obligation for land settlement in new development according to the Support Plan for Domestic Rice Production (2006 - 2010) by Ministry of Food and Agriculture (MOFA). The Study will sustain this guideline of MOFA. However the Study team shall propose a new rule on tenancy including stepwise revision of land rent in order to accelerate the consensus-building.

Agricultural extension workers and opinion leaders of community are important sources of information for selection of the development area. However it might be more pragmatic to disseminate the bottom-up approach in inland valley and low land development. A wide range of farmers will access to opportunity for rainfed development being assisted by local NGO support in preparation of proposal to the government. Meanwhile, the local government will prepare some criteria for evaluation and decision. Further fund arrangement for the development, which might be a new scheme, is necessary.

Essential points for rain-fed development are elaborated as follows:

Bund and leveling of field surface

Standing water in paddy field plays an important role not only for high fertilizer response but for weed control. Bunds constructed along the fringes of a paddy field retain standing water. Land leveling is also important to keep water depth evenly within a paddy field. The ideal water depth is between 10 cm and 15 cm. However, the water depth cannot be equally maintained in the paddy fields of poorly leveled. To avoid submerged paddy seedlings at depressed portions of the paddy field, farmers drain excessive water and reduce the standing water depth. On the contrary, the elevated portions of the paddy fields are exposed to the air. Weeds are encouraged and seedlings are killed.

Paddy fields directly sown need more careful on-farm water management. Weed infestation is encouraged where standing water is shallow. Use of herbicide is very common in Ghana. Propanil is a herbicide known worldwide but its cost implications are not small. It is crucial to minimize application amounts of herbicide as much as possible by improvement of land leveling quality. The relationship between land leveling quality, water depth and weed infestation is illustrated as follows:

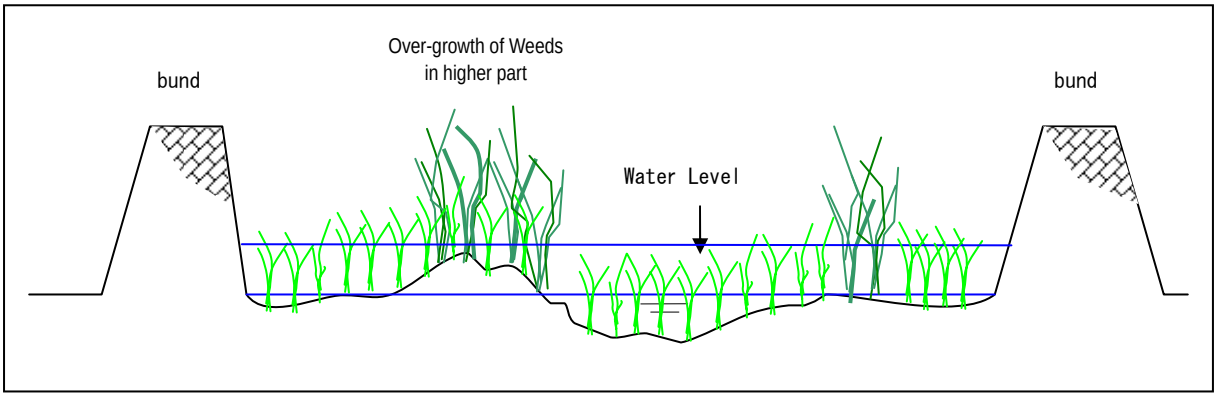


Fig. 9.8 Excessive Growth of Weeds under shallow water in Poor Leveling

Drainage canals

Drainage canals are constructed along the stream in the centre of inland valley, and water level is adjusted easily and reserve rain water in canal with gate at the end of drainage canal for preventing drought damage.

Flood prevention

Flood damage occurs after massed rainfalls in inland valley. Although flood protection dykes are effective measures, its construction is far above technical and financial capacity of farmers. The government's support is strongly required. According to the Inland Valley Rice Development Project, inland valley development with construction of dykes requires the cost of more than US$5,000. Therefore cost effectiveness must be examined carefully as well.

Table 9.14 Field Improvement for Semi-intensive Rain-fed Rice Farming

Item	Features of Components
Target	Existing lowland and inland valley areas will be developed and production of domestic rice will be increased.
Outputs	Development criteria and standard at lowland and inland valley areas, and farmers' participatory development approach will be prepared and disseminated.
Activity	Phase-1: Preparation of development criteria of lowland and inland valley areas and guidelines for cultivation right and tenancy conditions 1.1 Study on current situation on land development as well as conditions of cultivation right and tenancy rate at the existing rice fields in lowland and inland valley areas. 1.2 Preparation of criteria for land development as well as conditions of cultivation right and tenancy rate Phase-2: Promotion of development in lowland and inland valley areas 2.2 Implementation and evaluation of pilot development in the priority areas of lowland and inland valley. 2.3 Dissemination of land development in lowland and inland valley areas
Executing System	Execution：MOFA(CSD), GIDA Supporting：Local government, local NGO

9.6.2 Improvement of Semi-Intensive Rain-fed Rice Farming (Component: 2-2)

Rapid increase of rice production in lowland and inland valley areas might be not easy due to various unknown factors. Step-by-step technical improvement in rice farming shall increase current productivity. Confirmation on farmers' technique and improvement with farmers shall be required. Subjects for farming improvement are as follows:

1) Introduction of promising varieties ,
2) Seed selection with water before sowing,
3) Review of planting and sowing density,
4) Optimization of applied amount and timing of fertilizer,
5) Proper weed control,
6) Proper water management,
7) Proper harvesting,
8) Proper post-harvesting work, and
9) Application of compost, green manure, etc.

MOFA has prepared guidelines and pamphlets for rain-fed rice farming in lowland and inland valley areas in cooperation with various donors. However those useful materials have not broadly disseminated to extension workers and farmers except the particular projects. Utilization and dissemination of those materials are indispensable.

Table 9.15 Improvement of Semi-Intensive Rain-fed Rice Farming

Item	Features of Components
Target	Optimization for rain-fed paddy farming in lowland and inland valley areas is conducted, and its profitability will be increased.
Outputs	Appropriate farming practices of rain-fed paddy farming in lowland and inland valley areas is established and its profitability and income be increased..
Activity	Activity-1: Experiment for optimization of farming practices 1) Experiment for optimization of rain-fed paddy cultivation in lowland and inland valley areas 2) Establishment of farming technology in semi-intensive rain-fed rice areas in lowland and inland valley areas and preparation of materials for extension activities Activity-2: Dissemination of Appropriate farming technology 1) Demonstration of results of experiments (10 sites of demonstration) 2) Study tour, field school, field day, etc. for farmers 3) Training of extension workers 4) Distribution of extension materials 5) Monitoring and evaluation on farmers' application of appropriate farming technology
Executing System	Execution : MOFA(CS), CRI, SARI, SRI Supporting : GIDA

9.6.3 Community-Based Rice Seed Production and Distribution (Component: 2-3)

Mixture with different varieties and wild rice is significant due to no proper production and distribution of quality seeds. Although blast and brown spot were often observed at seed farm in Northern region, removing of damaged hills is not done significantly.

It is necessary to arrange seed production program for certain limited area under irrigation development and/or land development of lowland and inland valley. Seed production system generating immediate effect shall be established as an immediate countermeasure. Foundation seeds from research stations shall be given to the farmers' community in the project who multiply and distribute to other farmers. Initially, study on production and distribution system of paddy seeds, clarification of responsibilities of government, farmers' groups and NGOs, planning for expansion of facilities and their management, and training programs for staff and seed farmers shall be made. In addition, expansion of seed production facilities, operation and management, seed production and distribution shall be promoted.

Table 9.16 Community-based Rice Seed Production and Distribution

Item	Features of Components
Target	Promising varieties for lowland and inland valley are selected and quality seeds will be produced.
Outputs	Young farmers in the community will be trained on seed production technology. Quality seed will be produced and distributed in the community.
Activity	Phase-1: Development of organization and human resources for seed production 1.1 Study on production and distribution of rice seed. 1.2 Preparation of plans for expansion of facilities for rice seeds production and their operation and management. 1.3 Human resources development for rice seeds production and inspection 1.4 Training of seed growers Phase-2: Implementation of seed production program 2.1 Implementation of plans for expansion of facilities and their operation and management. 2.2 Implementation of seed production 2.3 Distribution of rice seeds
Executing System	Execution : CS, CRI, SARI Supporting : NGOs

9.6.4 Capacity Development of Extension Staffs (Component: 2-4)

Capacity development of extension staff shall be made through verification trials and demonstrations on improved rice farming. Extension staff shall implement the components of Section 9.6.1 to 9.6.3 together with farmers. Involving the extension staff in the activities of these components is highly recommended and initiated immediately after the selection of sites for the implementation.

Table 9.17 Capacity Development of Extension Staffs

Item	Features of Components
Target	Agricultural extension staffs will be trusted from farmers, and aggressively involved in farmers' production activities.
Outputs	Agricultural extension staffs will learn new knowledge and skills through activities.
Activity	Activity 1: Extension staff will participate in field improvement for semi-intensive rain-fed rice farming. Activity 2: Extension staff will participate in improvement of semi-intensive rain-fed rice farming. Activity 3: Extension staff will participate in community-based rice seed production and distribution.
Executing System	Execution：MOFA(AESD), Regional Development Office Supporting：NGOs

9.6.5 Support for Maintenance and Replacement of Rice Mills (Component: 2-5)

The component on "quality improvement of milled rice (Section 9.5.6)" aims at establishment and dissemination of rice processing technology for domestic rice in farmers and millers, which is competitive to imported rice in terms of quality. This component targets rice millers for maintenance and replacement of existing rice mills.

Currently rice millers with engerberg or one-pass purchase spare parts and consumables in market. Procurement of spare parts and consumables is not difficult without consideration of their quality. However small-scale rice millers without financial sources need to get financial assistance.

Engerberg rice mills producing a lot of broken rice need to be restricted in the future. One-pass type rice mills shall be promoted in remote areas and MOFA shall support procurement of machines, parts and consumables. Furthermore, medium and long term loans, provided by e.g. Agricultural Development Bank (ADB) shall be arranged for small-scale rice millers and farmers' groups.

Table 9.18 Support for Maintenance and Replacement of Rice Mills

Item	Features of Components
Target	Domestic rice same quality as imported rice will be continuously produced.
Outputs	1. Financial schemes for maintenance and replacement of small-scale rice mills will be arranged. 2. Rational operation and management of rice mills will be made by using institutional loan. 3. Payment for imported rice will be reduced by increase of domestic rice consumption.
Activity	Activity 1: Study on current financial status of rice millers Activity 2: Development and provision of institutional loans for rice mills Activity 3: Guidance for utilization of rice milling facilities Activity 4: Monitoring and evaluation on operation and maintenance of replaced facilities and repayment of loan
Executing System	Execution：MOFA, ADB Supporting：MOF

9.6.6 Improvement of Access to Rice Field (Component: 2-6)

In order to effectively carry out each component (Section 9.6.1 to 9.6.5) above, accessibility to rice fields at low land and inland valley shall be improved by construction and rehabilitation of rural road

as follows:

Table 9.19 Improvement of Access to Rice Field

Item	Features of Components
Target	Productivity of rice farming in low land and inland valley will be increased, and farmers' income be increased.
Outputs	Working efficiency in rice farming in lowland and inland valley will be increased by easy transportation of farm inputs and outputs.
Activity	Activity 1: Preparation of design standard for farm road improvement, organization and system for rehabilitation and construction. Activity 2: Development of pilot areas and organization of farmers, and monitoring and evaluation (coordination with Section 9.7.1) Activity 3: Promotion of access road development coordinating with development of rain-fed rice field in lowland and inland valley
Executing System	Execution：MOFA（AED）, GIDA Supporting：Regional government, Local NGO

9.7 Support Program for Poor Rice Farmers (Extensive Rain-fed)

9.7.1 Field Improvement for Extensive Rain-fed Rice Farming (Component: 3-1)

This component shall be formulated based on the development component 2-1. Investment for field improvement shall be limited to meet the increment of home consumption.

Table 9.20 Field Improvement for Extensive Rain-fed Rice Farming

Item	Features of Components
Target	Rainfed rice field will be improved and rice production for home consumption be increased.
Outputs	Guideline on field improvement for extensive rainfed rice farming and participatory development approach by farmers will be established and disseminated.
Activity	Phase 1: Preparation of guideline on field improvement for extensive rainfed rice farming and rationalization of cultivation right and tenancy condition. 1.1 Study and review of current situation of rice field, cultivation right and tenancy. 1.2 Preparation of guideline for field improvement, cultivation right and tenancy condition Phase 2: Promotion of field improvement (by individual farmers) 2.1 Pilot field improvement at priority sites 2.2 Extension of field improvement for extensive rain-fed rice farming
Executing System	Execution：MOFA Supporting：Regional government, Local NGO

9.7.2 Improvement of Extensive Rain-fed Rice Farming (Component: 3-2)

LRDP experiments on cover crop of mucuna and no tillage at Sahanayili village, in Tamale. In this village, farmers extensively cultivate paddy applying compound fertilizer (15-15-15) with 250 kg and Urea with 150 kg under rain-fed condition costing at 1,850,000 cedi/ha. In addition, land preparation by draft cattle is expensed at 200,000 cedi/ha. Initial investment is equivalent to 930 kg of paddy (2,200 cedi/kg) and not negligible for rain-fed paddy cultivation with 2 ton/ha of yield.

This component aims at an increase in home consumption of rice. Sites for this component shall be basically more difficult for rice cultivation. Rice farming technology under such condition shall be for increment of benefit against additional cost, not for increase in production only. Minimization of losses in rice farming is further important.

Table 9.21 Improvement of Extensive Rain-fed Rice Farming

Item	Features of Components
Target	Low risk technology in extensive ran-fed rice farming will be disseminated and home consumption rice be assured.
Outputs	1. Farming practices in extensive rain-fed rice farming will be established to maximize benefit to cost ratio. 2. Farming practices to be established will be disseminated to farmers.
Activity	Activity 1: Fertilizer application test for reduction of production cost 1) Fertilizer application test (comparison of fertilizer, amount and timing for application) 2) Sulfur application test Activity 2: Research on production cost saving 1) Identification of practicing items for production cost saving. 2) Technical and economical evaluations on cost saving technologies and their prioritization. 3) Research on priority cost saving technologies. 4) Evaluation of research results. Activity 3: Technology dissemination for improvement of extensive rain-fed rice farming 1) Demonstration of improved technology (10 locations) 2) Study tour, field school, field day, etc. for farmers 3) Technology transfer to extension staffs. 4) Monitoring and evaluation on farmers who apply recommended technology
Executing System	Execution : MOFA(CS), CRI, SARI, SRI Supporting : GIDA

9.7.3 Production and Distribution of Quality Rice Seed (Component: 3-3)

Upland rice varieties which produce sustainable yields by low inputs are demanded in Ghana. In 1997, a variety test of NERICA was initiated for improvement of upland rice productivity. Based on the result of field test at farmers' fields in 2000 to 2002, the variety test with eight varieties of NERICA was made in cooperation with CRI, SARI, and Agricultural Research Station of University of Ghana. Seed multiplication and distribution of NERICA in the Volta, Eastern, Western and Northern regions were carried out together with extension of rotational cropping and modified tools under Special Program for Food Security (SPFS).

In 2000, SSIAPP introduced nine varieties of NERICA to IDC for variety test. Answering an MOFA request, SSIAPP made a field trial of four varieties at the Ashiaman irrigation scheme of GIDA in 2001 which resulted at the yield of 2 to 3 ton/ha.

Table 9.22 Result of NERICA Variety Test in SSIAP(dry season in 2001)

NERICA Variety	No. of tillers/ hill	Plant Height (cm)	Days after Transplanting to heading	Maturity (days after transplanting)	Grain Yield (kg/ha)
WAB 450-1-B-P-38-HB	14	104	52	87	2,761
WAB 450-1-B-P-91-HB	24	105	56	89	1,954
WAB 450-11-1-1-P-31-HB	15	109	56	89	1,742
WAB 450-1-B-P-160-HB	15	139	62	93	2,251

In March 2003, MOFA started seed multiplication of NERICA varieties in response to the request of FAO. SSIAPP arranged seed production in Ashiaman-IDC in cooperation with CRI and SARI. IDC continues seed multiplication of NERICA varieties again from 2006. Extensive rainfed rice farming shall be promoted with selection and multiplication of NERICA varieties.

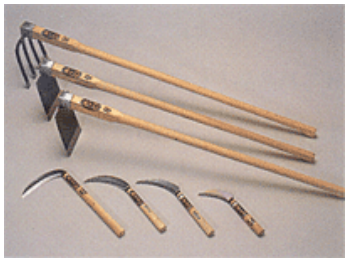
Table 9.23 Production and Distribution of Quality Rice Seed

Item	Features of Components
Target	Extensive rain-fed rice farming with assuring a certain income will be prevailed.
Outputs	1. Quality seeds will be produced by farmers. 2. Farmers adopt selected seeds.
Activity	1. Promotion of seed production of NERICA varieties 2: Preparation of guideline and materials for training and dissemination 3: Training of farmers and extension staffs. 4: Production of quality seeds by farmers
Executing System	Execution: CS in MOFA, CRI, SARI Supporting: GIDA, University of Ghana, NGOs

9.7.4 Farm Tools Improvement (Component: 3-4)

Prevailing tools used by farmers are for land preparation, weeding, harvesting, threshing, etc. The kinds and shape of those tools have been modified according to their long-term experiences and customs. However some tools might need modification. For instance, a common hoe in Ghana has a short stick and farmers are obliged to do farming practices with bowing position. If the stick is however much longer, their tiredness might be reduced. Weeding applying simple instruments could increase its work performance. This component shall be implemented through adaptive trials with farmers.

Common Hoes in Ghana



Common Hoe and Sickle in Japan

Simple Weeder for Paddy Field

Furthermore, this component shall introduce instruments for draft animals such as plough, leveler, etc.

Table 9.24 Improvement of Farm Tools

Item	Features of Components
Target	Work efficiency will be improved.
Outputs	1. Farmers recognize improved farm tools and utilize them in farming practices. 2: Manufacturing of improved tools will be initiated on trial.
Activity	Activity 1: Introduction of improved tools to farmers Activity 2: Training for farming practices with improved tools. Activity 3: Manufacturing of improved tools on trial basis
Executing System	Execution：MOFA(AED) Supporting：NGOs

9.7.5 Simple Grain Storage Extension (Component: 3-5)

After threshing, paddy grains could be stored temporarily. However, there are a lot of losses in the storage due to various damages caused by insect, over dry, water leaking, etc.

Respective farm household has individual grain storage and common storage managed by community

is not prevailed. It might be due to scattered farmers, poor road network, difficulty in management, land acquisition and construction cost, etc. Individual storage rather than community storage will be realistic at present. Grain storage with high and flat floor is proposed for reduction of losses. Photos show grain storage near Tamale (left) and highest storage in East Africa (centre and right).

Local Grain Store, Tamale: It is difficult to control rain water and incoming small animals.

Store in East Africa: Floor height 50cm from ground level. Ensuring proper air flow.

Capacity of proposed storage might be estimated at around 11 to 12 bags. The following is a proposed design of the storage.

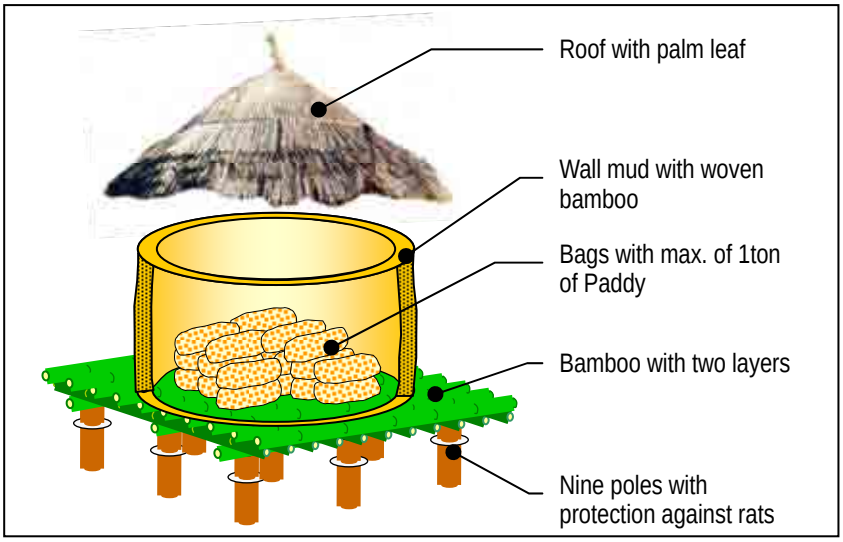


Figure 9.9 Proposed Small Scale Grain Store

In Ghana, bamboo is popular according to the climatic condition and used as materials for house and agricultural materials. Extension of a simple grain storage using local materials is recommended.

Rain-fed farmer with an average scale of 0.5 ha shall produce around 1.0 ton accounted for 11 to12 bags. Grain storage facility with high floor could bear its weight.

Simple storage shall be for piled bags with one ton in total, with natural ventilation and protection against animals. Tarpaulin sheet might be necessary to protect rainfall leak.

Grain storage in Ethiopia is for maize, sorghum and millet and with single bamboo floor. Relative density of paddy is larger than maize and others, hence two layer bamboo floors right-angled will be

necessary. On the floors, round wall mud woven bamboo shall be made with an entrance made in palm leaves good for one person. Conic woven storage roof shall be made in palm leaves and reeds. Nine poles shall be equipped with protection made in board or bamboo against animals such as rats.

Table 9.25 Simple Grain Storage Extension

Item	Features of Components
Target	Each rice farmer will be able to properly store paddy grains.
Outputs	1. Storing losses (animal eating, high moisture) will be reduced and milling recovery rate be increased. 2. Store in a long time and sales according to market prices will be made. 3. Farmers will learn construction technology for storage. 4. Maintenance of storage facility will be made economically.
Activity	Activity 1: Training for extension staffs on construction of storage 1) Training for farmer leaders Activity 2: Construction of simple storage 1) Advertisement of construction and recruitment of applicants 2) Selection of villages and locations concerned 3) Supply of minimal construction materials 4) Construction of simple storage, applying participatory approach 5) Preparation of extension materials (video and manual) Activity 3: Monitoring and evaluation on simple storage 1) Monitoring on losses (ordinary and recommended) 2) Verification of monitoring results and manual improvement 3) Extension and monitoring
Executing System	Execution：MOFA, Regional Development Office Supporting：GIDA, NGOs

9.7.6 Livelihood Improvement (Component: 3-6)

Agricultural activities are a part of farmers' livelihood. Improvement of performance of other livelihood activities will effect to agricultural activities, too. This component shall introduce improvement of local kitchen range. Generally, the kitchen range in each farm household is located outside as shown in the photo. This range has significantly low heat efficiency, because this has no cover to seal in heat. Therefore, additional fire woods are required, and thus farmers need more time for additional workload to collect fire woods.

Cooking Stove at Open Space

It is proposed to introduce an improved stove, in order to control useless fire woods. This range is covered by mud wall except a part for inserting fire woods, therefore heat efficiency will be improved and cooking time be cut down. Furthermore this range has a certain height, and then it is not necessary to keeping the bowing position, resulting in reduction of workload to waist.

Table 9.26 Livelihood Improvement

Item	Features of Components
Target	Farmers can get some margin of time for agricultural activities.
Outputs	Consumption of fire woods and cooking time will be reduced.
Activity	1: To make improved kitchen range 2: Training for utilization of improved kitchen range
Executing System	Execution：MOFA(Women in Agricultural Development, WIAD) Supporting：NGOs

9.8 Priority of Integrated Development Program and Selection of Area for Action Plan

9.8.1 Priority of Integrated Development Program

Present domestic rice supply is estimated at 290,000 ton of paddy grains, equivalent to 170,000 ton of milled rice accounting at 38% of self-sufficiency against total demand of 460,000 ton. Shortage of supply is supplemented by imports of 300,000 ton. The right figure shows demand of the urban area in large cities (Accra, Kumasi, Tamale and Sunyani), other urban area and rural area as well as supply by domestic production and import. Imported rice is mainly high quality rice targeting urban demand in large cities. Domestic rice is for demand in other urban and rural area including home consumption in the farm households. Supply of domestic rice is far below the urban demand in the large cities in terms of volume and quality.

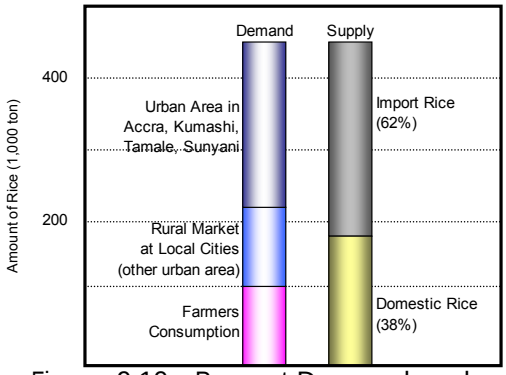


Figure 9.10 Present Demand and Supply of Rice
(Source: JICA Study Team)

Table 9.27 Increment of Rice Demand in Urban and Rural Area

	Average Demand 2002 – 2004	Total Demand 2015	Increment
Urban	360,000 ton	630,000 ton	270,000 ton (75%)
Rural	100,000 ton	190,000 ton	90,000 ton (25%)
Total	460,000 ton	820,000 ton	360,000 ton (100%)

Source: JICA Study Team

Provided the favorable situation of the present economy continues in the future, per capita consumption of rice is estimated at 820,000 ton in 2015, increasing by 360,000 ton from the present consumption of 460,000 ton (milled rice, average of 2003 - 2004). Out of an increment of 360,000 ton, the majority is demand for the high quality rice in the urban areas in large cities. To meet the large demand of high quality rice, drastic expansion of irrigation area is the way. On the other hand, demand in other urban and rural area and home consumption of farm households is not required for high quality rice, but destine and removal of debris are effective to meet these demands.

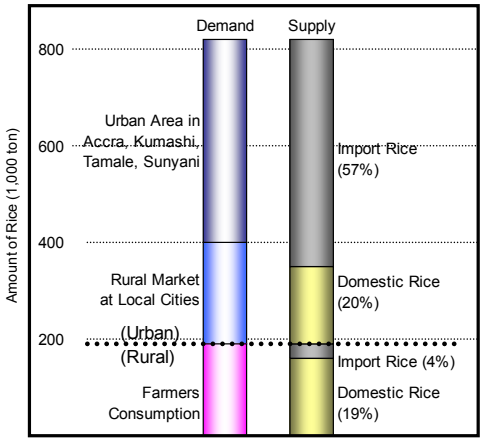


Figure 9.11 Future Demand and Supply of Rice (Source: JICA Study Team,)

Based on present government plan, rice production area is assumed to be expanded to 154,000 ha in future from the present 118,000 ha, increasing by 36,000 ha consisting of 6,000 ha in irrigation (Type 1), 19,000 ha in semi-intensive (Type 2: inland valley and lowland), and 11,000 ha in extensive (Type 3, rain-fed lowland and upland), along with increase of average unit yield to 3.5 ton/ha, improvement of processing and marketing. This will resulted in the same level of self-sufficiency (38% to 39%) in the future, as the 1st Stage of improvement of domestic supply. Depending on the progress and attainment of the 1st Stage, the 2nd Stage should be considered for

improvement of self-sufficiency (to maintain the future import amount to the present level of 480,000 ton equivalent to paddy grains).

Taking the above situation into account, priority of three integrated development program for Type 1, Type 2 and Type 3 are studied in the following:

(1) Market Driven Rice Enhancement Program (Irrigated Extensive: Type 1)

Presently, irrigated intensive rice farming system produces 16% of domestic production and supplies to the urban demand. To increase self-sufficiency by meeting the high growth of urban demand, a large expansion of irrigation area is required with large investment of irrigation infrastructure. On the other hand, total budget allocation in MOFA is 144 million cedi from the GOG for development expenditure covering all the crops and animal husbandry, this allocation is not able to allow large irrigation investment.

In addition, development progress and performance of irrigation schemes are not enough for drastic expansion of irrigation area. Therefore, it is proposed to maintain the present trend in irrigation development, and after some time along with monitoring the performance of irrigation sector, establishment and implementation of irrigation policy, financial situation of the government and socio-economic situation, irrigation investment would be revised in the 2nd Stage.

In addition, the present operation scale in individual irrigation farmers are mostly around 1 acre (0.4 ha) and their income from rice is supplemental level. This situation requires reduction in production cost and expands the operation area. An expansion of operation scale need to solve the land problems which GIDA schemes facing.

After improvement of the above circumstance to allow irrigation investment, rehabilitation and expansion of the existing irrigation schemes would firstly be implemented and lead to develop new irrigation schemes. GIDA has already prepared the long list of 20 new irrigation projects covering total area of 500,000 ha as shown below:

Table 9.28 Long List of New Irrigation Schemes under GIDA

Region	Project	Area	Status	Region	Project	Area	Status
Upper East	Tamne	1,476 ha	F/S	Brong Ahafo	New Longoro	-	Preliminary
Northern	Mpaha	5,500 ha			Asantekwaa	-	
	Lammassa			Northern	Buipe	110 ha	
	Upper Sissilli	19,270 ha	Pre-F/S level		Kete Krachi		
	Lower Sissilli	110,000 ha	Preliminary	Eastern	Amate	206 ha	
	Pwalugu	25,000 ha			Dedeso	440 ha	
	Daboya	134,000 ha		Volta	Kpandu Torkor		
	Kulpawn	-			Aveyime	7,900 ha	F/S level
Upper West	Kamba	4,050 ha		Eastern / Gr.Accra	Kpong	4,000 ha	
Brong Ahafo	Bui	64,000 ha		Eatern/G.Accra/Volta	Accra Plains	100,000 ha	

Source: GIDA

(2) Rainfed Rice Promotion Program (Semi-intensive Rain-fed: Type 2)

Semi-intensive rainfed rice farming system produces 78% of domestic rice, and many farmers conduct

rice farming. Rice produced in this type is supplied to urban area surrounding the rural area. Target area is inland valley and lowland where potential is high but not utilized. In this area, staple production is expected through utilization of supplemental irrigation water from springs and small streams, and development cost is not high as irrigation.

The Ashanti region, where large areas of inland valley are located, is the largest consumption area of domestic rice. The Northern region, where lowland is extending in large area, is the largest supply area of domestic rice. In these two regions, improvement from production to marketing, including removal of stones and debris in milled rice, will improve the domestic rice industry and increase the income of rice farmers.

(3) Support Program for Poor Rice Farmers (Extensive Rain-fed: Type 3)

Rice farming for home consumption and supplemental income is quite important in the agro-ecological conditions in the savanna in the three regions of Upper West, Upper East and Northern, where poverty head count is extremely high.

The Savanna Agricultural Research Institute is located at Tamale, capital of the Northern region, and has been conducting the participatory research of NERICA rice and extending NERICA rice production at farmers' level under the collaboration with NGO. Through taking the linkage with the Savanna Agricultural Research Institute, firstly approach and methodology will be established for "low input – low return" rice cultivation, and then extend to the Upper West and Upper East regions.

(4) Selection of Priority Program

Based on the above discussion, the priority in the 1st Stage is given to the following two programs for preparation of the action plan:

・Rainfed Rice Promotion Program	Type 2: Semi-intensive Rainfed Rice Farming System in Inland Valleys and Lowland
・Support Program for Poor Rice Farmers	Type 3: Extensive Rainfed Rice Farming System in Rainfed Lowland and Upland

In terms of profitability in bringing income to farmers, rice is higher than other food crops like maize, yam, sorghum and plantain. However, profitability per unit acreage of rice, particularly Types 1 and 2, is not so high compared with vegetables and fruits for urban and export markets. Reduction of production cost is important but not limitation is there. In this case, it is necessary to create the circumstance to enable expansion of operation scale for formers.

In the long term, preference of food will be changing due to change in economic situation and fluctuation of price of foods, this will affect farmers' income. In this situation, farmers will need enough capacity to change their farm management to suitable crops and commodities. It is expected through changing their farm management from traditional food crops to rice, farmers are able to obtain such capacity to adapt their management suitable for the economic situation. In promotion of

domestic rice, management capacities will be reinforced for farmers, rice millers and traders.

On the other hand, donors of Europe and US give assistances to fruits and vegetables which are targeted for the markets in cities and even Europe; and thus are highly value-added. However, the risk is high for such agriculture as producing crops targeted to international markets, which do not have enough demand in domestic markets. Also, such agriculture may cause regional disparity because it may be possible only in areas where social infrastructure is well developed.

In this regards, in promotion of rice industry, target is given to domestic markets which offer stable demand, though it may not provide high profit, and business capacities of farmers, rice millers, and distributors is strengthen. In the long run, they are expected to acquire capacities to cope with changes of the situation in the future.

9.8.2 Selection of Area for Action Plan

As mentioned in the previous Section 9.6 and 9.7, each of "Rainfed Rice Promotion Program" and "Support Program for Poor Rice Farmers" contains a wide variety of such components as rice production, processing, marketing livelihood improvement, as rural or regional development focusing on rice. In this case, smooth implementation may not be obtained in the virgin area where farmers and extension agents have no experiences in rice cultivation.

For the first step for implementation, methodology and approach will be established in the short term in the area where such relevant support agencies as research institutes and extension offices are available and accessible as well as similar projects are under implementation or implemented. Then, in the medium term, the methodology and approach will be extended to the other potential area. Therefore, the area for action plan to start the activities should have similar conditions with the other area to be extended. In this regard, the Ashanti and Northern regions are selected for short term activities, as shown below.

Table 9.29 Selection of Area

Item	Ashanti Region	Northern Region
Relevant Research Institutes for Linkage	・ Crop Research Institute ・ Soil Research Institute	・ Savanna Research Institute
Similar Projects and Programs for Rice	・ Inland Valley Rice Development Project (AfDB) ・ Nerica Rice Dissemination Project (AfDB) ・ Sawah Pilot Project	・ Lowland Rice Development Project (AFD) ・ Nerica Rice Dissemination Project (AfDB)
Natural	・ Rainforest and wet climate common to southern and central Ghana ・ High potential of Inland Valley (more than 130 sites) ・ Rural socio-economic situation common to southern and central Ghana	・ Savanna ecological region common to northern Ghana ・ High potential of lowland (more than 70 sites) ・ Rural socio-economic situation common to northern Ghana
Similarity with other area	・ Kumasi is the largest market of domestic rice and rice flows from other regions. Other Regions like Western, Eastern, Central and Volta Regions are similar marketing situation.	・ Largest production area to outflowing to other regions ・ Climate condition of Savanna and high incidence of poverty common to Upper West and Upper East

Item	Ashanti Region	Northern Region
	・ Methodology and approach for production and marketing to be developed for Kumasi and surrounding markets and to be extended to other areas	・ Methodology to approach to established in Northern Region and extend to Upper West and Upper East
Other development project and programs focusing on agriculture and rural development	・ Community Based Rural Development Project (WB)	・ UNDP Rural Livelihood Project (UNDP) ・ Intervention Zone 5 district under Millennium Challenge Account (MCA) located to improve trunk & feeder roads

Source: JICA Study Team

List of potential sites for inland valleys and lowland is prepared through collection of information from the regional and district offices of MOFA. Potential sites are about 130 in Ashanti and 70 in the Northern region, and sites of which could be identified are as shown below (detailed information is referred to Attachment-9 (1) and -9 (2)):

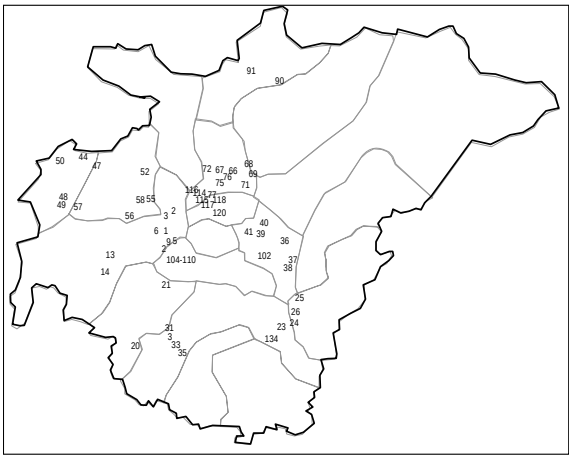


Figure 9.12 Potential Sites in Ashanti Region
(source: MoFA Kumassi RAD Office)

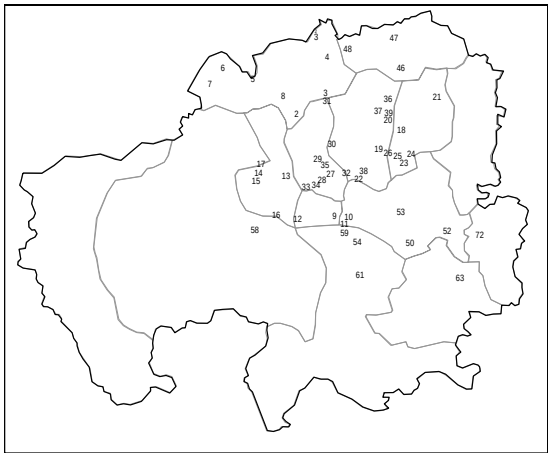


Figure 9.13 Potential Sites in Northern Region
(source: MoFA Tamale RAD Office)

9.8.3 Approach to Action Plan

In preparation of Action Plan of "Rain-fed Rice Promotion Program" and "Support Program for Poor Rice Farmers", it is important to arrange the enabling environment and linkage with relevant agencies.

(1) In view of the short term perspective, components in the programs will be implemented in the several sites in the Ashanti and Northern regions to establish methodologies and approach through trials, then the methodologies and approach will be extended to other sites for applicability and effectiveness. This practice would be replicated to expand the coverage of area, and reduction of cost would be elaborated in this process.

However, a minimum cost is required to expand the activities. In this regard, it is assumed to build a mechanism to utilize the counterpart fund of the Second Kennedy Round (Grant Aid for Support Program to Underprivileged farmers) and seek other available funds, in addition to the budget allocation from the government.

(2) Another environment is to create linkages among the stakeholders that will be managed in

order to 1) share and utilize the lesson learnt obtained in the other projects and programs, and 2) to extend the effect of the programs prepared in this Study. In this regard, it is necessary to share the information among the stakeholders from the initial stage. Particularly, many rural development projects are implemented by the donors, and if participants select rice farming and business as the income generation activities, some components in the "Rain-fed Rice Promotion Program" and "Support Program for Poor Rice Farmers" will be available to introduce.

Projects and programs to be taken linkage with are listed below:

Sawah Pilot Project under Soil Research Institute and Crop Research Institute

Suitability mapping of Inland Valley under IWMI

Inland Valley Rice Development Project under AfDB finance

Nerica Rice Dissemination Project under AfDB finance

Lowland Rice Development Project under AFD assistance

Ghana Rice Inter-professional Body under AFD support

Rural Livelihood Project under UNDP

Human Security Project under UNDP

System for Rice Intensification under Crop Research Institute

Environmental Resources Management Project under Soil Research Institute

Utilization of business development services promoted by micro, small and medium enterprise development for rice millers and traders

Improvement of access to financial services through utilizing procedures for microfinance institutions

CHAPTER 10 ACTION PLAN

10.1 Approach to Prepare the Action Plan

In the Master Plan, two stage-wise development is recommended taking into the present projects and programs from the practical viewpoints. As a short-term development, the priorities were put on Type 2 (this type occupies 80% of the domestic production) and Type 3 (main target is poor rice farmers) under two programs out of three integrated development programs as shown below, and the Action Plan was examined by selecting sample sites in the prioritized regions, the Ashanti region and the Northern region.

- Rain-fed Rice Promotion Program — Type 2: Semi-intensive Rain-fed Rice Farming System in Inland Valleys and Lowland
- Support Program for Poor Rice Farmers — Type 3: Extensive Rain-fed Rice Farming System in Rain-fed Lowland and Upland

In the preparation of the Action Plan for the above mentioned programs, the following points were considered; (1) selective application of development components depending upon the characteristics of each site, (2) consideration to preferability of consumers based on quality, (3) improvement of price by ensuring quality and shipping amount of products, (4) securing of sustainability to adopt rural development method, and (5) establishment of implementation method and application of it to other sites with similar conditions. These concepts are shown in Figure 10.1 as follows:

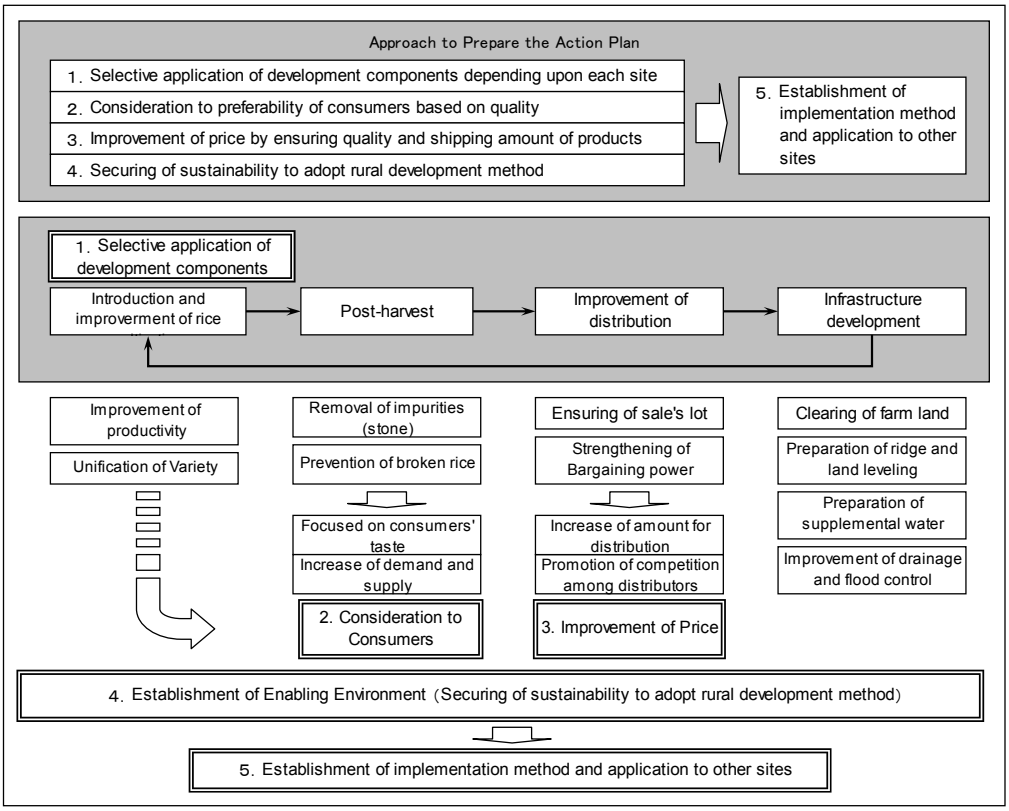


Figure 10.1 Concept of Action Plan (source: JICA study team)

The following points are focused as the approach to prepare the Action Plan:

(1) Selective Application of Development Components

The integrated development programs contain various development components from production to marketing, as shown below:

Table 10.1 Development Component under the Prioritized Program

Program	Development Components
2. Rain-fed Rice Promotion Program (Type-2: Improvement of Semi-intensive Rain-fed Rice Farming System in Inland Valleys and Lowland)	2-1 Field improvement for semi-intensive rain-fed rice farming 2-2 Improvement of semi-intensive rain-fed rice farming 2-3 Community-based rice seed production and distribution 2-4 Capacity development of extension staffs 2-5 Support for maintenance and replacement of rice mills 2-6 Improvement of access to rice field
3. Support Program for Poor Rice Farmers (Type-3: Improvement of Extensive Rain-fed Rice Farming System in Rain-fed Lowland and Upland)	3-1 Field improvement for extensive rain-fed rice farming 3-2 Improvement of extensive rain-fed rice farming 3-3 Production and distribution of quality rice seed 3-4 Farm tools improvement 3-5 Simple grain storage extension 3-6 Livelihood improvement

Source: JICA Study Team, refer to Table 9.4 on page 9-12

It is not necessary to apply all the components at each place, requirement will firstly be assessed for particular sites, and then appropriate components will be selected and modified to apply.

(2) Preferability of Consumers about Quality

It is expected that future rice demand will increase from the present 460,000 ton to 820,000 ton at the national level, however, 75% of increment amount is for urban demand. Therefore, domestic rice is required to satisfy the preference of urban consumers. According to the consumer preference in urban area (Table 10.2), the highest mark is given to "impurities (stones)" among the various factors governing rice selection. Then, "uniformity" and "broken rice" are also high-lighted. In this regard, quality factors are necessary to be taken into account together with production increase, and the highest priority is given to "impurities (stones)" at farmers level since some portion of produce is home consumption with the 2nd and 3rd priorities to uniformity and broken rice respectively.

Table 10.2 Factor for Rice Choice

Factor	Ratio
Impurities (Stones)	22%
Uniformity	18%
Broken Rice	15%
Taste	12%
Price	10%

Source: JICA Study Team

(3) Improvement of Price by Ensuring Quality and Shipping Amount of Products

Higher farm gate price will increase incentives for farmers to produce rice in terms of volume and quality, particularly in the Northern region where rice production is surplus and the lowest price is lowest in the country, as shown in Table 10.3. If farmers can sell their rice to Kumasi market where price higher than that of the Northern region, they will obtain higher price. Then, farmers will obtain bargaining power through collection of larger volume of uniform rice grain by inviting competition among local and regional traders. For this purpose, farmers can organized them into farmers based organization to produce uniform grains without stones.

Table 10.3 Sales Price at Producers

(unit: cedi/bag)

Factor	Paddy Grain (84kg/bag)	Milled Rice (50kg/bag)
Ashanti	308,000	306,100
Western	239,600	293,600
Volta	285,000	306,300
Northern	208,300	250,000
Upper West	220,000	260,000
Average	252,000	283,200

Source: JICA Study Team

Taking the above conditions into account, the following measures for quality improvement would be associated with the development component in the integrated development:

Table 10.4 Improvement Measures among Production to Marketing

	Farmers	Traders	Rice Millers
- Impurities (Stone)	- Improvement in harvesting, threshing, drying and handling (tarpaulin sheet, pedal thresher, manual winnower, concrete floor, etc.)	- Handling, drying and processing of products at clean place - Selection of proper rice mill with better machinery components for milling their products	- Introduction of pre-cleaner and de-stoner - Replacement of Engelberg type to milling machine with rubber roll husker
- Uniformity	- Application of single variety seeds and improvement of farming practices	- Handling without mixture of different varieties	- Handling without mixture of different varieties
- Broken Rice	- Selection of proper harvesting time to avoid over-dry of grains - Improvement of farming & post-harvest practice.	- Selection of proper rice mill with better machinery components for milling their products	- Introduction of shifter & length grader - Replacement of Engelberg type to milling machine with rubber roll husker
- Marketing	- Collection and shipment of uniform rice through group formation - Introduction of weighing equipment - Manifestation of brand name and producers name	- Introduction of weighing equipment - Pricing of rice for both buying and selling according to quality (stone contents and uniformity)	- Introduction of weighing equipment - Application of different charge according to the quality of raw paddy

Remarks: Rice farming tools and machinery in Ghana are shown in Attachment-10(3). Source: JICA Study Team

Based on the above measures, new development components are elaborated in view of post-harvest and marketing, namely 1) Extension of improved post-harvest processing technologies, 2) Promotion of post-harvest processing equipment, 3) Rice mill modernization and 4) Support program for marketing activities. Details are shown below:

Table 10.5 Development Component Newly Proposed in the Action Plan

Integrated Development Program	Development Component	Target Group
2. Rain-fed Rice Promotion Program 3. Support Program for Poor Rice Farmers	4-1 Extension of Improved Postharvest Processing Technology Program 4-2 Promotion of Postharvest Processing Equipment Program 4-3 Rice Mill Modernization Program 4-4 Support Program for Marketing Activities	1) Producer group 2) Producer group 3) Miller and producer group 4) Producer group

Source: JCIA study team

Table10.6 Extension of Improved Postharvest Processing Technology Program

Target Group	Rice Producers Group		
Implementing agency	MOFA (AESD)	**Cooperating agencies**	DAES
Output: 1) The mindset suited to market oriented activities will be promoted in producers. 2) Bargaining power will be increased. 3) Sales price will be raised.			
Activities: 1. Clarification of constraints a. Study of present postharvest processing practices (incl. simple loss assessment survey). b. Clarification of constraints on each process and stage. 2. Preparation of training manual for improvement of postharvest processing practices. a. Consideration on improvement measures for each constraint. b. Preparation of training manual for improvement of postharvest processing practices. 3. Training a. Training to extension officers. b. Training to producers. 4. Monitoring the implementation by producers (incl. simple loss assessment survey for evaluation).			

Table 10.7 Promotion of Postharvest Processing Equipment Program

Target Group	Producers' group		
Implementing agency	MOFA (AESD), GIDA(IDC)	**Cooperating agencies**	DAES
Output: 1) The mindset suited to market oriented activities will be promoted in producers. 2) Bargaining power will be increased. 3) Sales price will be raised.			
Activities: 1. Selection of equipment a. Selection of equipment that can be expected contribution based on the result of the study carried out by Component in Table 10.5. 2. Arrangement of procurement condition for farmers' group a. Conclusion of equipment supply condition with GIDA (IDC). b. Arrangement of credit program to farmers' group for equipment procurement. (2KR program and/or the revolving fund of 2KR shall be considered as the resource of the program.) c. Preparation of the equipment procurement manual including a guideline for using credit program. 3. Explanation to farmers' groups a. Explanation of the program content and the procedure for equipment procurement to farmers. 4. Training of equipment operation a. Preparation of the equipment operation manual. b. Training of extension officers. c. Training for equipment operation to farmers' groups that will procure equipment. 5. Monitoring the operational condition of equipment and credit program.			

Table 10.8 Rice Mill Modernization Program

Target Group	Rice millers / Rice producers' group		
Implementing agency	MOFA (AESD)	**Cooperating agencies**	DAES, MOTI

Output:

1) The management mind based on market needs will be fostered.
2) Consumers of local rice will be increased.
3) Management condition will be improved.

Activities:

1. Selection of machinery and equipment
   a. Selection of equipment that can directly contribute to rice quality improvement.
   b. Rough estimation of cost and contents for machinery and equipment procurement and attachment, and installation work.
2. Arrangement of credit condition for rice millers
   a. Development and decision of budgetary resources.
   (2KR program and/or the revolving fund of 2KR shall be considered as the resource of the program.)
   b. Arrangement of credit condition.
3. Preparation of the guideline of the credit for users.
4. Explanation and advertisement to rice millers and producers'groups.
   a. Explanation of the program content and the procedure for using credit.
   b. Consultation to candidates.
4. Monitoring
   a. Monitoring of management condition of users.
   b. Monitoring of budgetary control condition in the implementing agency.

Table 10.9 Support Program for Marketing Activities

Target Group	Rice Producers Group		
Implementing agency	MOFA (DAES)	**Cooperating agencies**	SRID

Output:

1) The mindset suited to market oriented activities will be promoted in producers.
2) Bargaining power will be increased.
3) Sales price will be raised.
4) Motivation for more production will be strengthened in producers.

Activities:

1. Workshop will be held among the producers for their understanding and consensus of the program's objectives and activities.
2. "Marketing Activities Group (MAG)" will be organized.
3. Brand name will be titled and used for the advertisement as the symbol of "different" quality of rice.
4. Sales promotion goods will be designed and produced. (flier, poster, flag, T-shirts, etc. / printing on clearly "brand name", "catch copy", "producer's name", "contact to:", etc.)
5. Collection and distribution plan of agricultural products will be formulated based on the projected production.
6. Sales promotion will be carried out using goods to wholesaler, retailers and consumers in near town and city and to middlemen covering far distant markets.
7. Candidate buyers list will be compiled during sales promotion activities.
8. Rice mill of modern facility that can be asked the milling of collected paddy will be looked for and nominated.
9. Collection and sales schedule will be prepared among all members based on harvesting schedule.
10. SRDI will provide rice market price information in major markets weekly. (Procedure and system for it will be discussed and agreed between both sides preliminarily)
11. Buyers will be screened and nominated among the candidate buyers list by negotiation on price and amount, watching market price information.
12. Product will be collected and gathered according to the schedule and sale to buyers on time after milling. ("brand name", "catch copy", "producer's name", "contact to:", etc. will be indicated on/in the bag.)
13. Sales income will be paid to producers according to each shipping share after reduction of rice mill charge and MAG's commission. (Amount or rate of MAG's commission will be discussed and agreed among group members in advance.)
14. Monitoring will be done on activities and management condition timely.

Afterward, activities will be back to 5) and continue. Expected optional activities for further development:

a) Various size of plastic bags by original design will be used.
b) Direct transportation and sales to buyers in far distant city market will be carried out (by the own trucks).
c) Own retailing shop will be established in the big cities.
d) Joint sales activities with other rice producers' groups will be introduced.
e) Own rice mill will be established and start the milling service to producers and other groups.

Because the above mentioned components were added, development components under two integrated development program become as follows:

Table 10.10 Development Components under Prioritized Program

Integrated Development Program	Development Component
2. Rain-fed Rice Promotion Program Type-2: Improvement of Semi-intensive Rain-fed Rice Farming System in Inland Valleys and Lowland	2-1 Field improvement for semi-intensive rain-fed rice farming 2-2 Improvement of semi-intensive rain-fed rice farming 2-3 Community-based rice seed production and distribution 2-4 Capacity development of extension staffs 2-5 Improvement of access to rice field 2-6 Extension of Improved Postharvest Processing Technology 2-7 Promotion of Postharvest Processing Equipment 2-8 Rice Mill Modernization 2-9 Support for Marketing Activities
3. Support Program for Poor Rice Farmers Type-3: Improvement of Extensive Rain-fed Rice Farming System in Rain-fed Lowland and Upland	3-1 Field improvement for extensive rainfed rice farming 3-2 Improvement of extensive rain-fed rice farming 3-3 Production and distribution of quality rice seed 3-4 Farm tools improvement 3-5 Simple grain storage extension 3-6 Livelihood improvement 3-7 Extension of Improved Postharvest Processing Technology 3-8 Promotion of Postharvest Processing Equipment 3-9 Rice Mill Modernization 3-10 Support for Marketing Activities

Note: "Support for maintenance and replacement of rice mills" component under Program 2 was excluded to avoid duplication. Source : JICA study team

(4) Securing of Sustainability to Adopt Rural Development Method

Components of the integrated development program will be selected based on the present conditions of sites. It is necessary to confirm needs of farmers and to make communities understand fully. To do so, rural development method is adopted in addition to the examination of technical aspects.

While experts confirm natural conditions and socio-economic conditions of candidate sites, it is necessary to obtain full understanding of community to which farmers belong. And Community Action Plan (CAP) will be prepared, which includes present conditions of sites, selection of development components and assistance, and their priorities. Through this process, capacity of planning and implementing projects by people concerned is expected to be strengthened. Then

sustainability will be ensured by establishing enabling environment by creating ownership of participants.

(5) Establishment of Implementation Method and Application To Other Sites

The Action Plan targets Rain-fed Rice Promotion Program and Support Program for Poor Rice Farmers. The following measures to increase rice production are assumed; 1) improvement of filed condition which can be done by farmers themselves such as making bund etc, 2) construction of irrigation facilities and access roads with civil works, 3) dissemination of basic farming technique, 4) introduction of improved farming technique, 5) improvement of post harvest technique to reduce loss and raise quality, 6) improvement of farmers' sales in marketing, and 7) interaction with distributors and consumers.

By doing such wide measures at sites, cooperation is required among related institutions such as regional and district agricultural extension offices, projects which are being implemented, crops research institute, savannah agricultural research institute, local government which promotes community development, distributors, and consumers. In order to make this kind of cooperation, it is necessary to establish implementation method through try and error in the limited site at first, and to apply the established method to other areas as the second step.

10.2 Field Visits at Sample Sites

Through selecting the sample sites for formulation of Action Plan, filed visits were carried out in the Ashanti and Northern regions during middle to late November 2007. The study team firstly visited the MOFA regional offices to explain the concepts, and consulted with the regional staff to select districts. Table 10.11 shows the districts selected for field visit:

Table 10.11 List of Districts selected for Sample Sites

Ashanti Region	Northern Region
Ahafo-Ano South district (Capital: Mankranso)	Tolon-Kumbungu district (Tolon)
Ejisu-Juaben district (Ejisu)	Sevelugu-Nanton district (Savelugu)
Ejura-Sekyedumanse district (Ejura: large market)	Karaga (Karaga)
Adansi South district (Edubiase)	East Gonja (Salaga)

Source: JICA Study Team

At the selected districts, the study team consulted with the MOFA district staff for selection of sample sites and, 11 sites in the Ashanti region and 15 sites in the Northern region were selected. Filed visits were jointly carried out by the study team, extension agents and staff from the regional and district office. Features of the sample sites are shown in Table 10.12 and Table 10.13.

Table 10.12 Brief Feature of Sample Sites (Ashanti Region)

District (capital)	Site (location)	Situation observed at Site Visits
(Ashanti Region)		
Ahafo-Ano South (Mankranso)	Attakrom: near district capital, along the main road	- Paddy cultivated under the rain-fed condition in small part. - Candidate of IVRDP (canceled), but land development required, small stream available for water source. - Encouragement of farmers not confirmed
	Adugyama: near district capital along the main road	- Paddy field opened by farmers. - Paddy well cropped. - Candidate of IVRDP for land development, and farmers well encouraged.
	Mankranso: close to district capital along the Mankran river.	- Paddy cropped in limited scale and looks poor. - Virgin pocket available for expansion. - Water available from the Mankran river, but pumping required - Encouragement of farmers not confirmed
Ejisu-Juaben (Ejisu)	Duampompom: along the road to Accra potential 40 ha or more	- No paddy cultivation at present though planted before. - Virgin land - Candidate of IVRDP (canceled), and encouragement of farmers not confirmed
	Kubease: near road to Accra	- 20 ac developed by SPSF, water pumping from small stream - Paddy well cropped, and farmers encouraged. - Candidate by IVRDP for expansion.
	Besease: other side of main road to Accra at Kubease	- Site is located near the road to Accra. - Research conducted by CRI Dr. Dartey, and looks encourage farmers. - Candidate by IVRDP for expansion and farmers well encouraged.
Ejura-Sekyedumanse (Ejura: large market)	Aframso: more than 50 acre extended along the Afram river	- Land development by IFAD - Paddy well cropped - Candidate by IVRDP for expansion and farmers well encouraged.
	Teacherkrom: inside from the main road, but no access problem	- NERICA planted area for community- based seed production (2 locations) and participatory variety selection (1 location), supported by CRI under Nerica Rice Dissemination Project - Land clearing, no leveling, no water source available - NERICA well cropped and farmers encouraged
Adansi South (Edubiase)	Subrinso: 1,200 acre (480 ha) potential in Subri and Ntontobu valleys	- NERICA 1 grain production (about 20 ac) in Subri valley - FBO: Subriso Rice Growers Association (rice mill by MOFA) - No support for expansion - Farmers encouraged.
	Bepoase: 4 valleys under community along the Pra river.	- Rice cultivated by 100 farmers - Local varieties planted. - Farmers encouraged
	Asarekrom: Akyekyenso valley about 40 ha potential.	- Site far from the village

Source: JICA Study Team

Table 10.13 Brief Feature of Sample Sites (Northern Region)

District (capital)	Site (location)	Situation observed at Site Visits
(Northern Region)		
Tolon-Kumbungu (Tolon)	Gbrumani:	- Community-based Seed production supported by SARI under Nerica Rice Dissemination Project. - Site under Land Restoration Project under UNDP
	Gbrumani: Kublinie Valley (several hundreds ha) and Funta (about 200 ha potential)	- Difficult access by vehicle when rain. - Lowland rice cultivated by 5 communities under rain-fed condition (GR8, Tox 3108. Faro 15). - Poor drainage with hydromorphic
	Dalun - Donjiri Lowlands: well defined area - Dalun Valley: located closes to the White Volta, susceptible to flood - Kukuo paddy fields in both lowland and rain-fed upland	- Rice cultivated in rainy season in the well developed area. - In dry season, vegetable by water from ponds. - Rice cultivated and water melons by residual moisture (high permeability). - Upland field: Community-based Seed production supported by SARI under Nerica Rice Dissemination Project. - Lowland field: lowland rice cultivated (GR 19, Tox 3108, Faro 15, Afife)
Sevelugu-Nanton (Savelugu) Many sites located for commercial production of mango by ITFC (Integrated Tamale Fruit Company)	Dipale: about 400 ha located nearby eastern bank of the White Volta	- No cultivation at present due to construction work by the Small Scale Irrigation Development Project, for paddy, maize, vegetables (Millennium Challenge Accounts indicated further commercial production). - Government land allocated to community based on the criteria by MOFA/District. - FBO: farmers cooperative (300 members) established
	Nabogu: located near Pong Tamale along the main road	- Lowland area with bund. - Western side allocated to MOFA staff of Region, by mechanized rice farming using combine harvester, initiated in 1972 – 74 (OFYP Achampong time) - Eastern side cultivated by small farmers (Faro 15, Tox 3108, Afife), manual threshing on-going at visit.
	Maligunayili: located along road: Karaga-Savelugu	- Paddy fields with bunds and drainage. - Previously large area under paddy cultivation, sponsored by MOFA. - Presently limited area under cultivation due to financial situation after 2005 draft. - Valley divided into 3 zones: 1) civil servant/ public workers, 2) commercial farmers, 3) peasant farmers.
	Nakpankzo: about 350 ha potential lowland	- Paddy fields with bunds and drainage. - Commercial production by farmers (average size about 6 ha).
	Zoggu: about 40 ha potential lowland, extending both side of road	- Upland and lowland under rain-fed condition - FBO: farmers association stabled in each community of 3 locations closed to the site.

District (capital)	Site (location)	Situation observed at Site Visits
Karaga (Karaga)	Gunayili Valley: large potential area in low land, 80 ha under cultivation	- In the past, large scale rice cultivation by Nasia Rice Company in 1970s. - Present cultivation using combine harvester.
	Jamaga – Tindong: about 500 ha potential	- Small to medium size farmers raging 2 ac to 6 ac with tractors. - Local variety: Mandii, without fertilizer but with herbicide - Harvesting and threshing by tractors, leaper utilized by some farmers.
	Napoligu – Diburo Valleys:	- Mainly large scale mechanized rice cultivation by commercial farmers, arranging seed production of Afife variety. - Stones contaminated and grain broken in the harvest by the combine harvester, most of grains parboiled in Tamale.
	Gaa Valley: located at about 15 km from Karaga	- Large scale mechanized rice cultivation by commercial farmers, similar way as indicated above (Napoligu – Diburo Valleys).
East Gonja (Salaga)	Mankongo Valleys: 800 ha potential near Salaga, marketing route to Kumasi through Ejura via ferry	- In the past, large scale rice cultivation by government rice company in 1970s. - 150 ha under cultivation by 120 small scale farmers. - Manual weeding, threshing by sticks on ground.
	Katanga Valleys: 15 km from Salaga, extending over 12,000 ha of potential lowland,	- In the past, large scale rice cultivation by government rice company in 1970s. - Most remaining fallow land, due to no availability of machinery.
	Fuu Valleys: 1 hour driving along the road from Tamale to Salaga, 200 ha potential of lowland	- 30 ha developed with bund for rain-fed cultivation by SPFS and 54 farmers participated (0.55 ha per farmer). - No cultivation since 2006 due to 2005 draft and subsequent years.

Source: JICA Study Team

10.3 Grouping of Sample Sites and Selection of Development Components

Sample sites were categorized into rice farming type based on the current conditions as a result of the field survey. Checklist used for the categorization is shown in Table 10.14.

Table 10.14 Checklist for Rice Farming Type

Items	Contents
• Topography	• Inland valley and low land suitable for cultivation of wet land paddy, and gently sloped lands suitable for cultivation of upland rice
• Water sources and supplement irrigation	• Availability of small streams, springs, wells, ponds, and facilities such as intake structure and pump
• Drainage and flood condition	• Depth and duration of inundation in rainy season as well as drainage condition, frequency of flood influencing to rice cultivation
• Land preparation, paddling, and land leveling	• Works made by manual, animal-power, power tiller, tractor through own resources or outside
• Bund preparation and leveling	• Improvement of bund and land leveling through land preparation and puddling • Level and uniformity of water depth by land leveling
• Seed	• Place to get seed, presence of seed selection and sterilization, update of seed, presence of official approval (quality)
• Planting	• Transplanting, dibbling, stripe seeding, broadcasting

Items	Contents
• Farming management	• Method and frequency of weeding, amount and frequency of application of fertilizer and chemicals, preparation and utilization of compost.
• Post harvest	• Harvesting method (panicle, hill, by hand, by reaper, by combine harvester), dry (utilization of tarpaulin, concrete floor), threshing (by stick, by oil drum, tarpaulin, pedal thresher), winnowing (winnower, by wind), weighing (balance), paddy storage facilities, rice milling facilities (kind, capacity, parboiled rice)
• Agricultural extension	• Support form extension worker and research institute (frequency of technical guidance, availability of demonstration plot), training history about rice farming, number of farm household and area which are covered by extension workers, cooperation with research institute.
• Beneficiaries and home consumption	• Number of beneficiaries, availability of farmers organization, land use right and rent • Frequency of eating rice, cooking method of rice
• Marketing	• Place and institution to sell (small scale collector and middlemen such as market mammy)
• Others	• Environmental impact etc.

Source: JICA study team

Sample sites were categorized into rice farming type particularly based on topographic condition, land consolidation condition, condition of water content in the field, water use facilities, farming practice method (planting, fertilizer and agrochemicals). In each type, current level of rice farming was investigated to judge direction of development. As a result, three steps in Type 2 and two steps in Type 3 were set. The following flow in the next page shows categorization of sample sites.

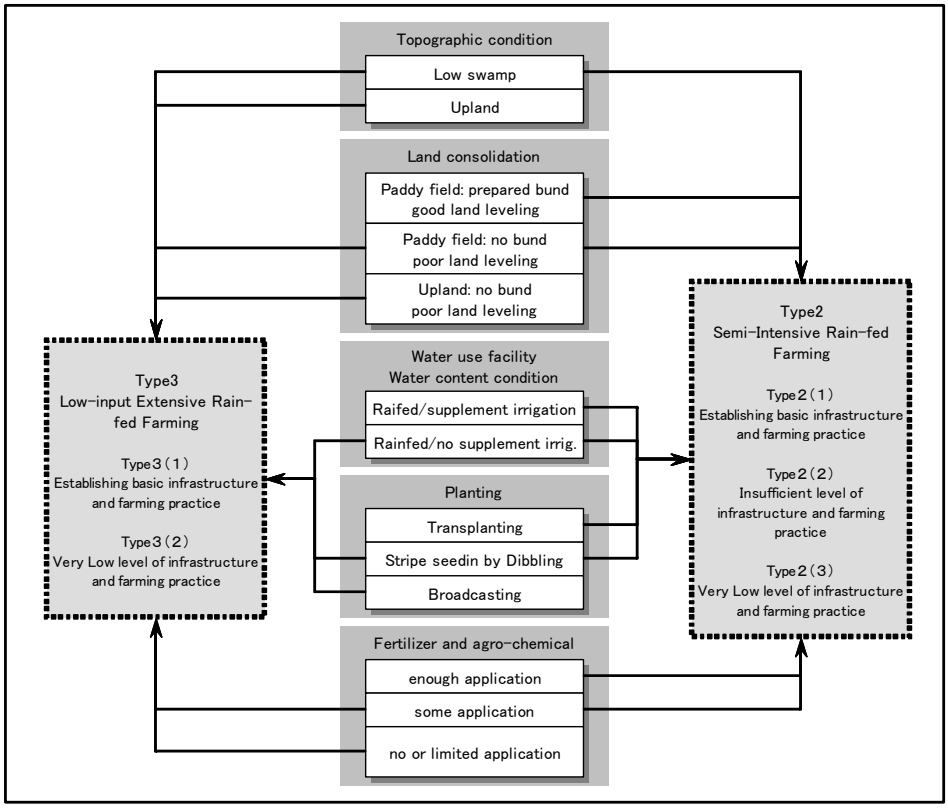


Figure10.2 Flow of Categorization of Rice Farming Type in Sample Sites

(Source:JICA Study Team)

Based on the above mentioned procedure, development components were selected and the detailed results are shown in Attachment 10(2). Seven sites were categorized into Type 2, and four sites were into Type 3 in the Ashanti region. In the Northern region, five sites are for Type 2, and Type 3 has 11 sites. Summary is shown as below:

Table 10.15 Category Groups of Sample Sites

Type	Current Condition	Site
Type 2(1)	Currently semi-intensive rainfed faming is practiced. Land consolidation and farming technique are relatively good, and basic farming technique has been established.	Ashanti Region: (2) Adugyama, (5) Kubeasase, (6) Besease, (7) Afranso Northern Region: (14-1) Dalun (Donjiri)
Type 2(2)	Currently rice is grown, but land consolidation and farming technique are not sufficient. Semi-intensive rainfed faming is expected.	Ashanti Region: (1) Attakrom Northern Region: (15) Dipale, (16) Nabogu, (24) Mankongo Valleys, (26) Fuu Valleys,
Type 2(3)	Currently rice is not grown, or infrastructure and farming technique are at low level. Semi-intensive rainfed faming is expected.	Ashanti Region: (3) Mankranso, (4) Duampompom Northern Region:
Type 3(1)	Currently low-input rainfed faming is practiced, and basic farming technique has been established.	Ashanti Region: (8) Techerskrome Northern Region: (12) Gbrumani, (14-2) Dalun (Kukuo)
Type 3(2)	Currently rice is not grown, or infrastructure and farming technique are at low level. Low-input rainfed faming is expected.	Ashanti Region: (9) Subriso, (10) Bepoase, (11) Asarekrom Northern Region: (13) Kubline Valley (Gbrumani), (17) Maligunyili, (18) Nakpankzo, (19) Zoggu, (20) Gunayli Valley, (21) Jamaga-Tindong, (22) Napoligu-Diburo Valleys, (23) Gaa Valley, (25) Katanga Valleys,

Source: JICA Study Team

Development components were selected from the integrated development programs for Type 2 and Type 3, considering the above mentioned current conditions. Especially in the sites where rice is being grown now, attentions were paid to the improvement of the following points; productivity (increase of unit yield), quality (removal of impurities such as stone), and sales side (increase of sales lot), and to the expansion of rice farming to surrounding areas.

In case of new introduction of rice cultivation, components were selected considering points to improve on-farm conditions by preparation of bund and land leveling which can be made only by farmers, and to improve rice food including home consumption. The results of selection are shown in Table 10.13.

Table 10.16 Development Component for Sample Sites for Type 2

Component	Type 2(1)	Type 2(2)	Type 2(3)
• Field improvement for semi-intensive rain-fed rice farming	• Basically not applicable (will be examined when farming technique is improved)	• Preparation of bund and land leveling are prioritized • Supplemented irrigation and on-farm will be constructed after farming technique is established	• Bund preparation through tillage and leveling through land preparation are promoted after bush clearing
• Improvement of semi-intensive rain-fed rice farming	• Farming management technique is introduced to increase production and improve quality such as cropping calendar hand weeder.	• Basic farming management technique is introduced to stabilize production	• Initial farming management technique is introduced such as nursery bed and transplanting
• Community-based rice seed production and distribution	• Rice farming is disseminated to surrounding areas	• not applicable	• not applicable
• Capacity development of extension staffs	• Improved farming technique is demonstrated. • Cooperation is enhanced with research institute and existing projects	• Basic farming technique is demonstrated. • Cooperation is enhanced with research institute	• Experience and knowledge are established by extension workers. • Initial farming technique is demonstrated.
• Improvement of access to rice field	• Not applicable	• Implementation is done in accordance with progress of facilities establishment (if necessary).	• Implementation is done in accordance with progress of bush clearing (if necessary)
• Extension of improved post-harvest processing technologies • Promotion of post-harvest processing equipment • Rice mill modernization	• Loss is decreased and mixture of impurities are prevented by introduction of pedal thresher and hand winnower, tarpaulin • Existing rice miller is updated	• Loss is decreased and mixture of impurities are prevented by introduction of pedal thresher and hand winnower, tarpaulin	• Basic technique is introduction for harvest, drying, threshing, and winnowing
• Support for marketing activities	• Competitive power is strengthened through improvement of quality • Bargaining power of sales is strengthened by ensuring a certain amount.	• Competitive power is strengthened through improvement of quality • Bargaining power of sales is strengthened by ensuring a certain amount.	• Support is made in starting sales activities.

Source: JICA Study Team

Table 10.17 Development Component for Sample Sites for Type 3

Component	Type 3(1)	Type 3(2)
• Field improvement for extensive rain-fed rice farming	• Basically not applicable (supplemental irrigation will be introduced such as water harvesting and pump when farming technique is improved)	• Bund preparation through tillage and leveling through land preparation are promoted after bush clearing
• Improvement of extensive rain-fed rice farming	• Improved farming management technique is introduced to increase production and improve quality	• Initial farming management technique is introduced and demonstrated.
• Production and distribution of quality rice seed	• Rice farming is disseminated to surrounding areas	• Not applicable
• Farm tools improvement	• Work efficiency is improved by introduction of improved farming tools	• Experience and knowledge are established by extension workers. • Initial farming management technique is and demonstrated.
• Simple grain storage extension	• Training is made about storage and storage facilities are constructed.	• Training is made about storage and storage facilities are constructed.
• Livelihood improvement	• Cooking method is improved by using improved cooking stove, and eating rice is promoted.	• Cooking method is improved by using improved cooking stove, and eating rice is promoted.
• Extension of improved post-harvest processing technologies • Promotion of post-harvest processing equipment • Rice mill modernization	• Loss is decreased and mixture of impurities are prevented by introduction of pedal thresher and hand winnower, tarpaulin • Existing rice miller is updated	• Basic technique is introduction for harvest, drying, threshing, and winnowing
• Support for marketing activities	• Competitive power is strengthened through improvement of quality • Bargaining power of sales is strengthened by ensuring a certain amount.	• Support is made in starting sales activities.

Source: JICA Study Team

10.4 Implementation of Action Plan

In the Ashanti region and the Northern region, 130 and 70 candidate sites were selected, and rice farming can be introduced in more sites than selected ones. The demand for rice is large mainly in urban areas and is considered to increase gradually in rural area. However, it is not easy to improve and introduce rice farming in many candidate sites at the same time. Step-wise development would be necessary. Namely, first, implementation method will be established, which reflects current level of rice farming at each site. And then rice farming will be expanded to surrounding areas by applying the established method with necessary modification.

In this sense, the following four steps are assumed as illustrated in Figure 10.3; (1) planning and preparing for implementation, (2) collecting site information, (3) implementation in the site, and (4)

monitoring and evaluation. Progress of the Action Plan will be monitored as needed, and feedback will be made to current implementation as well as next implementation in other sites.

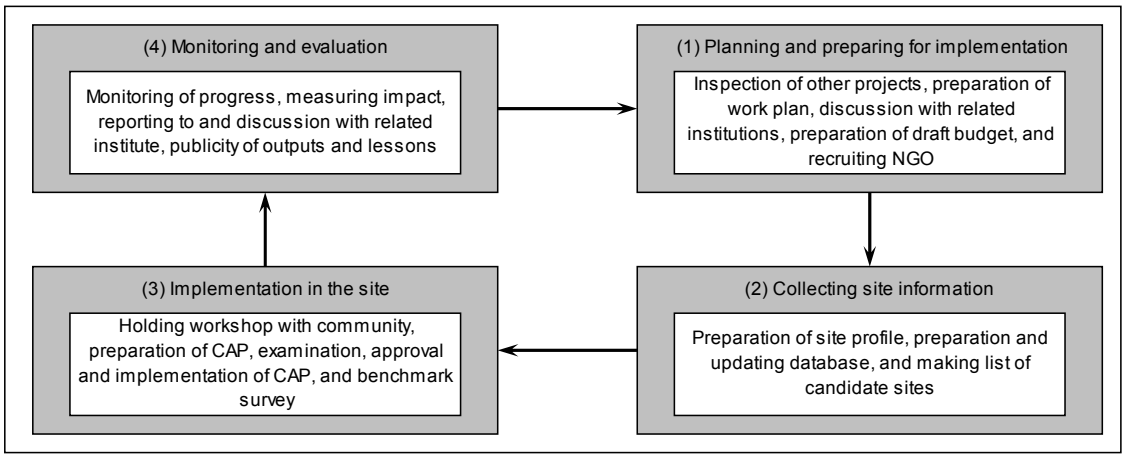


Figure 10.3 Implementation Cycle of Action Plan
(Source: JICA study team)

Table 10.18 Activities of Implementation Cycle of Action Plan

Steps in the Cycle	Activities
(1) Planning and preparing for implementation	• Discussion with central government and related institutions and obtainment of understanding of them • Establishment of implementation agency and opening of project office • Reviewing experiences and lessons of similar projects • Discussion with regional and district government, research institutes, and existing projects and obtainment of understanding of them • Preparation of work plan and draft budget • Preparation of list for supportive organization like NGO and recruiting of them • Formulation of scheme which utilizes counterpart budget of 2KR
(2) Collecting site information	• Discussion with staffs in district office and obtainment of understanding of them, training about selection of sites, implementation and monitoring of the project • Preparation of list and site profile about candidate sites • Preparation of database about site profile
(3) Implementation in the site	• Selection of the site and preparation of the site profile • Holding workshop with project beneficiaries and their communities • Preparation of Community Action Plan (CAP) • Examination, approval, and budget preparation on CAP by project office • Implementation by signing contract with beneficiaries • Business promotion in big cities and cooperation with middlemen • Support to beneficiaries from technical and management points of view by related institutions, and to community from the viewpoints of establishing enable environment • Collection of benchmark information
(4) Monitoring and evaluation.	• Monitoring of project progress and measuring of impacts • Report to and discussion with related institutions • Feedback of outputs and lessons to the site and the plan, and publicity of them.

Source: JICA Study Team

Particular contents of each activity are mentioned as follows:

(1) Preparation of Site Profile and Establishing Database

In the step of selection of the site, information about candidate sites will be collected as site profile, and database will be established. Detailed information would be 1) location, natural condition, and vegetation by using maps and satellite images, and frequency and extent of flood which influence on fields, 2) socio-economic conditions such as population and economic activities, and history of past development projects, and 3) crop production and sales records. After selection of the site, information on beneficiaries and their communities will be collected as benchmark for monitoring. In the implementation stage, progress information of the project will be collected.

Information related to site profile will be collected at district level office of the Ministry of Food and Agriculture and will be sent to the regional office. They will be input to the computer at regional office and updated when required. They will be utilized for monitoring and evaluation of the activities and for selection of and implementation at new site as well.

(2) Formulation of Scheme Which Utilizes Counterpart Budget of 2KR

Counterpart budget of the Grant Assistance for Underprivileged Farmer (the former the Grant Assistance for Increase of Food Production) is accumulating. Implementation of projects will be promoted by establishing and utilizing new scheme of which source is counterpart budget. The following activities will be made to do this; 1) confirmation of accumulated budget, 2) discussion among related units under MOFA and the Ministry of Finance and Economic Planning, 3) preparation of guideline, and 4) establishment of monitoring system of budget, particularly expenditure. Especially for expenditure monitoring, it is important to ensure transparency by adopting the third party.

(3) Support to Supportive Organization like NGO and to Community

Under the Action Plan, farm households are expected to acquire rice farming technique and post harvest technique; production will be increased, and quality will be improved. In order to increase income by selling rice production with increased amount and improved quality, it is necessary to tackle with various issues such as farm household economy, institutional management, sales, livelihood improvement. For this, it is required to establish the environment which enables project implementation at community level, not only individual beneficial farmer. In order to make this happen, it is proposed to adopt supportive organization such as NGO which can work closely with farm household and community.

Organizations which have enough experiences in the similar fields will be selected. Under such supportive organizations, local groups are expected to be trained and can expand their activities. Expected activities are; 1) microfinance introducing small saving by groups, which contributes for farmers to gain financial capacity and to do rice farming as business, 2) promotion of rice eating culture by improvement of cooking method and education of sanitation, 3) making young generation

familiar with rice farming practice by conducting test/demonstration of rice cultivation, and by measuring simple climate such as temperature and rainfall in elementary schools and junior high schools, and so on.

The above mentioned activities in the cycle of the Action Plan are shown as follows:

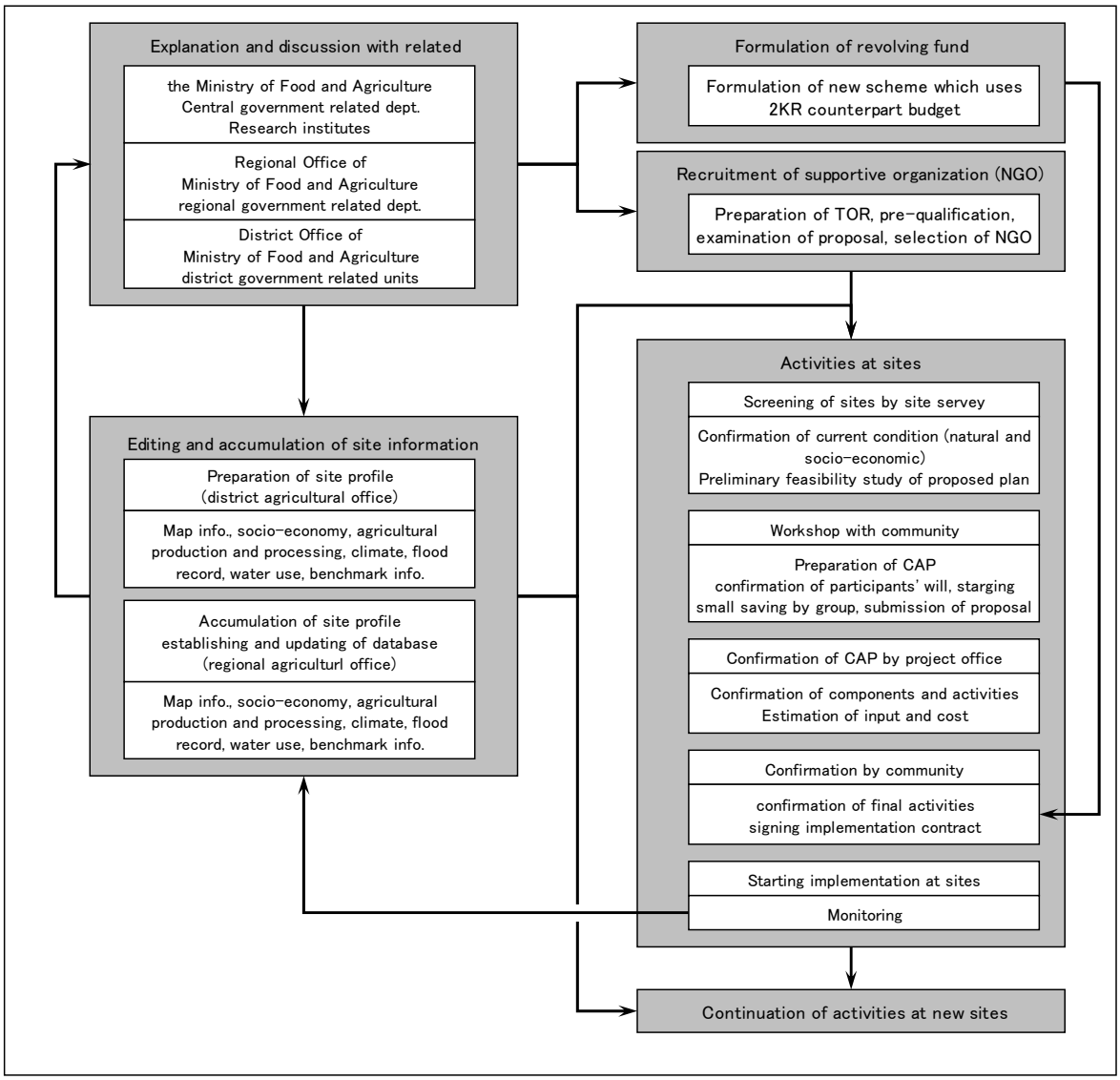


Figure 10.4 Flow of Particular Activities of the Action Plan

(Source: JICA Study Team)

CHAPTER 11 TECHNOLOGY TRANSFER PROGRAM

11.1 Technology Transfer in Phase -1 Study

Technology transfer activities in Phase-1are summarized as follows:

1) Technology Transfer in Ministry of Food and Agriculture (MOFA)

Chief counterpart (Director of Crop Services) and four counterparts covering marketing, extension, crops and agricultural machinery were assigned in Phase-1 Study. Technology transfer was made through the following baseline survey, preparation of master plan and participatory problem analyses:

(1)	Baseline survey	:	Selection of local consulting firms, identification of survey sites, preparation of questionnaires, monitoring survey progress, and analyses of survey results.
(2)	Master Plan (draft) preparation	:	Collection and analysis of information, and preparation of development components.
(3)	Participatory problem analyses	:	Preparation of workshop (selection of participants, coordination with the agencies concerned), monitoring workshop activities, and preparation of minutes of meetings.

In the field survey, the counterparts accompanied the JICA members and contributed for effective field activities. The JICA members explained objectives, contents and outputs expected through the field activities and encouraged their participation and ownership in the Study. The counterparts could make record of discussions, consolidation and preliminary analyses, taking photograph, etc. without any instructions.

2) Technology transfer in regional staffs

For promoting understandings of and ownership in the Study, the regional agricultural staffs concerned participated in selection of survey sites for the baseline surveys on production, post-harvest and marketing. In addition, the regional staffs participated in the survey activities, monitored the survey progress, and discussed the relevant stakeholders.

The JICA members visited the regional offices concerned and explained the contents of Progress Report (1) for further understanding on the Study.

3) Technology transfer in farmer organizations

Farmers and their organizations in five regions (15 sites) were encouraged through the baseline survey and participatory problem analyses in order to solve their problems. The JICA members introduced various technologies on rice farming for promoting appropriative technologies.

4) Technology transfer in rice miller, traders and consumer organizations

Same as the farmer organizations, the JICA members made technology transfer through the baseline survey and participatory problem analyses. In the workshops, development components in the draft master plan were explained and discussed.

11.2 Technology Transfer Programs in Phase-2 Study

The director of Crop Services Directorate, the Chief Counterpart was replaced in the middle of October 2007, and information was given to the new director on JICA technical cooperation through support to prepare request of the next projects. The following technical transfer was provided during the Phase 2 study.

1) Workshops on Study Progress and Action Plan

Through the workshops on the study progress about priority plans for the draft Master plan, and on the Action Plan, the study team tried to create common understanding on the following points through the discussion with the government officials in MOFA at central level, and staffs concerned in three regions in the central and southern part (Ashanti, Western, and Volta Regions), three northern regions (Upper West, Upper East, and Northern), at the district level in the Ashanti and Northern region, in the Crop Research Institute, in the Savannah Agricultural Research Institute, in the Inland Valley Rice Development Project, and in the Lowland Rice Development Project:

- The contents of the draft Master Plan
- High priorities of two programs such as rain-fed rice promotion program and support program for poor rice farmer out of three integrated development programs
- Importance of real conditions of each region in implementation of the components
- The contents of the Action Plan

2) Detail Survey on Priority Plans and Action Plan

In addition to the chief counterpart (director of crop service department) and four counterparts in four fields (distribution, extension, crop, and agriculture machinery), counterparts from GIDA were assigned for inland valley development. The study team conducted field visits with officials from four districts which are samples sites in the Ashanti and Northern regions. The team provided advices on farming techniques and business managements, and explained rice farming practices in Japan, southeastern Asia, and south Asia to farmers, rice millers, and distributors visited.

Technology transfer made in Phase-1 and Phase-2 is summarized as follows:

Table 11.1 Progress of Technology Transfer Programs

Target	Objective	Program	Method	Progress
Ministry of Food and Agriculture (MOFA)	・Understanding of process of preparation of MP and AP ・Creation of ownership to the plans ・Establishment of Implementation System (Central Government)	・Study and analysis methods ・Facilitation technique ・Problem analysis ・Identification of development subjects ・Preparation of plans (respective technical field)	・Participation in the baseline survey and analyses on production and post-harvest activities	Done
			・Participation in the baseline survey and analyses on rice marketing system	Done
			・Presentation in the workshops ・Preparation of minutes	Done
			・Participation in detail survey on priority plans	Done
			・Participation in preparation of plans (MP and AP)	Done
Agricultural Officers in regions and districts	・Understanding of process of preparation of MP and AP ・Creation of ownership to the plans ・Establishment of Implementation System (Local Government)	・Study and analysis methods ・Facilitation technique ・Problem analysis ・Identification of development subjects ・Preparation of plans (respective technical field)	・Participation in the baseline survey and analyses on production and post-harvest activities	Done
			・Participation in the baseline survey and analyses on rice marketing system	Done
			・Presentation in the workshops ・Preparation of minutes	Done
			・Participation in detail survey on priority plans (AP)	Done
			・Participation in preparation of plans (AP)	Done
Farmers' Organizations in regions and districts	・Understanding of the plans through study activities ・Creation of ownership to the plans	・Method of investigating and organizing subjects ・Identification of Self- reliant efforts ・Planning at farmer level	・Participation in workshop	Done
			・Participation in detail survey on priority plans	Done
Rice millers and traders Consumers' Organizations	・Understanding of the plans through study activities ・Promotion of communication between private and government sectors ・Creation of ownership to the plans	・Method of investigating and organizing subjects ・Identification of Self- reliant efforts ・Planning at farmer level	・Participation in the workshop	Done
			・Participation in detail survey on priority plans	Done

CHAPTER 12 ENVIRONMENTAL AND SOCIAL CONSIDERATION

12.1 Law and System Related to Environment

12.1.1 Organization Related to Environment

The Government of Ghana established the Environmental Protection Council in 1976 for addressing the movement of environmental protection. The Environmental Action Plan was formulated 1991 and the following issues are emphasized in the environment policies: 1) natural resource development in environmentally harmonized ways, 2) protection of ecosystem, 3) protection of human being, animal, and plant from environmental degradation, and preservation of biodiversity, 4) environmental consideration in development planning, 5) prevention of pollution by developmental activities, and 6) research on environmental issues of global and West Africa' topics.

Later than that, the Environmental Protection Agency (EPA) was established in 1994 based on the Environmental Protection Council by strengthening its functions referring to the atmosphere of increasing environmental conscious. There are Field Operations Division, Planning Policy & Research Division, Finance &Administration Division under the Executive Director (refer to Figure 12.1). EPA is in charge for environmental policy, environmental law and regulation, and environmental contamination and pollution, and other fields are covered by other related ministries. The Forestry Commission under the Ministry of Land and Forestry is in charge for wildlife and natural reserve areas.

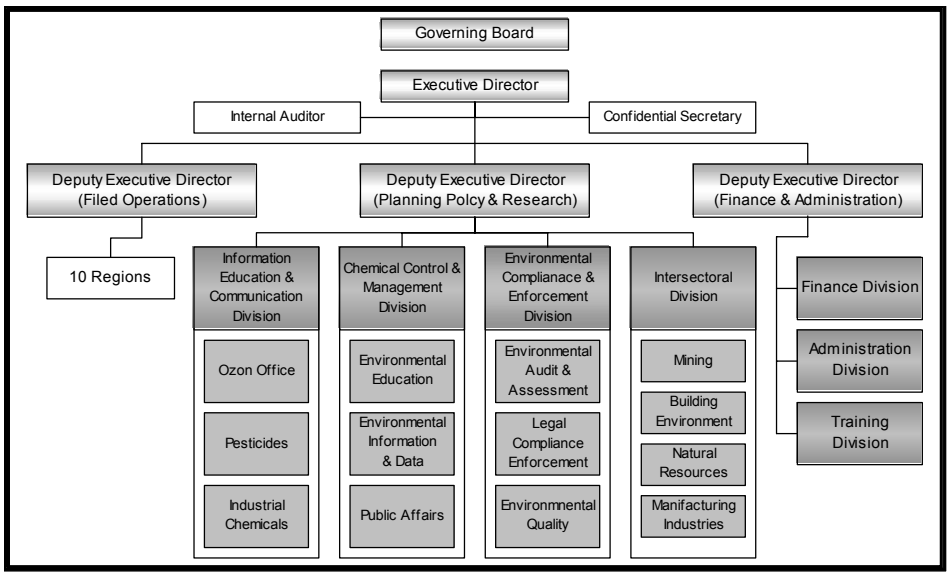


Figure12.1 Organization Chart of Environmental Protection Agency

(Source：Environmental Protection Agency)

12.1.2 List of Law and Regulation Related to Environment

The following laws and regulations are related to environment.

(1) Environmental Protection Regulation

EPA enacted the Environment Assessment Regulation 1999 in 1999 and forced to conduct Environmental Impact Assessment (EIA) in preparation of development plan. This regulation consists of two parts: one part is the Environment Permit, and the other is the Preliminary Environmental Report and the Environmental Impact Assessment. When projects are implemented, it is required to get the Environmental Permit following specified steps, and to monitor or take mitigation measure depending upon the extent of the influence of a project. Necessary Steps of the environment Impact Assessment is shown in Figure 12.2.

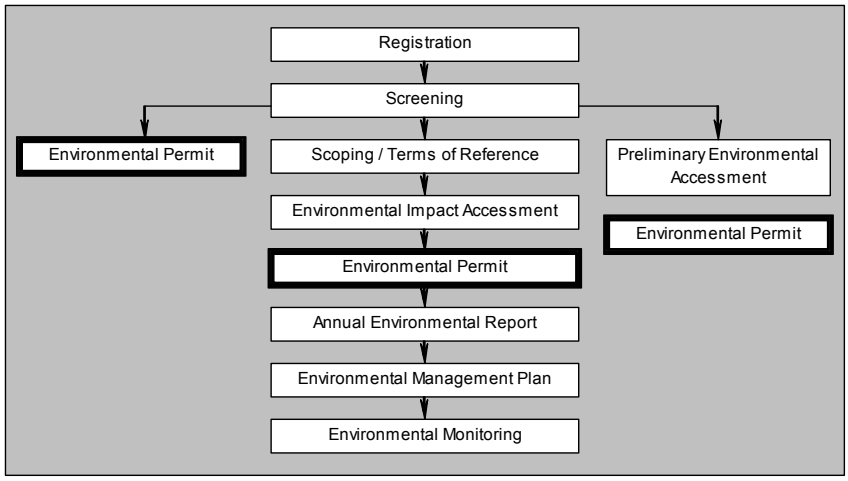


Figure 12.2 Necessary Steps of Environmental Impact Assessment
(Source : Environmental Protection Agency)

According to Schedule 2 (Regulation 3) in the Environmental Assessment Regulation 1999, EIA is required for land development with the areas more than 40 ha or cases that need resettlement of more than 20 families in the field of agriculture. In the field of irrigation and drainage, EIA is needed for construction of reservoirs and dams, drainage projects of swamp areas, and irrigation projects. Other than the above mentioned cases (Regulation 1 (1)), the Environmental Permit is required for projects with the area more than 40 ha for livestock, fruits, and vegetables in agriculture, and development of areas which are sensitive to environment.

The procedure is as follows: (1) to identify the development components and prepare the Community Action Plan (CAP) by holding workshops with beneficiaries after selection of the sites, (2) to submit an application to EPA based on CAP by an implementation body and to get the Environmental Permit following necessary steps, (3) to conduct screening based on the application and to judge the necessity of EIA by EPA, (4) in case that EIA is judged to be required, to examine the extent of the influence and possible mitigation measures specifying TOR by screening. After the implementation of EIA and clearance of all necessary procedure, annual report, the Environmental Management Plan, and monitoring are required.

The M/P and the A/P mainly focus on small community development and envisage the activities at the level of the Community Action Plan which is prepared mainly by beneficiaries. The extent of the

activities will be within the capacity of beneficiaries in order for them to manage by themselves and therefore target crop is limited to rice and effects of the activities are expected to be emerged quickly. In this regards, land development with more than certain acreages and irrigation facilities, both which require EIA, are tried to be excluded from the M/P and the A/P. However the development component 1-1 and 1-2 (refer to Table 9.4) under Marketing Driven Rice Enhancement Program, though it is not the priority program, include irrigation developments which possibly have environmental impacts and need EIA, and therefore when such developments are to be implemented, it is necessary to follow required procedures like EIA.

(2) Other Related Regulations

As other related regulations, there is the Wild Animal Preservation Act enacted in 1961, which deals with wildlife, and the Wildlife Reserves Regulation established in 1971, which covers natural reserve areas. The following regulations are in the field of plant, marine environment, mines, and land as related fields.

Table 12.1 List of Environmental Related Regulation

Related Field	Related Regulation
Plant Related Regulation	• Forest Protection (Amendment) Law 1996 • Forest and Wildlife Policy 1994 • Forest Protection Decree 1974
Wildlife Related Regulation	• Wild Animal Preservation Act 1661 • Wildlife Reserves Regulation 1971 • Consolidated Wildlife Laws of Ghana 2nd Edition (Wildlife Division) 2002
Marine Environment Related Regulation	• Fishery Law 1991 • Oil in Navigable Water Act 1964
Mines Related Regulation	• Mineral and Mining Law 1986
Land Related Regulation	• Land Administration Act 1991

Source：The Environmental Information Report, March 1997, JICA

12.2 Initial Environmental Study for the Master Plan

12.2.1 Environmental and Social Condition

Ghana has its land of 236,000 km^2 and is located between latitude 4° 44' N and 11° 11' N, and from longitude 3° 11' E to 1° 11' W. Although average annual rainfall exceeds 1,800 mm in one part of the southern area and is around 1,000 mm in the northern area, the pattern of rainfall varies a lot. Rainy season in the area of tropical humid climate which is mainly located in the southern area is during Major Season from March to July and during Minor Season from September to November. Rainy season in the area of Savanna climate which is mainly in the north is between April and October. These rainfall patterns are important for rain-fed agriculture and main rainfall patterns are shown in Figure 3.11.

Vegetation in Ghana is divided into three parts, namely Savanna area, Shrub area and Forest area.

Savanna area is further divided into the Coastal Scrub Grassland, the Guinea Savanna, and the Sudan Savanna. Forest area is divided into the Tropical Rain Forest and the Moist Semi-deciduous Forest spreading from the southern area to the middle area.

12.2.2 Results of Evaluation

As a result of scoping on the three integrated development programs proposed in the Master Plan, items to be considered for environmental and social consideration were identified as shown in Table 12.2. Causes and mitigation measures of them are shown in Attachment-12.

Table 12.2 Items to be Considered for Environmental and Social Consideration

Items	Type 1 : Marketing Driven Rice Enhancement Program	Type 2 : Rain-fed Rice Promotion Program	Type 3 : Support Program for Poor Rice Farmers
Items which are likely to have slight adverse impacts (B+)	· Soil Erosion	· Soil Erosion	· Soil Erosion
Items which are likely to have less adverse impacts (B)	· Conflict with neighborhood · Water use and water rights · Risk of epidemic · Impact on surrounding water area, water pollution · Soil Pollution	· Conflict with neighborhood · Risk of epidemic · Impact on surrounding water area, water pollution	· Conflict with neighborhood · Risk of epidemic
Items for which environmental impacts are not sure (C)	· Resettlement and impact on neighborhood · Land use · Impact on social foundation · Impact on the poor, social vulnerable, and ethnic minority · Unequal distribution of benefit · Impact on geology and topography · Diversity of animals and plants · Air Pollution · Odor · Traffic Accident	· Impact on social foundation · Impact on the poor, social vulnerable, and ethnic minority · Diversity of animals and plants · Air Pollution · Soil Pollution · Odor · Traffic Accident	· Impact on social foundation · Impact on the poor, social vulnerable, and ethnic minority · Diversity of animals and plants · Air Pollution · Odor · Traffic Accident

Source : Study Team

Regarding of Items which are likely to have less adverse impacts (B), the development components in the three comprehensive development programs were identified, which are expected to cause negative effects, and the mitigation measures against them were also examined. The results are shown as follows:

Table 12.3 Expected Items and Mitigation Measures Related to Development Components

Development Component	Items Which Have Expected Impacts	Mitigation Measures
· All components	· Conflict with neighborhood New residents from outside would be dealt with unequally in the communities, and conflict might occur Manager of lands and tenants might transfer land use rights to others without permission of persons concerned. All members in the community could not always enjoy project benefit equally.	· In a stage of project implementation, implementation body will communicate the communities and get understanding of them. · In case that lands are rented and land use rights need to be set up, decisions and process will be put in the statutory form witnessed by governmental agencies · In a stage of project implementation, implementation body will explain project components and selection of beneficiaries to the communities and get understanding of them.
· Rehabilitation and expansion of existing irrigation schemes · Participatory irrigation development	· Water use and water right There are projects whose water sources are small streams and ponds depending upon the irrigation schemes.	· In preparation of individual plans for development of irrigation facilities, water use of rivers will be confirmed including upstream and downstream, and coordination will be made among water users.
· Rehabilitation and expansion of existing irrigation schemes · Field improvement for semi-intensive rain-fed rice farming · Participatory irrigation development	· Risk of epidemic Insects which transmit diseases in paddy fields could increase.	· Insects which transmit diseases will be minimized by appropriate water management of paddy field · Education on health and sanitation will be made to beneficiaries and residents in the communities
· Improvement of semi-intensive rain-fed rice farming	· Impact on surrounding water area, water pollution · Soil Pollution Impacts on surrounding water area could occur due to increase of inputs. Improvement of daily life could indirectly worsen village drainage.	· Farming practices will be disseminated, which adopt low agrochemicals and less chemical fertilizers. · Knowledge about domestic waste will be enlightened to beneficiaries and residents in the communities

Source：Study Team

12.3 Initial Environmental Study for the Action Plan

12.3.1 Environmental and Social Condition in the Target Area of the Action Plan

Socio-economic conditions in the Ashanti region and the Northern region are shown in Table 12.4, which are the target regions of the Action Plan.

Table12.4 Socio-economic Conditions in the Ashanti region and the Northern region

Item	Whole Country	Ashanti Region	Northern Region
Area	238,500 km^2 (100%)	24,400 km^2 (10.2%)	70,400 km^2 (39.5%)
Population (2000)	18,912,000 (100%)	3,613,000 (19.1%)	1,821,000 (9.6%)
Household Scale of household (person)	3,977,000 4.75 persons	701,000 5.15 persons	261,000 6.98 persons
Population (2005)	21,367,000 (100%)	4,198,000 (19.6%)	2,032,000 (9.5%)
Population density (2000)	79.3 persons/km^2	148.1 persons/km^2	25.9 persons/km^2
Annual population growth	2.7% in 1984 to 2000 2.5% in 2000 to 2005	3.4% in 1984 to 2000 3.2% in 2000 to 2005	2.8% in 1984 to 2000 2.2% in 2000 to 2005
Religion (2000)	Whole Country	Ashanti Region	Northern Region
• Christian • Muslim • Other religions and no religion	68.8% 15.9% 15.3%	77.5% 13.2%% 9.3%	24.6% 56.1% 19.3%
Age structure (2000)	Whole Country	Ashanti Region	Northern Region
• Below 19 years old • Above 20 years old	54.4% 40.3%	51.5% 42.4%	55.5% 40.0%
Proportion of population in urban and rural (2000)	Whole Country	Ashanti Region	Northern Region
• Urban • Rural	43.8% 56.2%	51.3% 48.7%	26.6% 73.4%
Employment (2000)	Whole Country	Ashanti Region	Northern Region
• Economic activities population (percentage of total population) • Agriculture, hunting, and fishing • Fishing	9,039,000 (47.8%) 49.1% 3.2%	1,731,000 (44.2%) 42.3% 0.8%	898,000 (49.3%) 71.8% 3.0%
Ethnic Minority (2000)	Whole Country	Ashanti Region	Northern Region
• Akan • Gurma • Mole Dagbani • Others	49.1% 3.9% 16.5% 30.5%	77.9% 1.5% 9.0% 11.6%	10.0% 21.8% 52.2% 16.0%
Literacy rate of age 15 and above (2000)	Whole Country	Ashanti Region	Northern Region
• Illiterate	45.9%	40.4%	78.7%
• English only • Ghanaian language only • English and Ghanaian	12.7% 6.4% 34.2%	7.6% 9.5% 41.8%	10.9% 2.0% 7.7%

Item	Whole Country	Ashanti Region	Northern Region
Education of age 3 and above (2000)	Whole Country	Ashanti Region	Northern Region
• None or pre-school	47.7%	42.9%	78.6%
• Primary	18.6%	19.3%	10.7%
• Middle	21.1%	25.6%	4.5%
• Secondary	6.0%	5.8%	3.1%
Poverty index	Whole Country	Ashanti Region	Northern Region
• Extreme poverty in 1991/1992	36.5%	25.5%	54.1%
• Extreme poverty in 1998/1999	26.8%	16.1%	57.4%
• Extreme poverty in 2005/2006	18.2%	11.2%	38.7%
• Poverty in 1991/1992	51.7%	41.2%	63.4%
• Poverty in 1998/1999	39.5%	27.7%	69.2%
• Poverty in 2005/2006	28.5%	20.3%	52.3%

Remark:1) Urban area has population more than 5,000 and rural area is population less than 5,000.

Source: 1) Ghana Population Census and Housing Census 2000, 2005, Ghana Statistical Services.
2) Pattern and Trends of Poverty in Ghana 1991 – 2006, April 2007, Ghana Statistical Services.

Climate of the Ashanti region is a kind of transition from tropical humid climate to savanna climate. Average annual rainfall exceeds 1,800 mm, and there are two rainy seasons (Major and Minor season). On the other hand, the Northern region annually has around 1,000 mm mainly during rainy season between April and October under savanna climate. Following these climate conditions, vegetation in the Ashanti region is mostly forest, and it in the Northern region is savanna.

There are two national parts, Mole and Bui, and two forest reserves, Gmbaga Scarp and Damongo Scarp in the Northern region. The Ashanti region has Bomfobiri Wildlife Sanctuary, but there is no information on forest reserve. Thus, confirmation on forest reserve is required when projects are implemented.

12.3.2 Results of Evaluation about the Action Plan

Items to be considered for environmental and social conditions were examined for the Action Plan as well. The development components under the Action Plan were selected considering topography, level of farming practice and post-harvest, agriculture extension, condition of the beneficiaries, and marketing based on the field survey on 26 sites.

For these development components selected, expected impacts were examined when the Action Plan is implemented, applying the results obtained in Sub Chapter 12.2 and summarized in Table 12.5.

Table 12.5 Items which likely to have Impacts on Aspects of Environmental and Social Consideration in the Action Plan

Development Component	Items Which Have Expected Impacts	Mitigation Measures
· All components	· Conflict with neighborhood All members in the community could not always enjoy project benefit equally. Manager of lands and tenants might have different	· Implementation agency and government organization will fully communicate the communities and get understanding of them, involving neighborhood. · In case that lands are rented and land use rights need to be set up,

Development Component	Items Which Have Expected Impacts	Mitigation Measures
	understanding about land use rights	decisions and process will be put in the statutory form witnessed by governmental agencies
	· Risk of epidemic Insects such as mosquito and horsefly which transmit diseases in paddy fields could increase.	· Knowledge on health and sanitation will be disseminated to residents in the communities. Insects which transmit diseases will be tried to be exterminated: facilities to supply drinking water and drainage will be constructed, and water will be tried to be properly managed.
(1) Type 2 : Rain-fed Rice Promotion Program		
· Field improvement for semi-intensive rain-fed rice farming Fields and supplemental irrigation facilities will be prepared following the progress of improvement of farming technology. Land preparation will be necessary in case of new introduction of rice farming. Development with heavy civil works will be tried to be avoided. Otherwise, enough time will be spent in planning including environmental consideration.	· Preparation of irrigation facilities and paddy fields would affect water use and water rights; thus it might have social impact. · Impact on surrounding water area, water pollution due to hydraulic change · Insects which transmit parasites could increase and risk of epidemic would also increase.	· Development plan of facilities will be prepared following the progress of improvement of farming technology. Level of development will be at a necessary but minimum level. · In case of new land preparation, the construction will be firstly clearing of bush. And preparation of ridge in the paddy field and land leveling will be stepwise through tilling and land preparation. · In order that insects which transmit diseases are to be exterminated, proper water management will be introduced. Knowledge on health and sanitation will be disseminated to beneficial farmers and the communities.
· Improvement of semi-intensive rain-fed rice farming	· Impact on surrounding water area, water pollution due to hydraulic change by increasing agricultural input	· Education will be made to understand impacts of usage of many inputs · Technology will be disseminated to utilize inputs properly
· Improvement of access to rice field It will be done if necessary, together with clearing of bush and improvement of other facilities		· Level of access roads will be as same as that of road where agricultural input and output can be transported by hand tractor.
· Community-based rice seed production and distribution · Capacity development of extension staff · Extension of Improved Postharvest Processing Technology · Promotion of Postharvest Processing Equipment · Rice Mill Modernization · Support for Marketing Activities	· No impact is expected.	· Nothing

Development Component	Items Which Have Expected Impacts	Mitigation Measures
(2) Type 3: Support Program for Poor Rice Farmers		
· Field improvement for extensive rain-fed rice farming	· Impacts on natural environment such as swamp and vegetation could be expected by civil works.	· Input of fertilizer, agro-chemical, and labor will be kept at low level and bush will be cleared at a minimum level. · Preparation of ridge in the paddy field and land leveling will be stepwise though tilling and land preparation.
· Improvement of extensive rain-fed rice farming · Production and distribution of quality rice seed · Farm tools improvement · Simple grain storage extension · Livelihood improvement · Extension of Improved Postharvest Processing Technology · Promotion of Postharvest Processing Equipment · Rice Mill Modernization · Support for Marketing Activities	· No impact is expected.	· Nothing

Source：Study Team

The following considerations are necessary when sites are selected in the Action Plan, in order to minimize adverse impacts on environment.

(1) Reserved areas and parks for wildlife and their neighborhood should be avoided in site selection.

(2) Concrete ideas of development components will be decided through workshops with beneficiaries and site survey at the stage of site selection, and CAP should be prepared. Procedure must be followed to get the Environmental Permit applying to EPA based on CAP.

(3) If the Action Plan is implemented at one area which has more than 40 ha, implementation should be started at limited area first, and then area had better be expanded observing its impacts on environment.

Attachment-1(1)

Scope of Work (SW)
and
Minutes of Meeting on SW for the Study

SCOPE OF WORK
FOR
THE STUDY
ON
THE PROMOTION OF DOMESTIC RICE
IN
THE REPUBLIC OF GHANA
AGREED UPON
BETWEEN
MINISTRY OF FOOD AND AGRICULTURE
MINISTRY OF FINANCE AND ECONOMIC PLANNING
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

Accra, June 30th, 2005

Mr. Kwaku Owusu-Baah
Chief Director
Ministry of Food & Agriculture
The Republic of Ghana

Dr. Narihide Nagayo
Leader of Preparatory Study Team
Japan International Cooperation Agency
Japan

Mr. Ernest Osei-Prempeh
Ag. Director
External Resource Mobilization (Bilateral) Division
Ministry of Finance & Economic Planning
The Republic of Ghana

I INTRODUCTION

In response to the request of the Government of the Republic of Ghana (hereinafter referred to as "GOG"), the Government of Japan (hereinafter referred to as "GOJ") has decided, in accordance with the relevant laws and regulations in force in Japan, to conduct a preparatory study for the Study of Promotion of Domestic Rice in the Republic of Ghana (hereinafter referred to as "the Study").

Based on the decision of GOJ, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs, will undertake the Study in close cooperation with the authorities concerned of the GOG.

The present document sets forth the Scope of Work with regard to the Study.

II OBJECTIVES OF THE STUDY

The overall goal of the Study is to contribute to the income generation of small scale farmers.

The objectives of the Study are;

1. To make policy recommendations and plan of actions to improve rice production which will include post-harvesting and marketing through improving the competitiveness of rice produced in Ghana; and,

2. To carry out technology transfer to Ghanaian counterpart personnel through on-the-job training in the course of the Study.

III STUDY AREA

1. The Master Plan(s) will cover the whole area of the Republic of Ghana.

2. The Action Plan(s) will cover priority area(s) that will be established in the Master Plan(s).

IV SCOPE OF THE STUDY

The Study will consist of the items detailed below:

1. Phase 1: Development of the Master Plan(s)
   1-1. To collect and analyze relevant data and information from all the regions and at the national level such as present condition of rice production, distribution and marketing system, trend of supply and demand of domestic and imported rice, economic condition of small scale farmers, and others;

1-2. To discuss and review the existing development program(s) and project(s) carried out by GOG and/or other donors;

1-3. To conduct field surveys in the Study area;

1-4. To identify constraints, development needs and potential for improving the competitiveness of domestic rice production;

1-5. To formulate the Master Plan(s); and,

1-6 .To select the detailed survey areas for formulation of Action Plan(s).

2. Phase 2: Formulation of the Action Plan(s)

2-1. To conduct detailed survey in the selected areas; and

2-2. To formulate detailed Action Plan(s) for realization of Master Plan(s).

2-3. To analyze and advise on any other interesting and related issues aimed at consolidating the initial objectives.

V STUDY SCHEDULE/DURATION

The Study will be carried out in accordance with the attached tentative schedule. (See ANNEX I)

VI REPORTS

JICA shall prepare and submit the following reports in English.

Inception Report:	Twenty (20) copies
Interim Report:	Twenty (20) copies
Progress Report(s):	Twenty (20) copies
Draft Final Report:	Twenty (20) copies at the end of the field work; GOG will provide JICA with its comments on the Draft Final Report within one (1) month of the receipt.
Final Report:	Thirty (30) copies within two (2) months of the receipt of GOG's comments on the Draft Final Report

VII UNDERTAKING OF THE GOG

1. To facilitate the smooth conduct of the Study, GOG shall take necessary measures:

1-1. To permit the members of the Study Team to enter, leave and sojourn in the Republic of Ghana for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees;

1-2. To exempt the members of the Study Team from taxes, duties and any other charges on

equipment, machinery and other material brought into the Republic of Ghana for the implementation of the Study;

1-3. To exempt the members of the Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with the implementation of the Study; and,

1-4. To provide necessary facilities to the Study Team for the remittance as well as utilization of the funds introduced into the Republic of Ghana from Japan in connection with the implementation of the Study.

2. GOG shall bear claims, if any arise, against the members of the Study Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the Study Team.

3. The Ministry of Food and Agriculture in cooperation with the Ministry of Finance and Economic Planning and other organizations concerned, at their own expenses, where necessary, provide the Study Team with the following:

3-1. Security and safety of the Study Team and the relevant information;

3-2. Information as well as assistance in obtaining medical service;

3-3. Available data (including maps and photographs) and information related to the Study;

3-4. Counterpart personnel;

3-5. Suitable office space with furniture and telephone facilities; and

3-6. Credentials or identification cards.

VIII UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. To dispatch, at its own expense, a Study Team to the Republic of Ghana; and,

2. To pursue technology and skills transfer to Ghanaian counterpart personnel as well as the communities in the course of the Study.

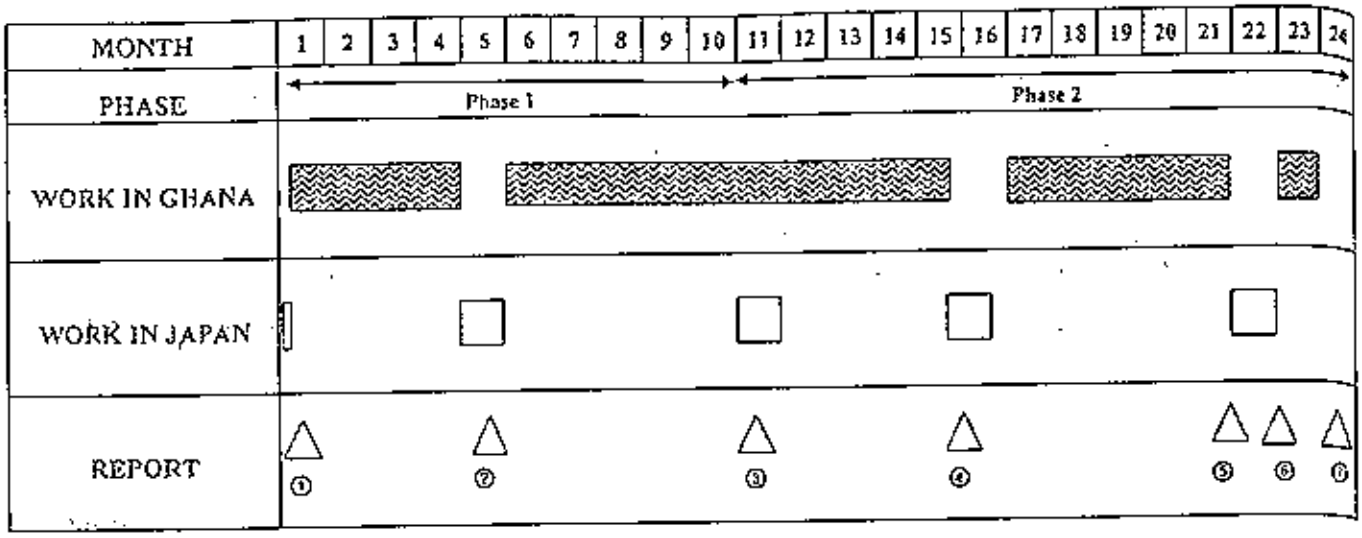
IX CONSULTATION

JICA and the Ministry of Food and Agriculture shall consult with each other in respect of any matter that may arise from or in connection with the Study.

X VALIDITY OF THE SCOPE OF WORK

The Scope of Work comes into effect as the date when necessary arrangement with JICA is completed.

TENTATIVE STUDY SCHEDULE



① Inception Report
② Progress Report 1
③ Interim Report 1 (Mater Plan)
④ Progress Report 2
⑤ Progress Report 3
⑥ Draft Final Report
⑦ Final Report

MINUTES OF MEETING
ON
SCOPE OF WORK
FOR
THE STUDY
ON
THE PROMOTION OF DOMESTIC RICE
IN
THE REPUBLIC OF GHANA
AGREED UPON
BETWEEN
MINISTRY OF FOOD AND AGRICULTURE
MINISTRY OF FINANCE AND ECONOMIC PLANNING
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

Accra, June 30th, 2005

Mr. Kwaku Owusu Baah
Chief Director
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Dr. Narihide Nagayo
Leader of Preparatory Study Team
Japan International Cooperation Agency
Japan

Mr. Ernest Osei Prempeh
Ag. Director
External Resource Mobilization (Bilateral) Division
Ministry of Finance & Economic Planning
The Republic of Ghana

I INTRODUCTION

In response to the request of the Government of the Republic of Ghana (hereinafter referred to as "GOG"), the Preparatory Study Team (hereinafter referred to as "the Team") headed by Dr. Narihide Nagayo was sent to Ghana by the Japan International Cooperation Agency (hereinafter referred to as "JICA") from 20th June to 13th July, 2005 for the purpose of discussing and confirming the Scope of Work for the Study on the Promotion of Domestic Rice in the Republic of Ghana (hereinafter referred to as "the Study").

The Team held a series of discussions with representatives of the Ministry of Food and Agriculture (hereinafter referred to as "MOFA") and other relevant organizations.

The following are the main issues discussed and agreed upon by both sides in relation to the Scope of Work. A list of participants in the series of meetings is attached as Annex I.

II RESULTS OF DISCUSSION

1. Title of the Study

Both sides agreed that the title of the Study should be as follows:

The Study on the Promotion of Domestic Rice in the Republic of Ghana

2. Objective of the Study

Both sides agreed that the Master Plan(s), which will be composed of various policy recommendation(s) to improve rice production, will include post-harvesting and marketing through improving the competitiveness of rice produced in Ghana. Action Plan(s) would be formulated as the detailed plan(s) to achieve the objectives of prioritized Master Plan(s) in the short-term.

3. Study Area

Both sides confirmed that the study area covers whole area of the Republic of Ghana for formulating the Master Plan(s) and Action Plan(s). Detailed study areas for formulation of Action Plan(s) will be selected on the basis of the prioritized Master Plan(s).

4. Study Schedule

Both sides agreed that the whole period of the Study would be twenty-four (24) months comprised of Phase I (approximately ten (10) months) and Phase II (approximately fourteen (14) months). The actual period of Phase I and Phase II should be discussed and finalized by MOFA and the JICA Study Team (hereinafter referred to as "the Study Team") in the first stage of the Study.

5. Steering Committee

For the smooth and effective implementation of the Study, both sides agreed upon the need for

establishment of a steering committee chaired by the Chief Director of MOFA in the course of the Study. Expected participants of the steering committee are listed below.

(1) Ministry of Food and Agriculture

(2) Ministry of Finance and Economic Planning

(3) Ghana Irrigation Development Authority

(4) Council for Scientific and Industrial Research

(5) JICA Study Team

(6) JICA Ghana Office

(7) Other agencies concerned

6. Administration of the Study

(1) The Chief Director of MOFA, as the chairperson of the steering committee, will bear overall responsibility for the administration and implementation of the study.

(2) The Director of Crop Services of MOFA will be responsible for the managerial and technical matters of the study.

7. Counterpart organization and personnel

(1) Both sides confirmed that the MOFA is responsible for coordinating and implementing the Study with the assistance of the Study Team and JICA.

(2) Ghanaian side promised to assign fulltime suitable counterpart personnel of about four (4) for the Study Team before the Study is commenced.

8. Equipment and Facilities

MOFA promised to provide the Study team with a suitable office space, desks, chairs and telephones in the office.

Ghanaian side requested JICA to support following equipment and materials for the Study. The Team promised to convey it to the JICA headquarters in Tokyo.

(1) Vehicle and relevant equipment

(2) Photocopy machine

(3) Personal computers, printers, and relevant equipment

(4) Other necessary equipment and expenses for the Study

9. Training of Counterpart Personnel

MOFA requested for the training of counterpart personnel in Japan. The Team promised to convey it to GOJ.

10. Final Report

Both sides agreed that the final report of the Study would be made open to the public.

ANNEX I

LIST OF ATTENDANCE

Ministry of Food and Agriculture

Mr. Kwaku Owusu Baah	Chief Director (MOFA)
Ms. Adelaide Boateng Siriboe	Ag. Director of Policy, Planning, Monitoring & Evaluation
Dr. J. A. Poku	Director of Crop Services (MOFA)
Mr. I. F. Jackson	Directorate of Crop Services (MOFA)
Mr. Abraham Manu Addae	Assistant Director of Crop Services

Ghana Irrigation Development Authority

Mr. Daniel Lamptey	Chief Executive
Mr. D. N. Oheneng	Deputy Chief Executive

Ministry of Finance & Economic Planning

Mr. Ernest Osei Prempeh	Director of External Resource Mobilization (Bilateral)
Mr. Samuel Abu-Bonsrah	Head of Japan Desk, External Resource Mobilization Division

Ministry of Trade & Industry

Mr. S. Y. Bortsi	Chief Industrial Promotion Officer
Mr. Francis Addo	Chief Industrial Promotion Officer

Customs Excise & Preventive Services

Mr. S. A. L. Hammond	Chief Internal Auditor
Mr. Paul Adubofour	Department of Commissioner, Administration & Human Resource

Preparatory Study Team

Dr. NAGAYO Narihide	Leader/ Rural Development Plan
Dr. NAKASONE Katsushige	Rural Society and Economy
Mr. TOYOOKA Nobuki	Post-Harvest/Distribution
Ms. IWAMOTO Aiko	Project Planning/Preparatory Evaluation

JICA Ghana Office

Ms. IZUMIYAMA Junko	Project Formulation Advisor

Attachment-1(2)

Minutes of Meeting on Inception Report

MINUTES OF MEETING ON INCEPTION REPORT

THE STUDY ON THE PROMOTION OF DOMESTIC RICE

IN THE REPUBLIC OF GHANA

1. Date, Time and Place :

Directorate concerned :	11:00 AM to 00:30 PM, July 10, 2006
	Conference Room, Land and Water Management Unit, Crop Services Directorate, MOFA
Chief Director, MOFA :	10:00 AM to 11:00 AM, July 12, 2006
	Office of Chief Director, MOFA

2. Attendee : Refer Attachment-1

3. Materials for the Meetings: Refer Annexes (1, 2, and 3)

4. Main Points Discussed at the Meeting with MOFA Directorates concerned :

The meeting was chaired by the director of crop services. After the introduction of the attendees (refer Attachment-1), the team leader of the JICA study team explained the outline of the Study covering the background, objectives, basic study approaches, work schedule with respective work items, assignment schedule and organization for the study by using the power point.

After the above explanation, the team leader presented the discussion points covering counterpart assignment, confirmation of steering committee and target year for the master plan. The followings were issues discussed and agreed:

Counterpart Assignment

The director of Crop Services (CS) stated the counterparts proposed by the Study Team will be assigned from several directorates of MOFA. Therefore the instruction from the Chief Director of MOFA to the respective directorates will be necessary. As early as possible, the director of Crop Services will arrange the meeting with the Chief Director for this matter.

Steering Committee

The director of CS will inform to the Chief Director for this matter.

Mater Plan Target Year

The director of CS will inform to the Chief Director for this matter.

Budget Arrangement

The director of CS stated that no budget allocation for the JICA study was made for the year 2006. Detailed budget plan should be prepared according to the JICA Study. However, the budget proposal required the contents of JICA budget to be allocated as well as the local budget requirement. The director of CS requested the indication of JICA budget for the Study to MOFA. The Team Leader answered the presentation of the budget without clear indication of the fund for the baseline surveys could be possible due to competitive bidding. JICA representative answered that the JICA budget would be presented accordingly.

The Team Leader questioned how MOFA would arrange the budget for 2006 including the Regional offices. The director of CS answered he will discuss with the Chief Director of MOFA.

5. Main Points Discussed at the Meeting with Chief Director:

The director of CS introduced the JICA study members and JICA representative to the Chief Director of MOFA. The Team Leader presented the outline of the Study and the discussion points covering the assignment of counterparts, nomination of the steering committee members, target year for Master Plan, and counterpart fund allocation. The followings were issues discussed and agreed:

Budget Arrangement

The director of CS explained the details on the budget requirement for the year 2006 for the study. He explained the budget plan for the year 2007 will be prepared on the basis of the activities of JICA study and the JICA fund for the Study.

The Chief Director basically agreed the budget arrangement according to the counterpart budget plan which required some verification. He promised to request Minister of MOFA for the budget arrangement.

The team leader stated the counterpart budget for the regional offices to be selected for the baseline surveys and other required surveys will be indispensable. JICA study team could not provide the allowance and transportation cost for the regional staffs who will be involved in the JICA study activities except the actual cost for holding and facilitating workshops.

The director of CS stated MOFA will need to get further detailed budget information from JICA to prepare the counterpart budget plan.

Counterpart Assignment

The Chief Director will instruct the counterpart assignment to respective directorates.

Steering Committee

The Chief Director will verify and inform the members of steering committee to the Study Team.

Mater Plan Target Year

The Chief Director stated the study period for two years seemed too long. The team leader explained the Phase-2 study in 2007 would be modified on the basis of the results of Phase-1 study in 2006 which might cover some initiation of priority plans. However the Master Plan of the Study will be completed in May 2008 against the target year of GPRS-II in 2009. The short term priority plans will be set in two years and long term plans be targeted to 2015.

The Chief Director stated the target year would be verified by the Policy Planning, Monitoring and Evaluation Directorate, MOFA.

Mr. Kwaku Owusu Baah
Chief Director
Ministry of Food and Agriculture

Mr. Yuichi Fukasaka.
Team Leader
JICA Study Team

Dr. J.A. Poku
Director
Directorate of Crop Services
Ministry of Food and Agriculture

Attachment

LIST OF ATTENDEES

1. Meeting on Inception Report (July 10, 2006)
Place: Conference Room at Land and Water Management, MOFA

Crop Services Directorate	
Dr. J.A.Poku	Director
Mr. R.T.Ankrah	Assistant Director
Mr. Abdul Majid	Assistant Agricultural Officer
Extension Services Directorate	
Mr. Gabriel Owusu	Agricultural Officer
Agricultural Engineering Services Directorate	
Mr. George. B	Principal Agric. Engineer
Statistics, Research and Information Directorate	
Mr. John Nortey	Senior Agricultural Officer
Ghana Irrigation Development Authority (GIDA)	
Mr. D.N.Ohemeng	Deputy Chief Executive
JICA Ghana Office	
Ms. Akiko Tatsuta	Project Formulation Advisor
Mr. Konlan K. Samson	Program Officer (Agriculture)
JICA Study Team	
Mr. Yuichi Fukasaka	Team Leader/Agricultural Policy
Akeshi Mori	Rice Marketing System Expert

2. Meeting with Chief Director, MOFA (July 12, 2006)

Ministry of Food and Agriculture	
Mr. Kwaku Owusu Baah	Chief Director, MOAF
Dr. J.A.Poku	Director, Crop Services
JICA Ghana Office	
Ms. Akiko Tatsuta	Project Formulation Advisor
JICA Study Team	
Mr. Yuichi Fukasaka	Team Leader/Agricultural Policy
Akeshi Mori	Rice Marketing System Expert

Attachment-1(3)

Minutes of Meeting on Progress Report (1)

Minutes of Meeting
on
Progress Report (1)
for
The Study on the Promotion of Domestic Rice in the Republic of Ghana

1. Date : December 11, 2006
2. Time : 10:15 am to 11:30 am
3. Place : Conference room, Land and Water Management Unit, Directorate of Crop Services, Ministry of Food and Agriculture (MOFA)

In accordance with the Scope of Work (hereinafter referred as the S/W) for the Study on the Promotion of Domestic Rice in the Republic of Ghana (the Study), the JICA Study Team officially submitted twenty (20) copies of Progress Report (1) to Directorate of Crop Services of MOFA.

In response to the request by Dr. J.A. Poku, the Chairman of the meeting, Mr. Y. Ishizaki, Acting Leader of the JICA Study Team, explained the contents of Progress Report (1) to the Steering Committee..

All the attendants of the meeting as per Attachment-1 confirmed that Progress Report (1) was prepared in compliance with the conditions set forth in the S/W according to the methodologies and schedule stipulated in Inception Report. The followings were discussed and mutually agreed in the meeting.

(1) The Study clarified and analyzed the current positions of the rice sector of Ghana very well. In the following stages, the Study will continue in-depth analyses of development constraints, which will be fully incorporated into the Master Plan.

(2) The Study will prepare the integral development programs to direct all the stakeholders toward the development targets, namely increased rice production and improvement of rice quality, along the following three (3) basic strategies.

Basic Strategy-1 : Production and marketing of quality rice, which is competitive to imported rice in both price and quality, will be integrally promoted. To produce quality rice constantly, quality control of paddy grains on farm will become crucial issue in the irrigation schemes. Expansion of irrigation area is also prerequisite for increased rice production. Possible government supports to private rice millers will be studied to ensure improvement of their service quality.

Basic Strategy-2 : Integrated program for semi-intensive rain-fed paddy cultivation, which covers 78% of whole domestic rice production, will be set up.

Profitability of farmers will be stabilized and expanded. Firstly, physical works to improve the quality of lowland paddy field will be considered paying special attention to water control measures and leveling of soil surface. Secondly, yield improvement and production cost saving will be focused.

Basic Strategy-3 : Rice farming for home consumption will also be assisted. Although extent is limited to 16% of the total paddy fields of Ghana, some farmers continue 'low input - low return' rice cultivation at subsistence level under marginal agro-ecological conditions. Development approach required is to mobilize low yielding rice cultivation for the purposes of food security at individual farmers' level. The program will promote introduction of drought resistance varieties and promotion of simple paddy storage.

(3) The Master Plan will be composed of three (3) development programs along the basic strategies mentioned above. Necessary measures urgently required will be selected among the programs and elaborated as the Action Plan to be prepared through the next phase in the next year. Although huge investment will be required for full implementation of the Master Plan, strategic investment plan will be considered in the Action Plan for the earliest achievement of the targets.

(4) The import levy to develop the rice sector currently becomes one of the central issues to secure rice self-sufficiency. However, technical aspects such as improvement of paddy yield, cost-saving farm management and improvement of rice quality have been fundamental for the rice sector of Ghana regardless to the government's decision on import levy. The Study will pay more attention to these technical measures for enhancement of absolute value-added to the rice sector of Ghana.

(5) Capacity building of the Ghanaian counterpart personnel is one of utmost important objectives of the Study. The Study will take into consideration more participation of the counterpart personnel in the on-going study activities.

(6) Further comments are to be submitted to the JICA Study Team in written form by 25th December 2006 through Directorate of Crop Services, MOFA.

Dr. J.A.Poku
Director for
Directorate of Crop Services, MOFA

Mr. Y. Ishizaki
Acting Team Leader
JICA Study Team

Attachment-1

LIST OF ATTENDANTS

Ministry of Food and Agriculture (MOFA)

Mr. Gyiele Nurah	Chief Director

Directorate of Crop Services, MOFA

Dr. J. A. Poku	Director (Chairman of the Meeting)
Mr. Abdul Majid	Counterpart (Agriculture)

Directorate of Statistics, Research, and Information, MOFA

Mr. K. Adarkwa	Counterpart (Marketing)

Directorate of Agricultural Engineering Services, MOFA

Mr. A. K. B. Deyang Akib	Principal Agricultural Engineer

Ghana Irrigation Development Authority (GIDA), MOFA

Mr. D. N. Ohemeng	Deputy Chief Executive (Agronomy)

Ghana Rice Inter-Professional Body (GRIB)

Mr. E. Tetteh-Bio	Executive Secretary

JICA Study Team

Mr. Yoshiyuki Ishizaki	Acting Team Leader / Farm Management Survey Plan
Mr. Akeshi Mori	Rice Marketing System
Mr. Masayuki Koyama	Paddy Production Technology / Farm Management
Mr. Teruhisa Aoki	Post-harvest Activities
Mr. Kenjiro Onaka	Agricultural Policy

JICA Ghana Office

Ms. Akiko Tatsuta	Project Coordinator

Attachment-1(4)

Minutes of Meeting on Interim Report

Minutes of Meeting
on
Interim Report
for
The Study on the Promotion of Domestic Rice in the Republic of Ghana

1. Date : May 22, 2007
2. Time : 10:00 am to 1:30 pm
3. Place : Conference room, Meklin Hotel, Accra

In accordance with the Scope of Work (hereinafter referred as the S/W) for the Study on the Promotion of Domestic Rice in the Republic of Ghana (the Study), the JICA Study Team submitted twenty (20) copies of Interim Report to Directorate of Crop Services of MOFA in advance.

The Steering Committee Meeting was officially opened under the chairmanship of Dr. J.A. Poku, Director for Directorate of Crop Services, MOFA. Mr. M. Kumagai, Deputy Resident Representative of JICA Chana, addressed the opening remarks to the Steering Committee. In response to the request by the Chairman, Mr. M. Koyama, the JICA Study Team, explained the contents of Interim Report.

All the participants of the meeting as per Attachment-1 confirmed that Interim Report was prepared in compliance with the conditions set forth in the S/W according to the methodologies and schedule stipulated in Inception Report. The following were discussed and mutually agreed in the meeting.

(1) The results of the Phase-I study provide us a wide range of data and information on the rice sector of Ghana in terms of economic and policy background, rice demand-supply balance, paddy production, rice processing and storing, rice distribution and marketing and agricultural supporting systems. Development constraints and potentials of the rice sector are carefully analyzed throughout the Study.

(2) The Steering Committee mutually agreed to attach development priority to promotion of lowland rice farming, which currently produces nearly 80% of the total domestic rice. In-depth study of inland valley development will be carried out in the Phase-2 study from both engineering and community development points of view. Particular attention will be paid to technical justification as well as cost optimization for improvement of hydrological conditions of inland valleys by means of drainage canals and flood control levees. It is also crucial to optimize demarcation of responsibilities and cost sharing between the government and farmers.

(3) The Study will direct every effort to optimal institutional set-up and strengthening management capacity of agricultural supporting systems for the rice sector of Ghana. They are represented by research-extension linkage, seed multiplication and supply, financial and technical supports to millers, market information system, farm credit and so on.

(4) Lower grain quality is disadvantage in competition against imported rice. Several causes are identified; poor moisture control of paddy grains during maturing stage, contamination of impurities during harvesting and drying, lengthy grain storing in inadequate storage facilities and use of Engelberg type mills. The Steering Committee requested JICA to extend their technical assistance to improvement of grain quality in future.

(5) The import tax of rice currently becomes one of the central issues to secure rice self-sufficiency. However, technical aspects such as improvement of paddy yield, cost-saving farm management and improvement of rice quality have been fundamental for the rice sector of Ghana regardless government's decision on import tax. The Study will pay more attention to these technical measures for enhancement of absolute value-added to the rice sector of Ghana.

(6) The organizational set-up will be urgently required among the government agencies concerned for smooth implementation of development programs in line with the Master Plan. It is recommended to organize an inter-ministrial forum under the Government to ensure monitoring and evaluation and regular discussion about development programs for the rice sector. In this regard, the ownership of the Study is enhanced and maintained among the Steering Committee and governmental agencies concerned.

(7) Close relationship between JICA and MOFA is key to promotion and early commencement of development programs to be prioritized among the Master Plan.

Dr. J.A.Poku
Director for
Directorate of Crop Services, MOFA

Mr. M.Koyama
JICA Study Team

List of Participants

Ghanaian side

Ministry of Food and Agriculture (MOFA)

Directorate of Crop Service (DCS)

Dr. J.A.Poku (Chairman)	Director
Mr. K. Amoo Baffoe	Deputy. Director
Mr. A. Manu Addae	Assist. Director
Mr. R. Twumasi Ankrah	Assist. Director

Directorate of Agricultural Extension Service (DAES)

Mr. Gabriel Owusu	Agricultural Officer

Ghana Irrigation Development Authority (GIDA)

Mr. Albert F. Swatson	Senior Agronomist

Policy Planning Monitoring and Evaluation Directorate (PPMED)

Ms. Zalia Zempare	Assist. Director

Agricultural Engineering Service Directorate (AESD)

Mr. Charles Osei Owusu	Representative

Women in Agriculture Development (WIAD)

Ms. Nyuieme Adiepena	Senior Agricultural Officer

Statistics, Research and Information Directorate (SRID)

Mr. Kwadwo Adarkwa	Counterpart to the Study Team

Council for Scientific and Industrial Research (CSIR)

Food Research Institute (FRI)

Dr. John Manful	Research Scientist

Crop Research Institute (CRI)

Dr. E. Annan Afful	Research Scientist

Japanese side

Japan International Cooperation Agency (JICA) Ghana Office

Mr. Masato Kumagai	Deputy Resident Representative
Mr. Tetsunori Hirahara	Assistant Resident Representative
Ms. Akiko Tatsuta	In-Charge of the Study

JICA)Study Team

Mr. Masayuki Koyama	Rice Farming and Extension
Mr. Akeshi Mori	Rice Marketing

Attachment-1(5)

Minutes of Meeting on Progress Report (2)

MINUTES OF MEETING
FOR
PROGRESS REPORT 2
ON
THE STUDY ON THE PROMOTION OF DOMESTIC RICE
IN THE REPUBLIC OF GHANA

Accra, November 8, 2007

1. Date: November 6, 2007
2. Time: 10:25 am to 12:35 pm
3. Venue: Conference room, Land and Water Management Unit, Directorate of Crop Services, Ministry of Food and Agriculture (MOFA)

In accordance with the Scope of Work for the Study on the Promotion of Domestic Rice in the Republic of Ghana (the Study), the JICA Study Team officially submitted twenty copies of the Progress Report (2) to Directorate of Crop Services of MOFA.

The Steering Committee Meeting was opened under the chairmanship of Mr. Kwaku Amoo Baffoe, Acting Director for Directorate of Crop Services, MOFA. Mr. N. Morioka, Team Leader of the JICA Study Team, explained the contents of the Progress Report 2.

The report was accepted in principle by all the participants as listed in the Attachment-1. In the meeting, various points were discussed on issues such as aromatic rice, cooking quality, rice quality, institutional support, variety, land issues, area selection for action plan, credit, etc. The following points were agreed upon among the participants:

1. Nerica rice is important for poverty alleviation, particularly in the three regions of Upper West, Upper East and Northern (where incidence of poverty is quite high), because of its nature as suitable for rain-fed low input rice in the savanna areas. Present activities under the Nerica Rice Dissemination Project and the Research Institutes would be reviewed and incorporated in the action plans for linkage to accelerate their activities.

2. Environmental issues are important from the view point of global climatic change at the macro level and resource management at the site level. Rice is basically planted in valley bottoms and lowlands where it is suitable, and this therefore minimizes adverse effect to the resource management at the micro level. Sato-Yama's concept of micro watershed management in rice development contributes to the development of inland valleys.

   Information would however be given to the Environmental Protection Agency for necessary clarification through Ministry of Food and Agriculture according to the rules and regulation.

3. The Steering Committee agreed on the stage-wise implementation of three (3) integrated development programs proposed in the master plan taking into consideration financial situation and past performance. Priority is given to two (2) programs for semi-intensive rain-fed rice (Type 2) and extensive rain-fed rice (Type 3) in implementation of the Stage-1.

   In order to prepare action plan for the two priority programs, Ashanti and Northern Regions are selected in order to establish methodology and approach for extending the programs to the surrounding areas.

   In parallel with preparation of the action plan, Directorate of Crop Services will ensure that the necessary action by the policy makers are taken.

Mr. Kwaku Amoo Baffoe
Acting Director,
Directorate of Crop Services
Ministry of Food and Agriculture

Mr. Naoto Morioka
Team Leader
JICA Study Team for
Promotion of Domestic Rice

Attachment: LIST OF PARTICIPANTS

1. Ministry of Food and Agriculture

Mr. Kwaku Amoo Baffoe	Acting Director, Directorate of Crop Services, Accra
Mr. Solomon Ansah	Senior Agricultural Officer, Directorate of Crop Services, Accra
Mr. Twumasi Ankrah	Coordinator, Nerica Rice Dissemination Project, Directorate of Crop Services, Accra
Mr. Kinsley Amoako	Land and Water Management (Environment), Directorate of Crop Services, Accra
Mr. Owusu Michael	Counterpart, Directorate of Crop Services, Accra
Ms Grace Andoh	Directorate of Statistics, Research and Information, Accra
Mr. Kwadwo Adarkwa	Counterpart, Directorate of Statistics, Research and Information, Accra
Ms. Nyuiemo Adiepena	Senior Agricultural Officer, Women in Agricultural Development, Accra
Mr. Abaka Cluarsahk	Directorate of Agricultural Extension Services, Accra
Mr. James Akatse	Ghana Irrigation Development Authority, Accra

2. Council for Scientific and Industrial Research

Dr. E. Annan Afful	Research Scientist Crop Research Institute, Kumasi
Dr. J. O. Fening	Director Soil Research Institute, Kumasi

3. JICA, Ghana Office

Mr. Masato Kumagishi	Deputy Resident Representative, Accra
Mr. Yukinari Tanaka	Assistant Resident Representative, Accra
Ms. Akiko Tatsuta	In-Charge of the Study, Accra

4. Study Team

Mr. N. Morioka	Team Leader, Accra
Mr. A. Mori	Marketing, Accra

Attachment-1(6)

Minutes of Meeting on Draft Final Report

MINUTES OF MEETING
FOR
DRAFT FINAL REPORT
ON
THE STUDY ON THE PROMOTION OF DOMESTIC RICE
IN THE REPUBLIC OF GHANA

Accra, December 19, 2007

1. Date: December 18, 2007
2. Time: 10:30 am to 13:30 pm
3. Venue: Tokyo Hall, Erata Hotel, East Legon, Accra

In accordance with the Scope of Work for the Study on the Promotion of Domestic Rice in the Republic of Ghana (the Study), the JICA Study Team officially submitted twenty copies of the Draft Final Report to Directorate of Crop Services of MOFA.

The Steering Committee Meeting was opened under the chairmanship of Mr. Kwaku Amoo Baffoe, Acting Director of Directorate of Crop Services, MOFA. Mr. N. Morioka, Team Leader of the JICA Study Team, explained the content of the Draft Final Report.

The report was accepted in principle by all the participants as listed in the Attachment. The following are the main points discussed among the participants:

1. Views provided in the Master Plan and Action Plan are well prepared and presented, and this is the time for implementation. In implementation, all the stakeholders in the rice value chain need to be empowered, particularly, rice brokers and consumers.

   Domestic market in Ghana has already linked up with international market by importing large volume of rice, and stakeholders should keep in mind to produce, market and consume domestic rice at the global standard level. However, consumers in the rural market are still sensitive to pricing.

2. In conducting the field survey to prepare the Action Plan, about 200 sites were listed in Ashanti and Northern Regions through consultation with the Regional Agricultural Offices. These are candidate sites, but all the sites may not be selected for immediate implementation. These sites will require verification in technical, social and managerial aspects before implementation. In addition, implementation would not be limited to these sites, keeping in mind that other sites will be found since potential for rice cultivation is high and selection criteria would be modified due to changes in socio-economic situation.

3. Master Plan is the policy recommendation for the rice sector to the Government of Ghana, and any development partners with similar objective

would be encouraged to implement any recommendation made in the document. However, it should be kept in mind that they are prepared according to the present situation, and the environment surrounding the rice sector keeps changing. In this regard, periodic revision is required to suit the policy of the future situation, and the document of Master Plan will provide the basis for discussion.

4. In preparation of the Action Plan, Ashanti and Northern Regions were selected for the detailed survey. These Regions were selected taking into account the criteria of physical potential, current position of market and production, access to supporting research institutions, and linkage to similar projects and programs. In implementing the Action Plan, activities would be commenced at the same time in these two Regions.

   It is important to note that the initial stage of the Action Plan would not be necessarily limited to these two Regions. The Action Plan can be implemented in other Regions with similar environment and circumstances as the above mentioned regions. The expansion of the action plan to other regions should be discussed among the stakeholders to achieve consensus before implementation.

The Final Report will be prepared in Japan by the JICA Study Team. Before then, additional comments and suggestions, if any, will be sent to the JICA Office through the Directorate of Crop Service by the end of 1st week of January 2008.

Mr. A. Manu Addae
Deputy Director,
Directorate of Crop Services
Ministry of Food and Agriculture

Mr. Naoto Morioka
Team Leader
JICA Study Team for
Promotion of Domestic Rice

Attachment: LIST OF PARTICIPANTS

1. Ministry of Food and Agriculture

Mr. Kwaku Amoo-Baffoe	Acting Director, Directorate of Crop Services, Accra
Mr. G. Badu-Yeboah	Regional Director, Ashanti Region
Mr. Twumasi-Ankrah	Coordinator, Nerica Rice Dissemination Project, Directorate of Crop Services, Accra
Mr. A. Manu Addae	Agronomist, Nerica Rice Dissemination Project, Directorate of Crop Services, Accra
Mr. J. S. Odoi	Deputy Director, Planning, Program, Monitoring and Evaluation Directorate, Accra
Mr. Solomon Ansah	Assistant Director, Directorate of Crop Services, Accra
Mr. A. K. B. Deyang	Counterpart, Assistant Director, Agricultural Engineering Service Directorate
Mr. Owusu Michael	Counterpart, Directorate of Crop Services, Accra
Mr. Kwesi Abake Quansah	Assistant Agricultural Officer, Directorate of Agricultural Extension Services, Accra
Ms. Nyuieme Adiepena	Senior Agricultural Officer, Women in Agricultural Development, Accra
Mr. Busia Dawuni	Agricultural Engineer Ghana Irrigation Development Authority, Accra

2. Council for Scientific and Industrial Research

Dr. E. Annan Afful	Research Scientist Crop Research Institute, Kumasi
Dr. M. M. Buri	Senior Research Scientist Soil Research Institute, Kumasi
Dr. Wilson Dogbe	Senior Research Scientist Savanna Agricultural Research Institute, Tamale
Dr. Kofi Dartey	Scientific Officer Crop Research Institute, Kumasi
Dr. John Manful	Cereal Scientist Food Research Institute, Accra

3. JICA, Ghana Office

Mr. Yukinari Tanaka	Assistant Resident Representative, Accra
Ms. Akiko Tatsuta	In-Charge of the Study, Accra

4. Study Team

Mr. N. Morioka	Team Leader, Accra
Mr. A. Mori	Marketing, Accra
Mr. M. Koyama	Paddy Production Technology/Farm Management