

Improving the Competitiveness and Marketability of Locally- Produced Rice in Ghana

I. Marketing of Rice in Ghana
I.1/I.2/I.3 (Collaborators' Reports)

Project R6688



**Department for International Development (DFID)
Crop Post Harvest Programme**

IMPROVING THE COMPETITIVENESS AND MARKETABILITY OF LOCALLY-PRODUCED RICE IN GHANA

**DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
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CROP POST HARVEST PROGRAMME

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1. Marketing of Rice in Ghana

1.1 - Report on Irrigated Rice Marketing in Ghana - George Day and Joseph Acheampong, December 1996

1.2 - Analysis of Rice Marketing in Northern Ghana - Augustine Langyintuo and Peter Oldham, March 1997

1.3 - Marketing of Rice in the Inland Valleys of Southern Ghana - Alex Opoku-Apau, Peter Oldham and George Day, October 1997

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Ghana Irrigation Development Authority (GIDA)

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1. Introduction

1.1 Historical Background

Irrigated rice has been grown over a number of decades in Ghana on state-sponsored government irrigation projects. Over the years these projects have received extensive state support, as the government has attempted, through various initiatives, to achieve food self-sufficiency. The emphasis on promoting domestic rice production was enhanced by the growing importance of rice in the diet of the urban population, combined with technical assistance provided by donors, such as the Chinese. In addition, the promotion of state-sponsored, input-intensive agriculture reflected the Ghanaian government's past adherence to socialist development models.

The irrigation projects have had an uneven history, reflecting Ghana's own uneven economic history. Most of the projects have required major rehabilitation efforts in order to maintain their functioning. Most recently, projects have been rehabilitated through EU-funded assistance. The projects come under the management of the Irrigation Development Authority (IDA), which is an autonomous authority under the Ministry of Food and Agriculture. IDA is responsible for managing irrigation development in Ghana, and, increasingly, seeks to transfer more of the responsibility for managing and funding irrigation operations to farmer organisations. World-wide experience suggests that this is a slow process, and Ghana has been no exception, with the process currently at different stages in different individual irrigation projects.

In addition, there is a change in emphasis in Ghanaian irrigation development. Previously, irrigation development was seen largely as a contributor towards meeting a food self-sufficiency objective with a consequent emphasis on rice production. Today, there is increasing emphasis on maximising the returns from the use of scarce irrigation resources, with a corresponding shift in thinking towards exploring the potential for production of higher value crops, principally fruit and vegetables. Similarly, IDA is currently involved in feasibility study work on a national small-scale irrigation project, which is concerned with identifying sites for smaller scale

irrigation developments. These trends suggest that there are important questions about the future role of irrigated rice development in Ghana.

1.2 Methodology

For the purposes of this study of rice marketing, the three most important rice growing schemes were visited. These are Dawhenya (approx. 15 km north east of Tema), Asutsuare (approx. 60 km north east of Tema, close to the Volta River) and Afife (close to Akatsi in the southern Volta Region).

The broad aim of the study was to identify and describe:

- the broad market flows and patterns of domestic rice marketing;
- the participants in the marketing chain;
- the marketing margins in the marketing chain;
- the actors and institutional arrangements in the marketing system.

This was accomplished by the use of semi-structured interviews of key informants, including rice farmers, rice wholesalers, rice retailers, rice millers and IDA staff. Direct observation of rice marketing, post-harvest practices, weights and measures and prices also provided important sources of information for describing the marketing system.

2. Dawhenya Irrigation Scheme

2.1 Background

Dawhenya irrigation project was first built in 1964 and provides approximately 200 hectares of irrigated land. It subsequently fell into a state of disrepair and was rehabilitated under EU funding in 1990-91. Rice is the main crop grown on the scheme, with around 190 hectares effectively cropped to rice at the present time by between 235 and 240 farmers. Since 1994, two crops per year have been grown with

the main season planting taking place during February to April with harvesting in June to August, and minor season planting in August to September with harvest in December to January. Yields reach around 5 tonnes per hectare during the main season with somewhat lower yields in the minor season. Total annual production is, therefore, around 1,600 tonnes of paddy. There is some discussion of crop diversification on the scheme, particularly during the minor season when, due to lower rainfall, pumping costs are higher. The thinking is that a less water-intensive crop could be grown.

The scheme is the first of the IDA schemes to be handed over to a Farmers' Association to be managed - though there is still considerable IDA support to the scheme. Effectively, the scheme is managed jointly by IDA and by the Farmers' Association, which has now employed a professional manager. The farmers on the scheme are charged an irrigation charge of C164,400 per hectare per season, which is designed to cover the running costs and electricity bills of the scheme. However, there are a number of facilities for which the farmers do not pay any charge including the provision of drying floor facilities and storage warehouses.

The farmers' association provides inputs to the farmers for production of rice including fertilisers, seed, herbicides etc. This production credit appears to be a continuation of a now defunct revolving fund credit arrangement, which was previously provided through the Agricultural Development Bank. Farmers then repay the association in kind in the form of paddy at an agreed price per bag, which is currently C40,500 per maxibag (84 kg)¹. In addition the farmers pay an interest charge of 18% of their outstanding input costs and a 7% charge for the administrative costs of the farmers' association. The farmers' association sells most of the paddy to the Ghana National Procurement Agency (GNPA). GNPA is a parastatal, which formerly controlled the importation of a number of important commodities including wheat, rice, sugar and rubber tyres. GNPA is now operating on more commercial lines, and is not currently loss making, but nonetheless remains an important player in

¹ Maxibags are jute sacks used for paddy (and other grains) in Ghana. They are usually assumed to contain around 84kg. However, weighing trials and other evidence suggests that their weight is likely to be somewhat higher, possibly in the range 86-90kg, depending on packing practices.

the rice market. The paddy marketed through the farmers' association to GNPA is taken to a private rice mill in Pokoasi (north of Accra) for milling. GNPA then bag and sell the rice under their own brand.

The arrangement for marketing rice in this manner through the GNPA dates from 1994, and to some extent reflects a parastatal rather than a pure commercial motivation. The basic arrangement was that the GNPA would purchase as much rice as would be available at a negotiated price. GNPA provides an advance to the farmers' association that is then used to finance input supply to farmers and to make purchases of paddy from the farmers.

Farmers at the Dawhenya scheme are free to sell all their paddy through the arrangement organised through the association and GNPA, or they may retain the paddy which is surplus (i.e. above and beyond the amount needed to repay the production credit advanced) for sale through their own arrangements. The GNPA marketing arrangement currently provides a price of C40,500 per maxibag of paddy (each maxibag weighs approximately 84 kg). In addition farmers sell some of their crop to itinerant market traders who purchase paddy from the scheme.

2.2 Varieties at Dawhenya

All rice varieties cultivated at Dawhenya are improved varieties of white rice. The main varieties currently grown are ITTA 222, CIAT 19970 and Bouake 189. GRUG 7 is another important variety at Dawhenya, but is now gradually being phased out as yields are reportedly declining. The supply of seed to the scheme is organised by the farmers' association, with seed sourced from the University of Legon farms at Kpong and multiplied on the scheme. Dawhenya appears to have the most organised arrangements regarding the supply of improved seed to farmers.

The CIAT variety appears to be the most recently introduced variety, but also the most popular among buyers. GNPA, for example, are offering a higher price of C42,500 per maxibag for supplies of CIAT paddy with the aim of encouraging its production,

based on their assessment of the quality characteristics of the available varieties. The yield from CIAT is also reportedly higher than other varieties, but it is a longer duration variety, taking 5 to 6 months to mature in place of 4 months for other varieties. It also reportedly requires higher applications of fertiliser and other inputs.

2.3 Post-Harvest Practices

Farmers employ teams of casual labour to perform the functions of cutting the crop, stacking in the field, threshing, field edge transport, drying and packing. The crop is cut, stacked on the panicle in the field and threshed by teams of male casual labourers. The post-harvest costs are shown in Table 1 below. These costs can be paid either directly by the farmer or can be paid by the farmers' association and treated as part of the input cost account which must be settled by the farmer to the association in the form of paddy.

Table 1: Typical harvest and post-harvest costs borne by farmers

| Operation | Cost to Farmer (per ha., unless specified) |
|--|---|
| Crop cutting | C70,000 |
| Threshing | C70,000 |
| Drying, field edge to roadside transport and packing | 2 bags (i.e. equivalent to C81,000) |
| Transport (roadside to drying floor) | C300/bag |

Threshing is carried out by placing tarpaulins on the field, placing stones on top of the tarpaulin and beating the panicles against the stones. Farmers reported that threshing boxes were formerly used at Dawhenya, but this practice was stopped when the farmers realised that much of the grain was being lost through scattering outside the threshing box, during panicle beating. Threshing reportedly takes two to three days per hectare for a team of 6 labourers.

The threshed paddy is gathered and bagged in the field by women packers. The sacks of paddy are then carried to the roadside and loaded onto trailers pulled by tractors or 'power-tillers' (small two-wheeler tractors) for carting to the drying floors. The

Dawhenya scheme has extensive concrete drying floors located at a central point along with the scheme offices, storage warehouse and a privately run mill.

Paddy is sun-dried on the drying floors by hired female labour. Following drying the paddy is winnowed by pouring from bowls held overhead and allowing chaff to be removed by the wind, and then bagged. It is then weighed by the farmers' association, and that portion which is required to cover input costs is deducted by the association with the remainder returned to the farmer for their own disposal. The paddy owned by the farmers' association is placed in the central storage warehouse located at the scheme, prior to its sale to GNPA. The farmers' association ensures that paddy is dried to around 11 - 12% moisture content before storage, and has a moisture meter for this purpose. There do not appear to be any major problems with storage losses.

2.4 Farm-gate Sales

For all of the Dawhenya farmers, as in the other irrigation schemes, rice is grown overwhelmingly as a cash crop with a very small proportion of the crop kept for home consumption. Many of the Dawhenya farmers sell their entire crop through the farmers' association. That is, they repay their input costs to the farmers' association in the form of paddy at an agreed rate per bag, with the surplus paddy paid out to them in cash at the same rate per bag by the farmers' association. This arrangement provides the advantage of quick realisation of the value of the crop from the farmer's perspective - although this is to some extent dependent on the cash-flow situation of the farmers' association, which in turn reflects purchasing advances made by GNPA. There is also a perception among farmers that the GNPA market provides a more reliable customer, with some farmers citing instances where they never received payment from some market women for paddy supplied on credit.

Farm-gate price levels appear to be determined primarily by the price level negotiated with GNPA by the farmers' association. At the present time the agreed rate is C40,500 per bag. It appears that some market traders are paying a slightly higher

price of C42,000 per bag, but they too wish to pay the same price as GNPA and are putting pressure on farmers for a lower price. Some market traders may be willing to pay slightly higher prices in order to attract supplies.

There is little evidence of farmers storing their crop for subsequent sale later in the marketing year to take advantage of any price increases. Farmers generally report selling their entire crop immediately after harvest - even that portion which is sold to market women. This is despite the fact that there is widespread awareness of a seasonality in rice prices - with prices generally perceived to be higher in the period after Christmas, when the availability of other staple foodstuffs is declining. Any storage that does take place is in small quantities at home. However, the farmers' association at the present time is storing the crop in the hope of higher prices later in the season. This partly reflects an impasse that has been reached with GNPA over the price to be paid for the current crop, with GNPA wanting to lower the price below the current agreed level of C40,500. It appears that at the time of the study GNPA were holding off from buying the Dawhenya crop due to this price dispute, resulting in the farmers' association holding around 1,400 bags of paddy in stock in the project warehouse.

In addition, significant sales take place through market women traders who visit the scheme in order source paddy. These traders are mostly wholesalers either from Dawhenya town or the Ashaiman/Tema area - they are described more fully below. Market women may buy directly from farmers or from the farmers' association. They appear to be a good market for the Dawhenya farmers providing an integrated credit and marketing service. However, the farmers are generally happier with the marketing arrangement which has been operational over the past two years with GNPA, because this provides a straightforward market outlet, and removes the dependence of the farmers on irregular demands placed by market women.

Farmers may grow a number of different varieties but varieties are kept separate when it comes to marketing. Similarly, market women are closely aware of the importance of variety difference in determining some of the quality properties of the final product.

A number of farmers have credit links to market traders. The traders provide production credit in the form of cash or inputs, which is then repaid in paddy immediately following the harvest by the farmer. The repayment is made without any direct interest payments, but at the ‘going rate’ price i.e. the GNPA price less around C2,000 per maxibag for the provision of the credit service. Some farmers also deal with the same trader from year to year, this relationship normally being cemented by the provision of credit on both sides. Other farmers report approaching market women to request credit, and will deal with the one who is able to advance funds. Market traders provide production credit to farmers, farmers provide an assured source of paddy to traders at a discounted price sometimes also with a number of weeks credit, allowing traders to sell rice before payment to farmers is made.

2.5 Milling

All paddy grown at Dawhenya is marketed by the farmers in paddy form. Thus, the primary buyer owns the paddy at the time it is milled. If the paddy is bought by GNPA it is transported to a mill located at Pokoasi, some 30-40 kms away to the north of Accra. This arrangement does involve extra transport costs, because the paddy must travel from the Dawhenya scheme to Pokoasi for milling before being returned to GNPA in Accra for distribution.

If the paddy is purchased by market women it is generally milled either directly on site at the private mill at Dawhenya, or at mills in Ashaiman or Accra. Ashaiman appears to be the primary milling centre for the entire trade in irrigated rice. There are four rice mills in Ashaiman, and each appears to provide a focal point for the businesses of a number of market women (around 20 to 50 at each mill). Market women appear to be attached to particular mills that they use on a regular basis for milling, drying, storage, assembly and as a central point for sales or the despatch of deliveries.

Kanawu Rice Mill

Kanawu rice mill is one of the four mills located at Ashaiman. The business was started in 1972, and the current Satake-type rice-milling machine was purchased in 1982. The business also comprises corn milling (both dry and wet) and cassava grating (for gari manufacture) using other milling equipment. The rice mill is used on a regular basis by around 20 market women, and the rice milling business is highly seasonal depending on the turnover of the market women. During the busiest period of the year, in February/March time (i.e. the so-called 'lean season' when standard staples are in less plentiful supply) around 50 to 60 maxibags of paddy are milled per day. During less busy periods of the year the average milling throughput is around 15 - 20 maxibags per day. At the time of the interview, no milling had been conducted over the previous four days. The miller has also observed that rice milling business has declined over the past few years, attributing this to the GNPA procurement of Dawhenya rice, which has diverted much of the milling of Dawhenya rice at least to Pokoasi.

The miller gave the following indicative information on costs and revenues.

Recurrent Costs

| Item | Monthly Cost (Cedis) |
|---|----------------------|
| Electricity costs | 80,000 |
| 8 Labourers (@ C40, 000/month plus C1,000 per day 'chop money') | 480,000 |
| Rice mill maintenance (spare parts etc.) | 40,000 |
| Total rice mill running costs, excluding depreciation (50% of labour and electricity costs attributable to the rice milling business) | <u>320,000</u> |

Revenues

| Item | Monthly Cost (Cedis) |
|--|----------------------|
| Milling charges @ C1,000 per maxibag paddy (assuming that 500 bags per month are milled - equivalent to an average over the year of 25 bags for 20 working days each month) | 500,000 |
| Sales of rice bran @ C3,000/50 kg bag (50 kg bran produced per 5 x 84 kg bags paddy milled) | 300,000 |
| Total revenues | <u>800,000</u> |

Interviews with other rice millers suggested different cost information, particularly with regard to maintenance and spare part costs.

2.6 Traders and Wholesalers

GNPA is a parastatal that formerly controlled the importation of a number of important commodities including wheat, rice, sugar and rubber tyres. It is now operating on more commercial lines, and appears from its annual report to be making a profit. The detailed nature of rice marketing by GNPA was not studied closely, due to time availability. However, the broad nature of GNPA's involvement in the rice market is known. Given GNPA's history as a government import procurement agency its primary role in the rice market is as an importer. However, since 1993 GNPA has entered the market for domestic rice, procuring from the IDA supported irrigation schemes. At present its main involvement is in procurement at the Dawhenya scheme.

The rice procured by GNPA is transported to Pokoasi where it is milled in a private rice mill. GNPA then packages the rice in GNPA branded packs of various sizes for distribution to wholesalers and retailers. Information gained from GNPA during a previous visit, suggested that little difficulty was experienced in disposing of this rice. However, GNPA are interested in improving the quality of locally produced rice, particularly in terms of cooking quality. As a result GNPA are offering a premium price for CIAT rice. The manager of the farmers' association at Dawhenya estimates that GNPA absorb approximately two thirds of the entire crop, with the remaining one third marketed through market women.

2.7 Market Women

Sales to market women may take place through the farmers' association or more commonly directly from farmers to market women. At Dawhenya there appear to be two main groups of market women who purchase from the scheme. Firstly there are market women based at Dawhenya, an example is given below. Around 20 Dawhenya traders have recently formed a traders' association, which is now a registered co-operative. The grouping was inspired largely by the example of the farmers' co-operative at the scheme, and is seen as a means of accessing external finance or assistance e.g. bank financing, and of dealing on a collective basis with the

farmers. The traders' association also provides a means of rotating liquidity within the group. The group comes together to place an order with the farmers' co-operative, those members who are able, make cash contributions, but all members receive an allocation of the purchased rice. Those members who received an allocation without contributing cash then repay the purchase price plus C500 per bag to those who advanced cash on their behalf.

The second group of market women is that based at the mills in Ashaiman. It would appear that this group, on average, has a higher turnover and more extensive trading and financing linkages.

Dawhenya Market Trader

Trader A lives in Dawhenya village. Trading in rice is her main activity. Rice is mostly purchased at Dawhenya, but she also buys from Asutsuare and Afife if rice is scarce at Dawhenya. She is a member of a Dawhenya-based association of small rice traders, the Dawhenya Co-operative Food Marketing Society Ltd. Rice is purchased both directly from farmers and sometimes through the traders' association. During the busiest part of the year she buys around 50 bags of paddy per month, going down to 2 bags per month during the slowest part of the year. She pays C40,500 to farmers, but this price reflects the fact that she has extended credit to those farmers (i.e. it is lower than C42,000). Paddy is milled mostly in the mill at Dawhenya, but some is also milled at Ashaiman. Rice is sold to retailers in Ashaiman, Tema and Accra - she delivers the rice to regular customers, hiring trucks or taxis for transport. Rice is sold as soon as possible after milling to release funds. The rice is sold in fertiliser bags that are collected from customers after use and reused.

Marketing costs and revenue are summarised below:

| Item | Cost (Cedis) |
|--|--|
| Cost of paddy | 40,500 |
| Milling Charge | 1,000 |
| Transport to Accra | 700 |
| Loading/unloading | 600 |
| Total cost per maxibag of paddy | <u>42,800</u> |
| Sales revenue i.e. Sales per maxibag of paddy | 44,000/bag milled rice (17 US tins) 49,000/bag paddy (19 US tins) |

3. Asutsuare Irrigation Scheme

3.1 Background

Asutsuare is located close to the Volta River at a distance of around 90 kms from Accra. The scheme has a potential irrigable area of 400 hectares and it is planted almost entirely to rice, with average yields of around 5 tonnes per hectare. During 1995 IDA estimated the total paddy production from the scheme at 1,650 tonnes. At present most of the scheme is only cropped once per year due to problems in the availability of machinery for cropping etc. There are 300 farmers on the scheme who are grouped into an association called the Asutsuare Co-operative Rice Farmers and Marketing Society. The plot size planted by each farmer varies, but the modal size is around 1 acre. IDA jointly manages the project together with the farmers' association, although the association appears to be somewhat less active than the Dawhenya association. Farmers purchase inputs, hire machinery and market their output on a largely individual basis.

The scheme has a drying floor facility, together with extensive warehouse storage. However, there are no moisture testing facilities (as there are at Dawhenya). There are also three private rice mills at the drying floor centre. The scheme levies an irrigation charge to the farmers, currently at C125,000 per hectare per season, which is repaid in paddy at the agreed rate of C40,000 per maxibag.

The supply of seed to the farmers at Asutsuare appears to be less well organised than at Dawhenya. The main varieties grown are ITTA 222 and ITTA 234. CIAT is not cultivated. Farmers frequently save their own seed over relatively long periods, although others purchase from local commercial suppliers such as Kpong Farms, Bok Nam Kims Farm or from Dawhenya or Ashaiman.

3.2 Post Harvest Practices

Paddy is harvested at Asutsuare by teams of casual labourers. Practices are similar to those at Dawhenya, but there are some significant differences. Paddy is cut, but not stacked in the field, as it is in Dawhenya. Cutting is carried out by men, but threshing and packing into sacks is carried out by women. Threshing is carried out using threshing boxes in the field, by beating the panicles against the sloping sides of the box. A team of female labourers was observed carrying out threshing in this manner, and it is apparent that significant quantities of grain are lost by being hurled outside the box in the action of threshing. No attempt is made to recover the loss by, for example, placing the threshing box on top of a tarpaulin.

Harvesting takes place under variable conditions of drainage in the fields. Plots are planted at different times due to problems with scheduling and access to equipment for land preparation. The water management system will not allow drainage of plots ready for harvesting, but located next to immature plots. Thus, on occasion, plots must be harvested while still waterlogged. This practice was observed at Asutsuare; it results in the paddy remaining wet for several days, prior to drying at the drying floor. It also makes for muddy paddy.

Paddy is bagged and head-loaded to a point accessible by power tiller. It is then transported on trailers drawn by power tiller to the drying floor, for sun drying and winnowing. At Asutsuare, traders often purchase the paddy when it is still on the drying floor (this practice was not seen at Dawhenya, although it may occur there). A number of traders mentioned a custom whereby paddy is purchased after two days on the drying floor, with the trader supervising the finishing of drying for a final day. According to the traders this is because they do not trust farmers to dry the paddy properly, and so prefer to supervise drying and winnowing themselves. Poor drying practises are perceived by farmers, traders and millers alike to be a cause of poor quality rice and in particular high proportions of broken grains. It may not be the proportion of broken grains per se which is the problem from the traders point of

view, but possibly the fact that a high proportion of breakage is also likely to reduce the milling out-turn, a key determinant of overall profitability.

According to the project manager and traders interviewed at Asutsuare, there is a particular problem of high chaff content of paddy. This was confirmed by observation of a winnowing machine at Asutsuare. Problems with chaff are reportedly related to low levels of fertiliser application. The ‘winnowing machine’ consists of an adapted pesticide spraying backpack unit, of a type that is reportedly commonly used in cocoa cultivation. The unit is adapted to spray a jet of air, rather than pesticide, which is used to winnow paddy as it is tipped from bowls held overhead. It appears that machines are hired on a piece-rate basis from their individual owner-operators, primarily by traders who are purchasing paddy at the drying floors.

The problem of chaff content and winnowing quality gives the trader a strong incentive to supervise the drying and winnowing of paddy, to ensure that the chaff content is kept as low as possible. This practice is particularly common where there are credit connections between trader and farmer, allowing the process of purchase to be pre-scheduled with the trader playing a fuller post-harvest supervisory role.

Even if paddy is purchased ready bagged, most traders report having to re-dry paddy. This involves extra work or costs as the trader has to employ labour to carry out the work. One trader reported paying 3 US tins of rice for drying of 20 maxibags of paddy (equivalent to around C400 per bag). However, the price paid to farmers for paddy does not vary on the quality of drying or winnowing, and there is therefore little incentive for farmers to improve their practices in this area. Typical harvest and post-harvest costs are shown in Table 2 below.

Table 2: Typical Harvest and Post-Harvest Costs - Asutsuare

| Operation | Cost per hectare |
|------------------------------|------------------|
| Cutting | C72,000 |
| Threshing & Packing | C96,000 |
| Transport o drying floor | C300/bag |
| Drying labour (paid in kind) | C19,000 |

3.3 Farm-gate Sales

All of the paddy from Asutsuare is marketed through market women. As mentioned above, sales by farmers frequently take place when the paddy is physically on the drying floor. This has a further advantage to the traders in that the quantity in each bag purchased can be measured out exactly using their own measures. This usually consists of 6 heaped buckets (No. 34 Nigerian bucket), which each weigh approximately 14.5 kg, thus producing an 87 kg maxibag (i.e. large size jute sack).

The most striking aspect of farm-gate sales at Asutsuare is the prevalence of storage activity by farmers. Most farmers reported storing at least part of their crop as bagged paddy in the large project warehouse, with the aim of selling later in the year to realise better prices. The warehouse is administered by an IDA member of staff, and there are no storage charges for farmers. It is not clear, however, why the Asutsuare farmers appear to be more able to postpone sales than farmers at other schemes. Storage losses do not appear to be a significant issue, and are not perceived by farmers or traders as a problem, with only some minor rodent damage reported.

Farm-gate price formation is the outcome of a number of influences, including a process of analysing production costs by IDA and the farmers' association to set an 'agreed' minimum target price, the influence of prices at other irrigation schemes and the influence of wider market forces. At the time of the survey the standard farm-gate price at Asutsuare was C40,000 per maxibag. However, this price was found to vary depending on the terms of the relationship between buyer and seller. If the payment is to be made by a trader in cash the current price was C38,000 per maxibag. Similarly, if a farmer is selling to a trader who has advanced him or her production credit then the price will be C2000 - C3000 below the 'going rate' i.e. C37,000-C38,000 per maxibag. One larger trader with extensive production financing operations among the Asutsuare farmers claimed to be purchasing paddy at C35,000 per bag, and this may reflect a degree of market power on the part of a particularly powerful trader.

Another striking aspect of farm-gate sales at Asutsuare was the strong seasonality of the terms on which sales take place, confirmed by a large number of respondents. During the period leading up to Christmas, sales to traders generally take place on credit, with traders paying farmers after a period of weeks or months. However, during the period of peak demand around the Easter period sales always take place on a cash basis.

3.4 Traders

Asutsuare appears to be somewhat less reliant on market women from Ashaiman for the marketing of its output. Traders interviewed tended to be from the surrounding area, or to be drawn from among the female farmers on the scheme, although traders from Ashaiman do also source from the scheme. There is some evidence that the mills at Asutsuare provide a similar focal point for a number of traders as the mills at Ashaiman provide for the Ashaiman traders. There is also a wide range of scales of trading at Asutsuare. One larger trader interviewed was also part owner of one of the three mills at the scheme, and buys in large quantities (up to 400 maxibags per month) from around 50 farmers who are provided with production credit, primarily in the form of inputs. This trader's main outlets are wholesale shops in Accra, particularly those around the Makola market area. Other traders purchase in smaller quantities and market rice to retailers and cooks who prepare food for sale to schoolchildren in the local area, and in surrounding towns such as Ada, Odumasi and Somanya. Some rice is also marketed to wholesalers in Kumasi, though this does not appear to be a major outlet.

Like the farmers, traders at Asutsuare appear to engage in more inter-seasonal storage than is apparent at the other schemes - though the main method of operation for most traders is still to turnover stock as rapidly as possible in order to release funds for further purchases.

Asutsuare Traders

Trader B buys rice from Dawhenya, Asutsuare and Afife. Asutsuare is the most important source of paddy, and trader B is also part owner of one of the mills there. All paddy purchased is milled at Asutsuare, and rice is sold to wholesalers in Accra. Rice is sold in non-returnable bags (purchased new at C550 each). Purchases of paddy may be made on cash or credit terms - but always for cash during the peak rice marketing period around Easter. Trader B provides production credit in the form of inputs and some cash to around 50 farmers on the scheme and is thus able to purchase paddy at C35,000 per maxibag (at the time of the study). At the present time some paddy is stored in the project warehouse at Asutsuare, since the market is not promising. Sales to wholesalers in Accra are usually on the basis of two weeks to two months credit. The selling price now is C39,000 - C40,000, and profits per bag for this time of year are low. Profits will be higher during the peak period.

Drying of paddy is a major issue for trader B. All paddy purchased from farmers to whom production credit is advanced is purchased on the drying floor. Purchases are also made from other farmers in bags, but care must be taken to ensure that it has been properly dried otherwise it must be re-dried at extra cost. Labourers can dry 20 bags of paddy/day at a total cost of C6,000 (i.e. C2000/day for each labourer).

The most important problems for trader B is cash-flow – particularly when cash is tied up in inputs purchased for farmers and rice is not selling quickly. In addition, the chaff content of milled rice is too high and customers have complained about this.

Trader C is from Odumasi and buys paddy only from Asutsuare. Paddy is milled at Asutsuare and rice is sold to regular customers (retailers or those who cook and sell rice in Kpong and the surrounding area). Paddy is purchased at C40,000/maxibag and milled rice is sold at C42,000/bag (containing 17 US tins). The profit margin for trader C is in the form of extra rice that is obtained from milling one maxibag over and above the amount required to fill the bag of milled rice. This is usually one or two US tins per maxibag. This 'extra' rice is retailed at C2,500 per US tin.

Trader C gives production credit (as inputs) to three farmers, and buys from them at C37,000 per maxibag. She buys from other farmers at C40,000 per maxibag. At the time of the survey (late Nov.) business is slow (she only purchased 3 bags of paddy this month) and all sales are on credit. Business will improve after Christmas and towards Easter, and sales will be made on cash terms. Paddy is usually purchased in bags from farmers, and often needs re-drying. She does this herself. The major business problem cited by trader C is defaulting customers who have received supplies on credit.

3.5 Milling

Milling there are three privately owned mills at Asutsuare which mill almost all of the crop. All the mills are Satake-type machines, and are powered by diesel engines. The milling charge at Asutsuare is C1,500 per maxibag, and reflects the higher costs of powering the mill using diesel in place of the electricity used at Dawhenya or Ashaiman. There does not appear to be a perception of any major differences in the quality of the milling between the three mills, though traders perceive milling quality as a problem. Traders at Asutsuare mentioned the problem of chaff and paddy present in milled rice, as well as the quality of polishing.

4. Afife Irrigation Scheme

4.1 Background

Afife Irrigation Scheme was first developed in the 1950s and has a developed irrigable area of 880 hectares. This year, 800 hectares of rice were planted for the major crop. The scheme is farmed by around 700 farmers, with yields of around 4 tonnes per hectare. Irrigation is entirely gravity-fed, and thus irrigation service charges are considerably lower than the other schemes surveyed at C50,000 per hectare. There is a farmers' association which works with IDA to manage the project, particularly with regard to the hiring of land preparation equipment. However, the farmers' association is not active in marketing the crop. Some efforts have been made by IDA management and farmers to interest GNPA in sourcing from the scheme. However, the price being offered by GNPA at C38,000 per maxibag is felt to be too low by farmers, so no sales have been made through this route.

The scheme is divided into 11 sections, each with its own drying floor and storage shed facility. There are also around 12 mills on the scheme which are privately run, together with one mill operated by the parastatal Ghana Food Distribution Corporation (GFDC). It is reported that this mill will now be divested from GFDC.

Seed supply at Afife was previously organised by IDA, but farmers now increasingly rely on their own seed, or from friends. A range of improved varieties are grown at Afife including GRUG 7 (introduced by IDA in 1992), CIAT (introduced in 1995, and now among the most popular) and TOX. In the field, a number of farmers were found to be cultivating a Thai variety that is reportedly very old (and therefore its quality must have deteriorated).

4.2 Post-Harvest Practices

Post-harvest practices are similar to other schemes with one or two important variations. Teams of male labourers carry out cutting and threshing. Threshing is carried out by threshing the panicles against a bottomless threshing box that is placed on top of a tarpaulin. Some threshing operations were observed, and again there were problems with harvesting taking place in waterlogged fields, resulting in muddy paddy that was also observed at the drying floors.

All other post-harvest practices are the same as those at Asutsuare. Drying and winnowing operations are carried out by women (and sometimes boys) who are engaged to assist with bird-scaring in the period leading up to harvest. Typical post harvest costs are given in Table 3.

Table 3: Typical Post Harvest Costs: Afife

| Operation | Cost per hectare |
|---------------------------|-----------------------------|
| Cutting and threshing | C100,000 |
| Transport to drying floor | C19,000 – C24,000 |
| Winnowing and drying | C48,000 (0.5 bags per acre) |

4.3 Farm-gate Sales

Farm-gate sales follow a similar pattern to the other schemes, although there is some evidence that farmers are involved to some extent in milling paddy, which is sold to local market women as milled rice.

One large farmer at Afife mills some of his paddy using his own mill prior to sale in bowls to local market traders - the remainder of the crop is sold as paddy to market women from Ashaiman. Farmers sell milled rice at around C2,400 per enamel bowl (with extra handful) to local market women at the mill on the scheme which is run by GFDC. Farmers tend to be less involved in inter-seasonal storage than the farmers at Asutsuare, although those farmers who finance production from their own resources (or through loans from relatives) are able to store their crop after harvest for sale later in the season at improved prices.

4.4 Traders

All sales of paddy from Afife are made to market women. The market women who purchase from Afife tend to fall into two main groups. The first group consists of local market women who tend to deal in smaller quantities, buying paddy or occasionally milled rice from farmers. Milled rice is then sold by these traders at local markets in the surrounding region including, Agbozume, Akatsi, Dzodze, Denu and Dabala. The rice is sold by some in olunka (enamel bowl) measures - a form of low-level wholesaling to retailers from villages and other women who prepare cooked rice for sale. Some of these traders actually retail rice directly. Many of these traders come from the village of Avalavi, very close to the irrigation scheme, and are attempting to organise an association. The peak marketing period is at Christmas when they will be buying around 5 bags per market day. This group of traders has very limited financing connections to farmers. These traders also source rice from Lome in Togo at certain times of the year when rice is not available at Afife.

The second group of traders is the Ashaiman market women. This group of traders is more important in terms of the quantity purchased, and the volume of sales to Ashaiman women has reportedly been increasing over the past few years.

4.5 Ashaiman Market Women

The market women based in Ashaiman are a major influence in the marketing of rice from the irrigated schemes. Typically, these retailers live in Ashaiman and purchase from more than one of the irrigated schemes in the south-eastern part of the country i.e. Dawhenya, Ashaiman, Weija, Asutsuare and Afife. Afife and Dawhenya are generally cited as the most important sources of supply to these traders, and are also recognised to produce higher quality paddy. Similarly, it appears that the Ashaiman traders are of the greatest importance as an outlet for Afife and Dawhenya. At Asutsuare farmer-traders, and other locally based traders appear to be of greater importance.

In terms of turnover, traders cited purchases of up to 400 bags of paddy. (i.e. around 30 tonnes) per month during the busiest period of the year, which from the rice traders' point of view is during the lean season between January and March, and around Easter-time when demand for rice is increasing. During the slowest periods of the year, trade may virtually come to a standstill, particularly when large volumes of imports reach the market.

The seasonality of the rice trade is also reflected in the prices paid to farmers and in the terms on which transactions take place. During the lean season, when demand for rice is high and trade is brisk, prices are up to C10,000 per bag higher and payment is made in cash. Traders must pay farmers in cash, and similarly, retailers must pay wholesalers in cash in order to secure supplies. During the slower times of the year, purchases and sales tend to be made on credit. No interest is charged, but payment can be made up to a few weeks after taking possession of the stock.

The Ashaiman market women purchase paddy which is transported to Ashaiman for milling. Turnover is normally fairly rapid, as the women need to release funds quickly for further purchasing, and there is relatively little evidence of inter-seasonal storage to take advantage of price swings. However, the mills visited did have significant storage sheds close-by in which traders can store either paddy or milled rice for relatively short periods prior to its further movement thorough the marketing chain.

The main source of profit for the Ashaiman market women appears to lie in the manipulation of relatively small quantities. Broadly, one maxibag of paddy produces one 50 kg bag of milled rice, with an excess usually of between 2 and 3 American tins, depending on the quality of the original paddy (i.e. 5.6 to 8.4 kg or 11 to 17% of the total output of milled rice). The milled rice is sold for a price that roughly equates to the cost of production, i.e. the cost of the paddy plus transport, loading and processing costs. Thus the extra American tins constitute the profit margins of the traders, and are clearly perceived as such by them.

The Ashaiman market women are active financiers of rice production, providing production credit to farmers on the irrigation schemes in the form of inputs or cash. The largest traders will sponsor up to around 50 farmers with production credit. No interest is charged on such loans to farmers, but they do hold a number of advantages from the point of view of the trader, as follows:

- supplies are secured, and a stable relationship with suppliers is established;
- the price paid is generally C2,000 to C3,000 lower than the ruling market price;
- such arrangements reduce transaction costs for traders in sourcing supplies;
- supervision of the drying and winnowing of paddy is more common where there is a credit relationship between farmer and buyer.

Availability of credit is the major constraint for most Ashaiman market traders. With greater funds, more supplies could be purchased, and the possibility of storage for price increases could rise.

Ashaiman Trader met at Afife Scheme

This trader buys paddy from Asutsuare, Dawhenya and Afife. She also purchases from Anyrawase (an area of inland valley cultivation near Ho in Volta Region) when paddy is unavailable in the schemes. The quality of the paddy from Anyrawase is not as good as from the irrigation schemes. She buys most paddy from Afife, where the quality is better and she supplies credit to 12 farmers. At the busiest time of the year she buys around 100 bags per month, currently (November) she is buying around 50 bags/month. All paddy is milled at Ashaiman and rice is sold to retailers at Ashaiman and Tema. She currently buys paddy at C40,000 per maxibag. This produces, on average, a milling out-turn of 19 US tins, of which 17 tins go into a sack of milled rice (currently selling at C42,000).

Paddy is purchased usually from the drying floor and measured into maxibags using 6 heaped buckets ('Nigerian No. 34 bucket'). She never buys paddy that has been bagged by farmers. Most of the paddy comes from the farmers she supplies credit to, at a price of C2,000 lower than the ruling farm-gate price. When she buys from these customers she does not pay for 2 weeks. When buying from others she pays cash. Currently, she has to sell rice on credit, but after Christmas when there is less rice in the market she expects retailers to pay cash. She pays C1,600/bag to transport paddy to Ashaiman, including loading. Retailers buy milled rice from the mill. The main problem is the lack of finance, particularly to take advantage of the inter-seasonal price increases. Currently she is obliged to sell rice immediately in order to release funds.

4.6 Milling

A number of millers were interviewed. Mills appear to fall into two main groups – the more sophisticated 'Satake-type' mills often from China or Taiwan, and the more simple 'huller-type' mill. Most of the irrigated rice is milled in the former type. Probably around 40% of the paddy is milled in Ashaiman, with the rest either milled at the mills located in the irrigation projects, or at Pokoasi under the GNPA purchasing arrangement (in the case of Dawhenya).

Mill at Asutsuare

A female trader and a male miller jointly own this mill at Asutsuare. The mill reportedly used to be able to mill around 150 maxibags of paddy per day, when it was purchased for C5 million three years previously. Now it is only able to mill around 50 maxibags per day. At the busiest times of the year, around 50 maxibags are milled. The machine is diesel powered and requires 5 gallons to mill 50 maxibags, at a cost of C2,750 per gallon.

Maintenance of the machine, which is now around 20 years old, is a major headache: fan belts, rollers and sieves must be replaced regularly. The problem is the poor quality of locally produced 'imitation' spare parts. The miller quoted the need to replace sieves once every two weeks. New imported rollers cost C200,000 per pair – or C120,000 if the rubber roller is replaced locally; sieves cost C35,000 per pair. The miller explained that competition from electrically driven mills in town that have lower running costs is affecting the business. The mill appears to save on costs (in comparison to the Ashaiman mills) by obliging the owner of the paddy to provide labour for feeding the mill. There is also some competition between the three millers at Asutsuare – on the basis of milling quality. The poor quality of spare parts can affect milling quality resulting in the presence of chaff and poor polishing on milled grain.

Rough estimates of running costs and revenues (based on milling throughput of 500 maxibags/month) are given below:

| Item | Value (Cedis) |
|--|------------------|
| Costs | |
| Diesel @ C2,750 per gallon (1 gallon needed to mill 10 maxibags) | 137,500 |
| Labourer | 120,000 |
| Spare parts (estimated) | 200,000 |
| Transport of rice bran @C400/bag (estimated) | 40,000 |
| Total cost (excluding depreciation) | 497,000 |
| Revenues | |
| Sale of rice bran (100 bags of rice bran – 1 sack of bran produced per 5 maxibags paddy milled) | 300,000 |
| Milling charges @ C1,500/bag | 750,000 |
| Total revenue | 1,050,000 |

Clearly the milling business varies from season to season. The major problem consistently cited by all millers interviewed was the problem of spare parts for machines. Most millers use locally manufactured 'imitation' parts to replace sieves and rollers on machines. The quality of these spare parts is universally perceived to be low. Some millers do purchase imported spares - but these are difficult to obtain and considerably more expensive than local spares. Prices quoted for repair of new rollers were C200,000.

5. Marketing Margins and Costs

This section attempts to piece together information on the marketing margins and build up of marketing costs.

5.1 Milling Out-turn

Milling out-turn is a difficult subject to investigate, because it is through the manipulation of weights and measures that market traders achieve most of their profit. Thus, enquiries regarding typical milling out-turns (i.e. how many of what measure of paddy go into a mill in order to produce how many of what measure of milled rice) probe at the heart of traders' profitability. The miller at Kanawu estimated the out-turn to be 21 to 22 olunka² (which would equate to 60 to 62 kg milled rice) per 84 kg bag of paddy milled.

A summary of the various estimates of milling out-turn is given below in Table 4. The estimates suggest that the milling out-turn from a maxibag of paddy does vary to some extent, reflecting the quality of the paddy, and the milling process itself. In addition, it is clear that profit margins of traders depend crucially on the difference

² The term olunka is a term which appears to be used to refer to any measuring container. In this study it was found to refer to the 'American tin', a reused tin frequently used for measuring grains, and a 20 cm enamel bowl. These are slightly different measures. Weighing trials revealed that a heaped American tin contains around 2,849 g of rice and a heaped enamel bowl contains around 3,000 g.

between the milling out-turn from a maxibag of paddy, and the amount of milled rice actually sold in each bag.

Table 4: Summary of estimates of milling out-turn

| Source of estimate | Milling out-turn per maxibag of paddy | Amount marketed in sack of milled rice |
|-----------------------------------|--|--|
| Rice miller, Ashaiman | 21-22 US tins (60-62.5 kg) | |
| Rice miller, Dawhenya | | 18 US tins (51.1 kg) |
| Rice miller, Dawhenya | 19 US tins (53.96 kg) | 16.5 US tins (46.86 kg) |
| Rice farmer, Dawhenya | 18 US tins (51.12 kg) for average quality paddy. 20-21 US tins (56.8- 59.6 kg) for good quality paddy | 16.5 US tins (46.86 kg) |
| Asutsuare Project Manager | 20-21 US tins (56.8- 59.6 kg) for good quality paddy | 17 US tins (48.28 kg) |
| Rice trader/mill owner, Asutsuare | 18 US tins (51.12 kg) | 52 kg |
| Rice trader, Asutsuare | 19-20 US tins (53.96-56.8 kg) | 18 US tins (51.12 kg) ¹ |
| Rice trader, Asutsuare | 18-19 US tin (51.12-53.9 kg) | 20 US tins (56.8 kg) ² |
| Rice trader, Asutsuare | 20 US tins (56.8 kg) | 16.5 US tins (46.8 kg) |
| Rice trader, Asutsuare | 16-20 US tins (45.44-56.8 kg) | 17 US tins (48.2 kg) |
| Rice trader/farmer, Asutsuare | 18-20 US tins (51.12-56.8 kg) | 17 US tins (48.2 kg) |
| Rice trader, Afife | 19 enamel bowls (57 kg) | 17 bowls (51 kg) |
| Rice trader, Afife | 16-17 bowls (48-51 kg) | 15 bowls (45 kg) |
| Rice miller, Afife | 16-18 bowls (48-54 kg) | |
| Rice miller, Afife | 16-17.5 bowls (48-52.5 kg) | |
| Rice miller, Ashaiman | 19-20 US tins (53.96-56.8 kg) | 17 US tins (48.2 kg) |

¹ This trader was actually observed in the process of filling bags with milled rice. Despite her claims, observation revealed that 17 US tins (48.28 kg) were placed in each sack.

² This trader was unique in placing a larger number of olunka in each sack of milled rice than the number realised from the milling out-turn from a maxibag of paddy. However, this was plausible as the price the trader claimed to charge per sack of milled rice(C50,000) was appreciably higher than those quoted by other traders.

Based on observation, average figures could be taken as follows:

- Weight of maxibag of paddy 87 kg
- Milled rice out-turn 54 kg
- Weight of sack of milled rice 48.5 kg

5.2 Marketing costs

Transport:

Transport charges vary according to the load size. Larger load sizes enable traders to pay a lower rate per bag, but it is not always possible to realise scale economies in this way. Transport is generally hired by traders and may be in the form of larger 'cargo' trucks or smaller Datsun minibuses or even taxis. Examples of transport costs are given in Table 5.

Table 5: Typical transport costs quoted

| Journey | Estimated distance | Cost per maxi bag | Rate per maxibag per km |
|--------------------|--------------------|-------------------|-------------------------|
| Afife- Ashaiman | 130 km | C1,600 | C12.3 |
| Dawhenya- Ashaiman | 16 km | C500 | C31.3 |
| Dawhenya-Accra | 50 km | C700 | C14.0 |
| Ashaiman-Accra | 35 km | C500-C1,000 | C14.3-C28.6 |
| Asutsuare-Accra | 90 km | C800 | C8.9 |
| Asutsuare-Ada | 100 km | C1,000 | C10.0 |
| Asutsuare-Accra | 90 km | C800 | C8.9 |

Loading and unloading costs:

Frequently, loading costs are included in transport costs. However, unloading usually results in charges for traders. Figures quoted for loading and unloading ranged between C100 to C600 per bag. An average figure would be around C400 per bag.

Bagging:

Bagging is not a major component of marketing costs. Traders generally make paddy purchases using their own jute maxibags that cost C1,200 each but which generally last for periods of up to three years. The jute maxibags are also repaired frequently in order to extend their life. Sales of milled rice are generally made in sacks of the type used for fertilisers and contain around 50 kg. Many of these white sacks are manufactured by GMG. They cost C350 to C600, depending on whether or not they are purchased new. Some wholesale traders sell the bag with the rice, while other

wholesalers who supply market retailers will collect used sacks from their customers for reuse.

Milling charges:

Milling charges vary quite widely. The standard rate at Ashaiman and also the mill at Dawhenya is C1,000 per maxibag. At Asutsuare the standard rate is C1,500 per maxibag, while at Afife, the GFDC mill charges C2,500 per maxibag. Other private millers generally charge one and a half 20 cm enamel bowls of milled rice in kind. This is equivalent to a charge of 4.5 kg rice, worth approximately C4,000 per maxibag. The variation in milling charges does not appear to be the outcome of lack of competition – because there are over 10 private mills at Afife. The mills at Ashaiman may be in a position to charge lower rates due to a higher overall capacity utilisation and their access to electrical power, which is reportedly cheaper than powering the mill with diesel. Mills at Asutsuare and Afife are diesel-driven.

Total marketing costs:

An example of accumulated marketing costs are summarised below in Table 6.

Table 6: Typical build-up of marketing costs; Ashaiman-based trader

| Item | Cost |
|---|----------------|
| Cost of paddy (87 kg maxibag) | C40,000 |
| Transport costs | C1,000 |
| Loading/unloading costs | C400 |
| Re-drying costs/labour | C500 |
| Jute maxibag depreciation | C200 |
| Cost of rice bags | C550 |
| Milling charges | C1,000 |
| Total | C43,650 |
| Revenue (Based on milling out-turn of 19 US tins per paddy maxibag and a wholesale price of C44,000 per 17 US tin sack of milled rice) | C49,000 |
| Profit per maxibag | C5,300 |

It is unlikely that many of the other traders will be able to realise the same margins as the Ashaiman traders, due to the fact that they are likely to pay higher milling charges, and may not be able to realise economies of scale in transportation. A more exact

analysis of the marketing margins for a representative group of traders would require more survey work, with direct measurement of quantities bought and sold, since the manipulation of weights and measures is a crucial determinant of trader profits. For example, practices such as the addition of an extra handful in measuring are common. Nonetheless, an initial assessment of trader margins would suggest that profits are not excessive. This would be expected given the large number of traders, and the competition that they face from imported rice in their main markets.

5.3 Price Information

Summaries of farm-gate prices and wholesale prices for various locations are given in Tables 7 and 8.

Table 7: Summary of farm-gate prices

| Source | Price/maxibag | Notes/Terms of transaction |
|---------------|----------------------|--|
| Dawhenya | C42,500 | GNPA offer price for CIAT rice |
| Dawhenya | C40,500 | GNPA price for other varieties – also paid by some traders |
| Dawhenya | C40,000 | Prevailing farm-gate price quoted by Ashaiman traders |
| Dawhenya | C38,000 | Price to trader supplying production credit |
| Asutsuare | C40,000 | Prevailing farm-gate price quoted by farmers /traders supply on credit |
| Asutsuare | C35,000-C38,000 | Prices quoted for traders supplying production credit |
| Asutsuare | C38,000 | Price to traders paying cash |
| Afife | C40,0000-C42,000 | Prevailing farm-gate price |
| Afife | C40,000 | Price to trader supplying production on credit |

Table 8: Summary of wholesale prices: local and imported rice

| Source | Price/sack of milled rice | Comments |
|----------------------|---------------------------|---|
| <i>Local rice</i> | | |
| Ashaiman traders | C44,000 | 50 kg sack |
| Ashaiman retailer | C45,000 | Price paid by retailer for sack of local rice |
| Asutsuare trader | C40,000 | Quoted wholesale price for sack |
| Asutsuare trader | C42,000 | 17 US tin (48.3 kg) sack |
| Asutsuare trader | C50,000 | 20 US tin (56.8 kg) sack |
| Ashaiman trader | C42,000 | 17 US tin (48.3 kg) sack |
| <i>Imported rice</i> | | |
| Ashaiman wholesaler | C40,000 | 50 kg sack of GNPA Pakistani 15% broken LG rice |
| Ashaiman wholesaler | C53,000 | 50 kg sack of IMEXCO ¹ US style 'Lucky Rice' brand |
| Ashaiman wholesaler | C56,000 | 50 kg sack of Thai premium 10% broken LG rice |
| Ashaiman wholesaler | C45,000 | 25 kg sack of perfumed Thai rice |

¹ IMEXCO is one of the major importers of rice in Ghana. It sells imported rice in 50 kg sacks under its own brand name of Lucky Rice.

5.4 Rice Retailing

Rice retailing was observed at a number of locations, and information was obtained from interviews with retailers and traders. Retailing usually takes the form of sale by volume measures based on heaped reused empty tins or bowls. Rice packaged in small plastic bags following measuring which is undertaken in front of the customer. The most widespread measures observed were reused tins that contained either 260 g or 480 g. Other retailing measures used in the Afife area in Volta Region were the 20 cm enamel bowl (weight 3,000g) and two other plastic bowl measures (weight of the smaller measure = 720 g, larger size weight unknown).

Retailers at the market centres in Accra, Ashaiman and the southern part of the country commonly sell a range of rice at different prices reflecting differing grades and colours. Commonly, a retailer will have a selection of three or four imported rices at different prices, along with a local rice, usually originating in one of the irrigation

schemes. Retailers purchase imported rice from wholesale shops, and local rice from market women who usually deliver rice to a number of regular retail outlets. Rice is commonly supplied on credit in this manner allowing retailers around two weeks before payment. During periods of high demand retailers may need to pay cash to secure supplies from traders, and also may collect rice from the mills.

Retail prices at various locations were collected, and are shown in Table 9 below, together with some comparative retail prices of imported rice. Some low-grade imported rice is retailing at prices marginally below the price of Ghanaian rice. Rice is also retailed in cooked form to schoolchildren, and in the form of ‘waache’ - a Ghanaian sticky rice dish, served with sauce.

Table 9: Summary of retail prices

| Source | Price per kg | Unit and price |
|--------------------------------|--------------|--|
| Ashaiman retailer | C962 | C250 per 260 g tin of Dawhenya rice |
| Ashaiman retailer | C865 | C225 per 260 g tin of low grade imported rice |
| Ashaiman retailer | C1,154 | C300 per 260 g tin of imported ‘Lucky Rice’ |
| Ashaiman retailer | C1,346 | C2,500 per US tin (2,840 g) of Asutsuare rice |
| Asutsuare trader/retailer | C880 | C2,600 per 20 cm enamel bowl (3,000 g) of Afife rice |
| Afife trader/retailer | C867 | C700 per 720 g bowl of Afife rice |
| Agbozume (near Afife) retailer | C972 | |

6. Issues Relating to Quality

Some preliminary observations can be made about potential influences on the quality of rice being produced by irrigation schemes.

6.1 Drying

Discussions with traders and millers highlighted drying as a major problem. Poor drying of paddy is widely perceived to lead to unnecessarily high levels of broken

grains when paddy is milled. Millers also cite the problem of caking on sieves as a result of milling poorly dried paddy. Traders, generally, do not trust farmers to dry paddy properly, and thus incur extra costs in employing labour to carry out re-drying, or spending time in supervising drying themselves - adding to the general transaction costs. Drying is a particular problem during the rainy months of June/July.

6.2 Winnowing

Winnowing is another problem area. Due to the use of volume measures for virtually all transactions, and the absence grading paddy, farmers have little incentive to ensure that their paddy is well winnowed before sale. This adds to the incentive for traders to develop credit relationships with farmers, because when tied in this manner it is easier for traders to oversee the drying and winnowing of the paddy. Winnowing is tested by throwing a handful of the paddy up in the air to observe the level of chaff content. Poor winnowing eats directly into the traders' profits by reducing milling recovery rates, and hence the amount of 'extra' rice which is accrued by the trader.

6.3 Foreign matter/stones

This does not appear to be a major problem. Threshing practices do not appear to introduce large amounts of foreign matter into the paddy, and the drying floor facilities are also helpful in this regard.

6.4 Milling Problems

Direct observation suggest that the mills suffer frequent and chronic maintenance problems. Rollers and sieves are constantly patched up in a fairly rudimentary manner. Millers acknowledge that this does have knock-on effects into the quality of the milled product. The use of very simple 'huller-type' machines for milling paddy also appears to result in a lower quality milled product with the presence of chaff and paddy grains.

6.5 Cooking qualities

A number of respondents mentioned that a key problem with local rice is the hardness on cooking. Some also mentioned that rice can have a high starch content which is not appealing to consumers.

7. Overall Market Flows and Patterns

In general most of the irrigated rice is grown in the south eastern part of the country, principally on the three irrigated sites surveyed. The majority of this rice is consumed in the Accra, Ashaiman, and Tema area. There is some evidence that irrigated rice reaches Kumasi, but the majority is clearly consumed in Accra/Tema. Some of the irrigated rice may reach other parts of the country (e.g. Takoradi, Kumasi etc.) via wholesale shops in Accra that are supplied by some of the larger market women who purchase from the irrigation projects. In addition, a proportion of the rice produced at each scheme is marketed in markets in the surrounding areas (e.g. Akuse, in the case Asutsuare; and Akatsi and Agbozume in the case of Afife) usually by local market traders operating at a relatively smaller scale.

The irrigated rice produced in Ghana does find a ready market in the urban centres, but it usually retails towards the lower end of the price scale. One or two imported rices are cheaper than the local irrigated rice, but they are low grade imports - and probably of lower quality than the Ghanaian irrigated rice. Most of the imported rice sells at prices that are higher than that of irrigated rice, and there is clearly a large market in urban centres of Accra/Tema, as well as smaller centres in the south, for rice of high quality. Nonetheless, the market for Ghanaian irrigated rice does not appear to be constrained - if there were more production, it could definitely find a market at the right price. Improvements in irrigated rice production and marketing practices would certainly enable Ghanaian rice to compete more effectively with imported rice. From a national point of view, realising the potential of rice production in inland valleys may be the most efficient means of promoting domestic production.

IMPROVING THE COMPETITIVENESS AND MARKETABILITY OF LOCALLY-PRODUCED RICE IN GHANA

**DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
(DFID)**

CROP POST HARVEST PROGRAMME

PROJECT R6688

1. Marketing of Rice in Ghana

1.2 - Analysis of Rice Marketing in Northern Ghana -
Augustine Langyintuo and Peter Oldham, March 1997

Collaborators:

Natural Resources Institute (NRI)
Savannah Agricultural Research Institute (SARI)

1. Introduction

Agriculture is the largest sector of the Ghanaian economy contributing about 50% to the Gross Domestic Product and accounting for about 60% of export earnings (Statistical Service, 1991). Over 60% of the population is engaged in agriculture, 85% of which is made up of small scale farmers producing crops and keeping livestock. While maize, millet, sorghum, cowpea, yam and cassava are produced for home consumption, groundnuts and rice are cash crops. Rice is, however, an important food crop among urban dwellers.

Over 63% of the country's local supply of paddy rice of 180,000 MT. (about 81,000 MT. milled rice) is produced in the inland valleys of northern Ghana mainly under rain-fed conditions (PPMED, 1996). Domestic production is growing at a slower rate compared to demand due to a number of factors including poor marketing arrangements. Annual shortfalls in production are offset by imports up to 200% of local production (SOFRECO, 1996).

2. Objectives of the study

The main objective of this study was to examine the marketing arrangements for rice. More specifically, the study aimed at identifying the bottlenecks to marketing efficiency that would aid in proposing recommendations for the improvement in rice production and hence reduce the economic burden on the economy by the importation of rice to meet domestic demand.

3. Methodology

In the last quarter of 1996, the study was conducted in Northern Region (NR) and Upper West Region (UWR) of northern Ghana. In the NR, the study focused on Gbirimani in the Tolon-Kumbungu district where 40 farmers were interviewed. Ten and 25 traders in the Katinga rural and Tamale-Aboabo urban

markets were interviewed as well as five and two rice millers in Tamale and Tolon, respectively. In the UWR 30 rice producers in Sing and 10 traders in Wa market were the focuses of the study. Five rice millers were also interviewed in the Upper West regional capital of Wa. Ten rice traders in Techiman in the Brong-Ahafo Region (BAR) were also interviewed in the first quarter of 1997. Data collected were complemented by baseline survey conducted earlier in 1996 as well as secondary data from the Policy Planning, Monitoring and Evaluation Division of the Ministry of Food and Agriculture.

4. Rice marketing in northern Ghana

4.1 Organisation of rice marketing at the farmer level

Results from the baseline survey conducted by Langyintuo (1996) indicated that in northern Ghana rice is cultivated mainly in the inland valleys. Rice fields in NR average 2.5 ha, about 50% of the total cultivated area. In the UWR, they are about 1.5 ha, about 44% of the cropped area. While in UWR farmers cultivate mainly three different varieties (*Muikpong*, *Muibile* and *Muikagyie*) in relatively pure stands, rice fields in NR contain mixed varieties. One could easily count up to five different varieties on the field. Popular among those cultivated were *Mandi*, *Afefe*, *Bontanga*, *Anyufula*, *Farrow 15* and *Anyufula*. The variety with the largest proportion in terms of area coverage is named as the main variety on the field. Mean yields are about 1.15t/ha in the NR and 1.2 t/ha in the UWR. Farmers use both combine harvesters and the sickle during harvesting. When the sickle is used rice is dried on a cleared piece of land for threshing. The grains are therefore sometimes collected with debris including stones.

During the 1996-cropping season, land preparation and post harvest operations appear to be the most expensive operations (Table 1). Total cost of production less cost of capital were ₦167,895/ha and ₦166,140/ha equivalent to about ₦14,675.59 and ₦11,076 a bag respectively in the NR and UWR.

Currently farmers finance the cost of production from their own resources. In the past they enjoyed a system of credit whereby traders financed cost of production by advancing money to farmers with the surety that the produce would be sold to them. This has since been discontinued in both regions because

¹ The national currency is the Cedi (₵). The exchange rate was 1 US\$ = ₦1870 as at February 1997.

farmers and traders alike lost confidence in each other. Farmers felt cheated when traders dictated the time and price of sale.

Table 1. Production cost of rice (¢/ha).

| Variable | NR | UWR |
|---|------------|------------|
| <u>Labour input (Man-days)</u> | | |
| Broadcast of seed | 2.00 | 2.00 |
| Weeding | 50.00 | 45.00 |
| Fertiliser application | 1.00 | 1.00 |
| Bird scaring | 15.00 | 15.00 |
| Harvesting | 18.00 | 20.00 |
| Threshing and winnowing | 15.00 | 20.00 |
| Total labour | 101.00 | 103.00 |
| Ploughing and harrowing of field by tractor | 90,000.00 | 90,000.00 |
| Cost of seed (100 kg) | 50,000.00 | 50,000.00 |
| Cost of transporting grain from farm to house | 3,500.00 | 2,000.00 |
| Sub-total | 143,500.00 | 142,000.00 |
| Cost of capital at 35% for half a year | 24,395.00 | 24,140.00 |
| Cost of production excluding value of labour | 167,895.00 | 166,140.00 |
| Value of labour | 121,200.00 | 123,600.00 |
| Cost of production including value of labour | 289,095.00 | 289,740.00 |
| Output (kg/ha) paddy | 1,150.00 | 1,200.00 |
| Value of output @ ¢425 | 488,750.00 | 510,000.00 |
| Profit | 199,655.00 | 220,260.00 |

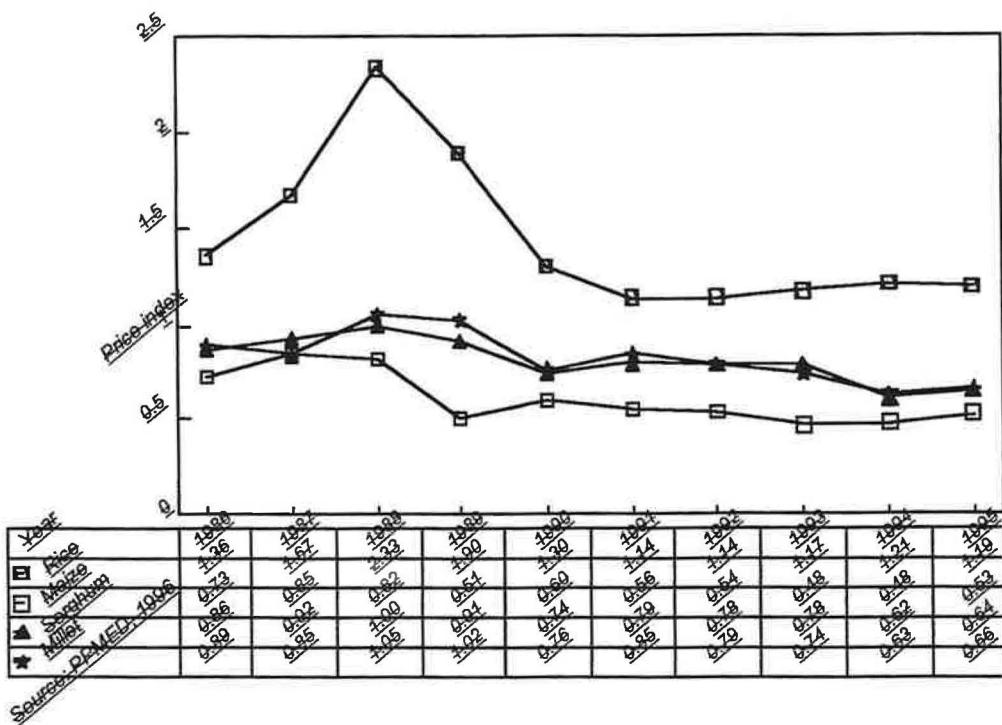
Source: Field study, 1996

More often than not traders bought the produce soon after harvest thereby giving farmers no option to cash in on higher prices at later periods. On the other hand traders buy at that time so that they could store to sell at a later date when prices are higher to compensate for the cost of the interest-free credit

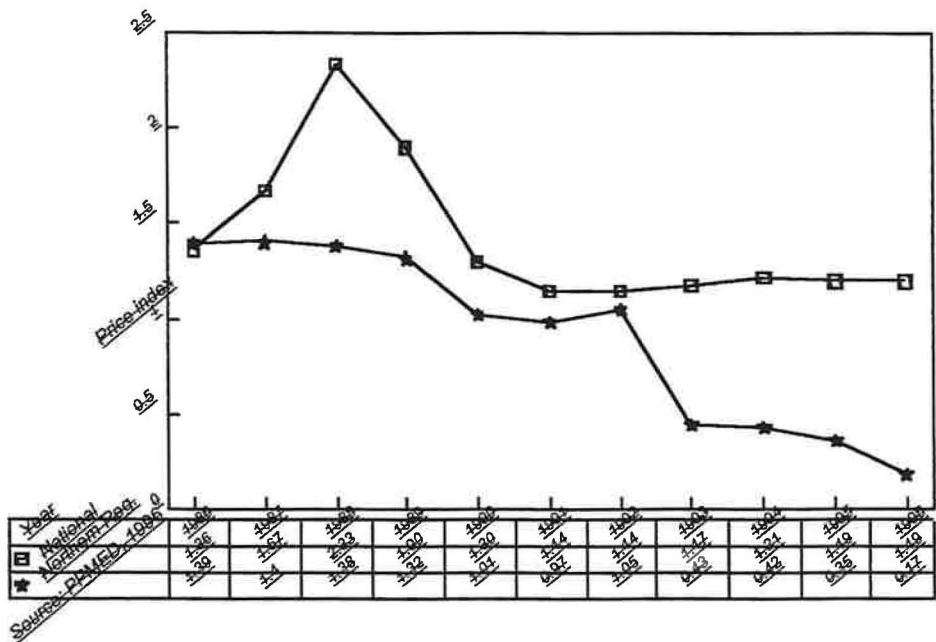
advanced farmers. Traders on their part were not happy with the attitude of farmers when they refused to sell the grain to them.

Even though rice is a cash crop farmers donate about 10.4% of the total output to relatives, mainly those who assist them in some of the field operations, especially harvesting. In addition up to 10.8% is given out as payment for labour. Consumption attracts a meagre 2.5% while seed for the next season claims 5.8%. The remaining 59% are sold as paddy directly to traders. A bag of paddy rice weighs 80 kg, which is the unit of measurement. Sometimes rice is sold in mini bags of 40 kg. Given that seed requirements are fixed, the proportion of sales decreases with decreasing output and vice versa. As their source of livelihood, the standard of living of the average farmer would be linked to how much he is paid for his produce in relation to the general standard of living.

Between 1986 and 1996, prices paid for food crops at the national level showed a decline in real terms. Sorghum, millet and maize for instance suffered price deterioration evidenced by price indices of less than 1 with their relative prices in 1977 (Figure 1). While sorghum and millet attracted real wholesale prices of 16% lower, maize suffered up to 38%.



Rice on the other hand experienced a gradual increase up to 133% in 1988. The price began to decline until stabilising at 17% between 1990 to 1996. Although the national figure for rice gives an impressive positive price index, real price in NR is to the contrary. Figure 2 shows that in 1986, both the regional and national averages were similar. While at the national level the price began to increase afterwards, that for NR remained static. It began to decline steadily from 1989 attaining an index of 0.17 by 1996 against an index of 1.19 obtained at the national level. This implies that the real price for rice in 1996 was about 83% lower than that obtained in 1977.



The disparity between the national figure and that obtained in the NR may be due to relatively higher prices paid for rice in other parts of the country compared to that in NR. Trade liberalisation leading to the massive importation of relatively cheap rice could have contributed in squeezing out the low quality locally produced rice from NR.

4.2 Farmers marketing strategies

Farmers have categorised the time of marketing rice into four "Periods" according to the level of prices received. Marketing done at harvest time in December is "Period" 1. "Period" 2 refers to marketing done within the first two months after harvest while "Periods" 3 and 4 designate marketing done 3 - 4 and 5 - 6 months after harvest, respectively. Successive Periods attract higher prices than preceding ones (Table 2). From June to December, traders control local rice supply.

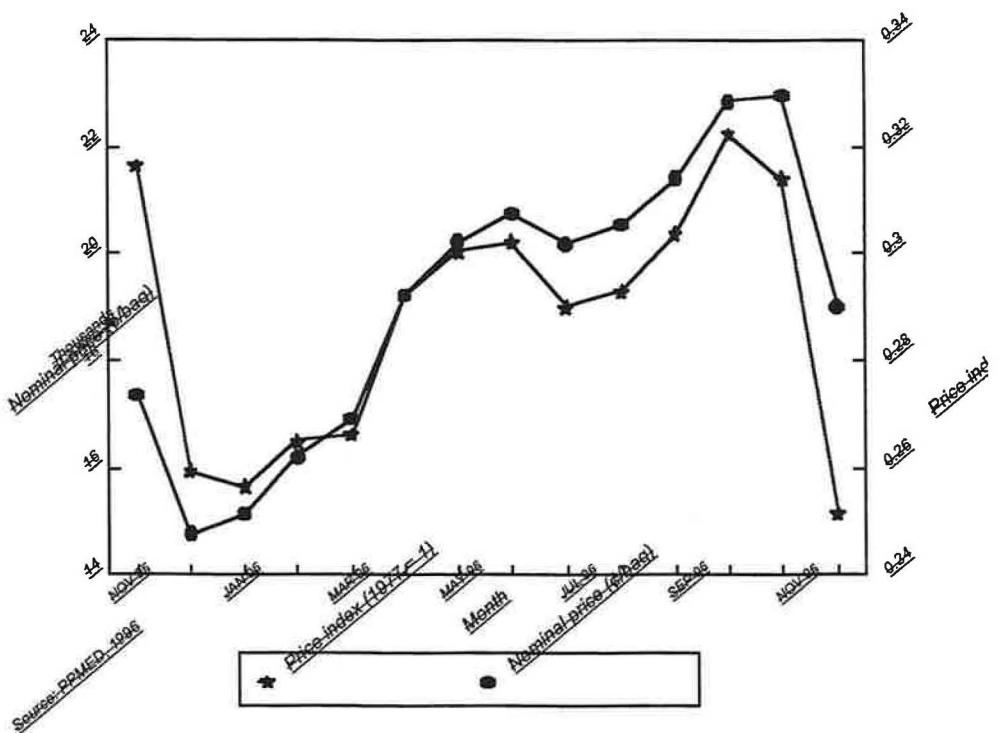
Table 2. Sales of rice at the farm level in northern Ghana, 1995.

| Period | Time period | Paddy price (¢/kg) | Proportion of sale | |
|--------|--------------------|-----------------------|--------------------|-----|
| | | | NR | UWR |
| 1 | December | 300 | 6 | 12 |
| 2 | January - February | 400 | 16 | 80 |
| 3 | March - April | 500 | 75 | 8 |
| 4 | May - June | 550 | 3 | 0 |

Source: Field survey, 1996

Sales are made on the farm in order to pay for labour. Where a combine harvester is used, operators prefer to collect portions of the harvest usually two and half bags per hectare as payment. Even though farmers are aware of price movement, sales are made based on felt need and the proportion marketed depends on the cash needs of farmers rather than the general price level. In general marketing activities at the farmer level end six months after harvest. Seasonally, rice prices demonstrate cyclical movement with the highest prices received between September and November and the least between December and March. Inflation imposes an illusion on the prices paid. For instance while the nominal price of ¢19,000 paid for rice in December 1996 is 28% more than that in December 1995, it is in fact 4% lower in real terms (Figure 3). A comparison of the real wholesale prices of local rice in Figure 3 with the distribution of sales as presented in Table 2 shows that a bulk of sales are made between December and April when prices are lowest. This thus confirms the assertion that farmers sell their produce when prices are lowest.

A closer look at the sales in the two regions indicates differences in marketing strategies between the farmers. In the NR 22% of their sales are made within the first two months after harvest against 82% in the case of UWR. The main reason for this observation is that farmers in NR are able to obtain credit from traders to meet their immediate cash needs with the promise to sell the produce to them. Sometimes a farmer may collect small sums from several traders making it possible for him to pay for his production and other related costs thus making it possible for him to store the grain for a little while before selling.



In contrast, a farmer in the UWR who does not benefit from such an arrangement is compelled to sell his produce to pay for his production and other related costs. Traders in the NR on their part may buy rice on credit from farmers to pay back after sales while those in the UWR pay cash to procure the grain.

This arrangement favours farmers more than traders because of the apparent stiff competition traders face. As a result of this competition, traders are more than willing to advance such credit on demand to guarantee access to the produce. Apart from bearing the risk and cost of credit, traders still visit farmers with cola to solicit their loyalty to reserve the grain for them to buy. When a farmer wants to sell his grain he invites traders, giving preference to his creditors and ones with whom he has long-standing relationship. Prices paid are, however, those traders quote as being the ruling ones in the Tamale regional market. Because sales are made in the home female family members are not involved in the marketing.

In the UWR, both men and women carry rice to the market for sale to any trader willing to buy. In some instances, however, farmers prefer to sell to their regular customers. Where possible traders intercept the produce on the way to the market and offer them prices sometimes lower than are ruling in the market. Farmers sometimes ignore the difference in prices and accept because by so doing they are relieved of the burden of carrying the grain and paying market tolls and council taxes. The average price paid farmers was ₦32,000 and ₦34,000/bag in UWR and NR respectively.

4.3 Processing activities of traders

In the NR, initial buyers concentrate the produce and release it into the market in bits after par-boiling and milling. May be because par-boiling has to be done, initial buyers were mainly females. Where males participated as in the UWR they had to sell to other traders for par-boiling. It was also observed that most of these assemblers lived in villages with rice mills or near them. In the UWR, traders travel from the urban centres to the hinterland to procure the grain back to the towns where the mills are installed for milling. Traders may buy in bowls or bags but store in bags. The quantity required for sale is par-boiled and milled.

On the eve of the marketing day, rice is put in a pot of water and boiled for a little while under fire made from firewood. This is collected and put in another pot and water added to submerge it overnight. As the grains absorb water and expand, more water is added to ensure that the grains are completely submerged. The next morning it is strained and dried. Drying takes place on a cemented floor where it is available or on any hard surface for up to two hours during which time the grains are stirred gently to allow maximum penetration of the sun rays.

The par-boiling procedure in the UWR is similar to that observed in the NR but a few differences were observed in the treatment of the grain. Unlike their counterparts in the NR, traders in the UWR attempt to sieve out all stones from the rice before par-boiling. Secondly, all empty glumes are removed by soaking the grain in water and removing them as they float on top. During drying, they first spread the grains thinly on a cemented floor and after an hour, heap it up slightly to avoid over drying. The length

of boiling and steaming may introduce some coloration in the grain. Grains are very white if boiling is at the minimum. Light yellowish coloration is obtained if allowed to boil for a little while on the first day and allowed to steam a little longer. The added advantage enjoyed by the traders in the UWR over those in the NR is that rice in the region is harvested at nearly physiological maturity and therefore less breakage in the grains. At the time of purchasing grain from farmers, traders peel off the seed coats to examine for broken grains. Rice with a high percentage broken grains are not purchased unless discounted at a rate between 5 - 20% depending on the level of breakage. This obviously is no incentive for farmers to harvest rice late.

The significance of par-boiling is ensure gelatinisation necessary for sticking broken grains so that they do not break up into pieces during milling especially in rain-fed rice not harvested at physiological maturity. It also improves the nutritional quality of the grains by fixing nutrients otherwise locked up in the seed coat into the grain.

4.4 Processing activities by rice mill operators

Rice produced by farmers is sold to traders who par-boil and mill before selling to consumers. No mills were observed in any of the farming villages surveyed but were located in villages within 20 km radius where rice traders were living. These were mainly the Engleberg type de-hullers, which are powered by diesel in the villages and electricity in the towns. There were about 26 serviceable mills in Tamale, and 10 in Wa. Milling out-turn is about 50% at the rate of about 450 kg paddy/hr. Additionally, Tamale is privileged to have three large scale Sataki type rice mills owned one each by Nasia Rice Company, Ghana Food Distribution Corporation and Juni Agro Limited. These have milling capacities of between 1 to 4 tons per hour. Due to limited quantities of rice handled by the traders, they tend to use the Engleberg type de-hullers.

The most disturbing components of the Engleberg type mills are the sieves which are easily damaged by stones and broken metals in the rice being milled. Rice milled in Tamale comes from surrounding villages such as Kumbungu, Dalun, Bontanga, etc. These mills are thought to do better than the ones in the villages in terms of quality of grains from mill. Traders have a system of credit with the millers

whereby milling charges are paid after the milled rice has been sold, usually to wholesalers who buy the grain at the milling place. This sometimes could still take up to five days before payment. In few instances some traders defaulted in payment.

Some rice varieties such as *Kpukpula* were said to pose problems of re-adjusting the shaft and reduced speed of milling due to its small size and hard seed coat. If rice is milled when not properly dried, a lot of power is drawn. Secondly the grain tends to be dusted with the dust from the mill thus making them unappealing to the eye. As rice is sold by volume, traders prefer to mill rice not properly dried because a larger volume is obtained and hence more money than when it is properly dried. Retailers of such rice however face the problem of moulding or discolouration of the grains if not sold in a relatively short period of time. On the other hand if rice is too dry or not properly dried, the grains tend to break during milling and thus blown away during winnowing.

Unlike in the northern region where the milled rice comes out with the chaff and has to be winnowed, in the UWR the grains are separated from the chaff and therefore requiring no winnowing.

Milling charges observed in both regions were variable, ranging from ₦800/bag to ₦1,600/bag with an average of ₦1,200/bag. Compared with the estimated operation cost of the mills as presented in Table 3, traders paid up to four times the nominal operation cost of roughly ₦400/bag of paddy rice.

Table 3. Cost of operating a rice mill in northern Ghana

| Cost item (₦/month) | Amount (₦) | |
|------------------------------|------------|------------|
| | NR | UWR |
| Monthly depreciation on mill | 40,000.00 | 40,000.00 |
| Rent | 3,000.00 | 6,000.00 |
| Electricity | 50,000.00 | 35,000.00 |
| Materials for servicing | 80,000.00 | 56,500.00 |
| Labour for servicing | 12,000.00 | 8,475.00 |
| Labour to operate mill | 100,000.00 | 100,000.00 |

| | | |
|-----------------------------------|------------|------------|
| Municipal charge | 1,000.00 | 1,000.00 |
| Bran disposal | 16,000.00 | 15,000.00 |
| Total operation cost | 302,000.00 | 251,975.00 |
| Mill turn-over (bags paddy)/month | 750.00 | 600.00 |
| Cost (¢/bag) | 402.66 | 420.00 |

Source: Field survey, 1996

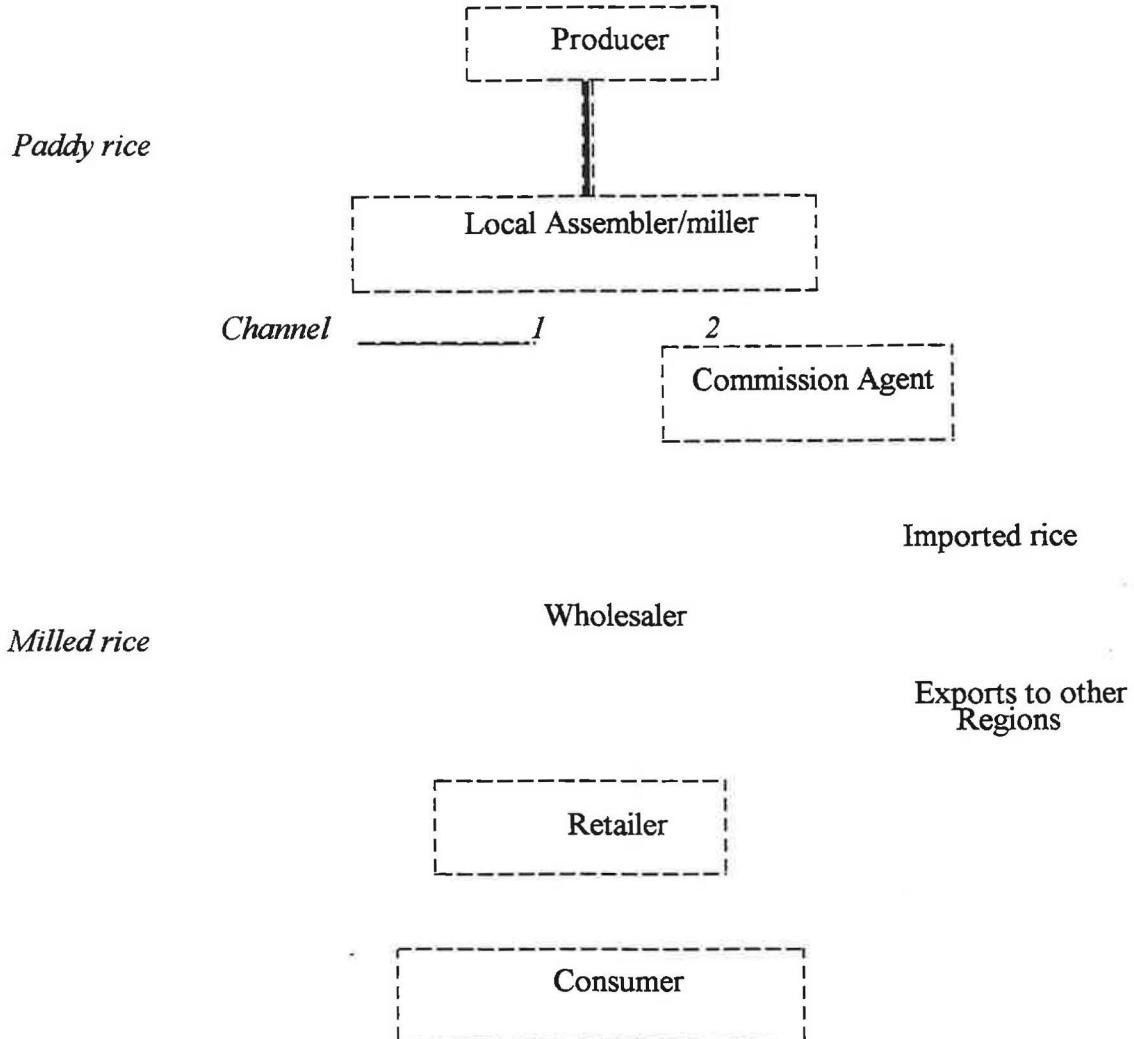
4.5 Rice marketing activities at the trader level

After milling traders either sell to wholesalers directly or through commission agents depending on whether rice is sold in the village or urban market. In NR if the local assembler sells in the village market she sells directly to the wholesaler. On the other hand if she transports the milled grain to Tamale, she hands it over to a commission agent who sells it for a commission of ¢100/bag. Commission agents are traders who have storage facilities but no money to purchase the grain. They therefore depend on other traders to provide the grain and they are responsible for providing storage and identifying potential buyers. Because they act on a commission based on quantity of grain sold, they tend to be more aggressive in attracting buyers than usually the case with the traditional assemblers or wholesalers. All the risks in the transactions are, however, borne by the assembler.

Where sale is direct to wholesaler, the units of measurement used are bowls (2.5 kg) and bags (100 kg). Because wholesalers are sometimes compelled to pay initial assemblers same price, as they would sell to retailers, they prefer to measure the grain in bowls. In the process they are able to measure out varied quantities of the grain ranging from 2.6 kg to 3.1 kg with an average of 2.8 kg instead of the standard 2.5 kg.

Two marketing channels were identified as presented in the simplified diagram below (Figure 4). Channel 1, which traces rice from producer to local assembler, to wholesaler, retailer and consumer was observed to be the most prominent.

Figure 4. Rice marketing channels in northern Ghana



Source: Field survey, 1996

Note: _____ Local Rice _____ Imported Rice

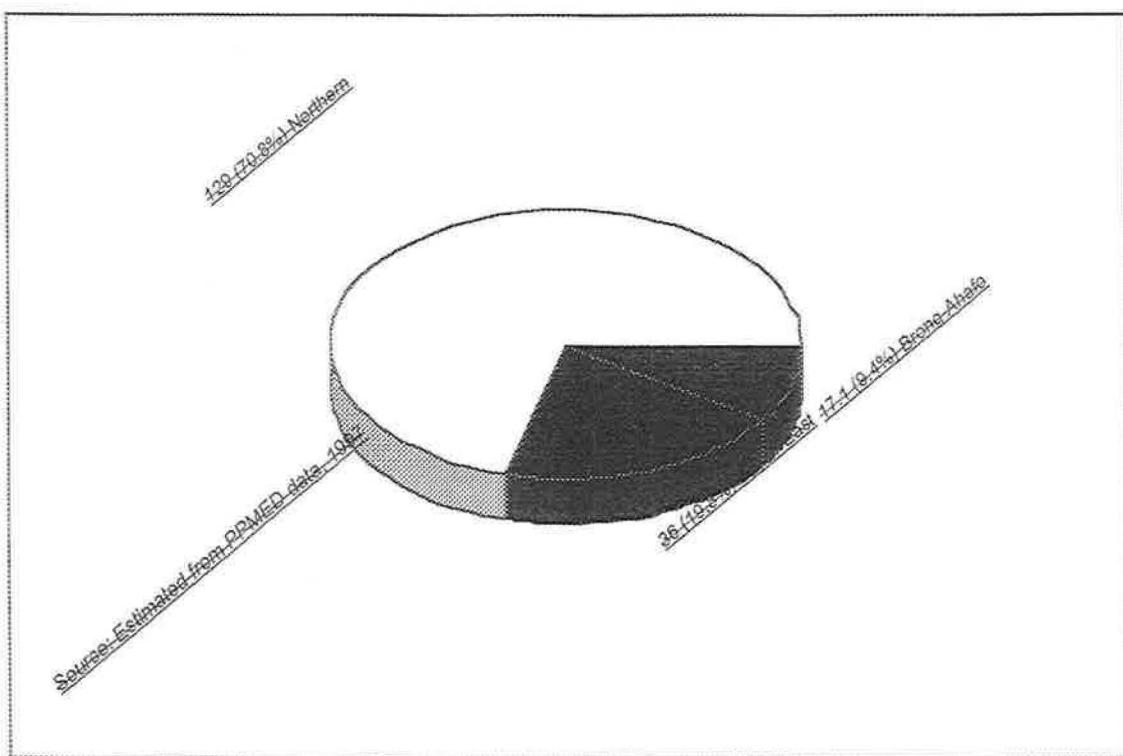
Channel 2 identifies a commission agent as the intermediary between the local assembler and the wholesaler. This is important only in the Tamale urban market in the NR. In the UWR, wholesalers buy the grain from farmers, sell to retailers after milling who intend sell directly to consumers. In both regions wholesale traders may also sell directly to consumers.

Besides local rice, traders handle imported rice at the ratio of 4 : 1 (local : imported). The reason being that imported rice is preferred by the elite and in fact unaffordable by all other people. Consumers also thought that local rice mixed better with beans, a popular dish. Besides, they thought local rice was

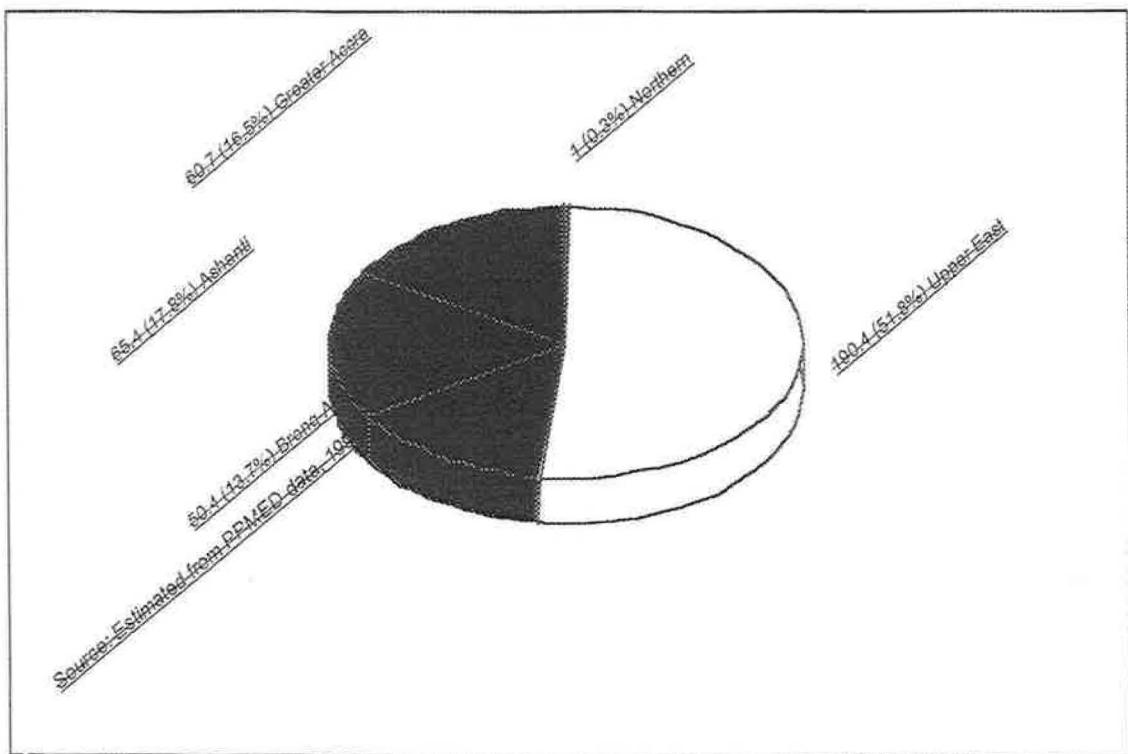
more filling and did not give the sickness called beriberi if consumed in large quantities, as does imported rice.

4.6 Movement of rice in northern Ghana

The dynamism of inter- and intra-regional maize movement in northern Ghana is more pronounced in the UER than in the other two northern regions. Between August 1995 and July 1996, about 182 MT of locally produced rice was marketed in Tamale and seven other markets in NR. Of this quantity 71% was sold within the region, 20% to UER and the remaining 9% to the BAR (Figure 5).



During the same period, about 368 MT was marketed in five markets in the UER. Over 50% was sold within the region, less than 1% to NR and the rest transported to southern Ghana (Figure 6). In the UWR, 80% of the 72 MT marketed was within the region and the remaining 20% sent to Techiman in the BAR.



In 1996, about 558 MT of local rice was marketed in Techiman from where it was either sent to Accra, Obuasi, Mankessim or Kumasi. The bulk of this quantity was from Bolgatanga and Wa. It was indicated by traders in Techiman that rice from NR was less preferred to that from either UWR, UER or within BAR due to its poor quality resulting from presence of foreign matter, discolouration, mixed grain sizes and grains turning mouldy within a short period in storage.

Transportation of rice involves some costs. An estimate of the relationship between transport cost, distance and quantity transported indicated a positive relationship with distance and a negative (although not significant) one with quantity (Table 4). Charges are higher during the rainy season than in the dry season due to poor road networks.

Table 4. Estimate of the relationship between transport cost, quantity of rice and distance.

| Variable | Coefficient | t-ratio |
|----------------|-------------|---------|
| Constant | 393.24 | 0.389 |
| Seasonal dummy | 500.61* | 2.689 |

| | | |
|------------------------------|--------|--------|
| Distance transported | 7.57** | 18.968 |
| Quantity of rice transported | -0.74 | -0.123 |
| R ² | 0.82 | |
| Adjusted R ² | 0.80 | |

Dependent variable: Cost per bag of rice transported

Source: Field survey, 1997

Note: * Significant at 5% error level
** Significant at 1% error level

5. Marketing margins

In the UWR the initial buyers process and sell the grain to retailers or direct to consumers. They are therefore selective in their choices of grain to purchase and endeavour to dry par-boiled rice on cemented floors. Consequently rice from the UWR tends to be of better quality and hence attract a higher premium than that from the NR where sometimes it is dried on ordinarily hardened floor so that during collection some stones are added. Secondly, while locally milled rice from the NR goes mouldy in storage that from the UWR remains clean for as long as it is stored. In the NR, initial assemblers may sell to wholesalers directly if marketed in the village or through commission agents if in the Tamale urban market. Where commission agents are used as intermediaries, they are paid ¢100/ bag sold.

Local rice enjoys differential pricing depending on the variety and quality of milling. In NR, the price of a bowl of local rice ranges from ¢1,400 - ¢1,500 for *Kpukpula*, ¢1,500 -¢1,600 for *Anyufula*, ¢1,600 - ¢1,800 for *Mandi*, *Afefe*, and *Bontanga* with mean price of ¢1,600. In the UWR, a bowl of *Muikpong* costs ¢2,600 - ¢2,800 and *Muibile* ¢2,400 - ¢2,500 with an average price of ¢2,600. In contrast, imported rice costs ¢4,000/bowl on the average in both Wa and Tamale.

Analysis of the costs and returns to rice traders appears more complicated than for other commodities. An assembler buys paddy rice and transforms it into milled rice at a conversion rate of one bag paddy to half bag milled rice. An examination of the operations of an assembler in NR indicates that a margin of -

¢2,000 is attributable to his effort in changing the form from a bag of paddy to half a bag of milled rice in addition to her marketing costs (Table 5). Wholesalers tend to exploit assemblers by weighing out 2.8 kg of grain as a bowl full at ¢1,600.

Table 5. Costs and returns in local rice trade in northern Ghana (¢/bag)

| Variable | NR | UWR |
|--|-----------|------------|
| Farm gate price (80 kg paddy rice) | 34,000.00 | 32,000.00 |
| Transport cost from farm village to store ¹ | 500.00 | 1,100.00 |
| Cost of processing ² | 4,500.00 | 3,360.00 |
| | | |
| Transport cost from mill to market | 1000.00 | 500.00 |
| Marketing costs | 350.00 | 400.00 |
| Nominal selling price of rice by assembler | 64,000.00 | 100,000.00 |
| Margin to assembler (for 1 bag of paddy rice) ³ | -2,000.00 | 18,000.00 |
| Effective selling price of rice by assembler ⁴ | 57,142.85 | 89,285.70 |
| Transport and storage costs ¹ | 440.00 | 200.00 |
| | | |
| Price at the retail level | 66,000.00 | 104,000.00 |
| Effective margin to wholesaler ⁵ | 8,857.15 | 14,714.30 |
| Transport and marketing costs | 300.00 | 300.00 |
| Consumer price | 68,000.00 | 108,000.00 |
| Margin to the retailer | 2,000.00 | 4,000.00 |
| Value of milled rice from 1 bag paddy at retail level ³ | 34,000.00 | 54,000.00 |
| Marketing margin from a unit (1 bag) of paddy rice | 0 | 22,000 |

Source: Field survey, 1996

Notes:

Includes loading and off-loading charges - over a 30 km radius.

Includes cost of transportation to mill, milling and winnowing charges.

Conversion factor from paddy to milled rice is 50%

Wholesalers measure out 40 bowls (each of 2.8 kg on average) as a bag full (112 kg).

Wholesalers reduce the weight of the bag at assembler level from 112 kg to 100 kg.

Re-bagging their purchases gives them up to 12% more grain thus implying that the effective cost of a bag of milled rice at the wholesale level is actually ₦57,142.85 thus giving them ₦8,857.15 margin when they sell to retailers at ₦66,000/bag. Retailers on their part gain a margin of ₦2,000 after selling to consumers.

The situation in the UWR appears more promising for traders. Improving the quality of the grain earns assemblers up to ₦18,000 a bag with about ₦12,640 as their profit margin (Table 5). Although wholesalers equally exploit assemblers, their margin of ₦14,714.30 is less than that obtained by the assemblers. However their profit margin of ₦14,514.30 is certainly higher than that obtained by the latter. Retailers on their part earn ₦4,000/bag.

Traders transporting local rice from Wa and Tamale to sell in Techiman make positive returns of about 33% and 13% over and above what they earn in Wa and Tamale respectively (Table 6).

Table 6. Nominal and effective margins of local rice trade in Techiman (₦/bag)

| | Variable | Tamale | Wa |
|---|---|-----------|------------|
| 1 | Nominal purchase price of milled rice | 64,000.00 | 100,000.00 |
| 2 | Effective purchase price | 57,142.85 | 89,285.70 |
| 3 | Total transaction costs | 5,350.00 | 3,350.00 |
| | -transport charge (including loading/off-loading) | 4,550.00 | 2,550.00 |
| | - use of shed in the market | 100.00 | 100.00 |
| | - market toll/commission | 700.00 | 700.00 |
| 4 | Selling price | 72,000.00 | 112,000.00 |
| 5 | Nominal margin (4 – 1) | 8,000.00 | 12,000.00 |
| 6 | Effective margin (4 – 2) | 14,857.15 | 22,714.30 |
| 7 | Effective profit margin (6 – 3) | 9,507.15 | 19,364.30 |

Source: Field study, 1997

6. Conclusion

The analysis demonstrates clearly that improving upon the quality of rice attracts a premium which consumers are prepared to pay for. Where this is not effected, the initial assemblers are the victims of poor returns. What needs to be established is the response of different varieties to different heat treatments during par-boiling. If these varieties require differential treatments, it means therefore that traders in NR may still content themselves with the difficulty of achieving good quality rice grains given the ad-mixtures observed on farmers' fields. This would imply a concerted effort on both farmers and traders to achieve grain purity and harvesting it at physiological maturity. The use of drying patios may also be of benefit to all. It also points to the fact that if farmers continue to produce at this rate it may be difficult for them to join the crusade to improve upon grain purity since traders may still compete for the little that is produced regardless of its purity.

7. References

Langyintuo, A.S. 1996. Baseline survey of rice production systems (unpublished)

PPMED, 1991. Policy Planning, Monitoring and Evaluation Division, Ministry of Food and Agriculture (MoFA). Facts and Figures. MoFA.

PPMED, 1996. Policy Planning, Monitoring and Evaluation Division, Ministry of Food and Agriculture (MoFA). Estimates of production and area of major crops. MoFA.

SOFRECO, 1996. Bottom-land rice development study (CFD-CREDIT). Detailed economic study of paddy production, processing and rice supplies and marketing in Ghana (draft final report).

Statistical Service, 1991. Quarterly Digest of Statistics.

IMPROVING THE COMPETITIVENESS AND MARKETABILITY OF LOCALLY-PRODUCED RICE IN GHANA

**DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
(DFID)**

CROP POST HARVEST PROGRAMME

PROJECT R6688

1. Marketing of Rice in Ghana

**1.3 - Marketing of Rice in the Inland Valleys of Southern
Ghana - Alex Opoku-Apau, Peter Oldham and George Day,
October 1997**

Collaborators:

***Natural Resources Institute (NRI)
Crops Research Institute (CRI)***

MARKETING OF RICE IN THE INLAND VALLEYS OF SOUTHERN GHANA

1.0 INTRODUCTION

In Ghana, and for that matter most developing countries, much attention is paid to the production rather than the marketing of agricultural produce. The focus has generally been on increased food production, providing farm income, and general improvements in the economic well-being of the citizens in the country. Less attention is, however, directed at identifying the goods preferred by consumers, time and place of delivery of the goods, and the form and appropriate price of the desired goods (Kohls and Uhl, 1990). These factors are, however, important in any technology development and consequent adoption by farmers.

This study was initiated in January 1997, with DFID Crop Post Harvest Programme support, to actually trace the marketing of domestically- produced rice in the inland valleys of southern Ghana, and to highlight some of the constraints to rice marketing.

1.1 OBJECTIVES OF STUDY

The primary aim of the study was to describe the structure, conduct and performance of the domestic rice market in Ghana. The specific objectives were:

1. To identify and describe the market flows or patterns of domestic rice.
2. To describe the marketing chain, as well as the marketing costs at the various levels of the marketing chain.
3. to identify the actors and institutional arrangements in the marketing chain for rice.
4. To identify the major marketing constraints to rice production.

The study should also provide very useful information that could be fed into the policy analysis matrix (PAM) model. The PAM indicates whether a commodity is competitive on the international market, and in this particular study, whether domestically-produced rice has a comparative advantage over imported rice based on PAM.

1.2 METHODOLOGY

The approach used was very participatory in nature (good for the study of market organizations), and it involved talking informally (using Participatory Rural Appraisal-PRA- techniques like farm walks and semi-structured interviews) to a group of rice farmers, traders (both local assemblers and itinerant middlemen), rice millers, retailers and consumers. Information gathered was on post-harvest practices, marketing costs and margins, milling charges, volume of trade (stocks and sales), transport costs, marketing constraints, etc.

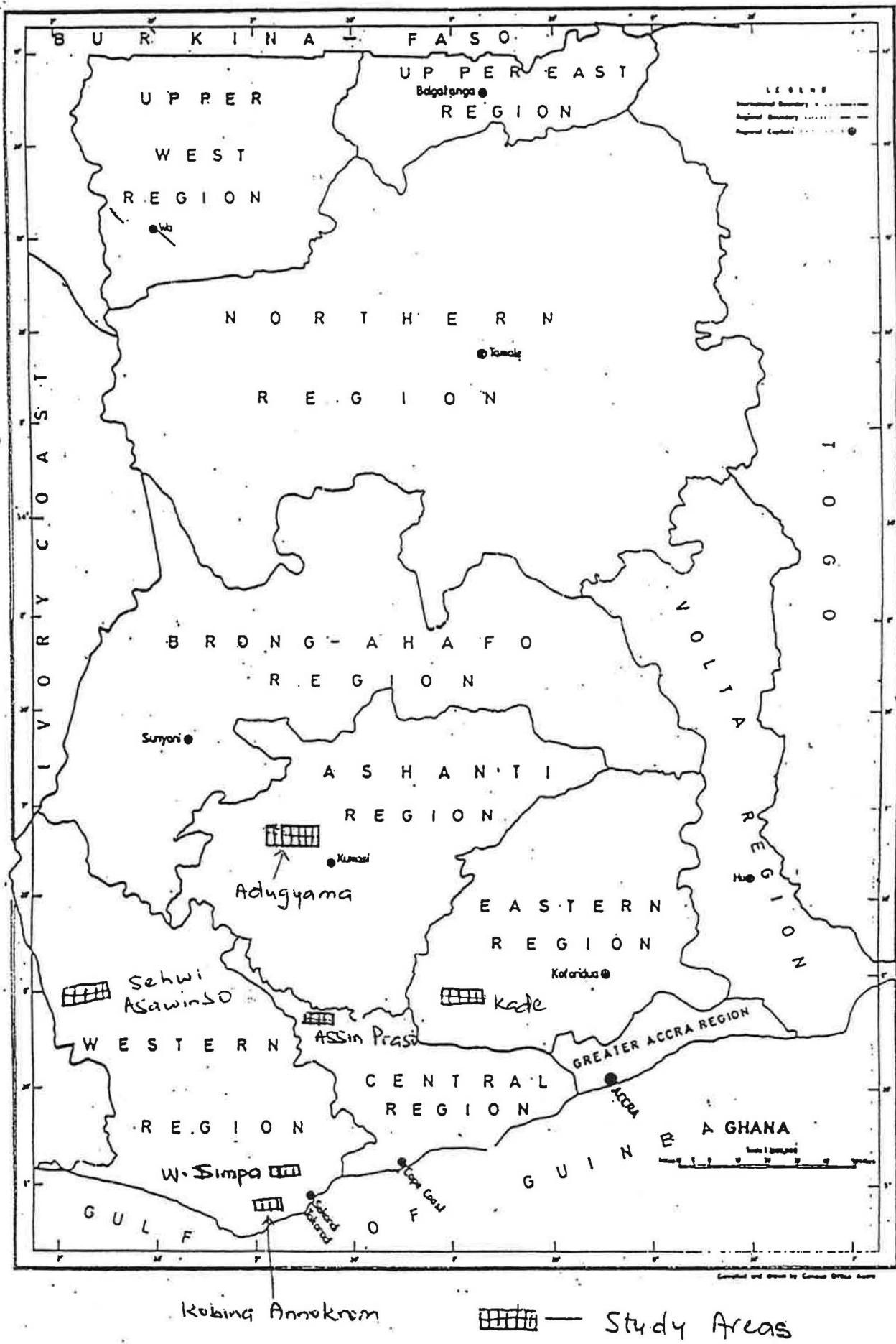
The areas visited were the rice valleys of Kobina Annokrom, Wassa Simpa and Sehwi Asawinso near Bekwai in the Western region, Assin Praso in the Central region, Godenu in the Volta region, Adugyama in the Ashanti region, and Kade-Subi in the Eastern region.

The valley at Dambai (Volta region) could not be reached because of poor accessibility of roads. Some major rice markets at Takoradi, Sekondi, Kumasi and Accra were also visited.

1.3 SUMMARY OF MARKETING STRUCTURE, CONDUCT AND PERFORMANCE FOR RICE IN THE INLAND VALLEYS OF S. GHANA

In almost all the valleys visited, the general observation was that about 80% of the farmers continue to use low input technologies - planting of mostly local varieties, little fertilizer application, less water management- to produce rice. Production practices are therefore very similar, and so also are the structure, conduct, and performance of the marketing system.

ADMINISTRATIVE REGIONS AND CAPITALS



1.3.1 Post-Harvest Practices

In all the valleys visited, harvesting of rice is done manually either by the farm family or on communal basis. Hiring of labour for harvesting purposes is rare, but where hired labour is employed at all, the labourers take up to about a quarter of the produce after harvest. In harvesting, the panicles are cut with a knife or sickle, and the panicle heads are tied together into bundles. The bundles could then be left on the field for some two or three days for them to dry or alternatively, they could be carted home for drying and storage. While in the house, the bundles of panicle heads are mostly stored on barns (cribs) in the compound of the house with fire set under them as a protection against insects and pests.

Threshing of paddy rice is done either on the farms or in the house. On the farms, specially-constructed threshing boxes are mostly used. Each bundle of panicle heads are beaten against the threshing box. The problem with this method is that much of the paddy is lost through scattering outside the threshing box during the beating exercise. The threshed paddy is gathered and bagged in the field mostly by women and children and carted home on their heads for further drying and storage. According to about 80% of the farmers, only improved varieties are threshed this way. When the threshing is to be done at home, the bundles of panicle heads are carted home immediately after harvest where they are then sun-dried on the bare-floor for two or three days. The bundles are then loaded onto tarpaulins and beaten with a stick. Majority of the farmers do the threshing on the bare-floor. The paddy thus gets contaminated with stones and other foreign particles like animal droppings. Most of the paddy also get broken even before milling as a result of the heavy beatings they receive. About 40% of the farmers claim only local varieties are threshed this way, as compared to the improved varieties, since the local ones have hard glumes.

After threshing, the paddy is winnowed to get rid of a lot of the chaff and other foreign matter. Winnowing is done by pouring the paddy from a bowl held overhead and allowing chaff to be removed by the wind. Winnowing is normally a woman's job

and is done by about 80% of the women. After winnowing, the paddy is bagged and stored, ready for milling.

There is no definite storage period for paddy because rice milling is done depending on market demand or when rice is needed for food. Much of the paddy dried and stored is used for seed.

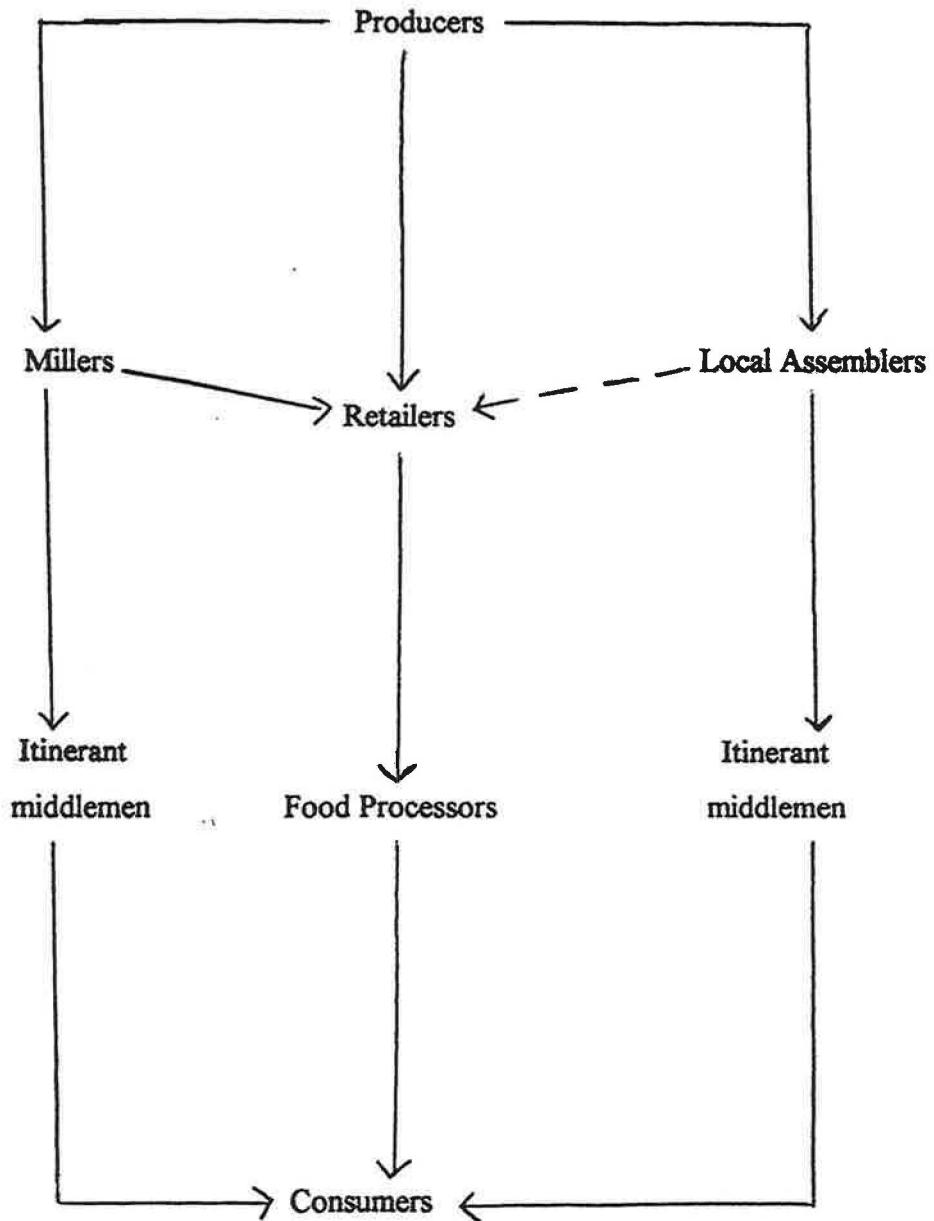
1.3.2 Marketing Of Rice At The Farm Gate Level

For most of the valleys visited (about 90%), rice is grown as a cash crop with only a small proportion (10%) kept for home consumption. The only exception is at Wassa Simpa (Western region) which is a rice deficit area- they consume virtually all the rice they produce. Rice sales could be in the form of paddy or milled rice. If paddy, selling is normally done at home but if milled rice, selling is always at the mill sites. Prices differ from place to place (as in table 1).

In times of scarcity (April-July), paddy rice could be sold direct to the numerous traders (mostly women) who travel to the production centers from the big consumption centers like Kumasi, Obuasi and Takoradi in search of rice to buy. Milling is then undertaken at the consumption centers by the traders themselves. There is no price difference between the paddy of the local and improved varieties grown domestically. The difference in price comes about when they are milled. The improved ones, when milled, attract slightly lower prices (about ₦2,000.00/bag) because traders claim they have larger grain sizes which take a longer time to cook. Some consumers also claim the taste is also inferior to that of the local ones, even though that is highly subjective.

Within the inland valleys, the marketing channels for milled rice are similar: rice farmers sell primarily to local assemblers or itinerant middlemen. The middlemen (who are wholesalers themselves) in turn sell to retailers, public institutions, or direct to consumers in the major cities (see figure 2). Retailers also sell in smaller bits to other consumers or food processors. There is however, free movement of people into

Figure 2: Marketing channel for domestically-produced rice.



and out of the rice business at any point in time. The only limitation is the amount of capital at hand. This in a way promotes competition.

In the case of imported rice, it could sell for a higher or lower price than the domestically produced ones depending on the taste and the quantity of broken rice. For example, at the time of the survey, a 50 kg bag of local rice was selling for ₦50,000.00 on the Takoradi market but a bag of 35% broken Thai rice was selling for ₦35,000.00, and that of Grade B Thai rice (no broken), ₦60,000.00 per bag. But generally, the imported rice attracts higher price than the locally produced ones because of their superior quality mostly preferred by city dwellers.

1.3.3 Milling

There are two broad categories of mills:- (a) the steel hullers powered by electric motor or diesel engines. The typical capacity is about 200 kg/hr. such machines have no ancillary equipment for cleaning and grading, and milled rice normally comes with high percentage broken since the machines have no device for grain-size reduction (recovery rate is about 40% depending on how the paddy was threshed, winnowed and dried). The final output can also have a lot of stones and chaff in them.

(b) Apart from the steel hullers, there are also milling machines with larger capacity using more modern technology but very few in the system. Examples are the SATAKI types imported from Japan by the Agricultural Development Bank. With these machines, the processes are multi-stage: incorporating separate cleaners, dehuskers, graders, and at times, colour separators even though they have high operating costs. Such machines have a conversion rate of about 2:1, i.e. two bags paddy to one bag milled rice. Depending on the age of the machine, the recovery rate could increase to 60%.

1.3.4 Marketing Weights And Measures

Local paddy and milled rice are traded on volume basis, both at the wholesale and retail levels. The measures however, vary between production centers. At the wholesale level, rice is marketed in jute sacks and the weight of the sacks is always standardized between 90-95 kg. At the retail level, however, most traders buy at the farm-gate level in sacks which are not standardized. Some farmers claim women traders preferentially use sacks which are very old and over-stretched in the buying of rice. Such sacks could contain anything up to about 120 kg of rice. When the women get to the wholesale level, they pour out into standardized sacks thereby making “illegal” profits of about 20 kg on each bag bought.

Apart from sacks, traders use all sorts of bowls and cups for measuring rice. These bowls and cups differ in shape, size and volume from one production center to the other. However, the standard unit in most of the production centres is either the margarine cup (which when full weighs about 0.48-0.5 kg) or the “olonka” (an American tin) which takes up to about 10 margarine tins when full. Ten of the American tins also fill a normal sack (50 kg) but this also depends on the grain size of the milled rice.

The use of local measures make objective assessments difficult and as such trading by volume and weights require further investigation.

1.3.5 Farmer-Trader relationship

A number of farmers have credit links with market traders. The traders provide production credit in the form of cash which is basically used by the farmer in the purchase of seed and for land preparation. The money is paid back either with paddy immediately after harvest or with milled rice. For every one bag of seed money provided, the farmer pays back with two bags paddy. If repayment is with milled rice, the trader buys it at a discount of about 10%. Where there is high demand for paddy, some traders over buy each other by providing facilities like tarpaulins and sacks to farmers free of charge. The idea is for the traders to get a constant source of paddy or

milled rice. Some millers also provide production credit to farmers and normally charge a 50% interest on money advanced. The money is deducted after milling. Farmers, apart from assuring their traders of regular source of produce, also provide paddy or milled rice on credit.

Table 1 presents a summary of some of the activities and marketing costs in the various valleys.

| VALLEY | LOCATION | VARIETIES PLANTED | MILLING MACHINE | MILLING CHARGE ¢ | FARM-GATE PRICE/BAG ¢ |
|--------------------|-------------------------|-------------------|-----------------|------------------|-----------------------|
| Kade | 250 km N/W of Accra | local | Sataki type | 2,000.00 | 50,000.00 |
| Sehwii Asawinso | 200 N/E of Kumasi | local | Lyster | 2,000.00 | 45,000.00 |
| Kobina Annokrom | 30 km South of Takoradi | improved | Locally-made | 2,000.00 | 50,000.00 |
| Wassa Simpa | 100 km N/E of Takoradi | local + improved | Locally-made | 2,500.00 | 45,000.00 |
| Assin Praso | 50 km S/E of Cape coast | local | Sataki | 4,200.00 | 45,000.00 |
| Godenu | 280 km N/E of Accra | local + improved | Lyster | 2,400.00 | 40,000.00 |
| Adugyama | 15 km West of Kumasi | local | Locally-made | 4,000.00 | 40,000.00 |
| Kumasi | 230 km N/E of Accra | — | Lyster | 4,000.00 | 55,000.00 |

1.4 Rice Marketing In The Inland Valleys

1.4.1 KADE-SUBI VALLEY (EASTERN REGION)

This inland valley which serves rice farmers in Subi, Nkwantanang, Asuom, Abodom, Prankese and Abaam lies about 10km to the North-West of Kade- the district capital.

Kade is also roughly 250 kilometers from Accra, the nearest major rice consumption centre. Almost all the rice farmers in these villages plant the local type¹. A few of them however, plant the improved types like Grug 7. Harvesting of rice is mostly done manually, using either a knife or sickle to remove the panicle one after the other. The panicle heads are then put together and tied. They are then transported by head pottage to the house where they are stashed on barns. Some farmers have the barns constructed in their kitchens where fire is lit always. The smoke from the fire helps to keep away insects from the stored produce and allows for systematic drying.

As and when needed, some of the stored rice could be removed, sun-dried for some few days and threshed. Threshing is normally done on bare floors or on tarpaulins, and it involves beating the panicle heads with a club or stick. The paddy is then loaded into sacks for milling. The nearest milling site is at Kade, an average of about 10 kilometers away from any of the production centers. Kade has four mills of the Japanese type (Sataki) and each can mill up to about 30 mini bags a day (when production is high). Because of the high competition for paddy rice, most millers provide free services like tarpaulins and drying floors, threshers and sacks for storing milled rice. Most farmers would therefore send their produce straight from their farms to the milling sites for drying, threshing and milling i.e. if milling is to be done within days of harvesting.

For milling, the conversion rate is 2:1 i.e., two maxi-bags of paddy to one bag of milled rice (50 kg), or a conversion rate of 50%. Millers charge an average price of ₦2000 for each bag of milled rice and transport owners also charge ₦1,000.00 to transport each maxi-bag paddy from the production centres to the mill sites at Kade.

Selling of milled rice is done at the mill sites by the farmers direct to itinerant middlemen. These middlemen, who are mostly women, come to the mill sites mostly from Accra, on special days (Mondays, Wednesdays, and Fridays) within the week. Transport fare per trader for each round-trip (Accra-Kade-Accra) is ₦5,000.00. A

¹ The names of the varieties in the various localities have not been systematically analysed. There are places where what farmers actually refer to as local variety is a mixture of both improved and local.

50kg bag of milled rice is bought for ₦50,000.00-70,000.00 and retailed in Accra for between ₦80,000.00 and ₦100,000.00 per bag.

Once in Accra, the rice is either supplied to institutions like hospitals, prisons, schools, etc. or sold to food processors and retailers who also sell in smaller bits to consumers. Each mini-bag (50 kg) contains up to about 100 margarine cups. Retailers sell a margarine cup of rice for ₦600-800 in Accra. For each trip, each trader can purchase up to about 50 bags. Two or three traders can come together to hire a cargo truck to transport their wares to Accra. The idea is for them to take advantage of economies of scale in transport. By this arrangement, traders can save up to about a ₦1,000 on each bag of rice transported, which otherwise would cost ₦2000.

1.4.2 SEHWI ASAWINSO (WESTERN REGION)

Important rice producing villages along the valley are Subri, Asawinso, Buabenso, and Nkronua. Sehwi Bekwai, which is about 15 kilometers North of the valley, is the district capital as well as the commercial centre. Even though there is at least one locally-made milling machine in each village along the valley, most farmers would prefer sending their paddy rice to Bekwai where they can be assured of quality milling and ready market.

All the five mills at Bekwai are of the modern Lister type. Most of the traders come all the way from Sekondi-Takoradi (350 kms. away), Kumasi (200 kms away), and Obuasi (250 kms. away) mostly in hired trucks to purchase rice at Sewhi Bekwai.

After harvest, farmers put all the panicle heads together and store them in rooms or on specially constructed barns in the house (similar to that of Kade). Fire could be set under the barns for the smoke to drive away insects. When farmers are ready to sell, they only bring out the panicle heads, dry them for some few days in the sun, and beat them on tarpaulins or on the bare floor. The paddy are then winnowed to get rid of chaff and other foreign materials before being loaded into maxi sacks for milling. Drivers charge ₦1,000.00 for carting a maxi-bag of paddy rice from the production centers to the milling sites at Bekwai.

Selling of milled rice is done at the mill sites, either through local assemblers or direct to itinerant middlemen who flock to the milling sites on market days (Tuesdays, Thursdays and Saturdays). Millers charge ₦2,000.00 for a 50 kg bag of milled rice, which in turn is sold to traders for between ₦40,000.00-50,000.00. Millers do also provide free facilities like drying floors, tarpaulins, and sacks. Itinerant middlemen also provide facilities like sacks and production capital to farmers as well as working capital to local assemblers who buy on their behalf. This goes a long way to boost rice production in the area.

On the average, each trader buys up to about 50 bags (50 kg each) before transporting them in bulk to consumption centres such as Takoradi, Obuasi or Kumasi. Depending on the supply situation, a trader can spend up to about two weeks at Bekwai before getting enough produce to buy. Drivers charge an average price of ₦1,500.00 for a bag of milled rice from Bekwai to Kumasi; ₦2,000.00 to Obuasi, and ₦3,000.00 to Takoradi.

Once at the consumption centers, each bag of rice is re-sold for between ₦50,000.00-60,000.00. Retailers then sell them in smaller bits at ₦500.00-700.00 per margarine cup to mostly small food processors (wayside rice sellers) or consumers.

1.4.3 KOBINA ANNOKROM (WESTERN REGION)

Farmers in this valley are mostly migrants from the Volta region who have settled in this valley since 1956. Most of them were earlier rice farmers at the Afife irrigation project site in the Volta region and are used to some improved methods of rice cultivation. For example, almost all of them plant improved varieties (popularly called ‘Russia’), apply fertiliser and construct bunds to retain water on their rice fields. Kobina Annokrom lies just by the Takoradi-Accra express road, and is about 30 kms South of Takoradi and 40 kms North of Cape Coast. Traders who throng to this village to purchase rice are mostly from consumption centres such as Sekondi, Takoradi and Cape Coast.

Harvesting of rice is done manually and in almost all cases, either by the farm family or on communal basis, in which case members of the village come together to help a particular farmer with harvesting for free. It is in rare cases that labour is hired for harvesting purposes. Where labour is hired at all, the labourers take up to about a quarter of the produce after harvest as their fee.

When harvesting, the panicle heads are put together and tied with a rope. The bundles could then be left on the field for some 2-3 days for them to dry or they could be carted home straight for drying and storage. Storage could also be done in barns on the field.

Threshing of the panicle heads is done either on the farms or in the house. Where it is done on the fields, specially-constructed threshing boxes are normally used. The bundle of panicle heads are beaten against the threshing box. The problem associated with this method is that much of the grain is lost through scattering outside the threshing box. It is estimated that up to about 15% of the threshed paddy is lost this way (personal communication with farmers). Farmers however, claim this is the best threshing method for domestically-produced improved rice because of their soft glumes. The threshed paddy is gathered, bagged in the field and carted home mostly by women and children for milling.

Where the harvested rice is stored in the house, threshing is done on bare floors or on tarpaulins using big sticks or clubs. Since majority of the farmers do not own tarpaulins, threshing is done on bare floors and the paddy gets contaminated with foreign matter like stones, livestock droppings, etc. Some of the grains also crack as a result of the heavy beating they receive during threshing.

The majority of the farmers sell their rice not from the house but at the mill site (and there is only one mill at the village using a Lister machine), milled rice is sold to traders for ¢ 40,000-50,000 a bag of 50 kg. Most farmers would also prefer selling their rice in paddy form to either the miller or the traders. The standard measure is the

bowl which costs ₦ 4,500.00 (paddy). 10 bowls paddy when milled is equivalent to one mini-bag which sells for ₦50,000.00. Milling charge is ₦2,000.00 per bag.

Traders also send their wares to Takoradi, Sekondi and Cape Coast markets at a transport cost of ₦1,000.00 per bag, and retail it at ₦50,000.00-60,000.00 a bag. Other retailers sell in smaller bits at ₦500.00-600.00 per margarine cup (a mini-bag contains up to about 100 margarine cups).

1.4.4 WASSA SIMPA (WESTERN REGION)

Wassa Simpa is about 100 kilometers North-East of Takoradi, the regional capital, and only 20 kilometers South of Tarkwa, the district capital. Rice farmers in this village number up to about 20 and they cultivate mostly the local type, even though the Ministry of Food and Agriculture (MOFA) through the South-Western Ghana Rice Development Project has started introducing improved rice varieties to the farmers. Wassa Simpa is a rice deficit area because almost all the rice produced in the area is consumed locally. Local assemblers even bring in a lot more from areas like Tarkwa, Prestea and Takoradi for sale to mostly food processors.

Post-harvest handling of the crop is about the same as in other valleys located in the region:- harvesting is done manually using either a sickle or a knife to remove the panicle one by one. Once harvested, the paddy rice is threshed in the field using the threshing box. The threshed paddy is brought home and spread on tarpaulins or on the bare floor for drying to take place before being loaded into sacks for storage in their bedrooms or on barns constructed in the kitchen area. There is no specific storage period; threshing and milling are done as and when rice is needed in the house for food.

Even though selling of milled rice produced locally is rare, the little that is sold is done at the mill sites and not at home, and selling is mostly to food processors who sell cooked rice to school children or by the wayside. Milling charge is normally ₦2,500.00 per bag of 50 kg or 100 margarine cups. A bag of milled rice is retailed for

¢45,000.00 or ¢ 450.00 per margarine cup. But this price can go as far down as ¢25,000.00 per bag during the harvesting season (August-October).

In most cases (about 70%), retailers purchase rice on credit and there are no specific terms or period for repayment. Paddy rice could also be sold to farmers as seed. Repayment is always in kind. After harvest, the farmer gives back twice the amount of seed received as payment.

The village has two locally-manufactured milling machines which give out milled rice with a very high percentage broken (about 50 %). Such rice attracts lower price (¢450.00 per cup) as compared to rice brought in from Tarkwa and its environs which sells for ¢500.00 per cup (¢50,000.00 a bag). Traders from Tarkwa however, incur extra transport cost of ¢1,000.00 on every bag brought in and another ¢1,200.00 per each trader.

1.4.5 ASSIN PRASO (CENTRAL REGION)

Assin Praso lies in between Cape Coast and Kumasi (a distance of about 190 km.) on the Anwhia Nkwanta-Yamoransa motorway. It lies very close to the river Pra which serves as the boundary between the Ashanti and Central regions. It is a very important rice producing centre with well over 200 rice farmers scattered along the Pra valley which serves about six villages such as Nduaso, Kushea and Ahasowodze.

Farmers along the valley plant mostly the local type with a few improved types such as Grug 7 popularly called Mr. More. Harvesting of rice is by the use of a sickle or knife and the produce is stored, mostly on the panicle head, in cribs at home. Fire is then lit under the cribs to ward off insects and rodents. Threshing is done either on tarpaulins or on bare floors using clubs or big sticks. Some farmers also thresh using the threshing box, especially when the paddy is of the improved type.

Assin Praso has seven modern Sataki milling machines (about 4 years old) which serve the whole rice farmers along the valley. These machines were imported from

Japan by the Agricultural Development Bank for distribution to rice millers on credit. Each machine costs ₦7.5 million and on average, can mill up to about 12,000 kg paddy rice (equivalent to about 100 bags milled rice) a day during the bumper season (Sept-Dec). These machines have high conversion rate of about 60% as compared to the local ones which are about 40-50% depending on how dry the paddy is. Milling charge per maxi-bag paddy is ₦4,200.00. Some farmers who are in need of cash do sell the paddy direct to the millers at a price of ₦18,000.00- ₦20,000 per maxi-bag. Because of the high competition for paddy, most millers provide (to farmers) free facilities like tarpaulins and drying floors for drying of paddy, jute sacks for storage, and even vehicles for the carting of the paddy rice from the production centres to the mill sites at Assin Praso.

Traders who buy the milled rice from Assin Praso come from urban centers like Obuasi, Accra, Takoradi, Kumasi and Cape Coast. A 50 kg bag of milled rice was selling between ₦45,000-50,000.00 depending on availability or season. Traders were incurring an extra cost of ₦2,000.00 to transport a bag of rice to Accra, Kumasi or Obuasi (₦1,000.00/bag to Takoradi or Cape Coast); ₦100.00/bag local council tax; ₦1,600.00/bag on waybill to the district council at point of discharge; ₦1,000.00 to load and off-load a bag of rice on a vehicle; and each trader pays ₦4,000.00 as transport fare from Accra, Obuasi or Kumasi (₦1,000.00 from Cape Coast or Takoradi) to Assin Praso.

At the consumption centres of Obuasi, Kumasi, Takoradi, Cape Coast and Accra, traders were re-selling a bag of rice for between ₦55,000.00-60,000.00 to public institutions like hospitals, schools and prisons. Majority of the rice went to retailers who at times buy on credit, and retail in smaller bits to consumers and food processors at ₦600.00-700.00 per margarine cup. Some traders also provide facilities like tarpaulins, tractor services, sacks and production loans to farmers. Even though the traders do not charge interest on loans, they have the exclusive right to buy the rice from their customers first before any other trader can come in.

1.4.6 GODENU (VOLTA REGION)

Godenu is just 12 kilometers South of Hohoe, the district capital, but 280 km North-East of Accra. Rice is actually a woman's crop in this area and is widely grown by women migrant farmers who migrate to the rice valley around the farming season in April-June from nearby areas like Lolobi, Nkonya and Jasikan. Their husbands would also be attending to their cocoa and other food crop farms in their respective villages around the same time.

These women farmers, who normally organise themselves into grower associations, receive loans and tractor services from government through the Agricultural Development Bank. The farmers are supervised by the Irrigation Development Authority (GIDA). GIDA tractor-ploughs the whole land and distributes it among the farmers.

Each farmer harvests her own field, dry the paddy and thresh into sacks for storage. The association has a storage depot (at Hohoe) where all the threshed paddy are kept until such a time that the market price is good enough. The association has its own mill (Lyster type) where all the stored paddy are taken to for bulk milling. Sale of the milled rice is also done in bulk and each farmer is then paid according to the amount of paddy rice supplied. The association then takes a commission for services provided. While waiting for the peak price before sale of the stored rice, the association advances inventory credit to farmers in need. This is also deducted after sales before the balance is given to the farmer. Milling charge is pegged at ₦2,400.00 per bag and each maxi-bag paddy transported to the milling site at Hohoe attracts a charge of ₦600.00.

Even though a large amount of the rice produced is bought and consumed locally within the Hohoe district, a lot of traders still come from Tema-Ashiaman and Accra to purchase rice from the Hohoe and Godenu Rice Farmers Associations. By the end of the 1996 farming season, the two associations sold 610 bags of rice to traders from outside Hohoe alone. A 50 kg bag of milled rice was sold for between ₦40,000.00-50,000.00 depending on availability. Traders also incurred transaction costs of

¢5,000.00 (return) on transport fare from Tema/Accra to Hohoe; ¢1,500.00 on transporting a bag of rice; and ¢500.00 per bag on local council tax;

Whilst in Accra or Tema, a bag of rice is retailed for ¢60,000.00 or more depending on quantity of rice on the market. Rice is normally retailed in smaller bits of ¢600.00 per margarine cup to food processors or consumers, or in large quantities to public institutions like hospitals and schools.

1.4.7 ADUGYAMA (ASHANTI REGION)

Adugyama is only 15 kilometers west of Kumasi, the capital of Ashanti region. Apart from growing traditional crops like cocoa, plantain, cassava and maize, about 40% of the farmers cultivate rice in the Dugyan valley which stretches from Adugyama to Potrikrom (about 15 km long). Rice farmers in this valley are mostly tenant farmers from northern Ghana.

Rice varieties grown are mostly local (red in colour) which is much preferred by the tenant farmers in the preparation of their traditional food *waakye*. Harvesting is by hand- the panicles are removed one after the other using a knife. After harvest, the panicle heads are tied together and stored on barns erected in the house very close to the kitchen. As and when necessary, some of the paddy (on the panicle heads) are removed from the barns and threshed on tarpaulins or on the bare floor. The paddy is sun-dried for some few days before being sent to the mill sites.

There is only one mill (an old Lister machine) at Adugyama which is about 20 years old. The recovery rate of this machine is so low (40%) that most farmers prefer sending their paddy to Kumasi for milling. The miller at Adugyama charges ¢4,000 for a maxi-bag of paddy. Those who send theirs to Kumasi for milling incur an additional cost of ¢500.00 on transport for every maxi-bag paddy.

Sale of milled rice is done at the mill site, and traders mostly come from Obuasi or Kumasi to purchase either the paddy or milled rice. A bag of milled rice (50 kg) sells

for between ₦40,000.00-45,000.00 at Adugyama and traders incur additional expenses of ₦1,000.00 per bag on transport; ₦500.00 per bag on local council tax; and another ₦2000.00 on transport fare for each trader. A maxi-bag of paddy however sells for ₦15,000.00 at harvest.

Once in Kumasi or Obuasi, each bag of rice is retailed for between ₦50,000.00-60,000.00 (just like any rice consignment brought in from elsewhere). The rice is sold to other retailers or to public institutions such as schools and hospitals. Small scale retailers who buy the rice also retail in smaller bits to consumers and food processors at ₦600.00-700 per margarine cup. At Obuasi, which is a mining town, the price of a bag of rice can go as far up as ₦80,000.00.

1.4.8 KUMASI (ASHANTI REGION)

The Asawase milling site (in Kumasi) has up to 14 milling machines (of the Lyster type) Each can mill up to about 50 bags a day during the bumper season (September-December). The machines are very modern (aged between 3-7 years), turn out very high quality milled rice, and have recovery rates of about 55%. Most consumers in the metropolis therefore prefer rice milled in Kumasi to the ones they bring from elsewhere because, according to them, the quality is very close to that of imported rice.

During the rice harvesting season (October-February), traders go to various rice producing areas like Sewhi Asawinso and Bekwai in the Western region; Konongo and Ejura in the Ashanti region; Hwediem, Dormaa Ahenkro and Goaso in the Brong Ahafo region to buy paddy rice to Kumasi for milling. The price of paddy rice in these areas differ from place to place but the average price is ₦20,000.00/maxi-bag. Traders incur other expenses such as transport (₦1000.00/maxi-bag up to 300 km, ₦1,500.00/bag beyond 300 km), loading and off-loading (₦800.00/bag), bagging (₦200.00/bag), waybill ₦200.00/bag, transport fare (₦2,000.00/trader), to bring the paddy rice to Kumasi.

Whilst in Kumasi, a maxi-bag of paddy attracts a milling charge of ₦4,000.00. Each miller also pays about ₦40,000.00 on electricity consumption every month as well as an income tax and council tax of ₦100,000.00 and ₦36,000.00 a year respectively.

Sale of milled rice is done at the mill sites and a bag of rice attracts an average price of about ₦55,000.00. Retailers then re-sell in smaller bits to consumers and food processors at ₦600.00 per margarine cup. During the bumper season (Sept-Dec), the milling sites serve as storage depots or silos for rice but only for a short period for most of the rice traders also deal in other agricultural products like maize, yam, vegetables, etc.

Traders do at times give production credit to farmers in villages they visit. Money given out is mostly for seed. For every bag of seed money provided, the farmer pays back with two maxi-bags paddy. Millers too advance credit to traders usually at 50% interest and the money is deducted after milling.

1.4.9 RICE IMPORTS

It is estimated that Ghana produces just about 40% of her annual rice requirement of about 200,000 metric tonnes. The remaining 60% is imported (E.Otoo 1994; MOA,PPMED 1991). Because of the trade liberalization policy being implemented by the government, there are all sorts of rice brands on the Ghanaian market, with their prices being dictated by the prevailing currency exchange rate. The rice come from different countries such as the U.S.A, Thailand, Malaysia and Singapore. The selling price for some of the imported rice brands on the Takoradi and Kumasi markets are: ₦35,000.00 for 50 kg 35% broken Thai rice.

₦52,000.00 for 50 kg 10% broken Thai rice.

₦60,000.00 for “grade B” Thai rice (no broken)

₦68,000.00 for 50 kg American long grain

1.5 CONSTRAINTS TO RICE PRODUCTION

1. Farmers need to improve on the quality of locally produced rice. They would need tarpaulins and concrete drying floors to dry and thresh their paddy in order to eliminate or minimize the presence of stones and other foreign matter.
2. Millers would require modern milling machines (like the Sataki type) at affordable prices and on good credit terms. Such machines should be accompanied by spare parts like screens and rubber rollers which break down or wear out more frequently. The machines should also have de-stoners and colour separators, and millers would have to be re-trained in the handling of such machines.
3. Traders would also need credit facilities from the banks at reasonable interest rates. They would also need transport for bulk haulage of produce to take advantage of economies of scale in transport.
4. Farmers find it difficult selling their produce whenever there is bumper harvest. They are therefore compelled to take any price given, which in most cases, is far below the cost of production. Government would have to intervene by providing marketing outlets in times of excess production.
5. Since farmers do not have any means of testing the moisture content of seeds before planting, the viability of seeds they plant needs to be investigated. Some farmers however, perform germination tests on their seed before planting.

1.6 CONCLUSIONS

The inland valleys, because of the presence of larger amount of water, have a great potential for increased rice production in Ghana. What needs to be done is for the government to create the enabling environment for more farmers to go into rice production to feed the ever increasing population of Ghana. Government must provide guaranteed markets as well as farm inputs at much affordable prices. The quality of locally produced rice too would have to be improved to match that of the imported ones.

One way of ensuring that is for the banks to continue to import more modern milling machines for the rice farming communities or organised cooperatives.

1.7 LITERATURE CITED

1. Kohl and Uhl (1990). Marketing of Agricultural Products. (Macmillan Press, 7th Ed)
2. E. Otoo (1994) "Towards Increased Rice Production In Ghana: Research on The Sustainable Development Of The Inland Valley For Rice Production"
3. PPMED, MOA (1991) "Agriculture In Ghana: Facts And Figures"