THE NIGERIAN RICE ECONOMY IN A COMPETITIVE WORLD: CONSTRAINTS, OPPORTUNITIES AND STRATEGIC CHOICES

Operationalizing the strategic framework for rice sector revitalization in Nigeria

By

Olaf Erenstein, Frederic Lançon, Olu Osiname and Mohamed Kebbeh[1]

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West Africa Rice Development Association (WARDA) – The Africa Rice Center[2]
Abidjan, Côte d'Ivoire

[1] The authors are respectively production economist - WARDA-Bamako, economist - CIRAD-Montpellier (former policy economist - WARDA), liaison scientist - WARDA-Ibadan and production economist - WARDA-St Louis. Contact: o.erenstein@cgiar.org

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Foreword

The present document is a companion volume for the strategy for rice sector revitalization in Nigeria developed by WARDA (2003) within the context of the project 'The Nigerian rice economy in a competitive world: Constraints, opportunities and strategic choices'. The strategy document provides a strategic framework and outlines the main elements in terms of strategic objectives, priorities and implementation. The present document aims at further operationalisation of this strategic framework.

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1 Introduction

There is a well established and growing demand for rice in Nigeria – amounting to 4.1 million mt of rice in 2002. However, only about half of that demand is met by domestic production - Nigeria importing 1.9 million mt of rice in 2002 valued at approximately US$ 500 million (USDA FAS, 2003). Given the size and value of the imports, there is considerable political interest in reducing rice imports.

The Nigerian government has the objective of self-sufficiency in rice high on the agenda – witness the previous import ban, the stated goals of the Presidential Committee on rice and the current effective duty on imported rice. Still, self-sufficiency in rice is a proximate objective that can contribute positively or negatively to the three fundamental objectives: efficient generation of income; more equal distribution of income; and security (the probability of obtaining income) (Pearson et al, 1981:4-5). The implications of the rice self-sufficiency objective for the fundamental objectives are likely not fully acknowledged. Of the three fundamental objectives, the first two are the most relevant for the case of rice in Nigeria.

Protection of domestic Nigerian rice production includes substantial costs to consumers. The current effective duty is now estimated at 115% (USDA FAS, 2003) – up from approximately 50% in the preceding years. The current effective duty implies an estimated cost to consumers of about US$ 1,000 million annually – about half as tax to the government (on imported rice), half as income transfer to domestic producers (due to higher domestic rice price) and the remainder as dead loss to the economy. Part of the income transfer maybe justified on equity grounds, assuming consumers of rice (primarily urban) to be better of on aggregate than producers (primarily rural).

Protection of domestic Nigerian rice production is not an efficient way of generating national income. At the previous protection level, domestic rice was hardly competitive with imported rice – both in terms of production cost and quality (Erenstein et al, 2003). With the recent increase in protection level, the inefficiency is only likely to increase. There is however substantial scope for enhancing the competitiveness of rice production – as outlined in the remaining of this report - and thereby converting rice production into an efficient generator of national income. The realization of this potential is imperative as the Nigerian government is unlikely to relent in its self-sufficiency goal. So the only politically viable way of reducing the inefficiency and losses related to the current protection levels are enhanced efficiency of domestic production. Only once competitiveness is assured, is the Nigerian government likely to allow for the dismantling of current protection levels.

The rewards for making Nigerian rice more competitive in terms of price and quality are substantial. Preliminary results from an analysis conducted by IFPRI[3] for West Africa highlight the rewards of agricultural R&D, particularly for rice and Nigeria. This analysis estimates that a one time 1% regional increase in rice productivity would result in a benefit of US$ 900,000 to producers and consumers by 2015, of which more than half would accrue to Nigeria. Similarly, a one time 3% increase in rice productivity in three focus countries (Nigeria, Ghana and Mali) would result in a regional benefit of over US$ 1,000,000 (including spillover) by 2015, of which over half would accrue to Nigeria. In terms of potential benefits, rice was second only to yam.

[3] IFPRI, unpublished. DREAM Analysis - identifying Key Commodities for R&D in West Africa. Preliminary results in the context of US President new Initiative to End Hunger in Africa (IEHA).

A more competitive domestic rice would also ensure significant equity gains at a significantly lower cost than the current protective measures. Indeed, domestic rice with its marked market integration is the main economic motor in rice producing rural areas (Erenstein et al, 2003). Boosting the performance of the domestic rice sector thereby has significant multiplier effects for the rest of the rural economy and urban centers outside the South-West. Indeed, rice production implies a significant cash injection into the rural economy – including significant cash income for the farm household and others through its reliance on day-labor and service providers (e.g. processing; inputs; traction; transport). The imported rice chain only adds to the existing distribution of income – with economic concentration in Lagos with income gains emphasizing importers and other vested interests, and with limited trickle down the marketing chain to rural areas. Enhancement of the domestic rice sector thereby provides a valuable alternative for more equitable development reducing rural-urban disparity and migration and providing a supplementary source of non-oil income. In the end, an internationally competitive domestic rice potentially implies complete self-sufficiency and thereby conceivably implies a saving of US$ 500 million annually in foreign exchange needs.

The challenge for the development of the Nigerian rice sector is to bring the cost of domestic rice down to internationally competitive levels and at the same time its quality up to international standards. Only then will Nigerians likely be willing to substitute domestic rice for improved rice without having to impose significant losses to the Nigerian economy.

The need to improve both the cost ***and*** quality aspect of Nigerian rice is imperative. Indeed, reducing the cost of Nigerian rice will be insufficient to close the self-sufficiency gap. The number of rice consumers who will substitute local rice for imported rice in response to lower domestic rice prices will be limited in view of the quality differential - local rice of current standards being an imperfect substitute for imported. Alternatively, improving domestic rice quality alone will be insufficient as the additional costs will only augment the price un-competitiveness of domestic rice.

In addition, there is a need to create an enabling environment for the development of the rice sector. Indeed, Nigeria's socio-economic and political environment as a whole and that affecting the rice sector in particular is characterized by its relatively instability. This creates entrepreneurial risk, an emphasis on quick returns and an initial unwillingness to invest/adapt. Lack of information and interaction between rice subsector stakeholders also augments transaction costs.

WARDA recently produced a strategy for rice sector revitalization in Nigeria (WARDA, 2003). The strategy draws from numerous studies implemented within the context of a rice sub-sector study which describes and analyzes the Nigerian rice economy and identifies various opportunities and challenges for its development. The rice sector study establishes the major underlying constraints for developing the rice economy, their causes and their effects - including rice consumption (Lançon et al, 2003a), rice production (Erenstein et al, 2003; Kebbeh et al, 2003), rice processing (Lançon et al, 2003b), rice markets (Akande & Akpokodje, 2003) and rice policy (Akpokodje et al, 2001).

The strategy document provides a strategic framework and outlines the main elements in terms of strategic objectives, priorities and implementation. The present document aims at further operationalisation of this strategic framework. It thereby presents a number of potential technological solutions for major constraints and windows of opportunity in the Nigerian rice economy, including best-bet technologies to enhance the competitiveness of Nigerian rice. The paper also explores some of the policy adjustments to make Nigerian rice more competitive in

terms of price and quality, while securing rice availability at an affordable price and maintaining integration in the world economy.

The present document presents a number of activities within the context of the strategic framework. Ideally, the whole set of activities would be implemented. However, it is unlikely that sufficient resources can be mobilized to implement all activities to the same extent throughout Nigeria within a short time span. The scale and speed of implementation in the end therefore depends on the amount of resources that can be mobilized. Furthermore, in view of the complexity of the development task, a phased approach seems advantageous (WARDA, 2003). Therefore, to aid the implementation process and in view of likely limited resources, further priorities for activities, systems and regions are given in the present document. That is, the present document provides an outline of the way forward and prioritization of activities as well as an identification of entry points. Some of these entry points can subsequently be developed into full project proposals.

The present document also identifies potential collaborators and assigns potential roles to them within the sets of activities. Where possible, examples of specific partners are given to make the document more specific. However, the most logical and best placed partner to implement activity X in location Y depends on a number of factors – and not least on the activity X itself, its location Y and the capacity of each potential implementing partner. The present document also can not always be conclusive in that sense. During the project we have interacted with a range of representative stakeholders and covered major rice producing and processing centers – but we will be the first to admit that we have not interacted with all stakeholders nor covered all rice producing and processing locations. Except for certain public sector collaborators, most potential collaborators like NGOs and private enterprises also do not have a national presence but are location bound. By necessity therefore, the recommendations of potential collaborators sometimes tends to remain somewhat generic or somewhat biased towards promising sites/partners covered by the study. In this regard it is also important to underline that the “civil society” is not strong yet and that professional organizations – be it producers, processors or traders - are still limited in scope and efficiency. In the end, the actual choice of the type of partners and the scope of the project will depend on the actual geographic and thematic areas retained and resources available. Based on such practical considerations the potential collaborators and their potential roles spelled out here should be seen as tentative – and the final choice and division of roles should be spelled out in subsequent full project proposals.

Finally it must be reiterated that although specific technological opportunities exist, there is no quick fix to boost the competitiveness of the Nigerian rice sector. The various technologies identified in this report are typically presented as best-bet technologies. This implies that they hold particular promise for amelioration of the current situation and likely adoption by at least a considerable share of rice sector stakeholders. However, even best-bet technologies need to be tested and possibly adapted locally before successful dissemination and adoption are likely – an issue particularly for such a huge, diverse and complex country as Nigeria. This also implies that change is unlikely to happen overnight – instead a longer term view with the necessary political commitment and investments are needed.

The three priority and complementary interventions needed to develop the Nigerian rice sector are:

- Increasing efficiency along the commodity chain;
- Improving quality management along the commodity chain;
- Creating an enabling environment for these changes to happen.

Each of these interventions will be reviewed hereafter. For simplicity they are discussed sequentially, but for their success each intervention needs to be complemented with the other. A small scale integrated intervention dovetailing these three different sets of intervention within the same context is likely to be more effective and efficient than the implementation of any of these interventions in isolation at a large scale. Indeed, a commodity chain approach can not be overemphasized - where producers need to meet consumer demands in an efficient and effective way.

The present document is divided into five sections, the first being this introduction. The second section will address costs competitiveness enhancement, whereas the quality enhancement will be discussed in section three. The fourth section addresses some of the enabling environment issues. Section five concludes.

2 Increasing price competitiveness of Nigerian rice

Nigerian rice is uncompetitive with imported rice in terms of price. For rice producers to be price competitive they need to undercut the imported rice price. In terms of price competitiveness it is important to distinguish between private (or financial) and social (or economic) prices. The private prices reflect the actual market prices and thereby the incentives and disincentives to private agents. The social prices reflect the real prices for the economy as a whole and thereby correct for eventual taxes and subsidies. For the rice sector, the largest discrepancy between private and social prices exist in terms of the produce price due to the significant duties on rice imports (current effective duty of 115%). The magnitude dwarfs eventual differences in terms of private and social resource costs and therefore is the focus here.

The market (private) price of imported rice in Nigeria puts a cap on the market price of local produce – basically a function of world market (social) price, import duties, transport costs and quality premiums. Still, local rice is an imperfect substitute for imported rice – as imported rice is widely perceived to be of better quality and therefore commanding a higher price. A recent producer survey (Erenstein et al, 2003) reflects that at the prevalent market prices at the time of the survey and with the assumed opportunity costs, production costs are high and only half the surveyed rice producers were price competitive. However, since the lifting of the rice import ban, a number of uncompetitive rice producers have stopped producing rice and/or significantly reduced their area as they are unable to compete with imported rice at the prevalent market price levels. The recent increase in the import duty on imported rice should imply more favorable producer prices for rice – which in turn should imply more favorable private returns to rice production, *ceteris paribus*.

Import duties make local rice production more privately attractive, by artificially creating market price competitiveness. However, returns and price competitiveness from the private viewpoint do not equate social returns and competitive advantage from the social viewpoint. Indeed, the two viewpoints diverge significantly because of the social costs implied by the protection. Import duties should therefore be seen as a temporary measure and more structural improvements in the rice sector are needed to make the rice producers genuinely competitive with imported rice.

2.1 Priorities

Enhancing price competitiveness implies the need for substantial productivity increases to lower production costs. The first priority to increase the price competitiveness is to reduce on-farm production costs. These costs represent the largest cost-component (90% of current production costs for lowland and upland rice; 82% for irrigated rice). Local production costs are substantial, particularly in view of high labor costs and low yields. New improved varieties and labor-saving technology offer particular promise to lower production costs. The potential to reduce production costs are ecology dependant - e.g. in terms of current and potential yield and technology use.

The three main production ecologies for rice in Nigeria are lowland rice, upland rice and irrigated rice. Amongst these, lowland rice has the highest priority for reduced production costs – being the ecology that represents the largest share of rice area and rice production (Table 1). Furthermore, the social opportunity costs of producing rice in lowlands tend to be limited in view of the limited viable alternatives. The upland and irrigated rice ecology have an approximately equal share in overall production. Still, irrigated rice should be second in priority as it represents an easier to target area – being smaller and less diffuse and having had past land development investments – with potentially high spillovers from other regions. Within irrigated rice attention should be

targeted to existing schemes (i.e. where the irrigation investment is a sunk cost) – not to the construction of new schemes. Upland rice should be third priority. The mangrove ecology is mainly of local importance in the delta with only a minor contribution to the national rice subsector and does not merit attention within the context of this plan. For each ecology, two main options exist to increase the price competitiveness of Nigerian rice: increasing yields and reducing production costs. The relative potential of each depends on the ecology.

Table 1 Relative contribution of main rice ecologies to the rice sub-sector

	Area (000 ha)	Area share	Yield (mt/ha)	Rice (000 mt)	Production share
Upland	493	30%	1.9	562	28%
Lowland	854	52%	1.7	871	43%
Irrigated	263	16%	3.7	583	29%
Mangrove	16	1%	2.0	20	1%
Overall	1 642		2.1	2 036	

Source: WARDA rice sector study

After reducing the on-farm production costs, processing costs merit attention. Indeed, whereas the processing cost represent only 10% of total production costs for lowland and upland rice, it already contributes up to 18% for irrigated rice with current production costs. Once on-farm production costs are successfully reduced, the relative weight of the processing costs in the total domestic rice costs increases. For instance, reducing on-farm production costs of lowland rice to a break-even level with the import parity price, increases the share of the processing cost to 21%.

In terms of geographic priorities, emphasis should be put primarily on North Central Nigeria. This is in line with the finding ANAP study (IITA/UI/IFPRI, 2003) and corresponds with the ecologic emphasis on lowland rice. For irrigated rice, emphasis would be on the existing irrigation schemes in the North and North East Nigeria. For upland rice, emphasis should also be on the North Central Nigeria (eg Kaduna State) and to a lesser extent the upland rice growing regions in the South West (eg Ekiti State). In view of complementarities with the rice quality improvement (chapter 3) it is advisable to emphasize the same geographic areas.

In the end, the viability of competitiveness enhancing interventions is to a large extent determined by the corresponding private returns (for individual rice producers, traders, etc). Although the positive implications of reduced production costs seem self-evident, their potential still hinges on the magnitude of cost reductions implied. Indeed, if the saving is ‘not worth the candle’ private agents are unlikely to be interested. Priority should therefore be given to those interventions that are likely to generate the most significant gains.

2.2 Likely benefits

Improved productivity implies lower production costs for domestic rice. This implies an outward shift of the domestic rice supply curve. This outward shift creates an economic surplus for the economy, typically shared between producers and consumers depending on the slopes of the supply and demand curves. This economic surplus could conceivably amount to some Naira

1,060 million annually (or the equivalent of US$ 8.1 million) for each Naira unit reduction of domestic rice production cost.[4]

Under normal circumstances in an open economy, such an outward shift would typically imply a lower rice price and an increase in domestic rice consumption and production. The Nigerian situation is compounded by the presence of imported rice and it being an imperfect substitute for domestic rice in view of its better quality. In the presence of imported rice, the price elasticity for demand for domestic rice is low in Nigeria. Indeed, lower domestic rice prices are likely to result in only limited substitution of domestic rice for imported rice because of the quality difference – although there may still be some substitution of domestic rice for other staples. Lower domestic rice prices are therefore likely to result in only a limited increase in overall rice consumption (i.e. imported plus domestic). And without a concomitant increase in the domestic rice quality issue, will only result in a limited increase in Nigerian self-sufficiency in rice.

The effects of the lower production costs of domestic rice will in part compensate and offset some of the effects of the recent increase in effective duty on imported rice – particularly in terms of the inflationary effect on rice prices (particularly relative to other staples) and the subsequent substitution of other staples for rice.

The subsequent sections review the best-bet options and related activities for the main three ecologies and rice processing/marketing in sequence.

2.3 Enhancing lowland rice production

Table 2 presents some lowland production cost scenarios. The current scenario presents the average production costs for lowland farmers during the producer survey (Erenstein et al 2003). The last three sets of columns present the break-even situation under varying protection levels:

- '50% duty' scenario: represents the situation at the time of the survey.
- '115% duty' scenario: represents the current situation after the recent increase in protection levels.
- 'no protection' scenario: represents the situation when no import duties on rice apply.

For each scenario the break-even yield and break-even cost under the prevailing protection level are presented separately. The break-even scenario shows the level of the corresponding variable (yield or cost) needed for costs (including opportunity costs) to equal benefits when domestic rice is valued at import parity.

Whereas the break-even scenarios rely on the variation of one single variable, the goal scenario allows for simultaneous variation of the two key variables (yields and costs). For simplicity, the goal scenario attributes an equal weight to each key variable. The goal scenario also assumes the ideal case of no protection. It thereby represents an indication of the simultaneous yield increase and cost reduction needed to make domestic lowland rice competitive with imported rice.

With a current yield of 1.7 mt paddy per ha, lowland rice yields would need to improve with 41% for lowland rice to break even under the situation prevailing tat the time of the survey. Alternatively, production costs would need to be reduced by 29%.

[4] This estimate reflects a current domestic rice production of 2.1 million mt and the unit reduction ion production cost being achieved by 50% of domestic production.

The recent increase in duty on imported rice is sufficient to ensure profitability of domestic rice production – the average yield surpassing the break-even yield or alternatively, the production costs being lower than the break-even production cost. As mentioned earlier, the current duty levels however imply substantial social costs.

For lowland rice to be competitive without protection, yields need to be improved by at least 130% to an average of slightly under 4 mt paddy per ha. Alternatively, production costs need to be slashed by at least 57% to not more than Naira 25,000 per ha if the current yield level of 1.7 mt paddy is maintained. The lowland goal scenario implies a yield increase of 65% to an average yield of 2.8 mt paddy per ha and a simultaneous cost decrease of 28% to Naira 41,000 per ha. The needed yield increase and cost decrease to make Nigerian lowland rice are potentially achievable with the best-bet technologies as indicated below.

Table 2 Lowland production cost scenarios

Scenario:		Current	Goal	No protection		50% duty		115% duty	
				BE yld	BE Cost	BE yld	BE Cost	BE yld	BE Cost
Yield increase		-	65%	130%		41%		-6%	
Cost decrease		-	-28%		-57%		-29%		7%
Yield	mt/ha	1.70	2.81	3.91	1.70	2.40	1.70	1.59	1.70
Production cost	N/ha	57 500	41 248	57 500	24 995	57 500	40 808	57 500	61 364
	N/kg paddy	33.82	14.70	14.70	14.70	24.00	24.00	36.10	36.10
Processing cost	N/kg rice	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
Total cost	N/kg rice	62.87	31.01	31.01	31.01	46.51	46.51	66.66	66.66
	US$/kg rice	0.48	0.24	0.24	0.24	0.36	0.36	0.51	0.51

The most promising venue for yield enhancement in the rainfed lowlands is the enhanced use of improved varieties in farmers fields. This calls for varietal dissemination and varietal improvement. The most promising venue for reducing production costs relates to improving rice management, including the increased use of cost saving technologies.

Development efforts in lowlands should particularly target lowlands with limited flooding levels (i.e. lowlands without deep-flooding). Deep-flooded lowlands offer less direct opportunities for yield enhancement and cost reduction along the lines discussed here. Particularly the opportunities for the use of improved varieties are limited as this ecology has been relatively ignored by rice breeders. Furthermore, these areas already typically have reduced production costs in view of the widespread use of labor-saving technology (mechanization, herbicides) to establish large areas within limited time prior to the floods limiting access to the fields.

2.3.1 Lowland varietal dissemination

Although numerous varieties have been developed and released in Nigeria, uptake by farmers has typically been limited. In part this is likely due to limited access to the developed products. The participatory varietal selection (PVS) methodology used by WARDA and its Nigerian partners is already a welcome step towards moving towards the farmer fields. Still PVS is primarily a research tool and the number of farmers potentially covered are still limited – the more so in view of the size of Nigeria. There is a need to make the released varieties available to a much wider range of rice producers and allow them to assess the scope of these varieties under there own field conditions. This calls for the multiplication of released varieties and making seed widely available in the likely appropriate rice growing regions.

There appear to be substantial barriers to entry in terms of establishing a viable rice seed industry in Nigeria. In part this reflects the market limitations of a crop where there is limited perceived need by farmers to renew seed annually – and hence each farmer may purchase seed only once every so many years. At least initially, there is a need for substantial public sector involvement, particularly in initial seed distribution and marketing (eg through ADPs and their field agents in the selected states) – although seed multiplication may be contracted out to the private sector (eg Premier seed). Such varietal dissemination activities should be coordinated closely by the Africa Rice Initiative once it becomes operational in Nigeria – although the latter will initially likely focus more on upland rice.

Best-bet varieties:

- WITA 4 (FARO 52): a rainfed lowland variety tolerant to iron toxicity and drought. Recent trial results (across 8 sites in Nigeria) showed that WITA 4 outyielded local checks by 78%, providing an average yield of 3.8 mt/ha (against 2.5 mt/ha for the local), with lower yield variation (coefficient of variation of respectively 59% and 84% - based on averages over sites).
- CISADANE (FARO 51): a rainfed lowland variety tolerant to the African Rice Gall Midge (AfRGM), the most important insect pest of rice in Nigeria.
- Other varieties for rainfed lowland condition: FARO 35 (ITA 212), FARO 36 (ITA 222) and FARO 37 (ITA 306). All these varieties are already popular with farmers particularly in the North. Many farmers also like FARO 44 (SIPI) for its early maturity and good quality grain but it is susceptible to iron toxicity.

Proposed activities:

1. *Seed multiplication:* Multiplication of recently released improved varieties for certified seed purposes (starting with 50 tons/year/variety, with potential increase subject to demand).
2. *Seed marketing:* Marketing of small packages (1, 5 and 10 kg) of such certified seed to farmers through a network of sale outlets. The ADP could be the initial suppliers. Other stakeholders could take on an increasing role for seed supply of these varieties as the interest in certain varieties expands. It is recommended that the seed is sold at least at cost price and with an initial maximum per client to ensure a wider coverage. As other partners take on new roles in multiplying and marketing the new seeds the need to regulate prices and quantities can be waived and left to the nascent seed market. There would be a need to certify seed quality.
3. *Maintenance breeding:* to maintain the breeder seeds as a source for further multiplication.
4. *Varietal dissemination mechanisms:* Development of novel varietal dissemination mechanisms – including public – private partnerships and seed networks.
5. *Extension:* Dissemination of information on improved varieties (e.g. varietal characteristics, procurement sources) and seed renewal practices – including pamphlets and targeted media (e.g. rural radio).

Proposed leader: Africa Rice Initiative - Nigeria[5]

[5] The Africa Rice Initiative (ARI) is a recently established regional rice varietal dissemination program hosted by WARDA with a national program of activities and implementing partners in selected countries – including Nigeria. At the time of writing ARI-Nigeria was in the process of becoming operational and would spearhead rice varietal dissemination in Nigeria (www.warda.org).

Proposed collaborators by activity:

	Activity number				
	1	2	3	4	5
Africa Rice Initiative - Nigeria				X	X
Private sector (e.g. Premier Seed Nigeria Ltd - Zaria, others)	X	X			X
Agricultural Development Projects (ADPs – e.g. Niger, Kaduna, Benue, Ebonji, others)		X			X
NGOs (state dependent)		X			X
WARDA – Ibadan			X		

2.3.2 Lowland varietal improvement

The current set of activities in varietal improvement need to be continued, strengthened and expanded in scope. WARDA, in collaboration with NCRI and other national partners have made much progress in recent years in terms of developing appropriate improved varieties for the lowland ecology – including the release of WITA 4 and Cisadane.

Varietal improvement however never stops with the release of a new variety as there is always scope and need for further improvement (eg in terms of yield stability; adaptability across environments; stress resistance/tolerance) and replacement of old lines. In addition to continuation, there is a need to strengthen on-going efforts in terms of the currently limited resources available and to expand the scope of efforts. Indeed, resources for varietal development in Nigeria are scarce, particularly compared to the rice growing area and potential size of benefits.

WARDA's main activities on lowland rice varietal improvement are carried out at IITA Ibadan, with outposts at Edozhigi (Bida) in the Guinea Savanna and Abakaliki in the humid forest zone. WARDA currently collaborates closely with NCRI, including the NCRI outstations in Edozhigi and Abakaliki which offer good facilities for joint on-farm screening. Nigeria is currently the principal regional outpost for the African Rice Gall Midge (AfRGM). Abakaliki is the hot spot for the AfRGM. WARDA has access to screen houses for screening varieties for resistance / tolerance to biotic pests (AfRGM, RYMV, blast) and adequate laboratory space. Edozhigi is used mostly for iron toxicity screening.

Best-bet lines (elite lines in advanced development stage):

- TOX 4004-43-1-2-1, TOX 4303-13-3-1-1-2, TOX 4004-8-1-2-3, BW 348-1 and WITA 12: These have undergone three years of evaluation with farmers. These lines are tolerant to iron toxicity and drought stress.

Proposed activities:

1. *Initial lowland rice screening:* Evaluation of rice lines at Ibadan starts from the Pedigree Nursery (PN) through Advanced Yield Trials (AYT). Data are collected on response to biotic (diseases and insect pests) and abiotic (Fe toxicity) stresses, lodging, earliness and grain quality.
2. *Advanced lowland screening:* Outstanding lines are nominated into the PVS rice garden and/or the Coordinated Rice Evaluation Trial (CRET) of the NCRI.
3. *Varietal release:* From the results of these trials, recommendations are made to the Variety Release Committee.

Proposed leader: WARDA

Proposed collaborators by activity:

	Activity number		
	1	2	3
WARDA – Ibadan	X	X	
PVS collaborators (ADPs[6], NGOs)		X	
National Cereals Research Institute (NCRI, Badeggi)		X	
National Rice/Maize Centre, Federal Ministry of Agriculture			X

2.3.3 Enhancing labor productivity in lowland rice

High labor costs are the key cost component undermining the price competitiveness of Nigerian rice. Labor alone represents 83% of the estimated production cost of upland rice (Erenstein et al, 2003). The only viable way to reduce production costs is to tackle the inherently low labor productivity in lowland rice through the use of labor-saving technology. The three main labor demanding activities in lowland rice production are:

1. land preparation (27% of average labor needs);
2. weeding (27%);
3. harvesting, threshing and winnowing (32%).

Appropriate mechanization and herbicides are two key labor-saving technologies to boost labor productivity to address the labor bottle necks of land preparation and weeding. Indeed, slightly over half the surveyed farmers across the main ecologies were already using either traction and/or herbicides in their current production rice production practices. Both technologies already provided a significant reduction in labor demand. Herbicide use is particularly common in the lowlands, with half the surveyed lowlands farmers using herbicides for weeding and 11% during land preparation. Traction use is less widespread, with 31% of surveyed lowland farmers reportedly using it. Use in part reflects the availability of the technology at the village level, with 66% of the villages reporting access to herbicides and 44% to traction (Erenstein et al, 2003:39).

There is considerable scope in ameliorating and spreading the use of herbicides. First, although use is already relatively common, about half of the surveyed lowland farmers did not use herbicides. Second, although relatively common, herbicide doses used and particularly herbicide use efficiency seem low. Indeed, part of the labor-saving effect is thereby forfeited and herbicide use is often complemented by manual weeding. This suggests considerable labor-savings are still achievable by a more informed and efficient herbicide use - herbicide use being relatively knowledge intensive. Herbicide use in itself is facilitated by the market orientation of rice production and relatively widespread availability of herbicides.

The case for ameliorating and spreading the use of traction is less obvious. Although mechanized traction is labor-saving compared to land, it is capital intensive. Past public efforts at tractorization have also not been too successful. Animal traction is less capital intensive and currently in use in certain lowland rice production – but its spread seems subjected to a number of other constraints. Two-wheel tractors are also less capital intensive than standard four-wheel tractors. However, their potential seems more appropriate for lowlands with at least some degree of water control and corresponding intensification potential.

[6] WARDA currently works closely with ADPs in Oyo, Ogun, Osun, Ekiti, Kwara, Kaduna, Ebonyi, Nassarawa, Benue, Kano, Abia – particularly in the field of PVS.

A venue worth exploring is the applicability of reduced and zero-tillage practices in lowland rice production. These systems substitute chemical control for mechanical land preparation and weeding. They have potential to be economically viable, as they address two pronounced labor peaks, conceivably allowing for an expansion of rice area per household. These systems would however still require further research and local adaptation before large-scale dissemination.

Another area holding high economic potential is the small-scale mechanization of post-harvest operations – particularly threshing. Threshing is a labor-intensive operation with negligible mechanization so-far in Nigeria. When appropriate, threshers tend to be highly economical (Donovan & Douthwaite, 1997) and when available, widely adopted in extended rice growing areas (Wopereis et al, 1998). WARDA has co-developed a thresher in Senegal and this prototype can be adapted locally. The strengths of the thresher include its size and that it is produced locally by black smiths – ensuring that the availability of spare parts are no bottleneck to its continued use.

Best-bet technologies:
- appropriate herbicide use (e.g. based on active ingredients glyphosate, 2,4-D, others)
- reduced and zero-tillage practices
- adapted thresher/cleaner (based on ASI prototype)

Proposed activities:
1. *Testing and adaptation of herbicide options:* Selected herbicides will be widely tested and adapted as needed to the local circumstances in lowland rice fields. The purpose is to derive a range of suitable herbicides from which lowland rice farmers can choose and test whatever is most appropriate for their needs. That is, the purpose is not to derive a fixed set of recommendations but a set of propositions which have shown potential within the local setting.
2. *Herbicide use promotion:* Promotion involves both dissemination of herbicide use and ensuring its appropriate use. Appropriate use emphasizes both herbicide use efficiency and health/environmental aspects. Includes herbicide use demonstrations, demonstration plots in farmers fields, training and discussions, development and distribution of extension material. Promotion focuses on a limited number of herbicides (active ingredients). Likely to include public – private sector partnerships.
3. *Development of reduced and zero-tillage options:* Testing and adaptation of chemical tillage based lowland rice production in a limited number of settings. When proven promising, move to wider testing and possibly dissemination. Linked to herbicide use activities.
4. *Production and promotion of adapted thresher/cleaner* (based on ASI prototype): Implies training of selected blacksmiths in producing local version of adapted thresher/cleaner. Includes initial testing and adaptation to local needs. Subsequent promotion includes demonstrations and information dissemination.

Proposed leader: WARDA

Proposed collaborators by activity:

	Activity number			
	1	2	3	4
WARDA – Ibadan	X		X	X
NCRI – Badeggi	X		X	
ADP (Niger, Kaduna, Benue, others) & NGOs (state dependent)		X		
Agro-industry (herbicide marketers)	X	X		
Nova technology, Ibadan[7]				X

2.3.4 Other considerations for improved lowland rice production

To reduce production costs in the medium term improved varieties and labor-saving technologies hold most promise. Indeed, labor and not land tends to be the most limiting factor in this ecology in the medium term. In addition, the rainfed lowlands are characterized by having no water control – and intensification without water control is thereby inherently risky. Part of the production risk relates to flooding. In this respect it is worth engaging in discussions to optimize water allocation and flood control along major river basins to improve rice production on flood plains by involving River Basin Development Authorities.

Lowland intensification may hold promise in certain settings – particularly in lowlands in areas with good market access and relatively high population densities. To obtain full water control requires major investments which are unlikely to be socially viable (Lançon & Erenstein, 2002). More appropriate for these settings are improved field-level water management practices - i.e. bunding and other small-scale interventions. These options may merit further research and development interventions. In tandem, improved water management opens the way for integrated crop management practices and intensification measures. Venues worth exploring in these instances are increased use of transplanting, increased fertilizer use (now 69% of lowland farmers use, but at relatively low doses) and enhancing fertilizer-use efficiency (e.g. through the use of split-applications [now only 7% of lowlands farmers split] and more balanced use of fertilizer types in terms of quantity and time of application).

A number of lowland biotic (e.g. African rice gall midge; Rice yellow mottle virus RYMV) and a-biotic stresses (e.g. Fe-toxicity) can be addressed by using appropriate improved varieties - i.e. varieties with tolerance or resistance against the respective stresses (see above).

2.4 Enhancing upland rice production

Table 3 presents some upland production cost scenarios along the same lines as lowland.[8] With a current yield of 1.9 mt paddy per ha, upland rice yields would need to improve with 40% for upland rice to break even under the situation prevailing at the time of the survey. Alternatively, production costs would need to be reduced by 29%. The recent increase in duty on imported rice is sufficient to ensure profitability of domestic rice production.

For upland rice to be competitive without protection, yields need to be improved by at least 128% to an average of 4.3 mt paddy per ha. Alternatively, production costs need to be slashed by at

[7] Private enterprise able to develop machine prototypes. Participated in stakeholder workshop (NISER & WARDA, 2001).

[8] For explanations see discussion above in section 2.3. The current scenario presents the average production costs for upland farmers during the producer survey (Erenstein et al 2003).

least 56% to not more than Naira 28,000 per ha if the current yield level of 1.9 mt paddy is maintained. The upland goal scenario implies a yield increase of 64% to an average yield of 3.1 mt paddy per ha and a simultaneous cost decrease of 28% to Naira 46,000 per ha. The needed yield increase and cost decrease to make Nigerian upland rice are potentially achievable with the best-bet technologies as indicated below.

Table 3 Upland production cost scenarios

Scenario:		Current	Goal	No protection		50% duty		115% duty	
				BE yld	BE Cost	BE yld	BE Cost	BE yld	BE Cost
Yield increase		-	64%	128%		40%		-7%	
Cost decrease		-	-28%		-56%		-29%		7%
Yield	mt/ha	1.90	3.12	4.34	1.90	2.66	1.90	1.77	1.90
Production cost	N/ha	63 800	45 868	63 800	27 936	63 800	45 609	63 800	68 583
	N/kg paddy	33.58	14.70	14.70	14.70	24.00	24.00	36.10	36.10
Processing cost	N/kg rice	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
Total cost	N/kg rice	62.46	31.01	31.01	31.01	46.51	46.51	66.66	66.66
	US$/kg rice	0.48	0.24	0.24	0.24	0.36	0.36	0.51	0.51

The most promising venue for yield enhancement in the uplands is the enhanced use of improved varieties in farmers fields. The most promising venue for reducing production costs relates to the increased use of cost saving technologies.

2.4.1 Varietal dissemination

Similar to lowland rice ecology there is substantial scope for the dissemination of improved upland rice varieties.

Best-bet varieties:
- ITA 321 (FARO 53): a high yielding rainfed upland variety resistant to blast.
- WAB 189-B-B-B-8-HB (FARO 54): a high yielding early maturing rainfed upland variety.
- NERICA 1 (FARO 55): a high yielding early and drought tolerant variety which performs better than existing varieties under low input.

The three released upland varieties outperformed by at least 75%, with FARO54 performing well in all the agro-ecological zones (Table 4).

Table 4 National average yield of WARDA's new Upland rice varieties

Variety	Average yield kg/ha	% Yield index over local
FARO 54 (WAB 189-B-B-B-8-HB)	2100	175
FARO 55 (WAB 450-1-B-P-38-HB)	2100	175
WAB 450-11-1-P31-1-HB	2000	166
WAB 450- P160-HB	2000	166
FARO 53 (ITA 321)	2600	216
Farmers Local	1200	100

Source: Trial in 21 states of the National Rice/Maize Centre of the Federal Ministry of Agriculture, as cited by Osiname, unpublished memeo.

Proposed activities:

1. *Seed multiplication:* Multiplication of recently released improved varieties for certified seed purposes (starting with 50 tons/year, with potential increase subject to demand). Premier Seeds is in position to supply tonnes of seeds of FARO 54 and FARO 55 to farmers.
2. *Seed marketing:* Marketing of small packages (1, 5 and 10 kg) of such certified seed to farmers through a network of sale outlets (see lowland varietal dissemination above for details).
3. *Maintenance breeding:* to maintain the breeder seeds as a source for further multiplication.
4. *Varietal dissemination mechanisms:* Development of novel varietal dissemination mechanisms – including public – private partnerships and seed networks.
5. *Extension:* Dissemination of information on improved varieties (e.g. varietal characteristics, procurement sources) and seed renewal practices – including pamphlets and targeted media (e.g. rural radio).

Proposed leader: Africa Rice Initiative - Nigeria

Proposed collaborators by activity:

	Activity number				
	1	2	3	4	5
Africa Rice Initiative – Nigeria				X	X
Private sector (e.g. Premier Seed Nigeria Ltd - Zaria, others)	X	X			X
Agricultural Development Projects (ADPs – Kaduna, Ekiti, others)		X			X
NGOs (SHARE Foundation, Maryland Farms, Watershed Initiative in Nigeria - WIN, others)[9]	X	X			X
WARDA – Ibadan			X		

2.4.2 Varietal improvement

The current set of activities in varietal improvement need to be continued, strengthened and expanded in scope. WARDA, in collaboration with NCRI and other national partners have made much progress in recent years in terms of developing appropriate improved varieties for the upland ecology – including the release of FARO 53, FARO 54 and FARO 55 (NERICA 1).

[9] These NGOs are already multiplying seed on a limited scale for the PVS activities in collaboration with WARDA.

WARDA's main activities on upland rice varietal improvement in Nigeria are carried out at IITA Ibadan and the Ikenne outpost in the humid forest zone. WARDA in collaboration with its national partners has gained substantial experience in the on-farm evaluation of elite lines in various agro-ecological zones in Nigeria through Participatory Varietal Selection (PVS). This approach is employed to assess adaptability, acceptability and farmer preferences of new rice lines. The PVS provides pathways for farmers and other user groups to influence research, and it also allows research to identify niches and categorize groups by the importance they gave rice varietal characteristics when making their selection decisions.

Best-bet lines (elite lines in advanced development stage):

- WAB 450-1-B-P160-HB, WAB 450-1-B-P-28-HB and WAB 880-1-32-1-1-P2-HB: . These three lines will be tested widely across Nigeria in collaboration with the Rice/Maize Center in year 2004 to determine extent of adaptability.

Proposed activities:

1. *Initial lowland rice screening:* Evaluation of rice lines at Ibadan starts from the Pedigree Nursery (PN) through Advanced Yield Trials (AYT). Data are collected on response to biotic (diseases and insect pests) and abiotic (Fe deficiency) stresses, lodging, earliness and grain quality.
2. *Advanced lowland screening:* Outstanding lines are nominated into the PVS rice garden and/or the Coordinated Rice Evaluation Trial (CRET) of the NCRI.
3. *Varietal release:* From the results of these trials, recommendations are made to the Variety Release Committee.

Proposed leader: WARDA

Proposed collaborators by activity:

	Activity number		
	1	2	3
WARDA – Ibadan	X	X	
PVS collaborators (ADPs[10], NGOs, University of Agriculture, Abeokuta - UNAAB)		X	
National Cereals Research Institute (NCRI, Badeggi)		X	
National Rice/Maize Centre, Federal Ministry of Agriculture			X

2.4.3 Enhancing labor productivity in upland rice

High labor costs are the key cost component undermining the price competitiveness of Nigerian rice. Labor alone represents 87% of the estimated production cost of upland rice (Erenstein et al, 2003). The only viable way to reduce production costs is to tackle the inherently low labor productivity in upland rice through the use of labor-saving technology. The three main labor demanding activities in upland rice production are land preparation (24% of average labor needs); weeding (29%); and harvesting, threshing and winnowing (30%). The %-shares mask that the overall labor needs amongst the surveyed farmers for upland rice are substantially higher than for lowlands – in part a reflection of the less widespread use of labor-saving technology (herbicides, mechanization) and the preference for dibbling over broadcasting.

[10] WARDA currently works closely with ADPs in Oyo, Ogun, Osun, Ekiti, Kwara, Kaduna, Ebonyi, Nassarawa, Benue, Kano, Abia – particularly in the field of PVS.

Appropriate herbicide use is again the key labor-saving technology to boost labor productivity to address the labor bottle necks of land preparation and weeding. Herbicide use is relatively uncommon in the uplands (reported by only 28% surveyed upland farmers) – its use being limited to weeding and to uplands in the savannah zone. Indeed, herbicide use during land preparation and in the forest zone was not reported amongst survey upland farmers. There is considerable scope in ameliorating and spreading the use of herbicides. Even for current herbicide users in uplands, herbicide doses used and particularly herbicide use efficiency seem low. This suggests considerable labor-savings are still achievable by a more widespread, better informed and more efficient herbicide use - herbicide use being relatively knowledge intensive. Herbicide use in itself is facilitated by the market orientation of rice production and in the North-Central zone by the relatively widespread availability of herbicides.

Enhancing herbicide use is linked to ameliorating and further extending reduced and zero-tillage practices in upland rice production. In fact 40% of surveyed upland farmers already use zero-tillage systems – but with manual land clearing, no tillage but also no herbicide use during land preparation. Increased herbicide use has the potential to be economically viable, as it alleviates two pronounced labor peaks, conceivably allowing for an expansion of rice area per household.

Traction use was relatively uncommon amongst surveyed farmers for upland rice (18% using tractors, none using animal traction). The case for ameliorating and spreading the use of traction is again less obvious (see lowland above).

Best-bet technologies:
- appropriate herbicide use (e.g. based on active ingredients glyphosate, 2,4-D, others) and related reduced and zero-tillage practices

Proposed activities:
1. *Testing and adaptation of herbicide options:* Selected herbicides will be widely tested and adapted as needed to the local circumstances in upland rice fields. The purpose is to derive a range of suitable herbicides from which upland rice farmers can choose and test whatever is most appropriate for their needs. That is, the purpose is not to derive a fixed set of recommendations but a set of propositions which have shown potential within the local setting.
2. *Herbicide use promotion* (similar to lowland – see above)
3. *Adaptation/development of reduced and zero-tillage options*.

Proposed leader: WARDA

Proposed collaborators by activity:

	Activity number		
	1	2	3
WARDA – Ibadan	X		X
NCRI – Badeggi	X		X
University of Agriculture, Abeokuta (UNAAB)	X		X
ADP (Kaduna, Ekiti, others) & NGOs (state dependent)		X	
Agro-industry (herbicide marketers)	X	X	

2.4.4 Other considerations for improved upland rice production

To reduce production costs in the medium term improved varieties and labor-saving technologies hold most promise for upland rice – similar to the lowland ecology. Indeed, labor and not land also tends to be the most limiting factor in this ecology in the medium term. Gradual upland intensification with external inputs as fertilizer may hold promise in certain settings – particularly in areas with good market access and relatively high population densities. Fertilizer use in upland rice is relatively limited overall (41% surveyed upland farmers reporting), and tends to be concentrated in the savannah area (Kaduna). Other venues worth exploring are crop rotations with productive legumes.

Bird damage is particularly a problem in upland areas. However, no easy solution exists. However, bird damage tends to be diffused in areas with significant rice areas and that synchronization of planting may also help to diffuse damage. Farmers in upland areas already tend to hang unrolled cassette tapes in their fields to scare birds.

2.5 Enhancing irrigated rice production

Table 5 presents some irrigated production cost scenarios along the same lines as lowland.[11] With a current average yield of 3.9 mt paddy per ha, irrigated rice yields are already above break even yields under the situation prevailing at the time of the survey. Similarly, production costs are already below break-even levels. The recent increase in duty on imported rice only further enhances the private profitability of domestic rice production.

For irrigated rice to remain competitive without protection, yields need to be improved by at least 12% to an average of 4.4 mt paddy per ha. Alternatively, production costs need to be reduced by at least 11% to not more than Naira 60,000 per ha if the current yield level is maintained. The irrigated goal scenario implies a yield increase of only 6% to an average yield of 4.2 mt paddy per ha and a simultaneous cost decrease of 6% to Naira 61,500 per ha. The needed yield increase and cost decrease to make Nigerian irrigated rice are relatively small and easily achievable with the best-bet technologies as indicated below.

Table 5 Irrigated rice production cost scenarios

Scenario:		Current	Goal	No protection		50% duty		115% duty	
				BE yld	BE Cost	BE yld	BE Cost	BE yld	BE Cost
Yield increase		-	6%	12%		-31%		-54%	
Cost decrease		-	-6%		-11%		45%		118%
Yield	mt/ha	3.94	4.19	4.43	3.94	2.71	3.94	1.80	3.94
Production cost	N/ha	65 150	61 540	65 150	57 930	65 150	94 578	65 150	142 220
	N/kg paddy	17.81	14.70	14.70	14.70	24.00	24.00	36.10	36.10
Processing cost	N/kg rice	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
Total cost	N/kg rice	36.18	31.01	31.01	31.01	46.51	46.51	66.66	66.66
	US$/kg rice	0.28	0.24	0.24	0.24	0.36	0.36	0.51	0.51

[11] For explanations see discussion above in section 2.3. The current scenario presents the average yield and production costs for irrigated farmers during the producer survey (Erenstein et al 2003) and the irrigated scheme survey (Kebbeh et al, 2003). Although the study method and sites were different for the two studies, they both came up with relatively similar estimates for irrigated rice.

Of the three main ecologies, irrigated rice clearly presents the most favorable competitiveness with imported rice. However, current private profitability mask the significant investments made earlier by the public sector. Indeed, new investments in irrigated schemes are unlikely to be socially profitable (Lançon & Erenstein, 2002).

There is also significant variation amongst irrigation schemes. Indeed, the priority is to enhance the performance of existing operational irrigation infrastructure before rehabilitating or expanding irrigation infrastructure. In this regard there is need for capacity building and farmer involvement to enhance operation and maintenance. Performance also varies by water source and pumping of water increases production costs and results in limited profitability.

The most promising venue for yield enhancement in irrigated rice is the enhanced use of improved varieties in farmers fields. The most promising venue for reducing production costs relates to the increased use of labor saving technologies and integrated crop management measures.

2.5.1 Varietal improvement & dissemination

The current set of activities in varietal improvement for irrigated rice need to be continued, strengthened and expanded in scope. There is considerable potential for spill over from WARDA's on-going work in the Sahel region – where numerous high potential varieties have been and/are being developed. WARDA, in collaboration with NCRI and other national partners, should test a number of the promising lines under Nigerian conditions. These varieties hold particular promise for the Sahelian irrigation schemes in northern Nigeria.

WARDA's main activities on irrigated rice varietal improvement in Nigeria are carried out at IITA Ibadan and the Ikenne outpost in the humid forest zone. WARDA in collaboration with its national partners has gained substantial experience in the on-farm evaluation of elite lines in various agro-ecological zones in Nigeria through Participatory Varietal Selection (PVS). This approach is employed to assess adaptability, acceptability and farmer preferences of new rice lines. The PVS provides pathways for farmers and other user groups to influence research, and it also allows research to identify niches and categorize groups by the importance they gave rice varietal characteristics when making their selection decisions.

Best-bet lines/varieties:
- FARO 50 (ITA 230).
- A number of promising lines currently being tested by WARDA Sahel, including both intraspecifics and interspecifics (Table 6).
- Sahel 108, Sahel 202: These are introduced materials that have been highly successful in the Sahel (eg Senegal).

Table 6 Promising new lines from WARDA Sahel station for irrigated rice in Nigeria

Line	Cycle (days)	Height (cm)	Pan / m2	Potential yield (t/ha)
WAS 73-B-B-246-1	114	107	435	9
WAS 21-B-B-20-4-3-3	110	95	426	10
WAS 20-B-B-5-10-1	118	97	418	9
WAS 62-B-B-14-1-4-2	120	102	489	10
WAS 33-B-B-15-1-4-5	118	102	495	9
WAS 19-B-B-52-4-4-1B	116	109	465	9
WAS 173-B-B-9-5	121	101	313	10
WAS 161-B-9-2 *	110	98	412	9
WAS 122-IDSA 13-WAS-B-FKR-1 *	123	96	433	9
WAS 161-B-6-B-3-1B *	116	102	437	9
WAS 161-B-9-1-FKR-1 *	121	89	433	10
WAS 191-10-3-FKR-1 *	117	110	541	9

Lines marked with an '*' are interspecifics.

Proposed activities:

1. *Initial irrigated rice screening:* Evaluation of rice lines on station under irrigation in Ibadan and in Kano.
2. *Advanced irrigated rice screening:* Outstanding lines are nominated for further on-farm/PVS testing and/or the Coordinated Rice Evaluation Trial (CRET) of the NCRI. Potential sites for such screening include Sokoto/Kebi, Kano (Bagauda Dam) and Maiduguri.
3. *Varietal release:* From the results of these trials, recommendations are made to the Variety Release Committee.
4. *Varietal dissemination:* Released varieties can subsequently be disseminated at larger scale.

Proposed leader: WARDA

Proposed collaborators by activity:

	Activity number			
	1	2	3	4
WARDA – Ibadan	X	X		
On-farm/PVS collaborators (ADPs, River Basin Authorities, NGOs)		X		X
National Cereals Research Institute (NCRI, Badeggi)		X		
National Rice/Maize Centre, Federal Ministry of Agriculture			X	
Africa Rice Initiative – Nigeria				X

2.5.2 Improved irrigated rice management

Relative to the two other main rice ecologies, irrigated rice holds most promise for intensification. Indeed, irrigation allows for water management and thereby opens the way for integrated crop management practices and intensification measures.

There is considerable scope to adapt irrigated rice technologies that have been successful in similar environments in other Sahel and Sudan Savanna regions (eg. Senegal, Mali, Mauritania). Integrated crop management improves crop management and input use efficiency. This does not necessarily imply the need for more or higher input use, but typically significant gains are

feasible through better input use, better timing and better integration with other practices (Donovan et al, 1999; Wopereis et al, 1999; Kebbeh & Miezan, 2003).

The reasonable yields help ensure the competitiveness of irrigated rice in Nigeria (particularly relative to the other main ecologies). Indeed, irrigated rice has a high labor input and labor alone again represents the main production cost (Erenstein et al, 2003). The use of labor-saving technology in irrigated rice is limited. Enhancing the use of labor-saving technology may thereby help further boost the competitiveness of irrigated rice. Venues worth exploring are the use of herbicides and two-wheel tractors. Two-wheel tractors are less capital intensive than standard four-wheel tractors and are likely to be particularly appropriate in schemes with overall small farm and field sizes.

Another area holding high economic potential is the small-scale mechanization of post-harvest operations – particularly threshing. Threshing is a labor-intensive operation with negligible mechanization so-far in Nigeria. As outlined above, appropriate mechanized alternatives exist but these need to be further adapted to the Nigerian setting. Particularly promising are the thresher co-developed by WARDA in Senegal (also see 2.3.3 above; Donovan & Douthwaite, 1997; Wopereis et al, 1998).

Options for the small-scale mechanization of harvesting may also merit further research (e.g. a reaper-harvester). Indeed, currently most irrigation schemes are harvested manually. In some schemes (eg South Chad) combine harvesters are in use but present problems in terms of availability and appropriateness (Kebbeh et al, 2003).

Best-bet technologies:
- integrated crop management
- enhanced use of agro-chemicals (fertilizers, herbicides –in terms of dose used, active ingredient and use efficiency);
- small-scale mechanization of harvest and post harvest operations (Thresher-cleaner, reaper-harvester);
- small-scale mechanization of land preparation (two-wheel tractors).

Proposed R&D activities:
1. *Adaptation of improved integrated crop management technologies:* Site specific adaptation in a limited number of key irrigated sites (one or two) for participatory on-farm research and development (R&D) activities.
2. *Agro-chemical use promotion:* Promotion of both fertilizer and herbicide use. Includes both dissemination of use and ensuring its appropriate use. Includes herbicide use demonstrations, demonstration plots in farmers fields, training and discussions, development and distribution of extension material. Includes public – private sector partnerships.
3. *Development and adaptation of small farm machinery for harvest and post harvest operations* (Thresher-cleaner, reaper-harvester – also see 2.3.3 above).
4. *Access to and promotion of two-wheel tractors*: Promotion includes demonstrations and information dissemination on potential of two-wheel tractors and potential sources for access. In addition to importation from Asia may explore options for local production.

Proposed leader: WARDA

Proposed collaborators by activity:

	Activity number			
	1	2	3	4
WARDA – Ibadan	X		X	
NCRI – Badeggi	X			
ADP (Kano, Chad, others) & NGOs (state dependent)	X	X		
Agro-industry (agro-chemical marketers)		X		
Nova technology, Ibadan			X	X
Agro-machinery dealers (importers; marketers)				X

2.6 Enhancing rice processing and marketing

2.6.1 Improved processing technology

Processing cost merit attention as they are likely to represent an increasing share of the total production costs for local rice. Emphasis thereby should be on reducing the cost of parboiling. First, as parboiling makes up 75% of the processing cost, with milling contributing 17% and other operations the rest (Lançon et al, 2003b). Second, in terms of actual potential for costs reduction. The cost of current milling practices already appears competitive and is not foreseen to change dramatically over the medium term. The cost of parboiling however is inflated by current energy use. Furthermore, without technological improvement, this cost is likely to increase over time as pressure on wood as energy source increases and thereby its cost.

Rice processing is significantly different from rice production in terms of factor costs. Energy represents 59% of total processing costs, with labor accounting for 27%, water 12% and others 2% (Lançon et al, 2003b). The low labor share is in part a reflection of the near-complete and successful substitution of labor-saving mechanization in milling for labor-intensive hand-pounding. The high energy share is a reflection of energy demanding processing technology – particularly for parboiling (50% of overall processing cost and 87% of energy cost).

The traditional parboiling technology in drums implies inefficient energy use. There seems considerable scope to adapt and promote existing more energy efficient parboiling techniques. Improved energy efficiency of parboiling would thereby reduce rice production costs. It would also greatly reduce the negative environmental externality implied by the reliance on fuel wood.

Improved (post-)harvest and processing technologies offer the potential for further costs reductions. Indeed, improved harvest and threshing technologies have important labor-saving potential – and have been addressed earlier at the production level (particularly for the lowland ecology [2.3.3] and the irrigated ecology [2.5.2]). The potential of the other post harvest and processing technologies primarily relates to quality improvement and this will be addressed in the subsequent chapter (see 3.4).

Best-bet technology:
- energy efficient parboiling technology

Proposed R&D activities:
1. *Adaptation and promotion of energy efficient parboiling technology:* Promotion includes demonstrations and information dissemination on potential of technology and potential sources for access. Adaptation includes the adaptation to local need and possibilities for local production.

Proposed leader/coordinator: WARDA

Proposed collaborators by activity:

	Activity number
	1
Nova technology, Ibadan	X
ADP (e.g. Niger, Kaduna, Ebonji)	X (promotion)

2.6.2 Reducing transaction costs along rice commodity chain

The domestic rice commodity chain would benefit from low transaction costs from rice producers upstream all the way to consumers downstream. Indeed, transaction costs are potentially high and thereby could further reduce the competitiveness of domestic rice vis-à-vis imported rice. There is a need to distinguish those transaction costs which are location (geography) specific from those that are rice sector specific.

Location specific transaction costs are geographically determined and are a function of the location of production, location of consumption and infrastructure linking the two locations. The domestic rice sector will naturally benefit from improvements in Nigerian infrastructure as these typically would imply lower transaction costs for delivery in urban markets and access to inputs. In this respect it is worth noting that a lasting geographic disadvantage for domestic rice is the proximity of the point of entry of imported rice to the main population centers in the South-West. However, despite the present state of Nigerian infrastructure, the location specific transaction costs do not seem the major bottleneck for price competitiveness. First, as transportation costs are dwarfed by the domestic production costs.[12] Second, as transportation costs do not prevent imported rice from even being traded in rice producing villages (Erenstein et al, 2003).

Rice sector specific transaction costs merit more attention – although by their nature they are difficult to quantify. First, there is a problem of domestic rice availability. Imported rice is typically available year round, in any quantity needed, at easily identifiable locations and negotiable terms. In contrast, domestic rice supply is seasonal, needs to be assembled in disperse and remote locations and needs to be paid on the spot. Support to the domestic rice marketing sector merits attention to enable it to reduce the corresponding transaction costs and enhance its competitiveness with imported rice marketing. Support could be directed at local rice retailing and trade expansion by facilitating access to working capital. This conceivably would enable the increase in size of operations; improve regularity of supply; and facilitate entry of new operators in the market to increase competition.

A second transaction cost problem is the heterogeneity of domestic rice. The domestic rice sector is hampered by all sorts of units, grades and names. This typically implies that each transaction can only take place between agents after direct assessment of the commodity on offer (e.g. in terms of quantity, grade and attributes). This augments transaction costs and commodity standardization could alleviate these.

[12] From the processor survey an average transportation cost of 1 to 2 Naira per kg can be estimated – which compares to a production cost of some Naira 50 per kg rice (Lançon et al, 2003b).

Best-bet approaches:
- Efficient local rice retailing/trade
- Standardization domestic rice commodity

Proposed R&D activities:
1. *Support local rice retailing and trade expansion:* Includes facilitating access to working capital and information sharing;
2. *Promoting standardization domestic rice commodity*: Includes development and application of standardization system for domestic rice units, grades and terminology (e.g. correspondence between rice and paddy names and their attributes).

Proposed leader/coordinator: RUSEP

3 Increasing quality competitiveness of Nigerian rice

In the long term, the competitiveness of the Nigerian rice economy will be strongly determined by productivity increases. Still, any effort in productivity enhancement will not return its full benefit if the quality of the local rice does not match urban consumers' requirements. Indeed, in spite of higher price, imported rice is increasing its market share in the Nigerian rice economy. This clearly shows the limits of the current trade policy imposing a high level of taxes on imported rice without having the expected impact on the local production.

The major determinant of the consumer shift towards more expensive imported rice is the appearance, the cleanliness and the homogeneity of the imported rice (Lançon et al, 2003a). There is still a market for local rice but mainly due to price differences, which attract low-income consumers who cannot afford to purchase imported rice on a regular basis. However, it is important to note that local rice consumers still acknowledge the higher organoleptic properties of local rice. Therefore the improvement of the Nigerian rice quality is a necessary condition to develop local rice production, which cannot be sustained without securing a durable outlet.

A recent processor survey (Lançon et al, 2003) indicates that only a minority of millers have full control of the process of transforming paddy into rice, including parboiling. Post-harvest operations are typically split among various operators, resulting in low coordination between parboiling and milling processes, and consequent lower recovery rates and rice quality at the milling stage. Furthermore, even though a wide nomenclature of paddy and rice types prevails there is no clear evidence of an effective system of reward to quality. It is important to note that the majority of processors do not have any direct interest in paddy or rice trade as they only mill paddy on a fee basis. Millers' opinions about incentives and rewards to quality are very mixed. Typically there is a lack of clear incentives from the consumer side for delivering clean and homogenous paddy that can match consumers' preference. This explains why there is limited investment in improved technology for cleaning paddy and packaging rice before delivering it to the consumers, in spite of potential significant returns on investment given the price differential between imported and local rice. Another constraint for investing in de-stoners and related equipment is the rather small size of the average mills (200 kg or rice per hours), which do not match the average capacity of de-stoners.

3.1 Priorities

Imported rice easily surpasses local rice in terms of quality and commands a quality premium. For domestic rice to be quality competitive it needs to drastically improve its quality – both in terms of its actual and perceived quality. There are already a number of potential technologies to improve rice quality – but they typically are not used, sometimes simply because there is not enough incentive to use them. A first priority is to enhance quality management along the commodity chain from the production to the retailing stage, including proper transmission of incentives and distribution of rewards.

A second priority is to rehabilitate the status and reputation of Nigerian rice among local rice consumers by convincing Nigerian consumers that the domestic rice industry is able to deliver a product that matches imported rice quality attributes for appearance and cleanliness.

Improving quality management calls for a clear commodity chain focus, where efforts are targeted to stakeholders within the same commodity chain. Furthermore, in view of the complexity and time needed a focus on relatively short identifiable chains is needed. Geographic

proximity of producers, processors, traders and consumers within the same chain therefore seems advisable. The North-Central region seems a priority intervention area in this respect – particularly Abuja and its rice producing areas.

In the end, the viability of quality enhancing interventions is to a large extent determined by the corresponding private returns (for individual rice producers, traders, etc). The potential of improved rice quality will only be realized when the stakeholders are adequately rewarded for the enhanced quality. Furthermore, the quality improvements need to be achieved in a cost effective way. Indeed, the costs for achieving quality improvements should not exceed the current reward to quality in terms of the price differential between domestic and imported rice. Priority should therefore be given to those interventions that are likely to generate the most significant gains within the margins imposed by imported rice.

3.2 Likely benefits

Improved quality implies a higher value for domestic rice. This implies an outward shift of the domestic rice demand curve (although at least initially, the aggregate rice demand will not shift). This outward shift creates an economic surplus for the economy, typically shared between producers and consumers depending on the slopes of the supply and demand curves. This economic surplus could conceivably amount to some Naira 10,600 million annually (or the equivalent of US$ 81 million).[13]

On aggregate, both producers and consumers will gain from quality improvement. For a given rice price level the aggregate rice demand is given – currently the sum of low quality domestic rice and high quality imported rice. Improving the quality of domestic rice would create a third intermediate category – high quality domestic rice. Assuming the latter category to be cheaper than imported rice and constant rice demand, this is likely to result in the substitution of quality domestic rice for quality imported rice as it is cheaper. In turn, this substitution is likely to result in overall lower rice prices and an increase in rice demand. Producers of domestic quality rice will still benefit – both from a higher price (then their current price) and increasing demand for their produce – resulting in increasing domestic supply. Consumers will benefit by paying lower prices for the same quality.

Quality improvement allows for a structural increase in the market share of domestic rice. It thereby represents the most viable way of approaching the political goal of self-sufficiency in rice without imposing excessive social costs.

Quality improvement allows domestic rice producers/traders to capture the current reward to quality. Depending on the urban market, imported rice commands at least a 20-30% premium. By improving quality, rice domestic rice can realistically recover part of the current price differential. This would allow for the revitalization of the most promising components of the rice sector. It would also restore incentives for investment in improved technology.

The subsequent sections review the best-bet options and related activities for the enhancing the quality of Nigerian rice.

[13] This estimate reflects a current domestic rice production of 2.1 million mt; a quality premium of Naira 10 per kg and enhanced quality for 50% of domestic production.

3.3 Improving the quality and homogeneity of paddy at the farm level

Integrated quality management along the entire commodity chain starts at the producer level. Indeed, producers variously affect the quality of the end product, including through their management of seed, production, harvest, threshing, parboiling, drying, milling, storage and marketing.

Primordial is the need to reduce mixing of varieties as this adversely affects the processing and thereby the quality of the rice produced. Potential mixing can occur at various stages at the farm level. Particularly important are:

- *Homogeneity of seed:* Farmers need to use pure varieties, i.e. farmers should not mix seeds of different varieties at planting. This implies a need for varietal identification and maintenance of varietal purity.
- *Homogeneity of produce:* Farmers need to keep different varieties separate during harvest and post harvest handling of varieties to prevent mixing.

Best-bet approaches:
- ensure quality and homogeneity of paddy at farm level

Proposed R&D activities:

1. *Dissemination of integrated quality management practices:* Includes demonstrations, training and information dissemination on potential, application and adaptation of appropriate improved quality determining practices. Includes both production level practices (e.g. handling of varieties/seed, handling and timing of pre-harvest practices) and post-harvest (threshing, winnowing, drying, parboiling, handling of produce).
2. *Promotion of homogeneity of seed and produce:* Includes demonstrations, training and information dissemination on practices affecting homogeneity of paddy at farm level.

Proposed leader/coordinator: WARDA

Proposed collaborators by activity:

	Activity number	
	1	2
ADP (Niger, Kaduna, Ebonji, Benue, others) & NGOs (state dependent)	X	X

3.4 Improving processing technology

Processing technology has a great influence on the eventual rice quality. Significant improvements on current practices can be made with existing technology. However, frequently such improved technology is not known – and this merits further promotional efforts. In other instances, improved technology may be known, but not available or inappropriate for the operators.[14] For a typical cottage industry improved technology frequently implies significant and indivisible investments – and their may be economies of scale negatively affecting smaller operators. This may call for innovative mechanisms for collective use of some technologies such as destoners to circumvent the indivisibility problem. In other instances, financing the initial investments in the improved technology may be problematic and innovative mechanisms for funding sources need to be explored. A rice development fund within the existing financial systems may be beneficial to that respect.

[14] Alternatively there may be no incentive for their use, an issue addressed in the next section.

Best-bet approaches:
- improved processing technology (parboiling; drying; milling; destoning; grading).

Proposed R&D activities:
1. *Training on improved parboiling and drying methods:* Includes demonstrations, training and information dissemination on improved parboiling and drying methods and potential sources for access. Includes both improved practices (e.g. quality and temperature of water - Ojehomon et al, 1998; location of drying and handling) and improved equipment.
2. *Dissemination of improved small-scale milling technology:* Includes demonstrations, training and information dissemination on improved milling methods and potential sources for access. Includes equipment operation and maintenance (including spare parts) and improved equipment types (e.g. rubber roller).
3. *Dissemination of destoners and their use:* Includes demonstrations, training and information dissemination on destoners and potential sources for access. This includes the establishment of mechanisms to enhance their collective use to circumvent indivisibility problem.
4. *Establishment of rice development fund:* Within existing financial system establish fund to facilitate investments in new rice processing technology/equipment.

Proposed leader/coordinator: WARDA

Proposed collaborators by activity:

	Activity number			
	1	2	3	4
ADP (Niger, Kaduna, Ebonji, Benue, others) & NGOs (state dependent)	X			
Innovative and leading processors (Abakaliki Rice Mill Owners Ind. Association, Abakaliki; Cirico Rice Mill Nig.Ltd., Bida)[15]		X	X	
Nova technology, Ibadan		X	X	
Agro-machinery dealers (importers; marketers; producers)		X	X	
(Agricultural) Banks				X

3.5 Improving rewards to quality at all stages of the marketing chain

Simply improving quality is not good enough. There is a need to develop mechanisms that improve the rewards to quality at all stages of the marketing chain – all the way from the consumer down to the producer. To enable quality rewards there is a need to develop certain enabling conditions including an accepted grading system and a market information system. To actually put it to work requires an innovative approach to develop a market niche for quality rice. Important lessons can be gained from similar experiences in Mali (Groupement Nyeta Conseils/Afrique Verte, 2000).

Best-bet approaches:
- grading system of paddy and rice quality
- market information
- market segmentation

[15] Private enterprises at the forefront of rice processing. Participated in processor study and stakeholder workshop(s) (NISER & WARDA, 2001; Erenstein & Lançon, 2003).

Proposed R&D activities:

1. *Promote establishment of transparent and accepted grading system:* Includes harmonization and enforcement of rice quality standards taking into account rice traders' current practices.
2. *Adaptation and dissemination of graders:* Includes demonstrations, training and information dissemination on graders and potential sources for access. Includes initial testing and adaptation to local needs.
3. *Dissemination of market information:* Particular emphasis on prices and the price reward for quality to enhance bargaining power for rice farmers and traders. Dissemination by selected mass and targeted media.
4. *Development of market niche for high quality local rice:* On pilot basis develop contract between farmers and traders/processors to supply large rice users (eg selected hotel/restaurant/catering) to restore reputation of local rice. Once supply chain of high quality rice in sufficient quantities is secured, more aggressive and targeted marketing campaigns can follow to brand and market high quality rice in selected markets.
5. *Promote packaging and branding of local high quality rice.*

Proposed leader/coordinator: WARDA

Proposed collaborators by activity:

	Activity number				
	1	2	3	4	5
Innovative and leading processors (Abakaliki Rice Mill Owners Ind. Association, Abakaliki; Cirico Rice Mill Nig.Ltd., Bida)	X			X	X
Selected rice traders	X			X	X
Selected commercial rice producers (e.g. VEETEE Rice Nigeria Ltd., Lagos; BRANDScapital Ltd., Lagos; Ibom Rice Company, Akwa Ibom State)	X			X	
Rural Sector Enhancement Program (RUSEP), Ibadan (http://www.rusep.org)	X		X		
Nova technology, Ibadan & possibly other agro-machinery dealers (importers; marketers; producers)		X			
ADP (Niger, Kaduna, Ebonji, Benue, others) & NGOs (state dependent)			X		

3.6 Sensitization of stakeholders on quality issues

There is a need for sensitization of producers, processors, traders and consumers on quality (including quality aspects/management and quality rewards). The objectives are: (i) To promote Nigerian rice and enhance its trade image; and (ii) to enhance quality management along marketing chain.

Best-bet approaches:

- information dissemination

Proposed activities:

1. *National awareness campaigns*: Includes use of both mass-media (radio, tv, newspapers) and targeted media on sensitization of stakeholders on rice quality issues (including quality aspects/management and quality rewards).

Proposed leader/coordinator: WARDA

Proposed collaborators: Subcontracted to marketing team/experts

4 Creating an enabling environment for rice sub-sector development

The previous two chapters have outlined a number of interventions to resolve the current competitiveness gaps in terms of efficiency and quality. In addition, an enabling environment for rice sub-sector development is needed to facilitate this process. A number of interventions in this respect are reviewed hereafter.

4.1 Enhancing policy dialogue

There is a need to reinforce the policy dialogue amongst rice stakeholders - including farmers, private agents, policy makers, investors, consumers. The inclusion of quality management as a priority development intervention requires a strong participation of non-traditional stakeholders such as traders and processors in the policy dialogue. This dialogue should enable rice stakeholder participation in decision making with a particular focus on the respective roles of the private sector and the government. It also should help create ownership of the development process and its implementation. Finally, it should increase transparency and accountability of various institutions involved.

To facilitate genuine policy dialogue there is a need for capacity building of rice stakeholders (including processors, traders). A first need is to train stakeholders on rice commodity chain issues to enable a more focused participation. A second need is to support the emergence of stakeholder organizations and reinforce them by institutional strengthening. This should enable these organizations to take on a more proactive role and to target professional objectives – not political objectives. It should also ensure a more adequate representation of stakeholders by their organization.

Best-bet approaches:
- Policy dialogue amongst stakeholders
- Capacity building

Proposed activities:
1. *Establish rice stakeholder platform:* Platform to facilitate policy dialogue amongst rice sector stakeholders. Could take form of a rice network with a regular information exchange – including an annual gathering of rice sector stakeholders.
2. *Training of rice stakeholders for capacity building & organizational strengthening:* Training on assessment of rice development issues. Also training on organization management, effective participation and lobbying.

Proposed leader/coordinator: WARDA

Proposed collaborators by activity:

	Activity number	
	1	2
WARDA in collaboration with selected stakeholders - including representatives of producers (e.g. RIFAN, Abuja), traders and processors and a limited number from the public sector (e.g. Presidential Committee on Rice; African Rice Initiative – Nigeria; NISER, Ibadan)	X	
Subcontracted to organizational/civil society experts		X

4.2 Enhancing information exchange

The rice sub-sector is complex. Although a lot of information currently exists, it is typically difficult to access and not comprehensive. The rice sub-sector also involves many stakeholders with varying knowledge levels of the rest of the rice commodity chain. For the better development of the sub-sector it seems advisable to improve stakeholder knowledge and access to information.

Best-bet approaches:
- accessible reference information

Proposed activities:
1. *Develop rice information system:* Installation of accessible reference material on Nigerian rice sector (e.g. leaflets/publications; web-site). Types of information covered could include rice quality grades; varietal attributes/terminology; market information; information on rice processing equipment (sources, prices, types, etc); relevant material on rice sector.

Proposed leader/coordinator: WARDA

Proposed collaborators: NCRI, Badeggi, NISER, Ibadan and Ministry of agriculture, Abuja.

4.3 Enhancing efficiency and effectiveness development interventions

The development of the Nigerian rice sub-sector is complex - in terms of its sheer size, multitude of activities needed and multitude of actors involved. There is a need to reinforce coordination of rice sector interventions to avoid duplication, to reinforce visibility and to draw lessons from previous experiences. For efficiency reasons, a small coordination unit is advisable, but with a wider and representative steering committee to oversee its operation.

In addition, there is a need to establish a monitoring and evaluation mechanism of the rice sector developments. This mechanism should feedback information on changes affecting the rice sector to increase transparency, support decision making and facilitate subsequent scaling-up. It also should measure impact to enhance accountability.

At this stage a relatively independent, small and objective implementation coordination unit seems preferable. Such a unit is likely to be more effective to get the operational process moving, to bridge institutional divides and to reduce politization of implementation. This is particularly important as the challenges clearly surmount the traditional institutional divides (e.g. public-private; research-development). A couple of caveats are in order. Implementation coordination does not equate implementation - and actual implementation of specific activities is best subcontracted to the most appropriate stakeholder – be it governmental, non-governmental or private. Implementation coordination also does not equate exclusivity. Not all rice related activities necessarily fall under its auspices – but the unit should be aware of what is happening, ensure collaboration, complementarity and coordination where relevant. Although such independency seems advisable for now, in the medium term such implementation coordination function would need to find an institutional home. In any event, the implementation coordination unit needs to ensure a collaborative and institutional setting that creates the necessary ownership of the implementation by the stakeholders.

Best-bet approaches:
- Coordination and integration

- Rice development intervention focus
- Monitoring & evaluation

Proposed activities:

1. *Establish implementation coordination unit:* Unit responsible for overall implementation management and coordination of rice sector development interventions. Includes responsibility for subcontracting and resource mobilization.
2. *Establish steering committee:* Responsible for oversight of implementation activities. Comprises selected main stakeholders and who meet annually to assess progress.
3. *Establish monitoring & evaluation mechanism:* A mechanism will be put in place to allow timely and comprehensive monitoring of the implementation of development activities – both at the level of individual activities, the state and the federal level.

Proposed leader: WARDA

Proposed collaborators by activity:

	Activity number		
	1	2	3
WARDA – Ibadan	X		X
Potential steering committee members: - African Rice Initiative – Nigeria; - Ministry of agriculture, Abuja / Presidential committee on rice; - NCRI; - RIFAN; - selected representatives private sector organizations; - NGOs.		X	

4.4 Additional considerations for development interventions

Given the magnitude of the challenge a long term view (at least five years) is needed. Although certain activities can have a short term impact, many will require implementation over a prolonged period and an even longer period before the full benefits can be achieved. There is a need for political commitment at various levels and continuity and stability in the policy environment.

Given the diversity and complexity of the rice sector the interventions should focus initially on the most promising systems/locations. This allows to evaluate feasibility of and fine-tune proposed interventions as there is no 'silver bullet' or ready made solution. This also allows to build expertise prior to scaling up as the rice sector development process is complex – requiring learning by all concerned. Finally, this avoids dilution of effort and facilitates coordination and implementation.

The present operationalisation is based on the premise to start with rice specific development interventions. The rice sector has a number of urgent and rice specific problems that need to be addressed for the development strategy to be successful. Non-rice specific interventions (e.g. in relation to infrastructure, input markets, credit) are important, but are likely to diffuse attention and reduce likelihood of impact of strategy implementation. However, stakeholder organizations should lobby for non-rice specific interventions to be taken into account by the overall agricultural policy.

5 In conclusion

There are considerable opportunities to revitalize the Nigerian rice sector (WARDA, 2003). The current level of protection of the domestic rice sector provides an opportunity for such development. However, such a protection comes at a considerable social cost and therefore should be seen as a temporary transient measure. The only sustainable and socially acceptable way forward is to enhance the competitiveness of local rice against imported rice – both in terms of quality and price. This calls for improving quality management and increasing efficiency along the entire marketing chain. The present document has outlined a number of activities to operationalize the strategy to tackle these challenges. The proposed operationalisation of the strategy can be successful – but will depend on the mobilization of sufficient resources (human, financial) and political will for its implementation. Its success also implies changing business as usual and calls for some innovative approaches and partnerships and an overall enabling environment for such an investment and adjustment to occur.

One important departure from business-as-usual is the need to focus on consumer demands. Indeed, traditionally the domain of R&D intervention has been on productivity increases. Whereas such improvements are needed to enhance the price competitiveness of Nigerian rice, a complementary and equally important need is to improve the quality competitiveness of Nigerian rice. There is a genuine need to find the right balance between price and quality – without falling back in traditional patterns. Only then will the Nigerian rice sector be able to compete with imported rice and will a structural increase in the market share for domestic rice be realized – allowing Nigeria to approach its quest for self-sufficiency without imposing a high social cost.

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