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Needs assessment and uptake promotion of rainwater harvesting research in Nigeria

Final Technical Report – Annex I
Market chain analysis

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CONTENTS

1. Summary

The study investigated the transactions and interactions among different categories of actors in the rice and okra market chains located within the project sites. A wider view was taken by including the functional aspects of both chains together with the business organisations, supporting services, and the economic framework within which the market chains operated. Within this context, the identified actors were grouped into four functional areas: production, post-harvest / processing, trading, and business development services.

Results of the analyses revealed the different problems being faced by each group of actors in the respective chains. These problems were prioritised through the pair wise ranking methodology. The consolidated limitations of the market chains indicated that access to funds, competitions from imported rice; preservation / storage, limited market were common problems militating against improvements in the enterprises. However, field observations showed that the participants also need some drastic changes in their approaches to business. Appropriate recommendations were made, and the Osun State Agricultural Development Programme (OSSADEP) has substantial roles to play in this regard.

2. Introduction

This report describes the numerous links that connect actors and transactions involved in the movement agricultural produce from the farm to the consumer. Specifically, it investigates the Erin Oke / Erin Ijesa rice industry, and the okra market chain in Iwo. It also identifies problems encountered by various sets of actors in market chains and then makes appropriate recommendations to improve the economic production at the project sites.

The study took a wider view of a market chain by including the functional aspects of the market chain, as well as the business organizations, supporting services and economic framework in which these market chains operate. Arising from this context, the identified actors were grouped according to the following functions:

(i) Production: Actors selected in this category were known to be performing functions that are directly related to the particular crop production.

(ii) Post harvest and processing: Actors whose functions are directly related to parboiling and milling operations.

(iii) Trading: Actors whose functions are related to the buying and selling of rice.

(iv) Providers of business development services: Individual actors or corporate organizations offering business development services to the market chains.

Table 1 (a & b) Shows the various actors identified in each functional area.

Table 1(a): Breakdown of Identified actors by Functional Category

Functions performed in the Rice Market Chain			
Production	**Post harvest and processing**	**Marketing**	**Business Development and Services**
Farmers	Processors (Parboiling)	Retailers	OSSADEP
-	Rice millers	Wholesalers	Transporters

Table 1(b): Breakdown of Identified actors by Functional Category

Functions performed in the Okra Market Chain		
Production	**Marketing**	**Business Development and Services**
Farmers	Retailers	OSSADEP
-	Wholesalers	Transporters
-	Travelling Wholesalers (Collectors)	-

3. Collection of Primary Market Chain Data

The rapid market survey methodology was employed for the collection of the primary data in the rice and okra market chains. Various aspects of the different actor groups were examined. These included their profiles, reasons for participating in the chain, relationships with other actors in the chain, perception of government policies, perception on extension, record keeping, etc.

4. Results of Rice Market Chain Analysis

4.1 Farming Component

Rice cultivation has been an age-long economic activity in the communities of Erin Oke and Erin Ijesa. This block is actually the main rice growing area in the whole of Osun state.

The crop Area and Yield survey (CAYS) report of Osun State Agricultural Development Programme (OSSADEP) showed that 7,199 hectares of land were

devoted to rice cultivation in the state in 1996. The total yield was found to be 9,910 tonnes, with an average yield of about 1.38 tonnes/ha. Unfortunately, however, there are no current data to show the trend over the years. The socio-economic profiles of the farmers interviewed are typical of what is generally obtainable in the state. For instance, their ages ranged between 38 years and 56 years. Two of the six farmers interviewed were female. It was revealed that there are usually no differences between the male and female farmers in terms of farm size, input use, output etc. All of them wee married, and the children assist on the farm.

The estimates of the number of farms currently engaged in rice production could not be made due to lack of data. It was claimed almost all adult in every household were involved in rice planting in the past. The 1997 CAYS report of OSSADEP showed that 47,817 households were involved.

Two rice varieties are presently being cultivated: Faro and ITA 150 Faro as a maturity period of about 4 months, and is highly susceptible to drought. It also needs fertile soil to thrive well. This led the farmers to seek for better rice variety on their own. Hence ITA 150 was brought from neighbouring Efon Alaaye (Ekiti State) in 1992. This Species has a shorter maturity period of about 3 months, high yielding, and drought resistant. It is thus, more preferred by most farmers. A new Variety (Nerica Species) was recently introduced to the communities for trial. Its first planting was done on May 27, 2005. The assessment of its performance is being awaited. The size of rice fields is between 1.2 hectares and 6.0 hectares.

Rice seeds are usually saved from previous harvests. Some farmers however buy from others at the rate of ₦ 65 per Kg. About 75 Kg are needed to plant one hectare of land. Herbicides are usually purchased in Ilesa (a, distance of about 15 minutes drive). The farmers were able to identify the common pests and diseases attacking rice fields as: termites, toads, rodents (grasscutters) birds, and rice blast. Birds were regarded as the most destructive, as they could wipe off everything on the field. Lots of energy and man hours are often put into bird scaring activities from 6.00 am to 6.00 pm for about 40 days. Traps are set against grasscutters. Apart from these physical efforts, no pesticides are presently applied.

Land preparation is carried out in March, while planting is done between April and May. The rice is harvested between August and September. (The climate change has shifted the planting date from February to April / May).

Limiting factors in rice production are listed as rodents, weather instability, finance, and soil infertility.

There is a general absence of record keeping by all the farmers. Estimates of production costs were therefore obtained form memory recall. Unfortunately too, OSSADEP has not been keeping records of the production costs of the rice farmers. Though absence of production credit was widely reported, some farmers often obtain credit facilities from rice millers to whom they must also sell their produce.

It was observed that two cooperative groups (one in each community) have now being formed. The cooperative groups are off shoots of the RWH groups established in both Erin Oke and Erin Ijesa.

The yield / ha vary between 950 kg and 1150 kg. The harvested paddy is stored in an open place for aeration in order to prevent moulding.

Extension services from OSSADEP were poorly scored by the farmers. For instance, most of them claimed to have received no benefits in terms of advice, training or input supplies from the organization. The form of introducing the new rice variety (Nerica Species) was detested by the farmers. It was reported that only three farmers from the communities were given about 1Kg of the new species, with about 0.8 kg of NPK (15-10-10) as the only incentive. The team observed that no monitoring was made by the officials of OSSADEP with respect to the newly introduced Species.

The farmers believe that they possess the necessary capacity and capability to produce sufficient rice for domestic consumption. However, the stiff competition from imported rice should be removed by reducing the quantity of rice coming from foreign lands.

The rate of use of purchased inputs, such as fertilizer and herbicides is low. Farmers ascribed this problem to the relative difficulties in getting them locally, as well as financial constraints. It was discovered that many of the farmers were not properly following the instructions/recommendations for these chemicals. For

instance, the selective herbicide (2-4 D) is to be applied between 14 and 21 days after planting but most farmers often spray their crops much later. Gramoxone is also observed to be overused. None of the farmers ever reported making use of foliar fertilizer. The consequences of these are reduction in yield and depletion in soil quality.

The number of farmers cultivating swamp rice is observed to be on the increase, though it is generally claimed to be more tasking/ labourious than upland rice. There are no records to monitor the trends in the cultivation. Current estimates put the total number of farmers who cultivate swamp rice at 59. Cultivation of swamp rice was alien to the communities. It was by Benue farmers who are taking refuge in the settlements.

4.2 Processing Component

The harvested paddy is manually threshed on the farm, and transported home in bags for processing, which is usually handled by members of farmers' households.

The entire harvested paddy is processed locally within each community, and none is sold at that level in its raw form. Apart from own harvest, some farm families buy raw paddy from sellers who bring paddy from neighbouring communities (Ipole, Imesi, Efon Alaaye, Ogotun, etc) for further processing. Independent processors (i.e. processors without own rice fields) also buy raw paddy from neighbouring settlements. It is claimed that rice farmers from the neighbourhood often prefer to bring their parboiled rice to Erin Oke and Erin Ijesa for milling. This

is done in order for their produce to command similar status with those of the Erin Oke / Erin Ijesa rice industry.

About four stages are involved in processing. The first stage involves sun drying, especially if the paddy is planned to be stored for some period of time. In the second stage, paddy is soaked in cold water in a rectangular, block-made container locally referred to as “olupotu” for between 3 and 4 days. It is however possible to leave the paddy in this container for a longer period, as long as it is well immersed in cold water. Parboiling takes place at the third stage. The fourth stage is more involving, and the most worrisome. Here, the parboiled rice is spread on plastic mats/ tarpaulins in the open for sun drying. In some instances, the spreading is done on bare roads. In both cases, people and vehicles were observed to be moving over the produce. Furthermore, brooms that are generally used for domestic cleaning are often employed to pack the rice. A major consequence of the unhygienic practices above is the introduction of foreign impurities like stones in the rice to be milled. Since the sun drying is carried out in the open, lots of man hours are usually given to scaring domestic animals (such as goats, and chicken). As it normally happens in other locally produced items, there is a general absence of quality control.

About 500 kg of paddy rice is processed (soaked and parboiled) per unit of time. Family labour is majorly employed at this phase of post-harvest handling. The dried rice is later taken to the miller, who charges ₦150 per 30 kg of milled rice. The peak of rice processing activities is between August and November for upland rice and December to May in the case of swamp rice. The independent processors

often extend credit facilities to farmers who supply them rice from the neighbourhood.

The major problem at the processing level is the insufficient sunshine during the drying time. The weather is usually dull at that time of the year. Rice that is not properly dried usually go mouldy and smelly; thus resulting in some losses for the farmers/processors. Another problem in this segment of the chain is the rodent (rats) attack on stored rice. However, processors were unable to quantify the losses resulting from such attacks.

The milled rice may be sold directly to wholesalers, retailers, and even consumers right from the mill. It may also be sold at farmers' homes or taken to the periodic markets at Ilesa, Ipetu Ijesa, and Owena.

4.3 Milling Component

The parboiled rice is taken to the mills for dehusking. There are a total of 22 rice mills in the two communities, 9 (about 40%) of which are currently in operation. The remaining 13 are temporarily out of service due to low volume of paddy available. Though 13 of the mills have electric motors, they are mostly powered by diesel engines because of electricity outage that is frequently experienced. 5 of the functioning mills are located in Erin Oke, while the remaining 4 are found in Erin Ijesa.

The milling enterprise is male dominated; and most of the millers are over 55 years old. Only one of them is relatively young (about 45 years old). Some of the milling

machines are as old as 30 years, while the newest bought was bought in 1998. On the average, three people work each mill: the owner operator and two assistants.

It currently costs between ₦150, 000 and ₦200, 000 to establish a rice milling enterprise. The major variable input is the diesel oil, which cost about ₦ 80/ litre. A mill handles about 1.8 tonnes / day and works under this capacity for about 3 days in the week. This pattern of work falls on the eve of every three periodic markets that are often visited by the majority of traders in the two communities. The peak period of milling is between August and November. However, the level of activity in the rice mills has increased due to the rising popularity in the cultivation of swamp rice in the localities. There is now a second peak period, between January and April and hence increased economic activity to the rice milling industry. The capacity is limited by the amount of parboiled rice that is available for milling. Some of the mills also process maize and cassava. The attendants often work in the motorcycle ("okada") transportation business during the slack periods. The millers charge ₦150/30kg of milled rice consume about 0.75 litre of diesel to mill this quantity. The milling charges are dictated by the milling association. Each assistant is paid ₦500/day. Processors are often allowed to mill on credit, and later repay a day after the market day.

In addition, rice mills usually extend loan facilities to farmers, and this is used to gain their loyalty for patronage in the milling of rice. The independent processors also benefit from this symbiotic arrangement. The amount so extended varies between ₦5, 000 and ₦20, 000 for upward of 3 months without interest payments

The ‘waste’ from the mills (rice bran) is used in the formulation of animal feed; hence it generates additional revenue for rice millers. The bran is sold at the rate of ₦80 / 50 kg.

The youngest of the millers adds more value to his operations by offering to pack rice from customers and returning same after milling, free of charge. This gives him the opportunity of winning more customers to his mill. For instance he mills about 300 kg over and above the local average.

The main problem of the millers is to have a continued as well as increased patronage of their mills, especially that they have unused capacity to accommodate more volume of rice. In addition, some farmers and processors occasionally default in their repayment plans. For instance, there have been situations where the defaulting farmers/processors would take their parboiled rice elsewhere in order to avoid their miller creditor. It was observed that situations like these are not very common. Another problem faced by the millers is the time spent in winnowing the parboiled rice before it is milled. It is claimed that the milling rate is slowed down if this is not done. As already observed, lots of foreign particles enter the produce as a result of poor handling of the different processing stages. Since there are no mechanics available locally, millers often travel to Ilesa to get them for the purposes of servicing or the repair of broken down machines. However, the improvement in the means of communication through the global system of mobile communication, the incidence of traveling may be drastically reduced or completely eradicated. It will also reduce the amount of lost hours to breakdowns.

4.4 Trading Component

In the past, farmers and processors in Erin Oke and Erin Ijesa had no cause to trade outside their localities. This was as a result of the influx of buyers from such states as Ogun, Ondo, Oyo, Lagos, and even the Eastern and Northern states. However, the opening of the Nigerian boarders to imported rice has changed the face of the business.

Presently, the major marketing channels are Ilesa, Ipetu Ijesa, and Owena. The Owena market commands the highest patronage, and is situated at the boundary between Osun and Ondo states. Next in line is Ilesa. The common characteristic among these markets is their traditional periodicity. Listed in Table 2 below, for instance, are the periods for each market. This characteristic feature ensures continuous business for the participants, almost throughout the week.

Table 2: Trading Cycles of Markets

Market	**Trading Cycle**
Owena	Every 5 days
Ilesa (sabo)	Every Monday
Erin Oke (local)	Every Tuesday
Erin Ijesa (local)	Every Wednesday
Ipetu Ijesa	Every Thursday

Wholesalers often set out to reach designated markets as early as 5.00am, where retailers are awaiting them. As many as 50 wholesalers travel to reach market, with

an average of 450 kg rice. Rice is brought to the market in bags of 60 kg units on which ₦100 / bag is charged for transportation.

Another feature of rice marketing is that it is not sold in bags, but in small bowls known as 'kongo' (a kongo of rice weighs approximately 1.5 kg). Rice is sold to retailers at the rate of ₦150 / kongo. No credit facilities are extended to retailers. This was given in the past, but had to be withdrawn due to increasing rates of default. The fact that the retailers are resident in different locations away from wholesalers often makes recovery of the debts a little more difficult.

The 'kongo' is usually supported at the edge with palms, such that one measure is slightly more than a standard measure. On the average, 20 of such measurements yield 21 standard 'kongos' thereby giving the retailer one extra 'kongo' for every 20 bought.

Almost all stocks brought to the market by wholesalers are sold, and they usually leave the markets latest by 12.00 noon on each market day. Majority of the retailers often come from each market's neighbourhood. The exchange is conducted through the process of haggling. Average purchase/ retailer is 300 kg and sells at the rate of ₦160 / kongo, plus extra 'kongo' per multiples of 20 bought. Retailers stay much longer than wholesalers, since they have to wait for customers who buy in smaller quantities. There are no entry barriers into the markets. Each trader however pays ₦10 every market day to the respective local government offices as space charges. Both wholesalers and retailers move around other markets whose day falls due, and the cycle goes on like this throughout the year.

Since no records are kept, it was difficult to estimate the volume of trading, as well as the profitability of the business.

One of the major problems of this point in the chain is the use of different sizes of the 'kongo' to conduct trading activities.

In some cases, rice that is not properly dried is brought to the market. This may go mouldy after 3 days, and is usually rejected by customer because of its foul smell. Even if the rice is eventually sun dried, there is shrinkage in volume, hence reduction in returns accruable.

4.5 Transportation Component

Buses and motorcycles are the two modes of transporting rice in the two communities. As in other towns and villages, motorcycles are increasingly becoming popular, and are mostly used where the roads to the farm are not motorable. The operators charge about ₦100 / 60 kg bag of rice. Buses, on the other hand are mostly patronized for shipping rice to the different markers since they can handle large volume of produce. For instance, a bus can handle 3 tonnes of rice at a time. The problems identified here include the aging vehicles, which are not easily replaceable due to financial constraints. Another problem is the disturbance of the free flow of vehicle by police men who often mount illegal road blocks, particularly on market days. This is partly responsible for the early (around 4.30 am) movement of rice to designated markets.

4.6 OSSADEP Component

Osun state agricultural Development Programme (OSSADEP) was established in January 1992. The programme has the objective of increasing and improving the income and standard of living of the farmers' families in the state.

The programme operates 7 departments: Agricultural extension, input sales and distribution, rural road rehabilitation, rural water provision, agro processing, adaptive research and women-in-agriculture. For effective delivery of its mandate, OSSADEP has divided the state into three zones: Iwo, Osogbo, and Ife-Ijesa. The Erin Oke / Erin Ijesa rice industry falls within the Ife-Ijesa zone.

Each zone has a number of Local Government Areas (LGA) under it. For instance Ife-Ijesa zone has 10 LGAs of which Oriade LGA is one of such. Erin Oke and Erin Ijesa are located in Oriade LGA. Discussions held with some of the officials of the programme revealed that OSSADEP is plagued with a number of problems, which has consequently reduced its operational performance. One of this is the gross inadequacy of field staff. For instance, the total number of extension workers on the payroll of OSSADEP is about 67. This puts the ratio of extension staff to farming families at 1: 5, 000 instead of the recommended 1: 1, 000. The shortage has been attributed to the retrenchment of staff carried out by the last political regime in the state. Another problem is the low staff morale. It was revealed that none of the field staff had been promoted in the last 10 years. They were also said

to have been kitted only once within the same period. Another problem facing OSSADEP is the shortage of financial resources to run its various programmes.

4.7 Cost Structure in the Erin Oke / Erin Ijesa Rice Industry

As earlier explained, there is a general absence of record keeping by the participants in the Erin Oke / Erin Ijesa rice industry. This is typical of the Nigerian small scale farmer. For this reason, it is a bit difficult to accurately cost structure in the industry. However, information gathered from the actors (mainly from memory recall) has been used to compute the cost structure presented in Table 3.

4.8 Analysis of the Limiting Factors in the Rice Market Chain

Brainstorming sessions were held with all the relevant groups of actors. The sessions were conducted in a way that everyone present was made to air his or her views. In each group, participants were asked to mention the factors limiting their optimal performance of their activities in the market chain. The factors so mentioned were then prioritized, using the method of pair wise ranking. The results of these analyses are presented below:

The farmers' group reported more limiting factors than others. This is not surprising since they are the most important partners in the market chain. As shown

Table 3: Costs and return estimate per season from 1 hectare rice plot*

Revenue	**₦**	**% of Total Cost**
1, 050 kg @ ₦ 107/kg	112, 350	
Costs		
Land clearing (8 man days @ ₦ 1200 each)	9, 600	11.63
Planting (8 man days @ ₦ 600 each)	4, 800	5.82
Seed; 75 kg @ ₦ 40/kg	3, 000	3.64
Pre-emergence spraying (3 man days @ ₦ 1100 each)	3, 300	4.00
Water supply (3 labour @ ₦ 400 each)	1200	1.45
3 spraying machine (hired) @ ₦ 300 each	900	1.09
Gramoxone 3 litres @ ₦ 900 per litre	2, 700	3.27
Post-emergence spraying (3 man days @ ₦ 1100 each)	3, 300	4.00
Water supply (3 labour @ ₦ 400 each	1200	1.45
3 spraying machine (hired) @ ₦ 300 each	900	1.09
Herbicide (2-4 D) 3 litres @ ₦ 800 per litre	2, 400	2.91
Birds scaring (80 man days @ ₦ 300 each)	24, 000	29.08
Harvesting (25 man days @ ₦ 250 each)	5, 250	6.36
Transport from farm (vehicle)	3, 500	4.24
Parboiling and drying (4 man days @ ₦ 500 each)	2, 000	2.42
Milling @ ₦ 5.35/kg	5, 618	6.81
Interest (12% of operating capital)	10, 046	12.17
Total cost	82, 526	
Net return	29, 824	

* £1 = ₦ 256

in the matrix of Table 4, a total of 8 factors were mentioned by these actors. These factors were prioritized with the method of pair wise ranking, the result of which is presented in Table 5.

Prominence was given to two of the factors, both having being ranked as number one: Rodents' invasion and competition from imported rice. Big rodents commonly referred to as grass cutters often invade farmers' rice fields in the dead of the night. Unfortunately, there has not been any effective method of combating/controlling these invading animals. The most effective way is probably to have a short fence round the rice fields, but the financial resources of the farmers may not be able to bear the expenses. Unfortunately, the farmers were unable to quantify such loses from rodents' invasion. Such important estimates could have assisted in determining any justification for appropriate investments at checking the rodents.

The influx of imported rice was claimed to have been largely responsible for the distortion of their local economy, hence the current mass movement of people out of rice farms.

Access to funds, access to water, and improvement in soil fertility were ranked equally by the participating farmers. The issue of funds is a common problem in the Nigerian agricultural system, where many farmers complain of inadequate financial resources. The changing weather condition has been having its toll on farming activities, to the extent that it is becoming increasingly difficult to reasonably predict climatic events. The sudden cessation of the rain in the middle the cropping

season is becoming too worrisome to the farmers. The non-use of fertilizer and the continuous use of land were probably responsible for the depletion of soil fertility in the two communities.

The low ranking accorded birds' invasion was explained by the fact that it is at least controllable, since it happens during the day time. Farmers and / or members of their households often spend about 12 hours (i.e. 6.00 am to 6.00 pm) every day for a period about 40 days for scaring birds.

Four limiting factors were isolated during the brainstorming session for processors. These are contained in Table 6. The final ranking of these problems are presented in Table 7, which puts access to funds in the first position. This is followed by drying of rice and competition from imported rice in that order. The common consensus among the processors is that access to cheap loans would make them expand the scope of their businesses, as well as solve other problems militating against them.

The outcomes of the brainstorming session with millers are presented in Tables 8 and 9. They were also of the view that access to financial resources would go a long way in solving their problems, hence the placement of 'access to funds' in the first position. Competition from imported rice was rated second, and this has a direct bearing on the present low capacity utilization of their mills. As earlier observed only 40 percent of the mills are in operation, due to low patronage. Field observation shows that mills currently in operation are worked effectively for three days in the week.

Table 4: Farmers' Pair Wise Ranking of Limiting Problems

Problems	Access to funds	Rodents' (Grasscutters) invasion	Access to water	Birds' Invasion	Competition from imported ice	Improvement of soil fertility	Access to labour	Improvement of roads
Access to funds		Access to funds	Access to water	Access to funds	Competition from imported rice	Improvement of soil fertility	Access to funds	Access to funds
Rodents' (Grasscutters) invasion			Rodents' (Grasscutters) invasion	Rodents' (Grasscutters) invasion	Rodents' (Grasscutters) invasion	Rodents' (Grasscutters) invasion	Rodents' (Grasscutters) invasion	Rodents' (Grasscutters) invasion
Access to Water				Access to Water	Competition from imported rice	Access to water	Access to water	Improvement of roads
Birds' Invasion					Competition from imported rice	Improvement of soil fertility	Birds invasion	Improvement of roads
Competition from imported rice						Competition from imported rice	Competition from imported rice	Competition from imported rice
Improvement of soil fertility							Improvement of soil fertility	Improvement of soil fertility
Access to labour								Improvement of roads
Improvement of roads								

Table 5: Final Ranking of Farmers' Limiting Problems

Limitations	Frequency	Order of priority
Competition from imported rice	6	1
Rodents' (Grasscutters) invasion	6	1
Access to funds	4	3
Access to Water	4	3
Improvement of soil fertility	4	3
Improvement of roads	3	6
Birds' Invasion	1	7
Access to labour	0	8

Table 6: Processors' / Traders' Pair Wise Ranking of Limiting Problems

Problems	Drying of rice	Access to funds	Competition from imported rice	Improvement of roads
Drying of rice		Access to funds	Drying of rice	Drying of rice
Access to funds			Access to funds	Access to funds
Competition From imported rice				Competition from imported rice
Improvement of roads				

Table 7: Final Ranking of Processors / Traders' Limiting Problems

Limitations	Frequency	Order of priority
Access to funds	3	1
Drying of rice	2	2
Competition from imported rice	1	3
Improvement of roads	0	4

Table 8: Rice Millers' Pair wise Ranking of Limiting Problems

Problems	Access to funds	Loan recovery	Servicing / repairs of equipment	Low capacity utilization	Competition from imported rice
Access to funds		Access to funds	Access to funds	Access to funds	Access to funds
Loan Recovery			Loan recovery	Low capacity utilization	Competition from imported rice
Servicing / repairs of equipment				Low capacity utilization	Competition from imported rice
Low capacity utilization					Competition from imported rice
Competition from imported rice					

Table 9: Final Ranking of Millers' Limitations

Limitations	Frequency	Order of priority
Access to funds	4	1
Loan recovery	1	4
Servicing / repairs of equipment	0	5
Low capacity utilization	2	3
Competition from imported rice	3	2

Table 10: Consolidation of Limitations in the Erin Oke / Erin Ijesa Rice Industry.

Limitations	Order of Importance for Each Group of Actors		
	Farmers	Processor / Traders	Rice Millers
Competition from imported rice	1	3	2
Rodents' (Grasscutters) invasion	1	-	
Access to funds	3	1	1
Access to Water	3	-	
Improvement of soil fertility	3	-	
Improvement of roads	6	4	
Birds' Invasion	7	-	
Access to labour	8	-	
Drying of rice	-	2	
Loan recovery			4
Service / repairs of equipment			5
Low capacity utilization			3

5. Results of Okra Market Chain Analysis

5.1 Farming Component

Okra cultivation has been an age-long economic activity in Mafikuyomi and Obamoro communities. According to OSSADEP report, there are about 79 hectares of land cultivated to okra in Iwo Zone and the main growing areas are Mafikuyomi and Obamoro villages which are situated in the derived savannah ecological zone of the state. Compared to other crops, okra cultivation is preferred by farmers because of the quick stream of income it generates. In this wise, it helps in overcoming farmers' cash flow problems.

Most of the okra farmers are male and resident in the communities. They also have long years of experience in okra cultivation. The estimated population of these farmers is about 120.

The widely cultivated variety of okra is 'feweso', which is early maturing with a gestation period of 40-50 days. It is also claimed to be high yielding. The other variety cultivated is 'yaya'. Farm size ranged from 5 to 30 acres per farmer.

There are two main growing seasons. The early season is between March and May, while the late season comes up between July and September. In addition to these two, there is the 'fadama' production, which is cultivated in flood plains during dry season.

Most of the farmers obtained okra seeds from previous harvests and the seeds are said to be viable for one production year. All the farmers claimed that they have had no

bad experience with such seeds. Farmers who have to buy seeds for planting pay about ₦400 for a bottle of okra seeds. Between 5 and 6 bottles of seeds are needed to plant one acre of land.

The farmers were able to identify perforating flea beetles (locally named 'nini') as the major pest that attack young seedlings after emergence. Recommended pesticides are cypermethrin (Cymbush or Ambush) and Vetox 85. The farmers prefer cypermetrin to Vetox 85 because the former is readily available and less expensive. Discussions with the farmers revealed that they do not usually follow recommended dosages. For example, many of them often reduce the concentration, as well as the spraying regimes in other to cut down on costs.

Limiting factors in okra production are listed as infertile soil (due to over use of the land), lack of operating capital, delay in rainfall, long dry spell and high cost of purchased inputs.

The crop cycle is about three months and harvesting starts from 42 days of planting. Harvesting is manually done through hand picking, and is normally carried out by temporary farm hands that are paid ₦20.00 per basketful. This is done every 5 days, and goes on for about two months. The harvested fruits are packed in baskets.

The yield per hectare varies between 6 and 8 baskets each day it is harvested, while the price per basket varies between ₦300 and ₦400. Prices are generally determined by market forces. Picking is done manually and is paid per basket picked by farm workers.

It is possible to preserve okra by slicing and sun drying the crop, thus allowing for storage. The dried product could be kept in this form for at least 12 months or even more, without going bad. Ordinarily, this should become handy during periods of short supply, and may actually be a delicacy for those customers who cherish its taste in this dry form. However, this does not seem attractive to the farmers. It is claimed that the drying process would naturally reduce the volume of the product, hence affect their revenue.

Absence of production credit, especially from formal institutions, was widely reported. However, some farmers obtained loan facilities from wholesalers to whom they must also sell their produce.

Extension services of OSSADEP were poorly rated low by okra farmers. For instance, it was claimed that little or nothing has been received in form of advice, training or input supplies from the organization in recent past. The little that came their way is often usually untimely. They have therefore, been relying on their own initiatives, even in the introduction / adoption of new okra varieties. This is usually done through exchange of information and ideas among the farmers within and outside the neighbourhood.

Among the inputs purchased by the farmers, the use of pesticides to control flea beetles is relatively high, while that of fertilizer and herbicides is low. In the case of pesticides, farmers often make more efforts to spray their okra fields in order to eliminate / reduce the damage caused by the flea beetles. These inputs are usually

bought from the open market at relatively higher prices than what OSSADEP offers. However they find it difficult to buy from the organization. For instance the purchase of fertilizer from OSSADEP offices is bedeviled with bureaucratic bottlenecks. A farmer who needs more than two bags would have to travel down to the state capital at Osogbo to obtain a written permission from the Commissioner. Getting even a bag of fertilizer is equally said to be difficult for Agriculture. Farmers find all these to be uncomfortable, hence their recourse to the open market, where fertilizer is purchased at the rate of ₦2800 per bag.

Farms are accessible by roads constructed by the government. Despite this, transport cost has been on the increase because of the continued increase in fuel prices. Currently, transport cost is between ₦20 - ₦30 per basket depending on the distance between farms and market places.

Labour supply is not a problem. Labour services are mainly provided by non-indigenes who are resident in the communities. In the past, labour services have been provided by people from Makurdi in Benue State and later from Kogi State; some of whom now operate their own farms.

Land is rented from the Ogun – Osun River Basin Authority annually at the rate of ₦100 per acre. This allows both indigenes and non-indigenes access to land for crop production. Tractor services are provided by the Osun State Agricultural Development Corporation at the rate of ₦1, 200 per acre. Tractor drivers are said to often plough farmland along slope rather than across slope. This they do with impunity even if farmers protected against it.

The general decline in soil fertility reported by the farmers was attributed to the continuous use of the land, and which does not allow reasonable fallow period for it rejuvenate as it was in the past.

The main marketing channel for okra is 'Odo-Ori' market, where there are many wholesalers and retailers. There is a specialized wholesale market for okra at Ologun Ebi, located in a small village a few kilometers from Iwo township. However, this market is seasonal and is opened for transactions only in periods of high supply. Farmers supply these markets every 5 days.

Price per basket of okra fluctuates on every market day. This is due to various market forces such as supply, demand, climate, seasonality, and lack of storage facilities. As a result, farmers can not predict what their returns would be. In the current period, for example, the price of a basket of okra fluctuated between ₦200 and ₦500. Higher prices normally recorded during the dry season when supply is limited.

Farmers and farm workers do not usually observe the recommended safety measures when applying chemicals on the farm. Discussions with them revealed that they do not wear goggles, hand gloves and nostril mask when spraying.

The farmers sell their okra on "cash-and-carry basis". However credit purchases are allowed during glut periods as a safety measure. Information on prices is usually obtained through personal contacts.

5.2 Trading Component

There are three main categories of traders involved in okra business transactions: wholesalers, traveling wholesalers and retailers.

5.2.1 Wholesalers

Most of the actors at this level of the market chain are men, often with considerable years of experience in okra business. They are found mainly in 'Odo-Ori' market, 'Ologun ebi' and at times in 'Oluwo' markets. They sell to both retailers and traveling collectors who often come from other areas. Their main sources of financing the business are personal savings and cooperative societies.

Trading is done in each market for three consecutive days: pre-market day, market day, and post market day. Activities are however at the highest on the main market day.

Baskets of okra are conveyed to market places by vehicles such as pick-up vans, cabs, buses, and motorcycles, but pick-up vans are widely used. A pick-up van handles between 80 – 90 baskets per trip, while the motor cycle loads about 6 baskets per trip. Transport cost per basket varied between ₦20 and ₦40 depending on distance.

This category of traders rent shops, where they display and sell their product especially on the three market days (i.e. pre-, main, and post-market days). Annual rent per shop is ₦2, 600 while security fee is ₦50 / month. In Ologun-Ebi market, however, transactions are conducted in the open space.

The price of a basket of fresh okra fruit ranged from ₦250 to ₦600 depending on market forces. The price could be as high as ₦1000 during dry season, when 'fadama' okra is available. Sale of okra is normally conducted in cash. Credit facilities are permitted only during the period of glut. The major problems faced by these participants include trade sluggishness, and lack of storage facilities for fresh okra fruits.

5.2.2 Traveling Wholesalers (Collectors)

Actors in this category are also experienced, and are made up of both male and female market intermediaries who usually travel round okra producing areas. Okra is bought at the farm gates, as well as the markets within and outside of Iwo. Between 400 and 500 baskets of okra are handled by each collector per period of time, at prices ranging from ₦250 and ₦600. This is similar to what the local wholesalers also pay for a basket of okra.

The stock of okra is transported to each collector's particular destination(s), the same day in order to avoid deterioration in the quality of the fresh fruits. Such destinations include markets in Ibadan, Akure, Lagos, and Onitsha. The stock is sold to wholesalers and retailers in these respective markets at prices ranging between ₦550 and ₦800 per basket.

The collectors belong to a trade association that serves as a barrier to new entrants into the business. It was also claimed that they usually undergo between 3 and 4 years of apprenticeship before being allowed to engage fully in the trade. The

business is usually financed with money from collectors' personal savings, and loans taken from cooperative societies.

There is a linkage between these collectors and farmers: some of them lend money to farmers who must, in turn, sell okra fruits to them.

5.2.3 Retailers

Retailers are mainly women petty traders, majority of who are relatively old. They are also found in the three markets of Oja Oba, Odo-Ori and Oluwo markets. The number of the retailers could not be estimated due to the instability in the number of participants.

Okra is sourced mainly from Odo Ori market, and in order to avoid spoilage, each retailer purchases between half a basket and a full basket of okra at a time. This quantity is usually disposed of within four days. Apart from okra, retailers also deal in leave vegetables, tomatoes, and oranges.

About four fruits of okra (approximately 8.5 grams) are sold for ₦10. A discount of ₦5 is given to consumers who buy three units (and multiples of) at a time.

5.3 Transport Component

Participants in the transportation component are mainly men, aged between 25 and 65 years. All of them are indigenes of the locality. Some of them also claim to farm on part time basis. Crops grown include okra, yam, maize, and cassava.

Various types of vehicles, such as cabs, buses, pick-up vans and motorcycles are employed in moving okra to different market locations. However, pick-up vans are the most common. They are also best suited for the purpose. The intrusion of other modes of transportation is said to be the result of lack of effective entry barriers into the sector. The present scenario is that of an "all comers' game.

Transport operators are usually invited by traders who need their services. No definite pattern of business relationship was observed since there is freedom in the choice of who to engage.

5.4 Cost Structure in the Okra Enterprises

As usual, there is a general absence of record keeping by the okra farmers. Estimates of production costs given in Table 11 were therefore obtained from memory recall. Unfortunately too, OSSADEP has not been keeping up-to-date records of the production costs of okra farmers.

5.5 Analysis of Limiting Factors in Okra Market Chain.

The pair wise rankings of the limitations determined during the brain sessions held with the different actor groups in the okra market chain is presented in Tables 12 through 14. Frequency recording against each limitation has been used to prepare the final ranking of the problems, and are presented in Tables 15 to 17.

As shown in Table 15, the consensus of opinions amongst okra farmers was that climate change is having the greatest impact on their farming activities. The second limiting factor was the preservation / storage of okra fruits. This is particularly

worrisome to them because of its effects on farm revenue, most especially during the period of glut. This is a common phenomenon in agricultural supplies. As earlier mentioned, preservation of the fruits through sun drying was not found attractive to the farmers because of its perceived low returns. Access to credit (another common phenomenon in the Nigerian agricultural system was placed in the third position. The relegation of extension problems to the last position could be an indication that farmers are no more confident of OSSADEP services.

The final ranking of the limitations by traders is presented in Table 16, which puts access to funds as the most serious problem that should be solved. In the second and third positions were storage problems and poor sales. The issue of poor sales was linked to their desire to look for ways of expanding into new market areas.

Participants in the transportation component also gave the highest priority to 'access to'. It was claimed that they often find it difficult to replace their old and inefficient vehicles which usually game them mechanical problems too frequently. They would also want government to effect repairs on poor roads, since these have been adding to their burden. The issue of low patronage was put in the third place on the prioritized ranking.

The consolidation of the various limitations is presented in Table 18. The problem of finance is shown to run through the three groups of actors in the okra market chain. This may not be unconnected with the incidence of poverty in Nigeria, particularly in the agricultural sector. Preservation issues were also common problems cited by both

farmers and traders alike. Unfortunately, both of them were reluctant to sun dry the fruits for fear of reduction in revenue.

Table 11: Costs and returns estimate per season from 1 hectare okra plot

Revenue	₦	% of Total Cost
225 baskets @ ₦ 600/basket	135,000	
Costs		
Land clearing	6, 500	12.46
Ploughing	7, 000	13.41
Ridging	7, 500	14.37
Weeding	5, 000	9.58
Fertilizer	5, 000	9.58
Rent	250	0.48
Seeds	2000	3.83
Pest control	1375	2.63
Spraying of insecticide	2000	3.83
Spraying pump	300	0.57
Harvesting per basket	4, 500	8.62
Transport	4, 500	8.62
Interest (12% of operating capital)	6262	12.00
Total cost	52, 187	
Net returns	82, 813	

Table 12: Pair Wise Ranking of Limitations by Farmers

Problems	Insect pest infestation	Improvement in Soil fertility	Access to funds	Access to water	Preservation / Storage difficulties	Poor extension services
Insect pest infestation		Improvement in soil fertility	Access to funds	Access to water	Preservation / Storage difficulties	Insect pest infestation
Improvement in Soil fertility			Access to funds	Access to water	Preservation / Storage difficulties	Improvement in soil fertility
Access to funds				Access to water	Access to funds	Access to funds
Access to water					Access to water	Access to water
Preservation / Storage difficulties						Preservation / Storage difficulties
Poor Extension services						

Table 13: Pair Wise Ranking of Limitations by Traders

Problems	Low sales	Preservation / Storage difficulties	Access to funds	Transport problems
Low sales		Preservation / Storage difficulties	Access to funds	Low sales
Preservation / Storage difficulties			Access to funds	Preservation / Storage difficulties
Access to funds				Access to funds
Transportation problems				

Table 14: Pair Wise Ranking of Limitations by Transporters

Problems	Police harassment	Poor roads	Low patronage	Access to funds
Police harassment		Poor roads	Low patronage	Access to funds
Poor roads			Poor Roads	Access to funds
Low patronage				Access to funds
Access to funds				

Table 15: Final Ranking of Limitation by Farmers

Limitations	Frequency	Order of priority
Access to funds	4	1
Access to water	4	2
Preservation / Storage difficulties	3	3
Improvement in Soil fertility	2	4
Insect Pest infestation	1	5
Poor extension services	0	6

Table 16: Final Ranking of Limitation by Traders

Limitations	Frequency	Order of priority
Access to funds	3	1
Storage facilities	2	2
Low sales	1	3
Transportation problems	0	4

Table 17: Final ranking of limitations by Transporters

Limitations	Frequency	Order of priority
Access to funds	3	1
Poor roads	2	2
Capacity utilization	1	3
Police harassment	0	4

Table 18: Consolidation of Limitations in the Iwo Okra Market

Limitations	Order of Importance for Each Group of Actors		
	Farmers	Traders	Transporters
Insect pest infestation	5	-	-
Improvement of soil fertility	4	-	-
Access to funds	3	1	1
Access to water	1	-	-
Preservation / Storage difficulties	2	2	-
Poor extension services	6	-	-
Low sales / Low patronage	-	3	3
Transportation problems	-	4	-
Poor roads	-	-	2
Police harassment	-	-	4

6. CONCLUSIONS & RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made for the purposes of improving both the quality and quantity of rice in the Erin Oke and Erin Ijesa rice industry.

(i) There is the need for farmers to increase their use of purchased inputs such as herbicides, pesticides, fertilizers, etc.

(ii) Necessary trainings / demonstrations in the proper and appropriate usage of purchased inputs listed in (i) above should also be organised for the farmers.

(iii) In order to achieve (i) and (ii) above, OSSADEP needs to be re-invigorated and encouraged to perform its statutory roles of increasing agricultural production and improving income and standard of living of the farming families. For instance, it needs to increase the extension agent-farming households ratio substantially, as well as win the confidence and patronage of small scale farmers.

(iv) OSSADEP also needs to support the evolving swamp rice cultivation that is gradually coming to reckoning in the Erin Oke / Erin Ijesa rice axis, as well as encourage more farmers to adopt its growth. For instance, re-training programmes could be organised for farmers who currently grow the upland rice varieties.

(v) The harvesting and post-harvesting activities in the rice chain need lots of improvements in order to enhance the value of the final product. There is the need to eliminate / reduce the various sources of foreign particles, such as stones that are usually found in the final product. In this regard, small scale mechanical threshers could be developed and promoted for adoption by farmers. Similarly, de-stoning machines could also be introduced to the millers.

(vi) In addition to (v) above, the rice processors and millers should be trained on better ways of handling, parboiling, drying, and milling.

(vii) A study should be conducted to determine the level of consumer preference for dried okra. The price they would be willing to pay for particular quantity should also be determined.

(viii) For the purposes of addressing financial constraints of actors in the chain, necessary support should be given to their efforts at stabling cooperative societies. Membership drives should also be encouraged. OSSADEP has important roles to play here.

(ix) The current high interests of the farmers in RWH should be sustained to the point of final adoption.

Rice and okra enterprises are major income generating activities in the two RWH project sites of Erin Oke / Erin Ijesa and Mafikuyomi / Obamoro respectively. Developments in these crops would have considerable impact in the livelihood of the vast majority of the inhabitants of the communities.

In order to bring improvements to these enterprises, farmers and other active participants in the two chains need to be given appropriate assistance in production, post-harvest handling (including processing), and marketing. They should be empowered in such ways that will improve the levels of productivity in their enterprises. The Osun State Agricultural Development Programme has a big role to play in this regard.