Philippine Rice Postproduction Systems (PPS) — Moving to a Brighter Future

Proceedings of workshops and discussions

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Contents

Preamble

These proceedings report on a workshop held on Friday 9 October 1998, and follow-up meetings held on 4–6 November 1998, 10 December 1998, and 18 February 1999.

The project was organized by:

- IRRI–Agricultural Engineering Division in collaboration with IRRI–Social Sciences Division & Training Center;
- University of the Philippines Los Baños, College of Engineering and Agro-Industrial Technology (CEAT)-Agricultural and Bioprocess Division (ABPROD);
- Philippine Rice Research Institute (PhilRice);
- Bureau of Postharvest Research and Extension (BPRE) of the Philippines; and
- National Food Authority (NFA) of the Philippines.

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Executive summary

Management of postproduction systems (PPS) is increasingly being recognized as requiring greater attention. Although a good deal of research and development (R&D) has been focused on PPS, researchers have all too often lost sight of the forest for the trees, focusing on technology development in isolation of the system. Such R&D has often had little or no impact. To avoid the "technology trap" and to be more effective, researchers need to ensure an integrated, participatory systems approach[1]. To ensure an effective approach, the International Rice Research Institute (IRRI), the National Food Authority (NFA), the Philippine Rice Research Institute (PhilRice), the University of the Philippines at Los Baños (UPLB) and the Bureau of Postharvest Research and Extension (BPRE) have embarked upon a collaborative project to better identify and meet postproduction system needs.

This paper summarizes the output from the various workshops, planning and activity meetings of the collaborative project. Although the work is continuing, the paper is presented at this stage as an example of at least one model of how research partners can arrive at a list of identified priority opportunities, activities and plans.

Key points to date

The postproduction consortium has already produced a number of positive outcomes, including the following:

1 Peer review and evaluation of the relevance of present public sector PPS research and development activities.

2 Identification of opportunities to improve R&D agendas and have them better aligned with postproduction sector problems.

3 Generation of interest amongst non-traditional partners; e.g. government policy groups.

4 Development of collaborative partnerships between interested government parties, who traditionally did not enjoy such close linkages.

5 Inclusion of the private sector as a true collaborating partner.

6 Recognition of the private sector by the government as a legitimate beneficiary of public sector goods.

7 Recognition of a knowledge gap. Knowledge on technologies available, matching options with needs, and knowledge of correct operation were identified as major limitations to progress within the sector.

8 Finally, many institutes require some form of 'memorandum of understanding' so that staff can commit their time to activities.

In developing a multi-sectoral research and development agenda, one must consider the varying incentives and objectives of the different participants. Stakeholder meetings are essential for researchers to address real issues. However, such collaboration is not without its overhead costs especially in terms of transaction costs for meetings etc. KFPE (1998)[2] lists 11 principles for developing collaborations:

1 Decide on the objectives together

2 Build up mutual trust

3 Share information, develop networks

4 Share responsibility

5 Create transparency

6 Monitor and evaluate collaboration

7 Disseminate results

8 Apply the results

9 Share profits equitably

10 Increase research capacity

11 Build on the achievements

1. See Bell, M.A., Dawe, D. and Douthwaite, M.B. 1998. Increasing the Impact of Engineering in Agricultural and Rural Development. Deliberations of a Think Tank, 26–28 February 1998, IRRI, Los Baños, Philippines. IRRI Discussion Paper Series No. 30. Manila (Philippines): International Rice Research institute. 108 p.

2. Schweizerische Kommision für Forschungspartnerschaft mit Entwickungsländern (Swiss Commission for Research Partnerships with Developing Countries). 1998. Guidelines for research in Partnership with Developing Countries: 11 Principles. Produced by the Swiss Commission for Research Partnerships with Developing Countries. Berne, Switzerland. 57 p.

Document structure

This document includes the outputs from various workshops, and outlines the current and planned activities of the participating institutions. It is structured as follows:

Introduction – Workshop 1

1 An introduction indicating support for the activity from the Director General of IRRI

2 Project background – Workshop 1

Project background as presented at the first workshop.

3 Postproduction systems in the Philippines — a Review, D. de Padua

A review by Dr Dante de Padua of postproduction systems in the Philippines giving historical perspectives and progress made. This paper established a common point of entry to the first workshop discussion for all participants.

4 Project goal and workshop objectives — Workshop 1

The project goals and workshop objectives as specified during the first workshop.

5 Summary of workshop outputs

This section summarizes in Table 1 and Figure 1, the constraints, causes and opportunities as identified by the stakeholder groups during the first workshop.

Subsequent workshops primarily involved consortium members only.

Table 2 and Figure 2 show the players involved in the PPS and their roles as identified in the workshop. Table 3 shows the initial analysis of institutional priorities as developed during the second workshop. It was at this stage, that any discrepancies between system needs and institutional goals and interests emerged.

Table 4 was developed from Tables 1 to 3 to further develop a sense of where are the primary opportunities to influence the postproduction system.

To ensure the initiation of a collaborative workplan, priority issues were identified for initial joint action (Table 5). These activities generated a number of other stakeholder visits and surveys that are not recorded here, but which will form part of the longer-term project output.

6 A framework for priority setting in postproduction systems, A. Elepaño and M.A. Bell

Following the initial brainstorming, the relevance of the various constraints had to be determined. With so many possible problems and opportunities, a systems perspective was presented by Dr Arnold Elepaño to give a framework to help participants better identify next steps and priorities.

7 Present PPS activities of consortium members

To keep focused on measurable output, summary reports of present activities and progress were presented.

The participants in, and methodology used for running the brainstorming workshops are included in the appendixes.

Appendix 1. Participants at the different workshops.

Appendix 2. A “How to” on conducting brainstorming workshops.

Appendix 3 gives a copy of the memorandum of agreement between the members of the Philippine Rice Postproduction Consortium.

1 Introduction — Workshop 1

Rice production in Asia is under increasing pressure. During the next 25 years, the world's population will increase by around 2 billion, many of them living in the rice-growing and consuming countries of Asia. Only with new and vastly improved technologies can we hope to produce the 35–40% more rice required to feed those people. All too often though, the efforts of research and development stop at the production level. Obviously, the increased production must be handled, processed and marketed efficiently.

I am happy to see this workshop which is bringing members of both the public and private sectors together to brainstorm the issues and look for opportunities to improve the Philippine postproduction system. If we are to truly produce more and better rice with less water and less labor on less land, we need a concerted multi-sector and multi-disciplinary effort.

Ron Cantrell
IRRI Director General

2 Project background — Workshop 1

Why the workshop?

1 Since the introduction of the modern rice varieties to the Philippines in the 1960s, new systems of handling, storing and processing technology have been needed to meet the requirements of year-round cropping systems, harvesting in the wet, and the increased volumes of harvest. Several new technologies have been developed with varied levels of acceptance. Several institutional and social arrangements have also been tried to enhance the adoption and utilization of the new technologies — these too with varying degrees of success.

2 The continuing difficulties in the design and development of appropriate technologies may be attributed to the lack of understanding of the requirements of handling rice in the humid climates of tropical Asia, the small farms that typify the region, and the apparent confusion in the targeting of the best users of technology. The problems are manifested by the continuing lack of drying capacity for wet harvest, the antiquated milling systems, the high cost of production, and the poor quality of milled rice produced.

3 As economies in the rice-growing countries of Asia have developed, the amount of cheap labor available has fallen, increasing the need for higher levels of mechanization and automation in postproduction operations. Demand for better quality rice has also risen. Grain deterioration resulting from the absence of appropriate technologies in the postproduction system means that the potential qualities of new varieties are often not exploited to best advantage.

4 The Philippines has a pool of highly trained professionals working in the field of grain postproduction systems, but it still somehow lags behind countries such as Thailand, Indonesia, and Malaysia in the use of more efficient handling and processing technologies. These difficulties are compounded by the inward-looking culture of many research institutions. Many engineering research centers are obsessed with 'tinkering', and care little about the requirements for successful commercial utilization of their gadgets. The tinkering has to be complemented with marketing of technologies.

What do we want to achieve in the workshop?

5 IRRI Engineering, in association with members of the national, international, public and private sectors initiated a clinical analysis of the malaise afflicting engineering research. Guidelines were developed, which it now wishes to share with scientists in the national research system. Briefly, these are the need for a greater systems focus in technology development in the research process, and for greater collaboration between the public and private sectors.

6 Given the decreasing resources allocated for technical research, a collaborative research program between the various agencies would minimize costly duplication, and would result in better utilization of resources.

7 The workshop, which has a structured participation of all stakeholders in the rice postproduction industry, will review the current situation in the Philippines, identify priority problems, map out the possible responses to the problems, and draw out the interests of the different participating institutions. The desired outcome is a collaborative research program to meet the real needs of the rice industry, and which can be recommended to the government for funding or to the donor community for assistance.

3 Postproduction systems in the Philippines — a review, by D. de Padua

The Philippines has a long history of trying to provide efficient grain postproduction systems (PPS), primarily aimed to help the farmers. There have been some successes, but there also have been many blunders, which in retrospect almost look funny in the light of today's understanding of the postproduction systems.[3]

1958, US ICA builds 1st Republic of the Philippines grain elevators

There has been government recognition of the need for providing postproduction facilities even before the miracle varieties were developed. As early as 1958, the Agricultural Credit Administration (ACA) operated the Farmer Cooperative Marketing Associations, which had warehouses for paddy and rice mills. The US International Cooperation Administration (ICA), the forerunner of the present USAID, provided ACA with two complexes of bolted-steel-plate silos. One complex had a continuous-flow columnar dryer to complement the silos, and the other storage silo complex was provided with aeration blowers but no drying facility. An ACA engineer was sent to the US to train in the operation of the 'modern' systems. It is recalled that both complexes were colossal technical failures, although it was said that these were copies of systems operating successfully in the US. There was not enough paddy of a kind to feed the 10 TPH appetite of the continuous-flow columnar dryer. From what is known today about the physics of grain storage, the aerated storage silos had no chance of success in the humid tropics. They were filled with varying moistures of dry and semi-wet grain, and when the grain started to heat up, it was aerated in the early mornings when the air was cool (sounds logical), but saturated with moisture. In effect they were actually pumping water into the grain which accelerated spoilage. It was reported that thousands of tons of grain were spoiled. For a while the silos remained, breaking the landscape in the rice-growing area of Solano, Nueva Viscaya, unused and slowly rusting away like the relics of World War II. But despite this experience, the notion that Western technology could be transplanted into the rice-growing areas of Asia remained as a policy, and the financial institutions balked at providing research support for the postproduction sector.

3. This paper was presented at the opening workshop to establish a common point of entry to the discussion for all participants.

The 1960s, the PPS requirements of the miracle rice

The 1960s saw the advent of the miracle rice, IR-8, during the green revolution. IR-8 was not photo-sensitive, allowing a second crop to be planted during the rainy months, and it swept across the country with its high yields. This production increase accentuated the need for mechanical threshers that could handle the wet straw, and grain dryers to prevent the harvested seed from germinating and rotting. The International Rice Research Institute (IRRI) Agricultural Engineering mounted a well-funded research program to develop an entirely new thresher. The old mechanical threshing and grain cleaning equipment, copied from the International Harvester combines, was the standard in the rice estates of Central Luzon. These threshers choked with the wet straw of the new, wet-season crop. The axial flow thresher concept that is now widely adopted throughout Asia was an IRRI original design.

About the same time, engineers at the University of the Philippines Los Baños (UPLB) were busy learning how to dry paddy. There was no established design protocol or design data for the new grain varieties. The correct airflow rates had to be established and the resistance to airflow of the miracle grain had to be approximated, based on US varieties. Blowers and burners had to be developed and tested. Drying air temperatures had to be experimented with, to determine threshold limits to prevent reduction of the milling quality. The literature indicated that before the columnar dryers were developed in the US, grain farmers were using flat beds to dry their grain. A small, 2-ton capacity, flat-bed batch dryer was fashioned out of plywood boards to demonstrate to students the relationship of the different technical drying parameters. To this day,

the flat-bed dryer is still the most instructive set-up for teaching students and training extension engineers. The wooden model flat-bed dryer excited the Department of Agriculture which ordered the fabrication of more units for its rice and corn programs. At one time the National Grain Authority owned more than a thousand units. Several units were operated side by side in their warehouses to dry the grain they had to buy from the farmers. This was the only available working technology at the time.

Students who graduated from UPLB Agricultural Engineering in the early 1970s spread out and many started building their own versions of the flat-bed dryer. Notably, some were hired at IRRI to develop a more sophisticated version. A Vietnamese student went home to make a living manufacturing his versions of a flat-bed dryer. A Thai engineer also went home to develop a sleek model of a rice-hull furnace and flat-bed dryer. The International Development Research Centre (IDRC) of Canada financed the introduction of the flat-bed dryer in Indonesia and Malaysia.

Understandably, the flat-bed dryer had many limitations. It had to be manually loaded and unloaded, and drying was not uniform across the bed surface. In addition, if too much grain was loaded or if the blower was not delivering the desired air volume, the grain did not dry uniformly across the depth of the grain mass. Its 2-ton capacity was too large a batch for a small farmer and too small for a miller. Despite this we still see flat-bed dryers in operation today.

The demand for dryers spawned a lot of creative juices. For example, a Cornell engineer developed an oscillating table dryer, while an engineer working at IRRI developed a conduction-heated frying pan. Another developed a rotating-drum, conduction-heated dryer, while others tested the mixing of heated sand with the grain, silica gel as a moisture absorbent and heating pipes embedded in drying floors. They all had something in common. They were not adopted by the industry due to technical defects. All of these may be categorized as imaginative creations rather than calculated and engineered systems.

In addition to the local efforts, there were various imports. The Kongskilde vertical batch dryer was introduced to the country. This was a poor excuse for a dryer. Drying was non-uniform, and its operation was very dusty. The Cimbria, a Louisiana State University (LSU) type, continuous-flow dryer, was imported by the National Food Authority (NFA) and was found to be efficient but too expensive.

The NFA then commissioned the UPLB engineers to design an LSU-type dryer. The plans were farmed out to two local manufacturers to produce units for their paddy procurement program. Improved versions of the LSU dryer are still being manufactured on order.

The 1970s, corporate investments in PPS

The new, high-yielding varieties were opportunities for corporate business. Big business invested in modern systems. Industrial capacity dryers with tempering bins, bulk storage bins or silos, and banks of rubber roll mills from Japan or Germany, were brought into the country. PhilSeeds in Laguna had a 10 TPH continuous flow dryer with a 25 TPH mill. Minprocor in Digos, Davao had silos and a rice-husk-fired power plant. The Borromeos and the Ayalas set up a ‘modern’ pilot plant in Laguna. Bicol Seeds also set up a ‘modern’ plant in Libon, Albay. A consortium of banks financed milled-rice trading activities to complement these new industrial-processing complexes. Meanwhile, the government was not to be outdone. It imported 20 Butler silo systems for drying and bulk storage for its buffer stock program. These grain drying, storage, and processing plants all got commissioned and were operational when martial law was declared. Rice became a commodity under heavy government control, and all the corporate business set-ups eventually closed shop.

The land reform program initiated during the martial law years effectively broke up the rice estates into land parcels, which were awarded to the farmer tenants. The system of small-farm rice production became incompatible with large-capacity processing systems.

The 1980s, NAPHIRE and PPS research

In 1981 a research subsidiary of NFA, the National Post-Harvest Institute for Research and Extension (NAPHIRE), was created to study the many technology problems of the grain industry. The Philippines had become a modest rice exporting country, but because of the poor quality of the rice produced, it could not break into the premium markets. The priority problem then was the general discoloration and high percentage of yellow kernels in the milled rice produced from the wet harvest. At first, the yellowing was thought to develop while the grain was in the warehouse. Careful sleuthing by the NAPHIRE researchers found that the yellowing occurred right in the field when the wet harvest was piled in field stacks awaiting threshing and drying,

which were delayed. The yellowing was associated with fungal infection and heat damage. This phenomenon further stressed the critical need for harvesting, threshing and drying capability, particularly for the wet harvest.

The 1980s, PPS for farmer groups

With the comprehensive land reform program, the new government policy was to promote farmer groups, organized as cooperatives, to engage in processing and marketing of their harvest. The Technology and Livelihood Resource Center (TLRC) funded the establishment of 12 'modern' complexes all over the country. Each complex had a Kongskilde cluster of batch columnar dryers, a paddy storage plant, and a rubber roll rice mill. Some of the storage plants used aerated bulk bins. In addition, non-government organisations (NGOs) were commissioned to act as managing 'boards of directors' to oversee the operation of the plants. TLRC provided loans to the boards for operations. Technicians were trained at NAPHIRE to operate the facilities. The concept was to set up the operating systems and procedures, where the management of the complexes provided production loans to farmers and the farmers paid their loans in kind at prevailing farm-gate prices. The complexes were to process the paddy and market the milled rice produced. The feasibility studies for the complexes indicated a most profitable venture. The farmers were to be organized as cooperatives and federated to eventually take over ownership and management of the complexes. Today all 12 complexes are in financial distress. Only 2 of the 12 are still operational, both under new professional management.

The Kongskilde dryers proved a pain to operate. Drying is not uniform, operation is dusty, and because the humid drying air is exhausted inside the processing plant, moisture is condensed from the cold sheet-metal roofings in the mornings.

Most of the NGOs knew nothing about enterprise management and much less about the rice business. In some of the plants that were audited, they had 135 employees where at most 10 could operate the entire complex. There was no grain quality or stock inventory control in place.

Worst of all, the farmers who were to benefit from the exercise in the short and long term did not pay back their production loans from the TLRC complexes.

The concept of farmers participating in the processing and marketing of their harvest is flawed. The share in processing is only 2% of the value of the milled rice. Therefore, this additional 2% income to the farmer from his marketable surplus of, say, 2 tons is not worth the hassle of participating in a processing and marketing enterprise. On the other hand, the private miller works on volume to make it worthwhile. It would be difficult for a farmer cooperative to mimic the operational set-up of a private miller, which is a capital and management intensive operation.

The 1990s, two steps forward, one step backward

Two-stage drying strategy

Deep bin drying, a technology successfully adopted in Australia, was introduced in the Philippines through a collaborative research program between the University of New South Wales and NAPHIRE with assistance from the Australian Centre for International Agricultural Research (ACIAR). A pilot system was set up by NAPHIRE, and it was quickly discovered that the wet paddy had to be pre-dried down to 18% before it could be successfully dried to 14% in deep bins with low airflows of ambient or slightly heated air. The key in deep bin drying was to use drying air in equilibrium with 14% moisture to prevent over-drying. In-store drying as applied in the Philippines, however, takes several days (2–3 days per meter depth of grain to dry from 18% to 14% moisture content).

A two-stage drying concept was therefore evolved for the high moisture harvest. A first stage quick drying to remove the surface moisture, and a second or final stage drying in bulk bins were designed and developed. NAPHIRE engineers designed a 0.5 ton batch recirculating mobile dryer dubbed as the 'flash dryer'. This was intended to enable the farmers to pre-dry their harvest quickly in the field right after threshing, and arrest deterioration. The Philippine rice industry has not adopted bulk storage systems, and so for the second stage which is supposed to be a slow, final in-store drying of the pre-dried grain from 18% down to 14%, bulk bins with perforated floors over a plenum were designed. This two-stage scheme has its purported technical advantages. In-store drying with low temperature produces good quality rice and is reported to use less energy than the higher temperature convection dryers. Unfortunately, the first stage flash dryer was promoted without the

second stage, although the technical validity of the two-stage concept had been demonstrated.

First stage drying is better than nothing though. At least it can arrest bio-deterioration. At 18% moisture, the paddy can reportedly keep for at least three weeks. The flash dryer excited many congressmen who had money from their congressional budgets. As a result, at last reports, some 1700 flash drying units had been distributed, and about 300 units were bought by private millers, traders, and NGOs. The feedback from the email conference run by IRRI and FAO was that key informants of the Department of Agriculture reported that, for technical and socio-economic reasons, the farmers and cooperatives who were recipients of the flash dryers did not appreciate the flash-drying technology.

The more pragmatic engineers at NAPHIRE (now the Bureau of Postharvest Research and Extension, BPRE) say in retrospect that they knew of the limitations of the flash dryer as a stand-alone unit, but they were helpless against the political pressure placed on management.

Other drying technology ventures

There have been many other drying technologies foisted on the Filipino people. The IRRI–GTZ (German technical assistance agency) low-temperature, in-bin drying method claims to be able to dry in deep bins of rice with initial moistures higher than 18%. Born in Vietnam, the low-cost IRRI–GTZ SRR dryer for farmers is being tried with mixed reports. PhilRice researchers have rediscovered the Vietnamese flat-bed dryer for farming villages, and claim success with some Philippine farmer groups.

Probably the most significant development is the aggressive marketing of the Taiwan-made recirculating batch dryer. Many medium to large capacity rice millers have invested in this technology. A battery of units is installed to provide the required capacity. The millers seem to like the simplicity, the automation of operation, the easy financing provided by agents, and the pro-active services provided by the dealers.

Rice milling and private sector initiative

Practically all the old, under-run stone disk hullers have been replaced with rubber roll hullers. The significantly higher milling recovery advantage of the rubber rolls has provided the incentive. Locally manufactured hullers that are mechanically adjusted are available. The Japanese manufacturers offer automated self-adjusting units.

There are many new, milled-rice polishing technologies being offered. However, there is no comparative performance data available. The Thai manufacturers compete with the Chinese, Japanese and German technologies that are available in the market.

PPS research for the new millennium

Rice production in the Philippines has declined, but the number of rice-eating Filipinos keeps increasing. The government's rice program has switched its target from rice self-sufficiency to food security as its goal. The research community, however, believes that the country could be self-sufficient if only the government could 'get its act together'. The rice postproduction sector, the link between the farmers and the consumers, is being called upon to provide the incentive to produce more and better rice.

A reorientation of PPS research is happening, from very hardware-focused technology development, which has been the engineers' delight in the past decades, to more information-driven, demand-responsive, and systems-based technology. Institutional requirements of different stakeholders, the realities of rice as a commercial business commodity, will have to guide the politically driven policies of government.

4 Project goal and workshop objectives — Workshop 1

Overall goal

Improve the efficiency of the Philippine rice postproduction sector to reduce losses and provide better quality rice.

Meeting objectives

Establish a collaborative research agenda to address real needs

Specific:

1 Identify the players involved and the others influencing the postproduction system (PPS), their needs and constraints

2 Prioritize needs and constraints

3 Identify who needs to be involved and who is interested in various problems to develop a coordinated plan for collaboration

PPS interest groups represented at the first workshop:

Farmers

Service contractors

Machinery and input dealers

Manufacturers

Cooperatives

Marketers

Millers

Traders

Knowledge transfer – Extension

Researchers

Government policy-makers

NGOs

Credit providers

Donors

Consumers

5 Summary of workshop outputs

Introductory note

This chapter summarizes, in Table 1 and Figure 1, the constraints, causes and opportunities as identified by the stakeholder groups during the first workshop. Subsequently, Table 2 and Figure 2 were developed to show the players involved in PPS and their relative roles. The initial analysis of institutional priorities was developed during the second workshop (Table 3). It was at this stage that any discrepancies between system needs and institutional goals and interests emerged. To help ensure a system perspective in meeting needs, the paper in section 6 was presented during the third workshop. Table 4 was developed from Tables 1–3 to further develop a sense of what are the primary impact opportunities within the PPS. To keep focused on measurable outputs, summary reports of present activities were presented (section 7). To ensure the initiation of a collaborative workplan, priority issues were identified for initial joint action (Table 5). These activities generated a number of other stakeholder visits and surveys that are not recorded here, but which will form part of the longer term project documentation.

PPS constraints and opportunities

In the first workshop, representatives of the different stakeholders in the rice industry assessed the country's current postproduction situation. Participants represented the three interdependent sectors of the rice industry: (1) the farmers and their farmer groups and the farm service contractors, which make up the rice farm production sector; (2) the processors, traders, wholesalers and retailers which make up the processing and marketing sector; and (3) the consumers, who can be stratified according to economic groupings. In addition, there were participants from service industries such as equipment manufacturers and dealers, finance institutions, government agricultural services, and the technology and policy research and development community. These groups provide support to the PPS, but are not directly involved in grain handling.

The workshop prepared a comprehensive list of problems or constraints affecting the rice industry. The workshop secretariat then sorted the issues into categories based on the industry sectors, analyzed further the problems to try to determine their root causes and reveal where the research opportunities were. The results of this initial exercise were refined during a subsequent joint meeting of the researchers (Table 1 and Figure 1).

The farming sector pointed out several problems, including the dearth of information available about new and appropriate technology. They felt such information could help them produce better quality grain preferred by the market. The difficulty that farmers with small landholdings, and even farmer groups, had in acquiring expensive postproduction facilities to handle their harvest, especially during the wet season, was also raised. The uncontrolled distribution of cheap imported rice by the government was highlighted for its effect on the farm-gate price of paddy.

The rice processors and consumers cited the low quality of milled rice produced. This can be traced to a variety of reasons, including the lack of good seed, the large number of rice varieties with different milling characteristics grown, the poor management of the rice fields, the lack of timeliness in crop harvesting, the inability to handle wet harvest, the poor state of milling machinery, pest infestation of rice in storage, the apparent lack of price incentives to produce better quality rice, and the lack of operator skills and understanding of what it takes to produce higher quality rice. The processors railed against the rice distribution practices of the government, which upsets pricing of paddy and milled rice, and reduces their slim profit margins.

For consumers, mislabeling of rice by retailers was cited. The NFA milled rice grades and standards are not used, simply because they do not reflect what the consumers prefer. Consumers look for rice with the cooking and eating qualities they can afford but generally prefer white, well-milled rice, with few brokens, and no contaminants.

Interest groups and their roles

In subsequent meetings, researchers considered the various needs of the different interest groups based on their different roles in the PPS. The paper in section 6 was presented to give a systems perspective to problem identification and opportunity

development. Table 2 and Figure 2 were introduced to help identify the different PPS players and their roles in the postproduction chain. These activities led to the identification of potential priority activities by the different research institutions (Table 3). The activities were classified as 1. credit, 2. policy, 3. technology related issues, 4. rice quality related issues, and 5. information, training and extension. The interests and priorities for each institution were also identified, which indicated multiple agency interest in getting involved in the different activities (Table 3). It was at this stage that any discrepancies between system needs and institutional goals and interests emerged. These differences became the focus for the subsequent workshop development. The analysis of institutional interests also highlighted the potential benefits to the different research agencies if they collaborated more formally. As a result, the researchers felt that a collaborative research program should be inaugurated in which the comparative advantage of each institution could be harnessed in research projects initiated.

The Philippine Rice Postproduction Consortium

The principal institutions in the Philippines concerned with rice postproduction research are: 1. the Philippine Rice Research Institute (PhilRice) in Muñoz; 2. the Department of Agriculture's Bureau of Postharvest Research and Extension (previously known as NAPHIRE); 3. the University of the Philippines Los Baños, College of Engineering and Agro-Industrial Technology – Agricultural and Bioprocess Division (CEAT–ABPROD); 4. the National Food Authority – Technology Resource Development Department (NFA–TRDD); and 5. IRRI Agricultural Engineering Division. These institutes agreed to form a consortium to tackle the many and varied postproduction problems of the rice industry that were identified.

A memorandum of agreement has been prepared (see Appendix 3). It is proposed that the strategic and operational planning of research activities be done jointly by the agencies interested. The consortium is to meet at least once every three months to monitor the progress of collaborative projects. Other meetings may be arranged by the researchers to discuss special problems such as research methodologies and activities. The implementation of such activities is to be done using the resources of each collaborating institution, but it is expected that, given a united approach, the consortium might attract funding from government research funds and/or external donors.

The Bureau of Postharvest Research and Extension (BPRE) is leading the consortium during 1999. IRRI Engineering, which initiated consortium activities turned over the management of the consortium in mid-April 1999.

The Philippine Rice Postproduction Program

To keep focused on measurable outputs, and to assist with the formulation of the rice postproduction program, each research agency presented its current PPS activities (see section 7).

In the development of Table 3 there was some difficulty defining some of the strategic issues. Thus, expected outputs, probability of success, impact pathways, and alternative sources of supply or options were discussed, resulting in Table 4. Table 4 highlights the primary impact opportunities and provides the basis for development of an expanded R&D program.

The Philippine Rice Postproduction Consortium: program of activities for 1999

To initiate consortium collaboration, the following subset of its identified priority activities was initiated (see also Table 5).

1 Needs assessment — studies to validate or determine the more specific needs of the different stakeholders.

2 Database development — a computer-based format has been agreed upon, and each agency will collaborate to pool information available.

3 Characterization of the physical and chemical properties of the more common and recommended varieties.

4 Case studies of selected failed and successful processing enterprises.

5 Evaluation of farmer-based processing enterprises and technologies.

Note that technology development has been placed on hold until more information has been generated. The time frame for each activity is indicated in Table 5.

Progress to date — summary

The postproduction consortium has produced a number of positive outcomes, including:

- peer review and evaluation of the relevance of present public sector PPS research and development activities;
- identification of opportunities to improve R&D agendas and to better align them with postproduction sector problems;
- generation of interest amongst non-traditional partners — e.g. government policy groups;
- development of collaborative partnerships between interested government parties, who traditionally did not enjoy such close linkages;
- inclusion of the private sector as a true collaborating partner;
- recognition of the private sector by the government as a legitimate beneficiary of public sector goods;
- recognition of a knowledge gap. Knowledge on technologies available, matching options with needs, and knowledge of correct operation were identified as major limitations to advances within the sector; and
- a memorandum of understanding has been developed to allow staff to commit their time to PPS consortium activities.

Table 1. Philippine rice postproduction systems constraints and opportunities.[a]

Interest groups	Constraints	Cause[b]	Opportunities
Small farmers/ cooperatives/rural areas/farm labor	**1. Information**		
	• Lack of access to available technology	• Lack of information channel	• Develop database • Develop information centers/network
	• Lack of ex-ante or need assessment	• Ineffective research methodology	• Survey (stakeholders to identify specific constraints & opportunities)/Conduct ex-ante or needs assessment
	• Ineffective extension	• Lack of extension materials • Lack of qualified extension officers	• Develop information materials • Demonstrate technology • Train extension officers
	2. Knowledge (socio-cultural)		
	• Lack of knowledge in choosing appropriate technology	• Lack of database & decision support system	• Develop database • Develop information centers/network • Develop information materials
	• Resistance to new technology	• Lack of awareness on the benefits of new technology	• Develop information centers/network • Train extension officers • More nationwide pilot testing
	• Lack of knowledge of available technology		• Develop database • Develop information materials • Develop information centers/network
	• Lack of business and management acumen among majority of farmers' cooperatives	• Lack of knowledge in business management	• Seminar/training • Provide professional managers to manage cooperatives • Institution building for farmers' cooperatives (strengthen farmers' cooperatives)
	• Poor grain quality	• Lack of thorough knowledge of grain quality factors	• Set consumer standards • Identify market demands • Study factors affecting consumer preferences and grain quality • Develop usable and implementable systems and procedures

[a] Summary output of the first workshop as revised during the second meeting held last 4–5 November 1998 at BPRE, Muñoz, Nueva Ecija, Philippines
[b] Underlined words are those that were modified/added during the second workshop

Table 1. (cont'd) Philippine rice postproduction systems constraints and opportunities.[a]

Interest groups	Constraints	Cause[b]	Opportunities
	3. Credit/Financing/Insurance		
	• High investment cost of PPS	• High production cost and expensive raw materials • Inefficient plant production • Indeterminate market demand	• Review tariff policies • Study price trends • Feasibility study
	• Low price of paddy	• Government prioritization of consumers at the expense of the farmers and processors (e.g. rice importation) • Low quality of paddy • Government intervention in paddy price	• Lower production costs • Identify quality rice markets • Develop government comprehensive intervention
	• High labor cost (location specific)	• Labor shift to industrial sector	• Mechanization
	• Red tape in acquiring credit		• Conduct equipment loan
	• Lack of willingness to pay debts		• Value strengthening/reorientation • Study the lending schemes of informal sources as well as grant providers (i.e. traders)
	4. Technology		
	• Lack of small-scale equipment for rice (value adding) into food products	• No demand for food products	• Needs assessment • Encourage local processor for rice flour
	• Lack of infrastructure/postharvest facilities	• Financing constraint	• Machinery pool to be initiated by the government in collaboration with manufacturers and cooperatives • Provide infrastructure facilities
	• Lack of need assessment	• Fragmented approach to technology development	• Survey (stakeholders to identify specific constraints & opportunities) • Pilot testing • Adapt system approach • Conduct feasibility study
	• No appropriate technology available	• Inappropriate design • High cost of equipment • Poor quality machinery • Lack of parts/after-sales service	• Compulsory testing for quality and performance/inspection • Set standards • Make after-sales service compulsory
	• Lack of knowledge of by-product utilization	• Lack of awareness of the benefits of R&D support	• Study profitability/market opportunities of by-products

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Table 1. (cont'd) Philippine rice postproduction systems constraints and opportunities.[a]

Interest groups	Constraints	Cause[b]	Opportunities
Research & development: **1. Research planning & management**	**1. Funding**		
	• Lack of research funds/incentives (funds late)	• Fragmented/ivory tower mentality in R&D	• Develop bankable proposals (with impact)
	2. Lack of end-user participatory R&D		
	• Too many research results not adopted/used by industry		• Develop strong participatory R&D (government and private): coordination among social scientists and engineers and other stakeholders • Create a data bank of postharvest machinery designs for selection (decision support system)
	3. Lack of collaborative activities by research institutions		
	• Limited methodologies to assess postharvest technologies	• Lack of research focus and coordination	• Collaborative planning of research institutions • Pilot testing
	• Premature extension	• Industry demand • Institutional & political interest • Fragmented approach	• Independent group should do testing and evaluation of equipment
Research & development: **2. Design/ innovation (public & private)**	**1. Inappropriate design for real need**	• Insufficient review of existing technology and needs	• Survey (stakeholders to identify specific constraints & opportunities) • Conduct needs assessment • Develop localized design for manufacturers
	2. Lack of local design standards		• Develop local design standards
	3. Small implement not globally competitive		
	4. High cost of production materials & equipment	• High government tariff	• Review tariff policies
	5. Property rights	• Difficult to police patent laws	

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Table 1. (cont'd) Philippine rice postproduction systems constraints and opportunities.[a]

Interest groups	Constraints	Cause[b]	Opportunities
Manufacturers/ entrepreneurs/ distributors	**1. High manufacturing cost**	• High cost of production material/manufacturing equipment	• Integrate manufacturing activity • Adapt foreign technology for local use • Sub-contracting • Mass production
	2. Poor quality machinery	• Lack of manufacturing process standards for better quality product	• Standardize design parts for interchangeability • Compulsory testing of equipment for local sale and distribution
		• Lack of better fabrication techniques	• Technical training for new fabrication process
		• Lack of qualified technicians (after-sales services)	• Stronger after-sales services by equipment distributors • Establish common service facility
		• Fly-by-night manufacturers	
	3. Low impact of R&D on the manufacturing industry	• R&D work is not market-driven	• R&D to promote commercialization • Survey (stakeholders to identify specific constraints & opportunities) • Needs assessment
		• Lack of commercially available efficient designs (if there are, they are costly for small farmers)	• Aim for high quality machine, i.e. casting • Government to set up a production plant where small facility manufacturers could share machinery • Develop local manufacturing capability through coordinated R&D • Establish local manufacturer network with foreign manufacturer, for possible sub-contracting activities • Needs assessment
		• Lack of facilities/resources for R&D	• Financial assistance for manufacturers
		• Lack of cooperation between manufacturers and R&D institutions, particularly for needs identification	• Participatory R&D • Government to set up a center where R&D output will be showcased & manufacturers could shop (free) for possible technologies/design
		• Proprietary aspects of R&D results	
	4. Lack of policy to support local manufacturing	• Lack of incentives for local/private manufacturers	• Formulate policies to provide incentives for local manufacturers of postharvest equipment (i.e. lower tariff & duties on imported components/materials)

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[b] Underlined words are those that were modified/added during the second workshop

Table 1. (cont'd) Philippine rice postproduction systems constraints and opportunities.[a]

Interest groups	Constraints	Cause[b]	Opportunities
Rice processors and distributors	**1. Generally poor quality milled rice in the industry**	• Lack of information about consumer needs/ preferences	• Consumer survey
		• No price difference between sun dried and mechanically dried product	• Increase consumer awareness on rice/grain quality
		• Too many varieties	• Limit/categorize varieties • Determine marketable and preferred varieties
		• Lack of real rice quality standards	• Develop functional grades and standards
		• Inappropriate technology being used • Lack of incentive for high grain quality	• Identify appropriate equipment and procedure for processing better quality rice
	2. Technological/operational problems		
	• High cost of electricity		• Develop alternative power generating system (e.g. rice hulls)
	• Imported technologies are expensive and inappropriate (specify technology, e.g. rice mills)		• Develop database • Develop local designs
	• High drying losses	• Lack of intensive technology promotion	• Increase end-users' knowledge on available technology (database)
	• Inefficient grain handling and storage systems (bag versus bulk)		• R&D for conversion from bag to bulk handling
	• Post harvest facilities (PHF) operating below capacity		• Management and technical study
	• High cost & unavailability of spare parts		• After-sales services
	• Manpower problems		
	• Lack of well trained milling operators and grain quality experts		• Training/seminar on rice processing operations & maintenance & grain quality
Extension/ Training	**1. Inadequate extension system**		
	• Lack of extension capability of local government units (LGUs)	• Devolution (lack of national & LGU linkage) • Lack of funds for technology transfer	• Knowledge enhancement/training of LGU staff • Coordination between local and national agencies
	• No information available on tested technologies		• Develop information centers/network • Develop information materials • Develop database

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[b] Underlined words are those that were modified/added during the second workshop

Table 1. (cont'd) Philippine rice postproduction systems constraints and opportunities.[a]

Interest groups	Constraints	Cause[b]	Opportunities
	2. Inadequate training		
	• Training on information in popular forms not available	• Lack of proper management tools and strategies in the transfer and commercialization of developed technologies	• Develop information materials • Train extension officers • Strengthen coordination with Agricultural Training Institute (ATI) • Provide incentives • Identify and train key extension specialist for PPS
	3. Lack of public awareness (on grain adulteration etc.)		• Campaign to increase public inform
Policy-makers	**1. Lack of communication with stakeholders**	• No feedback on research results	
	2. Government policy on importation vis-à-vis pricing level		• Technology & agenda continuity • Review economics of rice production versus policy
	3. Weak political will to address PPS problems		• Provide bankable proposals and projects
	4. Lack of workable and consumer-based grades and standards on raw and processed products		• Identify suitable grades & standards e.g. NFA intra-agency/ discipline meeting to map-out & improve the present NFA grades & standards
	5. Scattered postharvest facilities (PHF)		• Centralized operation of PHF to attain economies of scale and efficiency
Research donors	**1. Lack of government financing support**		• Strategic location
Development partners	**2. Lack of workable credit and financing scheme (cooperatives)**		
Financing institutions	**3. Difficulty in credit access (strict credit requirements)**		
	4. Lack of feasible, specific & integrated PHF	• Individual operation of PHF is not economically viable	• Develop technology options and requirements for feasible implementation
Consumers	**1. Lack of rice quality standard as to taste, smell, and physical quality**	• <u>Standards not appropriate & not enforced</u>	• Review/restructure rice quality standards by consumer requirements
	2. Market price distortion • "Hoarding" to adjust palay price • Short changing • High cost of rice in the market • Classification/pricing problem		• Activate/organize consumer protection groups

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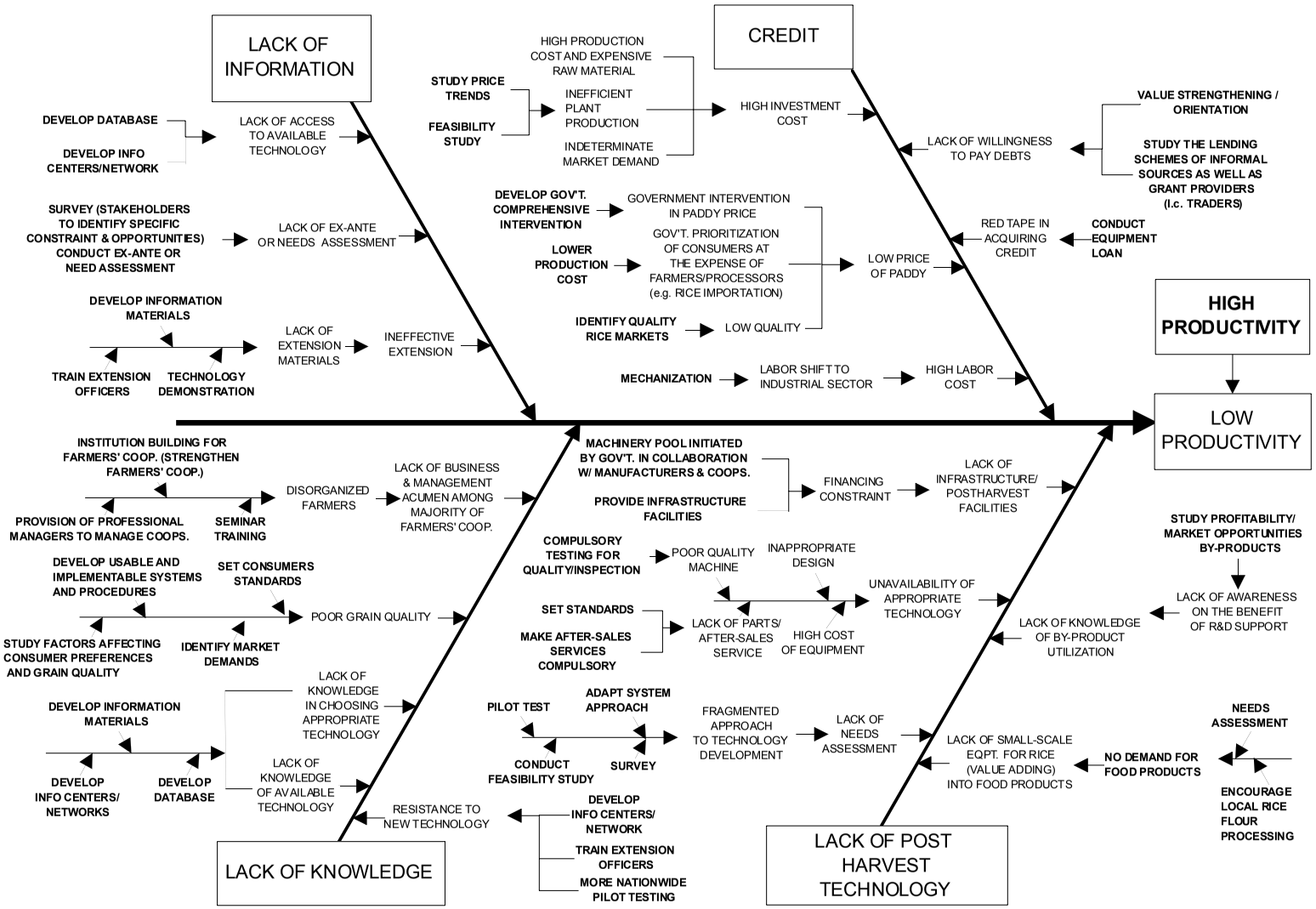
[b] <u>Underlined words</u> are those that were modified/added during the second workshop



NOTE:Graphical representation of Table 1, output of the first Philippine Rice Postproduction Workshop held last October 1998 at IRRI, Los Baños, Laguna, Philippines

Figure 1. Philippine rice postproduction systems constraints and opportunities: (a) Small farmers/cooperatives/rural areas/farm labor.

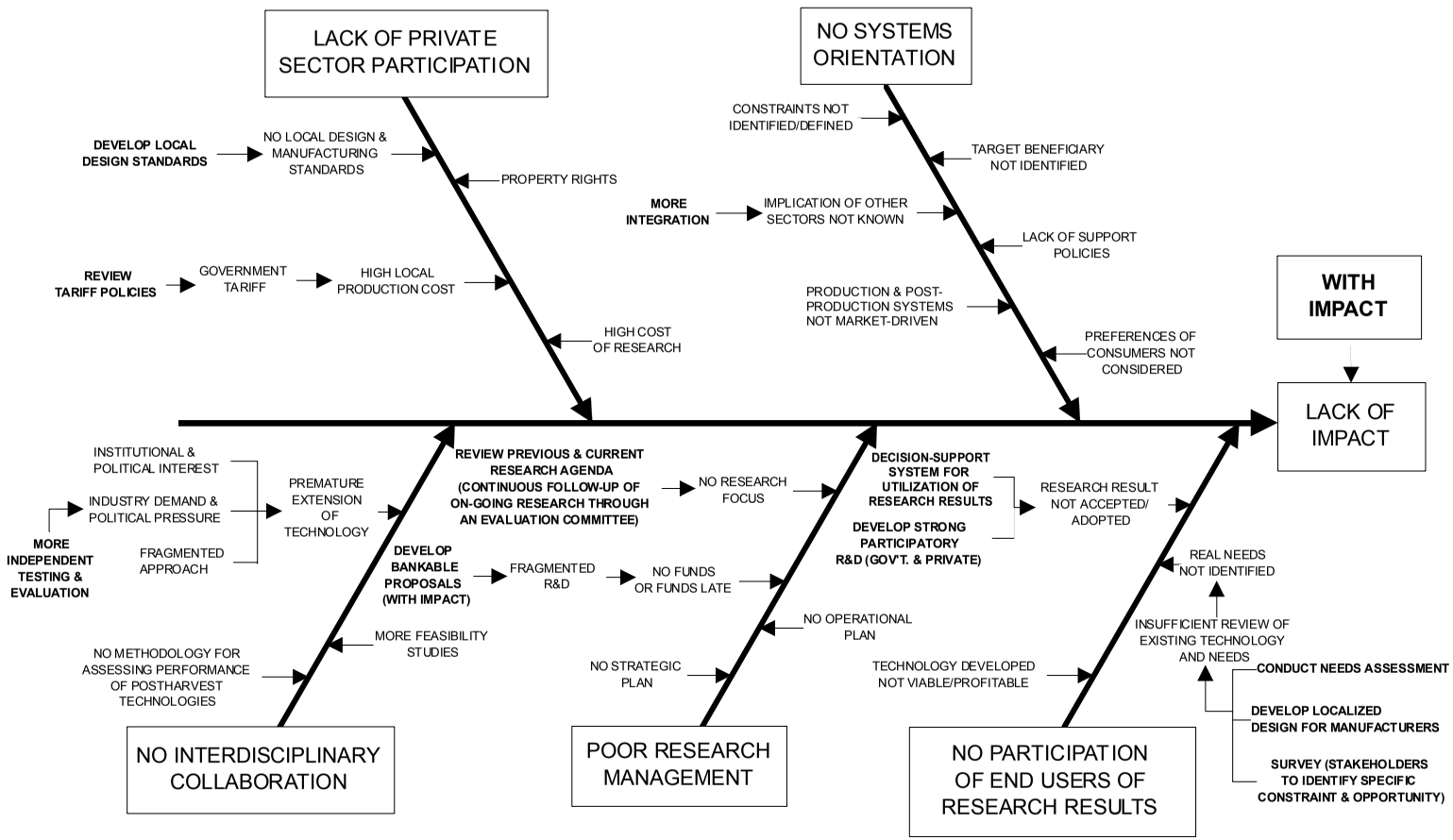


Figure 1. Philippine rice postproduction systems constraints and opportunities: (b) Research and development.

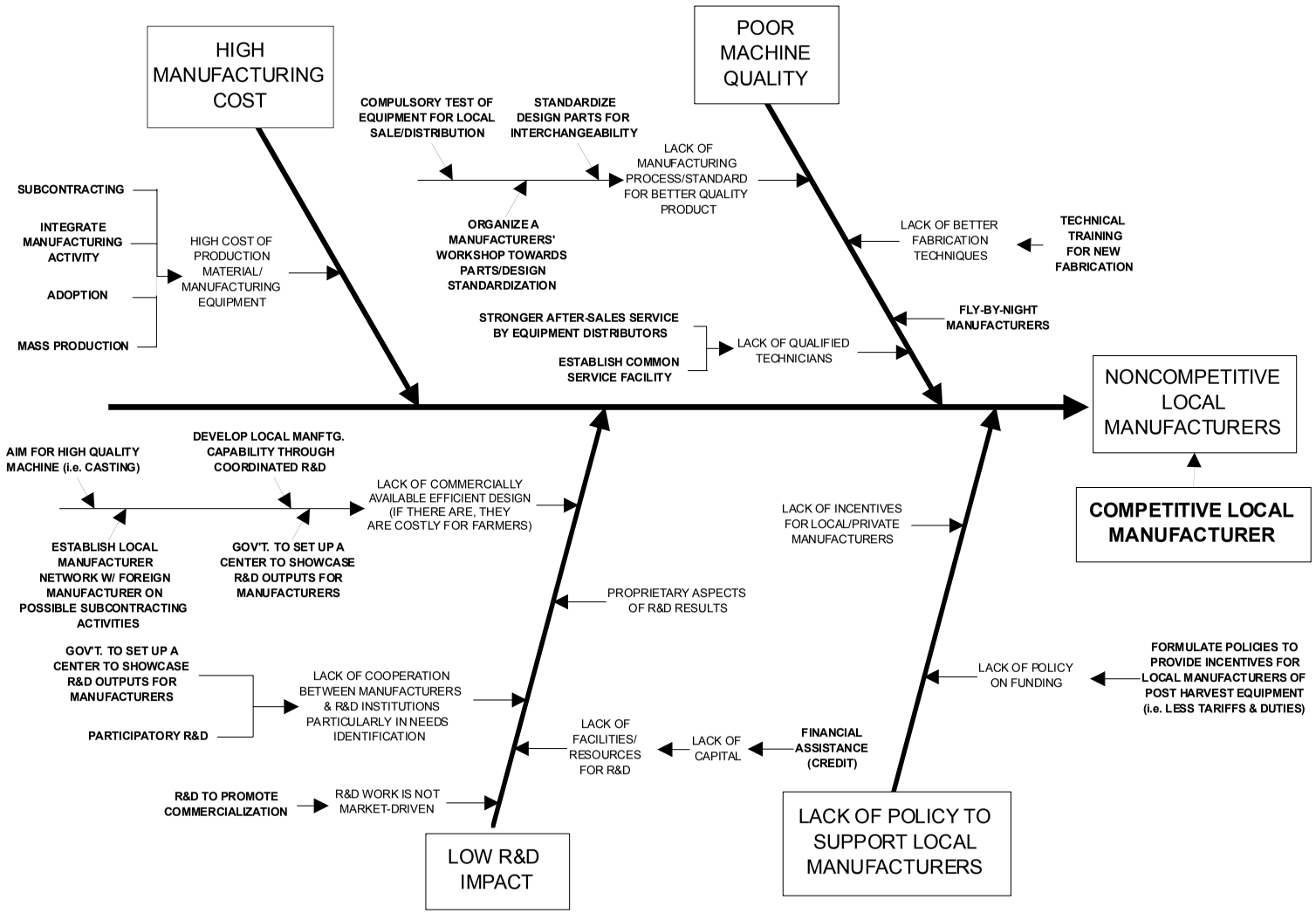


Figure 1. Philippine rice postproduction systems constraints and opportunities: (c) Manufacturers/entrepreneurs/distributors.

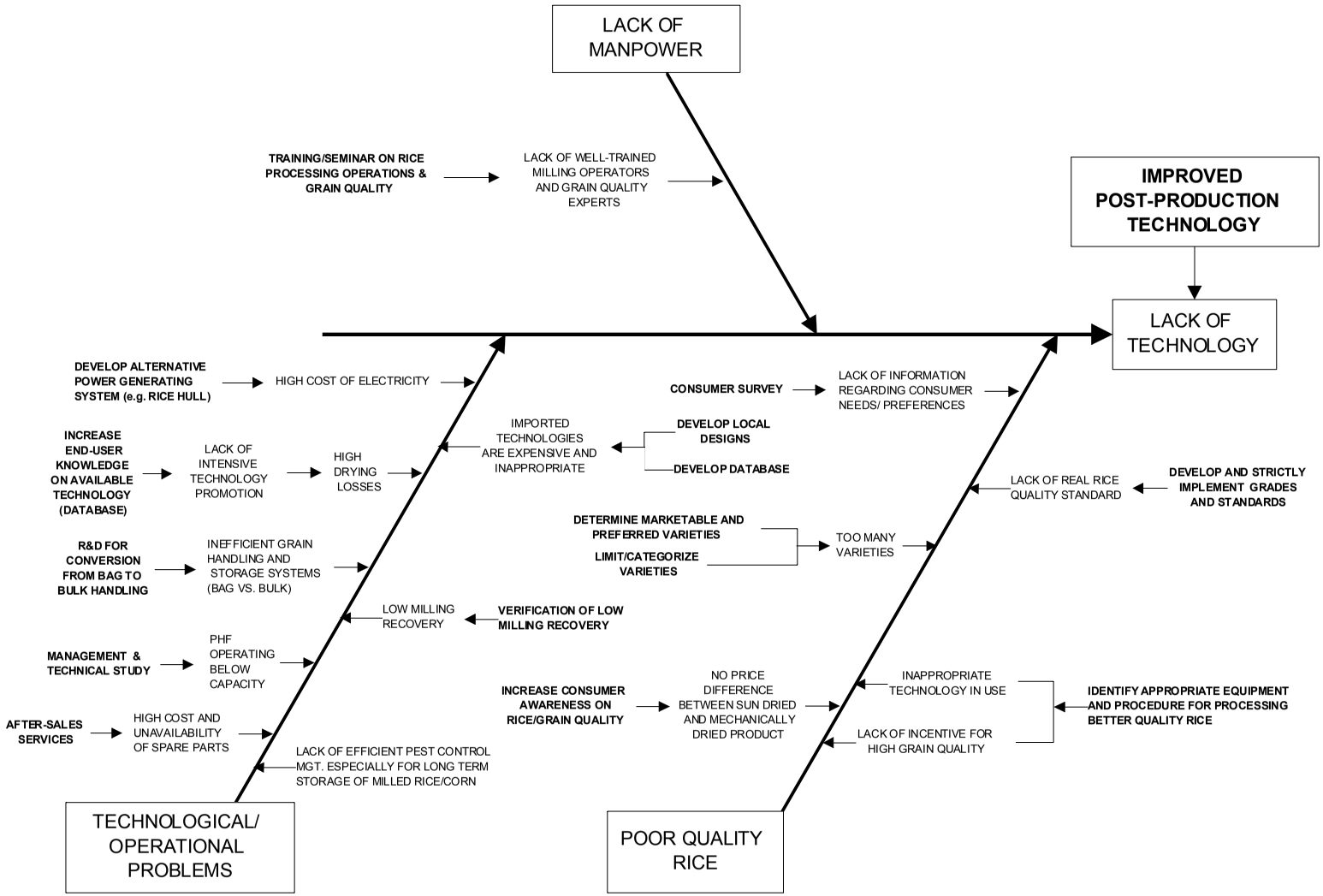


Figure 1. Philippine rice postproduction systems constraints and opportunities: (d) Rice processors and distributors.

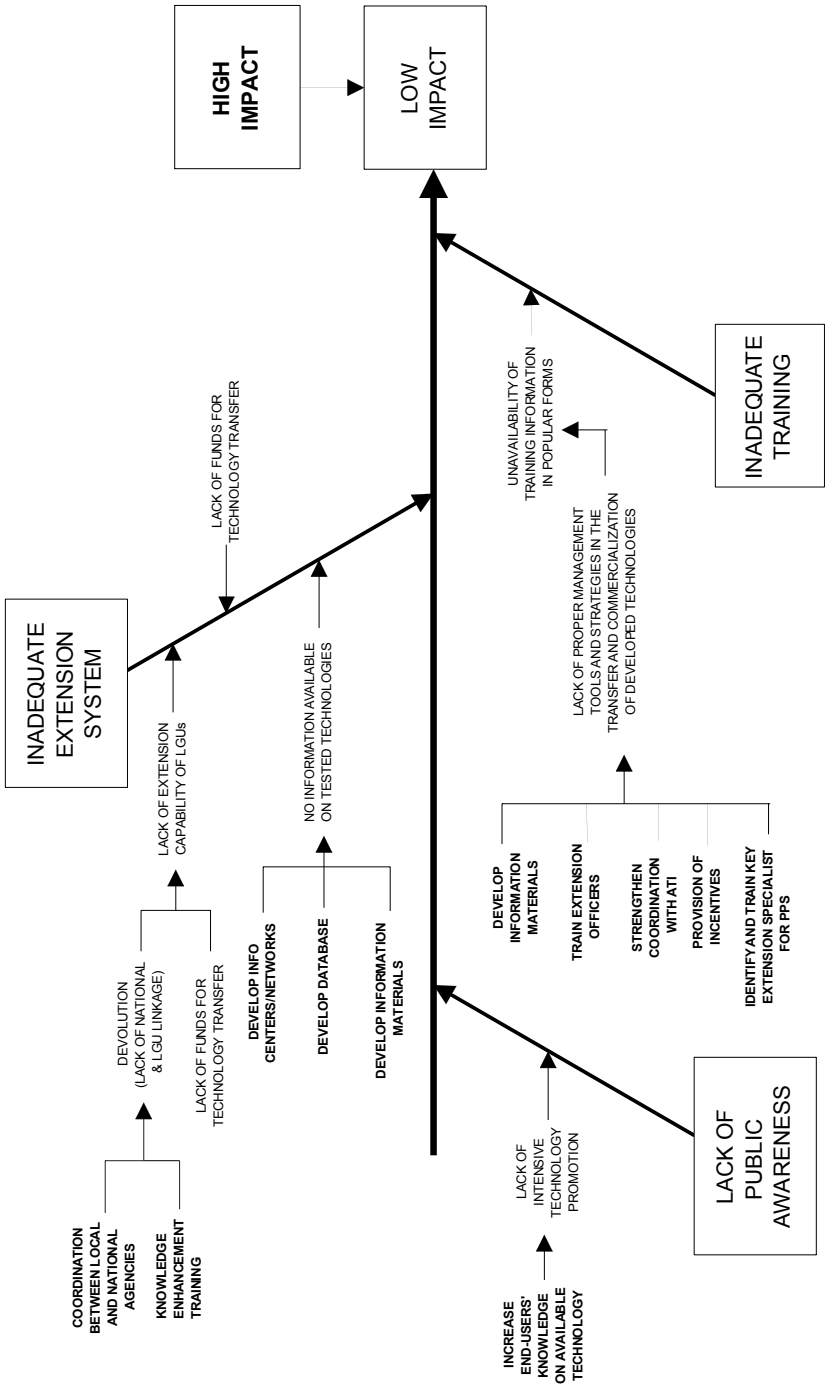


Figure 1. Philippine rice postproduction systems constraints and opportunities: (e) Extension/training.

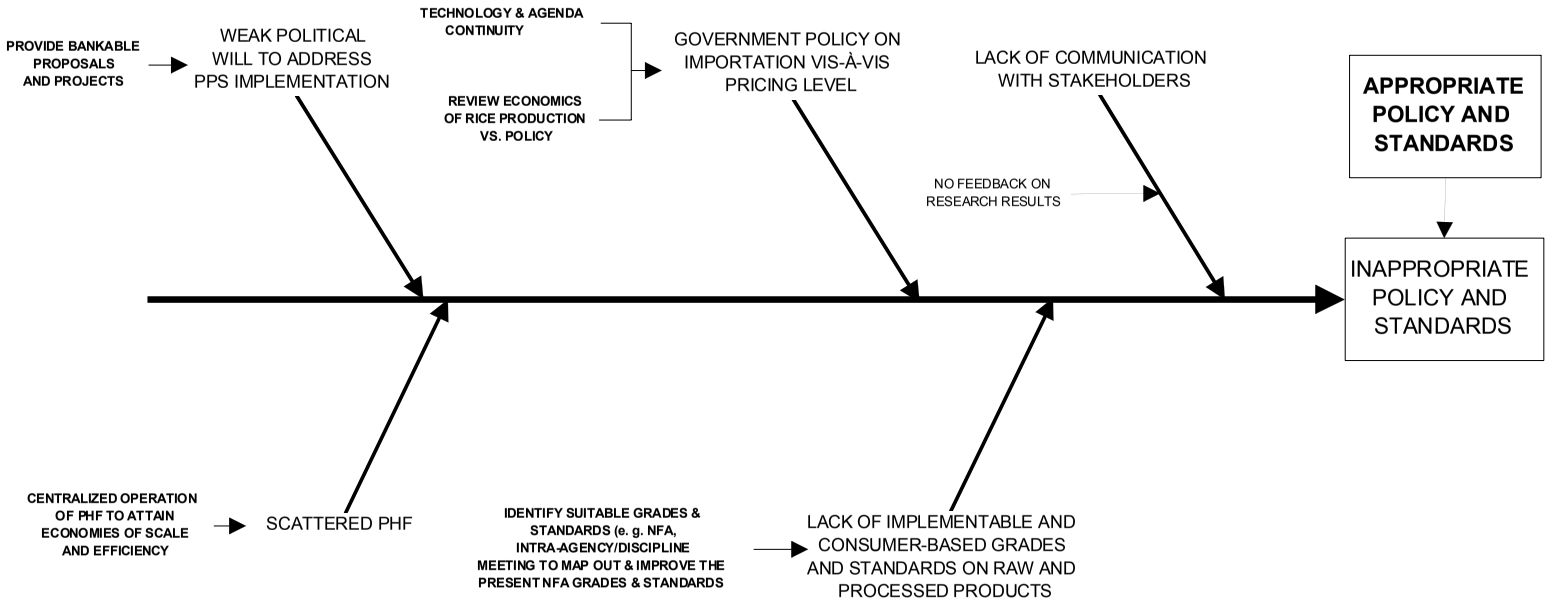


Figure 1. Philippine rice postproduction systems constraints and opportunities: (f) Policy-makers.

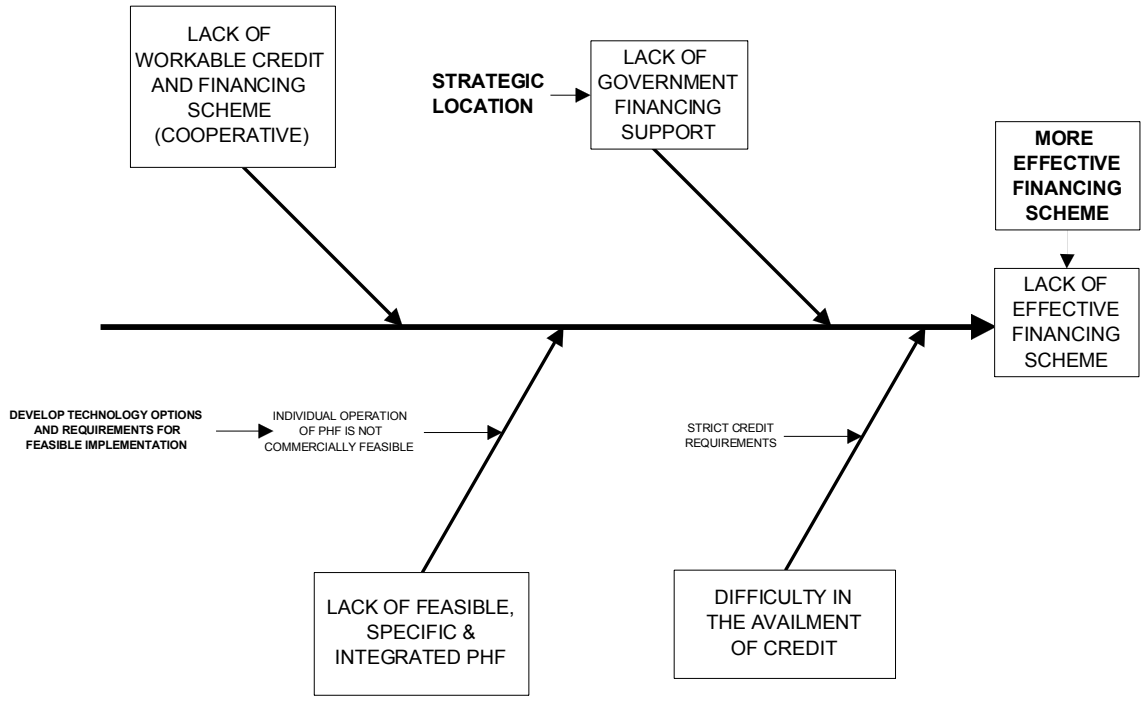


Figure 1. Philippine rice postproduction systems constraints and opportunities: (g) Research donors/ development partners/financing institutions.

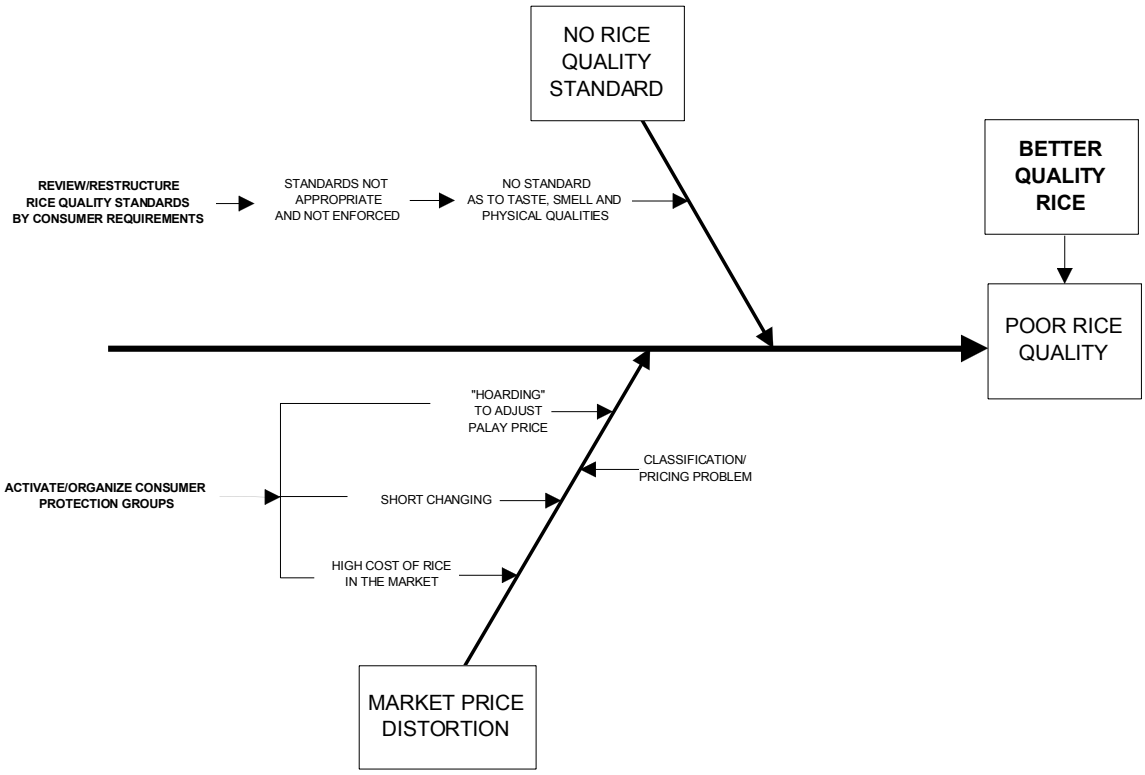


Figure 1. Philippine rice postproduction systems constraints and opportunities: (h) Consumers.

Table 2. PPS players and their roles in the postproduction chain.[a]

Who	What they do	What they need	What they handle
Production to consumption chain			
Farmers	• harvest • cut and haul • thresh • haul • dry • clean • handle • store • mill	• information/knowledge on PPS technologies • credit (for PPS equipment) • training for PPS equipment operation and maintenance • feedback on market research results (consumer preferences) • better quality rice to increase income	• straw • paddy – self • paddy – seed • paddy – excess • hull • bran • rice
Contractors	• harvest • cut and haul • thresh • dry • clean	• higher operator fees • training on PPS operations/process/activities • equipment for harvesting and threshing • management capabilities • credit	• paddy • wet grain
Traders	• haul • dry • clean • handle • store • grade • finance	• credit • thresher • moisture meter • transport facilities (i.e. truck) • market information	• paddy • bran • flour • rice
Processors (millers) and cooperatives	• haul • dry • clean • handle • store • mill • grade • finance	• transport facilities • dryer • bulk storage facilities • warehouse • plant design layout • development and training of systems and procedures for operation • upgrading of milling systems • pest control system development and training • research results information on business operation • knowledge of grain quality standards • credit	• paddy • hull • bran • flour • rice (including brewer's and brokens)
Wholesalers	• haul • dry • clean • handle • store • grade • finance	• sack storage (for rice) • bulk storage (for paddy) • pest control systems and procedures • transport facilities • training on storage and procedures for handling rice • credit • market information	• paddy – self • flour • rice
Retailers	• haul • clean • handle • store • grade • finance	• functional grades and standards • credit • storage facility (warehouse) • market information	• paddy – self • rice • flour • bran

[a] Combined output of Groups 1 & 2 during the Second Philippine Rice Postproduction meeting on 4–5 November 1998 at BPRE, Muñoz, Nueva Ecija, Philippines.

Table 2. (cont'd) PPS players and their roles in the postproduction chain.[a]

Who	What they do	What they need	What they handle
Consumers	• finance	• functional grades and standards • packaged and branded rice • market pressure • information on consumer rights • implementation of business regulations • credit	• rice • bran • flour
Public sector support			
Finance institutions	• provide financial support	• information on workable/viable equipment/technologies • loan requirements	• money
Government policy-makers	• provide policy/ regulations	• information on research results to develop/realign policy • information on regional PPS needs • information on programs of different agencies involved in PPS (i.e. the big 4 — BPRE, IRRI, UPLB, PhilRice) • sustained situational reports on PPS • enforcement • information on PPS technologies	• government funds • policy program
Research and development	• identify problems/ develop designs • inform • educate • communicate	• needs assessment (farmers/processors) • market research • case study on business operations of rice processing • think-tank group • upgrading of technology designs • credit/funds	• designs • technology (software and hardware)
Extension	• inform • educate • communicate • technology transfer	• information materials • systematic and organized technology information • electronic information • government policy to support extension • capability development of extension workers on PPS • trainers for PPS • credit/funds	• extension workers • farmers and other PPS clients
NGOs/ development organizations	• community organizing • people empowerment • provide information • donate	• information on workable/feasible/affordable PPS • financial support (grants) • terms	• people • funds/grants
Private sector support			
Innovators	• design and develop • improve designs • sales	• testing and evaluation • capital and market	• designs • hardware
Manufacturers	• fabricate • sell PPS hardware • sub-contract	• improve manufacturing process • government incentives (i.e. tariff reduction/exemption on imported materials) • matching research results to the market • credit	• PPS hardware

Table 2. (cont'd) PPS players and their roles in the postproduction chain.[a]

Who	What they do	What they need	What they handle
Machinery distributors	• sell PPS hardware	• technical information • improve manufacturing process • government incentives (i.e. tariff reduction/exemption on imported materials) • matching research results to the market • credit	• PPS hardware (machinery)

Table 3. The Philippine Rice Postproduction System — activities.[a]

Title					
Super goal	**Food security and poverty alleviation** **More and better quality rice**				
		Institute priority	**Expected output**	**Target groups**	**Who involved**
Theme	**Credit**				
Activities	**Document/analyze credit mechanisms (success and failures)**	H-I[b]			International Rice Research Institute-Social Science Division (IRRI-SSD)
	Develop case studies of successful/ unsuccessful cooperatives	M-P H-B H-I		Cooperatives, F, E, PM, FI	IRRI-SSD BPRE Philippine Rice Research Institute-Social Science and Policy Research (PhilRice-SSPR)
	Evaluate the viability of farmer-based rice processing enterprises	H-B M-P		Cooperatives, F, E, PM, FI	BPRE PhilRice-SSPR
	Document and analyze operations of successful/viable farmer-based rice processing enterprises	H-B M-P		Cooperatives, F, E, PM, FI	BPRE PhilRice-SSPR
	Strengthen financing institution capability to evaluate financing proposals (i.e. provide technical training and more information/ feasibility studies	M-B L-C		FI	CEAT
Theme	**Policy**				
Objective	**To recommend/advocate functional PPS policies**				
Activities	**Analyze the implications of importation versus local manufacturing of PPS technology**	L-B			AMMDA

[a] Ativities as identified by the four institutions during the Second Philippine Rice PPS meeting on 4–5 November 1998 at BPRE, Muñoz, Nueva Ecija, Philippines.

[b] See end of table for key to priorities, target groups, and institutions.

Table 3. (cont'd) The Philippine Rice Postproduction System — activities.[a]

		Institute priority	Expected output	Target groups	Who involved
Theme	**Policy (cont'd)**				
	Formulate/conduct policy studies on public investment for selected postharvest infrastructures (dryers, warehouses, storage facilities, cold storage for seeds and perishables)	H-C H-B M-P L-I		PM, FI, E, F, T, R&D, C, M	University of the Philippines-Centre for Policy and Development Studies (UPLB-CPDS) BPRE PhilRice-SSPR
	Provide information on current issues/policies concerning PPS (information dissemination)	M-P M-I M-B		R&D, PM, E	PhilRice-SSPR
	Provide sustained situational reports on PPS	M-B			
	Provide information on research results to guide in formulating policies	H-C M-P M-B M-I		GP, FI, I, R&D All	UPLB-CPDS PhilRice-SSPR
Theme	**Information, training and extension/education**				
Objective	**To increase knowledge and skills of PPS workers**	Increase access to inform-ation			
Activities	**Collect information**				
	• Develop database on: – technologies – manufacturers – literature	H-I H-C M-B			IRRI CEAT
	Making information available				
	• Develop and provide information exchange through electronic communications	H-P H-I H-B		R&D	IRRI BPRE Philippine Rice Research Institute-Rice Engineering Mechanization (PhilRice-REM)
	• Develop and disseminate information materials on PPS and feasible technologies	H-P H-B H-I		F, PM, T, P, FI, E	IRRI BPRE PhilRice-REM/ Technology Promotion Division (TPD)
	Needs assessment				
	• Develop case studies to identify user needs and feasibility studies	H-P H-B H-I M-C		R&D, FI, P, F, M, FI	IRRI BPRE PhilRice-SSPR

Table 3. (cont'd) The Philippine Rice Postproduction System — activities.[a]

		Priority	Expected output	Target groups	Who involved
Theme	**Information, training and extension/education (cont'd)**				
	Develop training materials based on needs assessment (computer-aided learning, video and packaged information)	H-I H-C H-B H-P		All	IRRI CEAT BPRE PhilRice
	Conduct training based on stratified target groups (e.g. local manufacturers, producers etc.) identified through case studies	H-C H-I H-B		All	CEAT IRRI BPRE
	Develop case studies on PPS development in other countries	H-I H-P M-C L-B		All	IRRI (CEAT) PhilRice-REM
	Establish one-stop shop of rice PPS technology	H-I L-P L-C		F, PM, GP, P	IRRI
Theme	**R&D methodology**				
Objective	**To strengthen the participatory PPS R&D for increased impact**				
Activities	**Committees for improved coordination**				
	• Establish a rice PPS collaborative network	H-C H-I H-B	DONE		Big 4 — BPRE, IRRI, UPLB, PhilRice
	• E-mail network for better coordination	H-P H-C H-B H-I		R&D All	Big 4 NFA
	• Establish/develop a tripartite scheme of commercializing/ adopting mature technologies among R&D institutions, manufacturers and financing institutions	H-P H-C H-B L-I		R&D, M, FI	PhilRice-REM/ TPG AMTEC BPRE
	Design methodologies				
	• Application of decision-support systems in the design of appropriate rice postproduction technologies	H-C H-I H-B M-P		R&D, M, FI	CEAT IRRI BPRE (PhilRice-REM)
	R&D methodology studies				
	• Evaluation of PPS technologies	H-C H-I H-P M-B		All	PhilRice-REM/ SSPR AMTEC IRRI
	• Adoption studies of developed postharvest technologies	H-P M-I M-B		F, T, P	PhilRice-REM/ SSPR (IRRI, BPRE)
	• Local manufacturing of PPS facilities (involvement of manufacturers)	H-C H-B M-I L-P		M	CEAT BPRE (IRRI, PhilRice-REM)

Table 3. (cont'd) The Philippine Rice Postproduction System — activities.[a]

		Priority	Expected output	Target groups	Who involved
Theme	**R&D methodology (cont'd)**				
	• Identify/update harvest needs of rice farmers	H-P H-B H-I M-C		F, C, R&D	BPRE IRRI (CEAT) PhilRice-SSPR/ REM
	• Participatory studies on evaluation of postharvest technologies	H-C H-I M-B M-P		R&D, F, T, P	CEAT IRRI (BPRE) (PhilRice-REM/ SSPR)
Theme	**R&D on technology**				
Objective	**To develop improved PPS technologies**				
Activities	**Promote/develop farm and plant-level mechanical dryers**	H-P H-I H-C H-B		T, F, R&D, P	Big 4
	Pilot test and assess quality of local and foreign-made technologies	H-C M-B		M, D&D	CEAT-AMTEC
	Develop high-temperature dryer, one pass	H-P H-B H-C L-I		T, P, R&D	PhilRice-REM CEAT BPRE
	Develop pest-control systems and procedures for bulk storage of paddy	H-C H-B L-I			BPRE CEAT
	Design and develop bulk handling systems	H-P H- I H-C H-B		T, P, R&D	Big 4
	Evaluate the effect of postharvest technologies on health and nutrition	H-I			IRRI-PBGB
	Develop/promote mechanical harvesters/ combines				
	Evaluate/ monitor/SE on the sustainability of postharvest technologies	H-B H-I M-P		F, T, P, C, R&D	BPRE IRRI PhilRice-SSPR/ REM
Theme	**Rice quality**				
Objective	**To develop improved PPS technologies**				
Activities	**Characterize physical and chemical properties of common Philippine rice varieties**	H-P H-C H-I		R&D, Millers	IRRI CEAT Philippine Rice Research Institute-Rice Chemistry and Food Science (PhilRice-RCFS)
	Establish/update thermophysical properties of major rice varieties	H-P H-I H-C		R&D	IRRI CEAT PhilRice-REM/ RCFS
	Pilot test existing rice/paddy standards	M-B L-I L-P		R&D, Con	BPRE NFA

Table 3. (cont'd) The Philippine Rice Postproduction System — activities.[a]

		Priority	Expected output	Target groups	Who involved
Theme	**Rice quality (cont'd)**				
	Develop and pilot test feasible quality standards	H-C H-B L-P L-I		R&D, Con	CEAT BPRE NFA
	Undertake awareness campaign for rice quality standards	L-I			
	Identify consumer preferences	H-I			IRRI

Institutions:
- B – Bureau of Philippine Research and Extension (BPRE)
- C – College of Engineering and Agro-Industrial Technology (CEAT)
- I – International Rice Research Institute (IRRI)
- P – Philippine Rice Research Institute (PhilRice)
- AMMDA – Agricultural Machinery Manufacturers and Distributors Association
- AMTEC – Agricultural Machinery Testing and Evaluation Center
- NFA – National Food Authority
- SSD – IRRI Social Sciences Division
- SSPR (PhilRice) –
- UPLB – CPDS
- REM (PhilRice) –

Target Groups:
- C – Contract
- Con – Consumers
- D&D – Dealers and Distributors
- E – Extension
- F – Farmers
- FI – Financing Institutions
- GP – General Public
- M – Manufacturers
- P – Processors
- PM – Policy-makers
- R&D – Research and Development
- T – Trader

Priority:
- TPG (PhilRice) –H – High
- M – Medium
- L – Low

.

Table 4 Philippine Rice Postproduction Program.[a]

Project activities	Current activities	Agencies involved	Target	Product/output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
1 Establishment of Philippine Rice Postproduction Consortium								
1.1 Establish a rice PPS collaborative network								
1.2 Establish/develop a tripartite scheme of commercializing/adopting mature technologies among R&D institutions, manufacturing, and financing institutions								
1.3 E-mail network for better coordination								
2 Rice postproduction system in the Philippines: a critical analysis								
2.1 Case studies								
2.1.1 Develop case studies on PPS development in other countries			•Big 5–BPRE, IRRI, NFA, UPLB, PhilRice (R&D) •Department of Agriculture (DA) management •Manufacturers	•Local tech. •Documented info/ data-base	Location specific e.g. high for Thailand, low for China	•Faster development of appropriate tech. •Improved decision-making ability •Rational and efficient use of private/public resources	•Training •Information exchange/ network •Budget allocation realignment	•Finance institution •Research/ academic institution •Participate in regional workshops •Proceedings from int'l forum

[a] Output of the third meeting as revised during the fourth Philippine Rice Postproduction meeting held last 18 February 1999 at the Philippine Rice Research Institute, Muñoz, Nueva Ecija, Philippines.

Target – the immediate beneficiary and intended user of the output of the activity
Product/output – the result of the activity which could be soft or hard technology, new knowledge, or information to resolve the problem being addressed by the project activity
Probability of success – a judgment call that the desired output can be achieved given the resources available
Impact if achieved – the positive changes in the system
Impact pathway – the means by which the target beneficiaries could access the results of the project activity
Alternative supply – other possibilities of providing the technology, information, or new knowledge required to resolve the issues or concerns being addressed by the activity

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
2.1 Case studies (cont'd)								
2.1.2 Develop case studies of successful/ unsuccessful farmer-based processing enterprises (Note: 2.1.2, 2.1.3, & 2.1.4 were merged)	•Impact assessment of postharvest facilities distributed to farmers cooperatives	•BPRE	•Financial institutions •Big 5 •Department of Agriculture (DA), Department of Agrarian Reform (DAR) •Farmers	•Successful strategies •Policy	High	•Involvement of major players in R&D	•Legislation/ Administrative issuances •Seminars/ Workshop	•Dissertation •Cooperative Development Authority (CDA) •Funding
2.2 Policy studies								
2.2.1 Formulate/conduct policy studies on public investment for selected postharvest infrastructure/ equipment			•DA mgt. •R&D •Congress	•Policy recommend-ations	Policy recommend-ations – high Policy implementation – low	•Improved decision-making and manufacturing capability •Better use of public fund	•Public awareness campaign •Legislation	•Policies and experiences from other countries
2.2.2 Provide information on current issues/policies concerning PPS			•Policy-makers •R&D •Manufacturers •Farmers •End users	•Database •Policy updates	High	•More focused R&D programs	•Publications •Billboards/Letters •Symposia/ conferences	•Center for Policy and Development Studies (CPDS) •National Economic and Development Authority (NEDA) •NFA

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
2.2 Policy studies (cont'd)								
2.2.3 Document/analyze credit mechanisms (success/failure)			•Financial institution •Office of the President •Non–government Organizations (NGOs) •DA	• Improved credit delivery system	Medium	•High availment and repayment of credit	• Training/seminars on value formation	
2.2.4 Analyze the importation versus local manufacturing of PPS technology 2.2.5 Make after-sales service compulsory (previously 6.3)[b]			•NFA •Manufacturers •Machinery dealers/ distributors •Congress •NEDA •DA •R&D end users	•Policy recommend-ations •Identify constraints	Medium	•Development of local manufacturing •Efficient use of resources	•Public hearing •Tri-media	•NEDA •Department of Trade and Industry (DTI) •Board of Investment (BOI)
2.3 Needs assessment								
2.3.1 Develop case studies to identify user needs and feasibility studies (e.g identify/update harvest needs of rice farmers) (note: 2.3.1 and 2.3.4 were combined)			•R&D •Finance institution •Policy-makers •Manufacturers •Farmers	•Database •Updated priorities/ focus	High	•Efficient use of R&D resources •Relevant, responsive, focused, acceptable R&D •Increased adoption of tech.	•Multidisciplinary, participatory R&D •Tech. advocacy • Inventors forum	•State Colleges and Universities (SCUs) •NGOs

[b] Activities as identified during the First Philippine Rice Postproduction Workshop held at the IRRI Training Center on 9 October 1998.

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
2.3 Needs assessment (cont'd)								
2.3.2 Identify consumer preferences			•Processors •NFA •Department of Health (DOH) •Department of Science and Technology (DOST) •Food and Nutrition Research Institute (FNRI) •Consumer •DA	•Quality standards/ preferences •Better processing methods •Nutritional and good quality rice	High	•Improved nutritional status •Increased productivity/ profitability •Education	•Tri-media campaign	•Local Government Units (LGUs) •Retailers
2.3.3 Evaluate the effect of postharvest technologies on health and nutrition								
3. Rice postproduction technology development								
3.1. Basic studies								
3.1.1 Characterize thermophysical, physical and chemical properties of common Philippine rice varieties (note: 3.1.1 and 3.1.2. were merged)	•Resistance to airflow of local paddy varieties	•CEAT	•R&D •Millers	•Information •Database	High	•Improved PPS technology	•Scientific papers/ posters •Journals •Handbook	•Agricultural engineering journals (scientific) •Internet

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
3.2 Harvesting systems development								
3.2.1 Develop/promote mechanical harvester/ combines	•Evaluation of harvesting of technology •Stripper gatherer •LS 600 stripper harvester •LS 120 stripper harvester •Rotary reaper •Combine harvester	•PhilRice	•Manufacturers •R&D institution	•Locally suitable harvester/ combine	Medium	•Mechanized operation	•Industrial extension	•Foreign designs
3.3 Drying systems development								
3.3.1 Promote/develop farm and plant level mechanical dryers (note: 3.3.1 and 3.3.2. were merged)	•Design and development of high temp. fluidized bed dryer •Design and development of recirculating dryer •Design and development of 3-stage high temp. dryer	•BPRE •CEAT	•Farmers •R&D •Processors •Manufacturers •DA/DTI/ BOI	•Appropriate mechanical drying technology	High	•Reduced postharvest losses •Better quality rice	•Tech. advocacy •Incentive packages •Industrial extension	•Foreign designs

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
3.4 Storage systems development								
3.4.1 Design and develop bulk handling systems, pest control systems, and procedures of bulk storage of paddy (note: 3.4.1 and 3.4.2 were merged)	•Development of computer-aided management tool for bulk storage •Evaluation of recommended fumigants for pest control in storage •Evaluation of gamma irradiation technology of rice for insect disinfestation	•BPRE •NFA	•NFA •Processors •Millers	•Improved designs	Medium	•Reduced processing and storage cost and losses	•Tech. advocacy •Incentive packages •Industrial extension	•Foreign designs
3.5. Rice grades and standards development[c]								
3.5.1 Study existing NFA grades and standards[c] (try to limit/categorize varieties)(note: 3.5.1 and 3.5.2 were merged)	•Review and revision of Philippine grades and standards for palay and milled rice	•NFA	•Retailers •Millers •Consumers	•Improved grade standards	High	•Better trading practices	•Multi-media •Tech. advocacy •Incentive packages •Industrial extension	•Foreign designs

[c] Activities identified during the first Philippine Rice Postproduction Workshop held at the IRRI Training Center on 9 October 1998

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternate supply
4. Rice postproduction technology dissemination								
4.1 Systems evaluation of PPS technologies (note: 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.2 merged)	•Technical assistance through •Distribution of paddy moisture meter •Promotion of Volcani cubes storage technology •Promotion of in-store drying tech. •Reviewing PH proposals of local government •Assist local governments in PPS projects	•BPRE	•End users •Manufacturers	•Recommend-ations •Technical information	High (Long-term)	•Improved technologies •Higher success rates	•Research Institution •Agricultural Machinery Testing and Evaluation Center (AMTEC) •Manufacturers • End-users	•NGOs •AMTEC
4.2 Develop and pilot test feasible rice paddy standards (note: 4.2.1, 4.2.3 merged)			•Consumers •Farmers •Processors	• Verified national standards •Recommend-ations	Medium (Long-term)	• Effective standards • Consumer/farmer protection	•NFA/Big 5 •Consumers • Processors	• Old standards • ISO standards

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
4.3 Training stratified target groups identified through case studies (note: 4.3.1, 4.3.2, 4.3.3 merged)	•Assistance to 3 pilot cooperatives by providing trained managers	•BPRE	•All sectors	•Training materials •Trained personnel •Competent personnel in industry	High	• More efficient PPS • Higher productivity	•Agricultural Training Institute (ATI) •CDA •Research institutions •SCUs •NGOs •LGUs • Contractors	• ATI
5 Rice postproduction information dissemination								
5.1 Database development								
5.1.1 Collect information: develop database on technologies, manufacturers, and literature (previously 5.1.2)			•Big 5 •DA •Bureau of Agricultural Research (BAR) •SCUs •Philippine Council for Agriculture and Fisheries (PCARRD) •Research institutions •Manufacturers •Processors •Finance institutions •All sectors in PPS	•Software •Catalogue	High	• Available information	•WWW •Media • Big 5	•Regional Network for Agricultural Machinery (RNAM) •Internet •USAID •Manufacturers •GTZ •Limited

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
5.1 Database development (cont'd)								
5.1.2 Design methodologies: application of decision-support systems in the design of appropriate rice postproduction technologies (previously 5.1.1)	•Software development/ decision-support system in drying and pest management in storage	•BPRE	•Big 5 •DA •BAR •SCUs •PCARRD •Research institutions •Private R&D	•Software •Manuals	High (Long-term)	•Appropriate technology	•WWW •Product promotion (media) •Workshop •Product launching	•Limited
5.1.3 Establish one-stop shop of rice PPS technology			•End users	•Showroom •Media •Hardware/ software • Demonstrat-ion farms	Medium (High capital/ resource requirement)	• Better appreciation/ awareness of technology	•LGUs •DOST •Research institutions • DA	•Tech. exhibits •Fairs •Limited
5.2 Information dissemination								
5.2.1 Develop and disseminate information materials on PPS and feasible technologies (note: 5.2.1, 5.2.2, 5.2.3, 5.2.4 were merged)			•End users •Big 5 •LGUs •Research institutions •All sectors	•Bulletins/ manuals •Printed materials •Blueprints (software)	High	• Knowledgeable/ informed rice sectors	•WWW •Product promotion (Media) •Workshop •Product launching •Big 5 • Information exchange through electronic comm.	•Department of Foreign Affairs (DFA) •DA •R&D institutions •Media programs • Limited

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
5.2 Information dissemination (cont'd)								
5.2.2 Undertake awareness campaign for rice quality standards (previously 5.2.5)			•Producers/ consumers •All sectors	•Printed materials •Media presentation	High (Long-term)	•Improved awareness • Better implementation/ application	•NFA •Media • Big 5, to help NFA in information dissemination	• NFA consultations with other sectors
6. Local manufacturing of PPS facilities (involvement of manufacturers)[d]								
6.1 Develop localized design for manufacturers[d] (note: 6.1, 6.2 were merged)			• Local manufacturers	•Local designs •Design standards • Appropriate designs	High (Long-term)	•More competitive local designs • More standard designs parts	•Bureau of Product Standards (BPS) •AMTEC	•Imports • Network with foreign manufacturers (previously 6.7)
6.2 Establish •Local manufacturing network •Service facility •Integrated manufacturing activity •Sub-contract •Feasibiliy study (FS) (note: 6.4, 6.5, 6.6 were merged)[d]			• Manufacturers	• Network	Medium depend on manufacturers	• More competitive Products	• DTI	•Laguna Agricultural Machinery Manufacturers Association (LAMMA) •Agricultural Machinery Manufacturers and Distributors Association (AMMDA) • Limited

[d] Activities identified during the first Philippine Rice Postproduction Workshop held at the IRRI Training Center on 9 October 1998

Table 4. (cont'd) Philippine Rice Postppostproductionroduction Program.

Project activities	Current activities	Agencies involved	Target	Product/ output	Probability of success	Impact if achieved	Impact pathway	Alternative supply
7. Promotion of potential uses of rice-based products and by-products (changed title)[e]								
7.1 Study profitability/market opportunities of rice-based products (7.1, 7.2 merged)[e]	•Industrial utilization of by-products: rice hulls and straw •Utilization of rice bran for feed formulations	•BPRE •CEAT	• Processors • Consumers	• Quality products • Acceptable products	Medium	• Additional entrepreneurs • Less waste (environmental conservation) • Improve nutrition • Add-on value of rice products	•Big 5 •Processors •Entrepreneurs	• Synthetic additives
7.2 Develop alternative uses of rice hulls (previously 7.3)[e]	•Testing and evaluation of rice-hull furnace	•CEAT	• Processors	•Energy •Heat •Potting materials •Insulation materials •Construction materials	High	•Less waste •Cheap materials	•Processors •Research institutions	• Imports • Traditional fuels

[e] Activities identified during the first Philippine Rice Postproduction Workshop held at the IRRI Training Center on 9 October 1998

Table 5. Philippine Rice Postpostproductionproduction Consortium. Program of activities for 1999.

Activity	Agency[a]	Time frame
1. Needs assessment		
• Farmers	PhilRice, IRRI – SSD	Mid-April
• Cooperatives as Millers	BPRE	
• Millers	IRRI – AED, CEAT	
• Manufacturers	IRRI – AED, CEAT	
• Retailers and wholesalers	NFA, IRRI-AED	
• Consumers	NFA, PhilRice	
2. Database development	All	Development report in April
3. Characterization of physical and chemical properties of rice	BPRE, CEAT, PhilRice	November
4. Case studies		
• Dayap Development Cooperative	IRRI, BPRE	November
• Corfarm Rice Processing and Marketing	IRRI, CEAT	November
5. Evaluation of farmer-based processing enterprises (cooperatives)	BPRE, CEAT, IRRI	June

[a] PhilRice = Philippine Rice Research Institute; IRRI – SSD = International Rice Research Institute Social Sciences Division, IRRI – AED = IRRI Agricultural Engineering Division; CEAT = College of Engineering and Agro-Industrial Technology of the University of the Philippines at Los Baños

6 A framework for priority setting in postproduction systems, by A. Elepaño and M.A. Bell

Introductory note

Following the initial brainstorming, it was necessary to establish the relevance of the various constraints. With so many possible problems and opportunities, a systems perspective was presented to help participants better identify next steps and priorities.

The critical issue in moving from a brainstorming session to an action plan is the issue of "how to quantify the impact of any change and so prioritize amongst the many potential interventions and activities".

When we look at the myriad of possible activities generated from the initial workshop (Table 1), it is important to consider the target groups, their roles, what they do and what they handle, their problems and their effect on the overall system. Figure 2 divides the postproduction system into players directly involved in the production to consumption chain and those providing support. Tables 6–8 present what the players do, what they handle, what they need and their objectives (Table 9). Tables 10–11 and Figure 3 present economic and system considerations to help set priorities.

When possible interventions or opportunities were considered, the accompanying tables and figures were used to put the activities in context. This helped in forming a better concept of potential impacts if the constraints are overcome.

Thus, using the associated tables and figures as guides, we suggest we use the original workshop table (Table 1) to develop a workplan structured on the blank table below.

Subsequently, for each high priority problem, it is necessary to clearly articulate:

- core problem;
- core objective;
- constraints to achieving the objective (i.e. what is causing the problem);
- impact if constraints are overcome; and
- potential activity or research output for each constraint.

Description of PPS stakeholders

1 Farmers

Philippine rice farmers harvest an average of 2.8 tons of paddy per hectare. The country produces an average of about 9.5 million tons of paddy per year from an estimated 3.4 million hectares of rice land (Table 10). Small farmers (those with less than 2 hectares) comprise about 65 percent of the total number of rice farmers but they eventually contribute to approximately 32 percent of the traded volume. In an IRRI study of the farmers' costs and benefits at Guimba, Nueva Ecija, it was noted that farmers generally keep 16 percent of the total produce for home consumption, 4.3 percent for loan repayment, 3.0 percent for seeds and only about 63.4 percent as marketable surplus. Table 12 further shows that there is an increase of 113 percent in total paddy production from the dry season to the wet season mainly because of increase in area planted with rice. A typical farmer with about 2 hectares will have only 3.55 tons of paddy to sell to the traders.

Area of activity (What to do?)	Target group	Who is involved in R&D, constraint solution

Figure 2. Players in the production–postproduction sectors and what they do.

Farmers will usually sell their produce right after threshing. Traders and contractors bring trucks to the farmer's field to transport the paddy. Transport cost is then borne by the traders, providing some time and financial savings to the farmers. However, Figure 3 shows that traders still get about 5.1 percent of the value of processed milled rice.

2 Contractors

Contractors or commission agents are those who procure paddy from the farmers and receive commission fees from the rice millers/ wholesalers. This type of buyer is common in Luzon and Visayas.

3 Traders

Paddy traders are those who primarily deal with buyers within their locality and engage in buying limited quantities of grains within their own area or nearby municipalities and selling grains to rice millers. They may also opt to sell rice after having it custom-milled to wholesalers.

The traders practice quality control by getting a small sample of rice from every sack being unloaded at their warehouse.

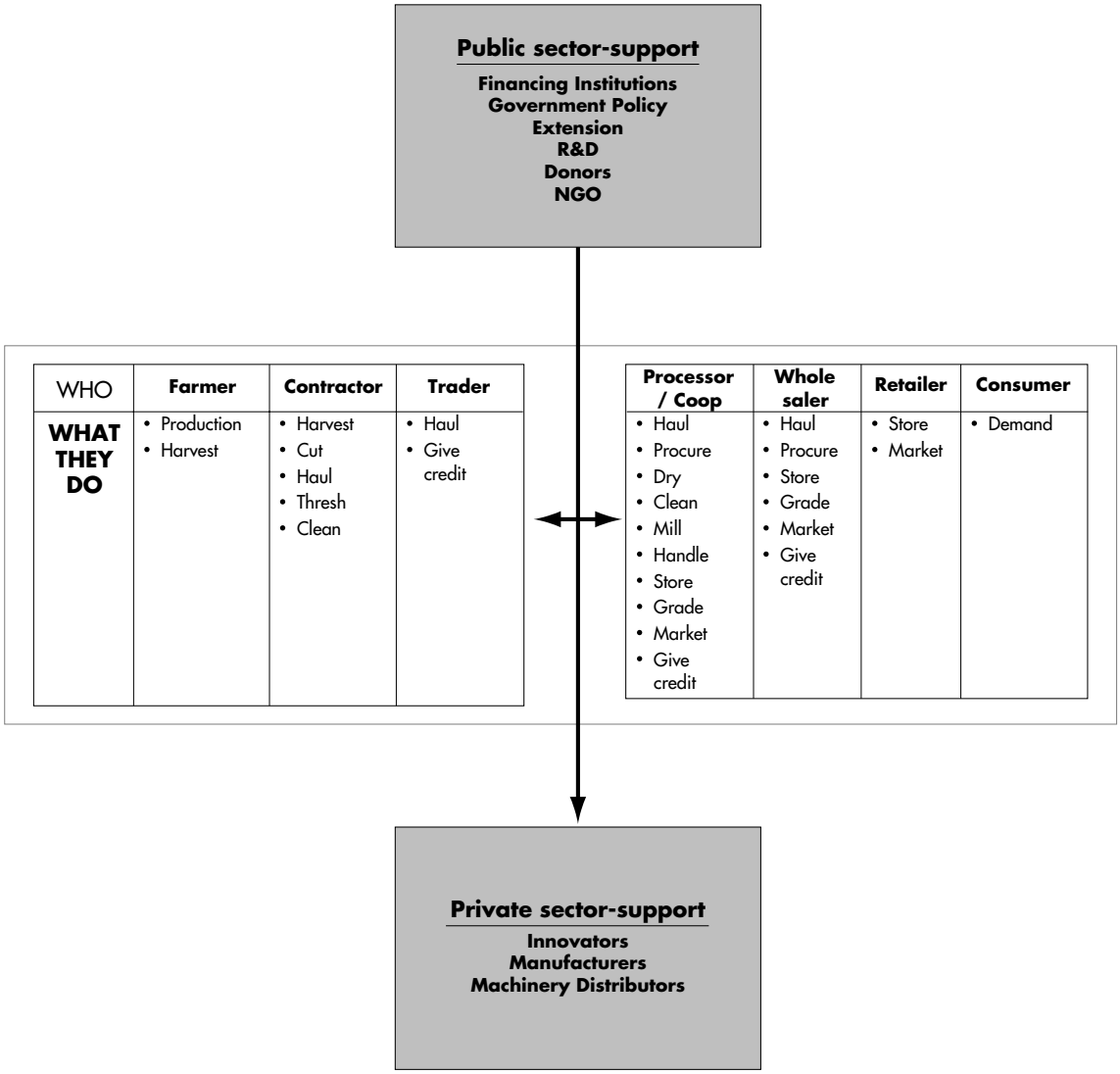


Figure 2. Players in the production–postproduction sectors and what they do.

4 Processors/Millers/Cooperatives

Rice millers/wholesalers are the most financially stable buyers. Aside from owning mills, warehouses, trucks and other facilities, this group of traders also provides free transportation and sacks to their regular producer-suppliers.

Based on recent records of the National Food Authority, the total number of registered rice mills in the country is 12,546 units with an aggregate input capacity of 7,696 tons per hour (153,933 bags/hour). These units consist of rubber roll, cono, kiskisan and very minimal units of impact-type rice mill. The rubber roll type constitutes about 55 percent of the total rice mill units or about 56 percent of the total milling capacity.

Figure 3 indicates that the processing cost, including marketing, is about 9.9 percent of the price of milled rice. Included in this cost are handling in the processing plant, cost of sacks, salaries and benefits of employees, equipment depreciation, repairs and maintenance of processing equipment, transport of milled rice, electric power, insurance, office supplies, utilities including security and the cost of paddy. Seventy-seven percent of the expenses in rice milling is the cost of paddy. Other major costs are interest (9 percent), electric power (3.2 percent), equipment depreciation (2.8 percent), and salaries and benefits (2.6 percent).

5 Wholesalers

The wholesalers, locally known as "viajeros", are small-scale mobile paddy and rice traders travelling with their trucks. They buy paddy from the farmers, sell to a miller or have the paddy custom-milled and buy rice from a mill for subsequent sale to wholesaler-retailers and retailers.

6 Retailers

Retailers are composed of the public markets, supermarkets and the corporate market.

a Public markets cater to consumers from all income brackets. A market rice vendor offers several types of rice, which are priced differently. Purchasing habits of the majority of rice buyers in public markets are greatly affected by the price, i.e. they discriminate based on the price of the rice.

   The rice sold in public markets is displayed for buyers to see. Also, the quality of rice sold in public markets is relatively inferior compared to rice sold in supermarkets. Disposal of rice is by the kilogram, packed in transparent plastic bags, or in 50 kilogram polyvinyl chloride (PVC) sacks.

b Supermarket customers are from the high and middle income groups. They discriminate based on the quality of the rice instead of the price, as evidenced by the relatively high price tag of rice in supermarkets compared with rice in public markets.

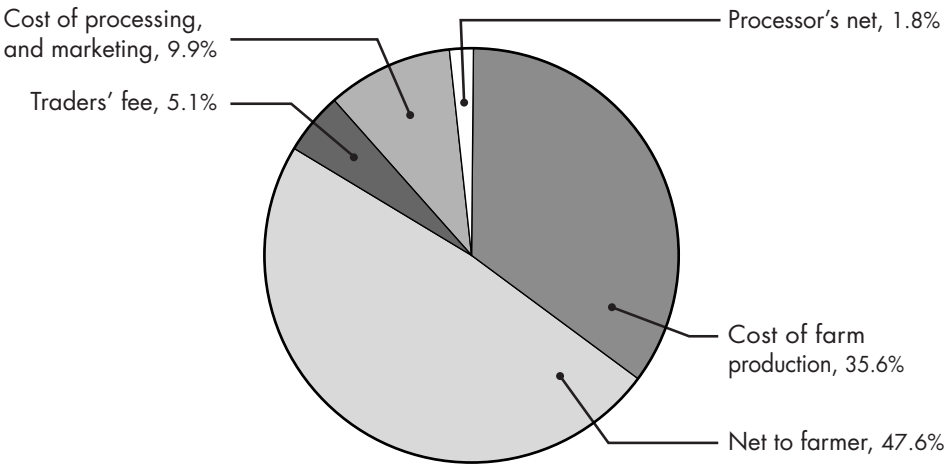


Figure 3. Shares in the value of processed milled rice.

Rice sold in supermarkets is packed into 2, 5, or 10 kilogram packs, sealed in transparent, thick plastic bags printed with the supplier's name. Supermarkets also sell 20, 25 and 50 kilogram PVC sacks of rice printed with the trader's/miller's name.

c Corporate markets—corporate consumers are the employees of firms who receive rice as part of their employment benefit package. They belong to the high- and middle-income groups and are conscious of the quality of rice they consume.

7 Consumers

According to the study conducted by IRRI, as income levels rose, consumers became more discriminating. High-income consumers purchased rice based on quality characteristics and attached higher implicit prices to these attributes than low- and medium-income consumers.

Also, the most common reason cited by consumers for buying a specific rice was the volume of expansion of the cooked rice. Other major selection criteria in descending order of priority were reasonable prices, whiteness and translucency, softness, and good taste.

Table 6. PPS players and their roles in the postproduction chain (draft used for discussion).

Who	What they do	What they need	What they handle
Production to consumption chain			
Farmers	Produce harvest	Labor	Paddy
			Straw
			Marketable surplus (%)
			Keep ≈ 16% seed
Contractors	Harvest	Equipment	Paddy
	Cut	Labor	Straw
	Haul	Threshers	Wet grain
	Thresh		
Traders	Haul	Trucks	Wet grain
	Finance		
Processors &	Finance	Trucks & labor	Grain
Cooperatives	Procure	Dryers	Rice
	Dry	Cleaners	Flour
	Clean	Equipment & labor	Bran
	Handling	Mills	Hull
	Mill	Space	
	Store		
	Market		
Wholesalers	Store	Warehouse	Rice
Retailers	Store	Shop	Rice
	Haul		
Consumers		Rice – 106 kg/person/year	
Finance institutions	Provide finance		Paper
Government policy	Set policy		
Research & development	Identify and overcome constraints		
	Educate		
Extension	Provide information	"How to" information	
NGOs/development organizations	Provide information	"How to" information	

Continued on next page.

Table 6. (cont'd) PPS players and their roles in the postproduction chain (draft used for discussion).

Who	What they do	What they need	What they handle
Public sector support			
Innovators	Provide equipment		
Manufacturers	Make equipment		
Machinery distributors	Provide equipment and services		

Table 7. Players in the production to consumption chain and what they do.

Activity	Farmer	Contractor	Trader	Processor/ Cooperative	Retailer	Wholesaler	Consumer
Harvest	X	X					
Cut & haul	X	X					
Thresh	X	X					
Haul	X	X	X	X		X	
Dry				X			
Clean		X		X			
Handle				X			
Store			(X)	X	X	X	
Mill				X			
Grade				X		X	
Finance			X	X		X	

Note: Line of credit — bank to processors to traders to farmers

Table 8. Players in the production to consumption chain and what products they handle.

Products handled	Farmer	Contractor	Trader	Processor/ Cooperative	Retailer	Wholesaler	Consumer
Straw	X	X					
Paddy – self	X						
Paddy – seed	X						
Paddy – excess		X	X	X			
Hull				X			
Bran				X			
Flour				X			
Rice				X	X	X	
Brewers				X			

Table 9. Expected outputs/needs of different stakeholders in production and postproduction systems (in part from Bell et al. 1998[a]; D. de Padua, pers. comm.)

Stakeholder	Expected outputs/needs
Rice farmers	1. Mechanized harvesting technology, competitive with current practices. 2. Guaranteed farm-gate prices. 3. Premium prices for good quality paddy harvest. 4. Threshing and transport services to remove burden from farmers, particularly during periods of inclement weather.
Rice processing businessmen	1. Local options for upgrading processing plants (specifically choice of drying plants with the capacity to dry the volumes purchased during the rainy season, with the cost of drying competitive with sun drying). 2. The hardware and software for producing better quality rice products. 3. The technology for utilizing rice hulls as a source of energy for drying, even powering their rice mill, that is convenient to operate. 4. Milling technology that gives better total and head rice recoveries. 5. Standardized varieties in terms of physical and biochemical properties. 6. Bulk handling technology for lower handling costs. 7. Cost-effective pest control technology.
Extension engineers	1. Information bulletins. 2. Training on PPS technologies.
Manufacturers	1. Lower cost of raw material—steel products. 2. Hardware designs. 3. Marketing assistance. 4. Jigs and templates.
Farmer based cooperative enterprises	1. Better management skills. 2. Systems and procedures, technical and financial. 3. System designs.
Consumers	1. Graded and packaged rice at reasonable prices. 2. More consistent quality for varietal brands. 3. More choices. 4. Longer shelf life of rice products. 5. Less contaminants.
Researchers	1. More experience in the commercial processing and business operations. 2. More training on research instrumentation.
Policy-makers	1. More economic information. 2. Better understanding of the workings of industry.

[a]Bell, M.A. and Dawe, D. 1998. Developments in the Asian rice economy: challenges for mechanization and use. In: Increasing the Impact of Engineering in Agricultural and Rural Development. Deliberations of a think-tank, 26-28 February 1998, IRRI, Los Baños, Philippines. M.A.Bell, D.Dawe, M.B. Douthwaite (eds.). IRRI Discussion paper Series No. 30. Manila (Philippines): International Rice Research Institute. pp17-30.

Table 10. Philippine rice system characteristics.

Rice area (m ha):		3.4	
Annual production (million t):		9.5	
Average yield (t/ha):		2.8	
Player	**Size**	**Number (million)**	**Trade volume handled (approx. %)**
Farmers	Small < 2 ha	3.0	
	Large > 2 ha	1.6	
	< 1ha	1.7	15
	1–2	1.3	17
	2–5	1.2	38
	5–10	0.3	21
	> 10	0.1	9
Cooperatives			<1
	Small < 15 members		
	Large > 15 members		
Millers			≈90
	Small < 1 t/hr		≈25)
	Medium 1–5 t/hr		
	Large > 5 t/hr		
NFA			≈10

Table 11. Players are paid on what basis?

Farmers	**Contractors**	**Traders**	**Processors/ Cooperatives**	**Retailers**	**Wholesalers**	**Consumers**
Market (kg – wet)	kg or volume	kg	kg	kg	kg	
Small mill Head rice						

Table 12. Example of farmers costs and benefits: Guimba, Nueva Ecija, Philippines, 94–95 (IRRI 1995 program report).

	Wet season	**Dry season**	**Total**	**(%)**
Rice area (ha)	134.2	53.0	187.2	
Area irrigated (ha)	71.0	53.0	124.0	
Production (t)	493.0	231.5	724.5	
Disposal of rice (t)				
Rent paid to land owner	21.3	6.5	27.7	3.8
Harvester and thresher share	35.0	16.5	51.5	7.1
Rent paid for irrigation	11.8	11.8	1.6	
Repayment of loan	24.0	7.3	31.3	4.3
Amount kept for seed	15.2	9.8	25.0	3.0
Amount sold to traders	313.0	146.6	459.6	63.4
Amount given to friends, family	2.2	1.1	3.3	0.4
Amount kept for household	82.3	31.9	114.2	16.0

From the IRRI perspective, it would seem the general opportunities identified from the think-tank are as follows:

What to do	Target	Who involved
Database development		
1. Technology options: hardware, software		
Harvest	Contractors	
Haul		
Dry	Processors	
Clean	Processors	
Store	Processors	
Mill	Processors	
Handling	Processors	
Marketing		
By-product use	Farmers	
	Processors	
2. Decision-support systems		
3. Training—Quality management and relation to technology options and management		
Case studies		
1. PPS development in other countries—key changes and key factors driving change (frame conditions required for change)		
2. Management and technology efficiency studies		
Consumer preferences and standards		

These activities can then be placed in a matrix to consider the approach and what is needed:

Operation	Target	Database development technology & management options	Efficiency and constraint study	Case study	Effect on quality	Who involved in study
Production	Farmer					
	Finance					
Harvesting	Contractor					
	Farmers					
Hauling	Traders					
	Farmers					
Drying	Millers					
	Cooperatives					
Cleaning	Millers					
	Cooperatives					
Storing	Millers					
	Cooperatives					
Milling	Millers					
	Cooperatives					
Handling	Traders					
	Millers					
	Cooperatives					
	Retailers					
	Wholesalers					
System management						

7 Present PPS activities of consortium members

BPRE REPORT

- Design and development of 8 t/hour high-temperature, fluidized-bed dryer with automated rice hull combustion (J. Tumambing, with ACIAR, temporarily stalled due to lack of funds)
- Industrial utilization of by-products: rice hull and straw (Ric Cachuela)
- Advanced systems: development of a computer-aided management tool for bulk storage systems
- Establishment of an electronic trading information system
- Development of controlled atmosphere storage technology for prolonging storage life of 18% paddy
- Assistance to 3 pilot cooperatives, by providing BPRE trained managers
- Technical assistance to the rice industry
  - Distribution of paddy moisture meters
  - Promotion of 'Volcani cubes' storage technology
  - Promotion of in-store drying technology
  - Reviewing postharvest proposals of local governments
  - Assist local governments in PPS projects
- Software development—decision support system in drying and pest management in storage in collaboration with ACIAR
- Impact assessment of PH facilities distributed to farmer cooperatives

College of Engineering and Agro-Industrial Technology/Agricultural and Bio-process Division (CEAT/ABPROD) REPORT

- Design and development of recirculating dryer
- Design and development of 3-stage high-temperature dryer
- Resistance to airflow of local paddy varieties (student thesis research)
- Adsorption drying with rice hulls
- Improving eating quality of rice with pandan leaves
- Improving head rice recovery through cooling in the polishing stages
- Testing and evaluation of rice hull furnace
- Optimization of rice drying process
- Utilization of rice bran for feed formulations

National Food Authority-Technology Resource Development Department (NFA-TRDD) REPORT

- Milled rice mist polishing studies: for improvement in appearance and monitoring of quality in storage
- Evaluation of double pass mist polisher
- Pile (paddy and rice in bags) control system for inventory control and liquidation
- Evaluation of plastic pallets as replacement for wooden pallets
- Validation of feasibility of Volcani cube technology
- Evaluation of recommended fumigants for pest control in storage
- Evaluation of sealed enclosure fumigation storage technology (SEFUST), a form of controlled atmosphere storage technology (CAST)
- Evaluation of organoleptic properties and preservation of packaged milled rice
- Design and development of receiving tanks for recirculating dryers
- Evaluation of effect of insulation liners for roofs of warehouses in minimizing stock deterioration
- Evaluation of gamma irradiation technology of rice for insect disinfestation
- Evaluation of moisture meters for milled rice
- Review and revision of Philippine Grades and Standards for Palay and Milled Rice
- Upgrading of rice milling facilities

PHILRICE REPORT

- Evaluation of harvesting technology
  - Stripper gatherer
  - LS600 stripper harvester
- Development of other harvesting technology
  - LS120 stripper harvester
  - Rotary reaper
  - Combine harvester
- Evaluation and promotion of farm drying technology
  - Vietnam model flat bed dryer (4, 6, 10 t capacity)
  - Bamboo bin dryer (Vietnam SRR dryer)
- Development of paddy grain cleaner
- Evaluation and promotion of rice flour mill
- Evaluation and promotion of micro-mill
- Development and evaluation of thresher-micro-mill for the Cordillera
- Evaluation of panicle thresher
- Adaptive development and promotion of University of California at Davis-designed rice hull gasifier
- Impact assessment studies
  - Analytical tools for grain quality evaluation
  - Improvement of rice food products
  - Field tests of milled rice flour for major rice products
  - Determinants of grain quality

IRRI AED REPORT

- Production of information series bulletins
  - Maintaining paddy quality in harvest operations
  - Inventory and application of paddy drying technology
  - Rice quality: seed to seed
  - Rice quality: increasing head rice recovery by preventing fissuring
  - Inventory of new rice milling technology for upgrading rice mills.
- Development and building of database on rice postharvest technology
- Development of a decision support system (DSS) package in rice production engineering
- Development of seed processing technology
- R&D programs in:
  - Bangladesh: Introduction of rice harvesting and processing technology
  - Bangladesh: Survey of rice products and by-products utilization among rice farming households
  - Cambodia
  - Philippines
  - Thailand
- Grain quality management research
  - Harvest and quality
  - Storage and discoloration
  - Market study and quality

Appendix 1 – Participants in the workshops

9 October 1998 held at IRRI Training Center

Thirty-three people representing the public and private sectors participated in the first meeting:

Name	Institution/company/agency
Joel V. Acorda	Acorda Agri-Business, San Jose, Occ. Mindoro
Dennis Tan	AMMDA, Manila
Angel Tactay	AMMDA, Turayong, Cauayan, Isabela
Virgilio G. Gayanilo	AMTEC, UPLB
Silvestre C. Andales	BPRE, Muñoz, Nueva Ecija
Romualdo Martinez	BPRE, Muñoz, Nueva Ecija
Rosendo Rapusas	BPRE, Muñoz, Nueva Ecija
Justin Tumambing	BPRE, Muñoz, Nueva Ecija
Edgardo V. Casas	CEAT, UPLB
Ponciano S. Madamba	CEAT, UPLB
Nelly M. Fortuna	Dayap Development Cooperative, Dayap, Calauan, Laguna
Godofredo D. Suerte	Dayap Development Cooperative, Dayap, Calauan, Laguna
Luis Mauricio	Equity, Turayong, Cauayan, Isabela
Bibs M. Ramos	Farmer, Los Baños
Rom G. Vildzius	Green Corps Foundation, Inc., Quezon City
Imelda R. Barredo	IRRI AED, Los Baños
Reynaldo D.C. Billate	IRRI AED, Los Baños
Paterno C. Borlagdan	IRRI AED, Los Baños
Eugenio C. Castro, Jr.	IRRI AED, Los Baños
Philip B. Cedillo	IRRI AED, Los Baños
Dante B. De Padua	IRRI AED, Los Baños
Edna B. Razote	IRRI AED, Los Baños
Catalina P. Diaz	IRRI SSD, Los Baños
Thelma R. Paris	IRRI SSD, Los Baños
David R. L. Cruz	LAMMA, Los Baños, Laguna
Chito S. Dayrit	Land Bank of the Philippines, Makati, Metro Manila
Diocano D. Alojado, Jr.	NFA-TRDD, Quezon City
Ma. Elvira M. Martinez	NFA-TRDD, Quezon City
Lito Ballesteros	PADISCOR, 114 Plaza Rizal, Pasig City
Celestino Damian	PADISCOR, 114 Plaza Rizal, Pasig City
Lito Bautista	PhilRice, Muñoz, Nueva Ecija
Serg Francisco	PhilRice, Muñoz, Nueva Ecija
Chris Rubiano	Solanda, Manila
Felimar M. Torrizo	Susi Foundation, Inc., Tiaong, Quezon
Facilitators:	Dr M. A. Bell Ms Sylvia Inciong Mr Ramon Oliveros

4–5 November 1998 held at BPRE

Name	Institution/company/agency
Silvestre C. Andales	BPRE, Muñoz, Nueva Ecija
Arnel Apaga	BPRE, Muñoz, Nueva Ecija
Don David T. Julian	BPRE, Muñoz, Nueva Ecija
Ramiro Lagunda	BPRE, Muñoz, Nueva Ecija
Ruben E. Manalabe	BPRE, Muñoz, Nueva Ecija
Helen Martinez	BPRE, Muñoz, Nueva Ecija
Romualdo Martinez	BPRE, Muñoz, Nueva Ecija
Normita A. Pasalo	BPRE, Muñoz, Nueva Ecija
Rosendo Rapusas	BPRE, Muñoz, Nueva Ecija
Genaro M. Tolentino	BPRE, Muñoz, Nueva Ecija
Justin A. Tumambing	BPRE, Muñoz, Nueva Ecija
Arnold R. Elepaño	CEAT, UPLB
Ponciano S. Madamba	CEAT, UPLB
Imelda Barredo	IRRI AED, Los Baños
Reynaldo DC. Billate	IRRI AED, Los Baños
Paterno C. Borlagdan	IRRI AED, Los Baños
Eugenio C. Castro, Jr.	IRRI AED, Los Baños
Philip B. Cedillo	IRRI AED, Los Baños
Dante B. de Padua	IRRI AED, Los Baños
Edna Razote	IRRI AED, Los Baños
Lina Diaz	IRRI SSD, Los Baños
Eulito Bautista	PhilRice, Muñoz, Nueva Ecija
Facilitators:	Dr M. A. Bell Ms Sylvia Inciong

10 December 1998 held at PhilRice

Name	Institution/company/agency
Arnel Apaga	BPRE, Nueva Ecija
Ruben Manalabe	BPRE, Nueva Ecija
Justin Tumambing	BPRE, Nueva Ecija
Edgardo Casas	CEAT, UPLB
Arnold Elepaño	CEAT, UPLB
Virgilio Gayanilo	CEAT, UPLB

Name	Institution/company/agency
Ponciano Madamba	CEAT, UPLB
Reynaldo Billate	IRRI AED, Los Baños
Imelda Barredo	IRRI AED, Los Baños
Paterno Borlagdan	IRRI AED, Los Baños
Eugenio Castro, Jr.	IRRI AED, Los Baños
Philip Cedillo	IRRI AED, Los Baños
Dante de Padua	IRRI AED, Los Baños
Edna Razote	IRRI AED, Los Baños
Catalina Diaz	IRRI SSD, Los Baños
Caesar Joventino Tado	PhilRice, Nueva Ecija
Eulito Bautista	PhilRice, Nueva Ecija
Ricardo Orge	PhilRice, Nueva Ecija
James Patindol	PhilRice, Nueva Ecija
Sergio Francisco	PhilRice, Nueva Ecija
Artemio Vasallo	PhilRice, Nueva Ecija
Rizaldo Aldas	PhilRice, Nueva Ecija
Rebecca L. Sampang	NFA-TRDD, Quezon City
Eduardo A. Jarcia	NFA-TRDD, Quezon City
Leonardo S. Silvestre, Jr.	NFA-EXD, Quezon City

18 February 1999 held at BPRE

Name	Institution/company/agency
Silvestre Andales	BPRE, Muñoz, Nueva Ecija
Arnel Apaga	BPRE, Muñoz, Nueva Ecija
Michael Gragasin	BPRE, Muñoz, Nueva Ecija
Anacoreta Gervacio	BPRE, Muñoz, Nueva Ecija
Maricel Hizon	BPRE, Muñoz, Nueva Ecija
Ruben Manalabe	BPRE, Muñoz, Nueva Ecija
Marygold Parane	BPRE, Muñoz, Nueva Ecija
Rosendo S. Rapusas	BPRE,Muñoz, Nueva Ecija
Joe B. Santos	BPRE, Muñoz, Nueva Ecija
Justin Tumambing	BPRE, Muñoz, Nueva Ecija
Edgardo V. Casas	CEAT, UPLB
Arnold R. Elepaño	CEAT, UPLB
Ponciano S. Madamba	CEAT, UPLB
Mark Bell	IRRI AED, Los Baños
Reynaldo Billate	IRRI AED, Los Baños
Paterno Borlagdan	IRRI AED, Los Baños
Philip Cedillo	IRRI AED, Los Baños
Dante de Padua	IRRI AED, Los Baños
Edna Razote	IRRI AED, Los Baños
Lina Diaz	IRRI SSD, Los Baños
Eduardo A. Jarcia	NFA-TRDD, Quezon City
Ma. Elvira M. Martinez	NFA-TRDD, Quezon City
Ricardo F. Orge	PhilRice, Muñoz, Nueva Ecija
Rizaldo Aldas	PhilRice, Muñoz, Nueva Ecija
James Patindol	PhilRice, Muñoz, Nueva Ecija
Caesar J. M. Tado	PhilRice, Muñoz, Nueva Ecija

Appendix 2 – A "how to" on conducting brainstorming workshops, by M.A. Bell

Reference: Schubert, B., Nagel, U.J., Denning, G.L and Pingali, P.L. 1991. A logical framework for planning agricultural research programs. IRRI. P.O. Box 933, Manila 1099, Philippines.

The workshop was based on the log frame approach described by Schubert et al. (1991).

Steps in the process

1. Planning

Identify interested parties for a small planning group

Develop outline and agenda.

Plan structure

Identify parties to invite

Send invitations

2. Implementation of initial workshop

General meeting—start meeting in plenary

Present introduction and workshop objectives (see earlier material)

Provide background presentation—set the scene to have a common understanding of some of the key issues (see paper of D. de Padua)

Clearly articulate the "rules of the game" for the workshop process (see detail below)

Break into small groups

Summarize small group output and present to the larger group

Allow for individual key points

Plan follow-up

3. Follow-up meeting

Summarize workshop output

Distribute to key planning group members

Review table

Identify potential R&D program and those who need to be involved

Distribute draft R&D program to workshop participants for comments

Divide based on groups (up to 10 per sub-group is reasonable—more than this and active participation is difficult)

Logistical needs for small group discussions

Lay out tables and chairs in room as a "U"

Provide paper, cards, pens, pins, boards (for hanging cards on paper), adhesive tape, glue

Each group should preferably be 10 or fewer (above this number group discussion is difficult)

Each room should have at least 2 boards and there should be enough pens and cards for everyone to participate easily

If possible, there should be at least one computer and printer available with spare blank overheads for making up fast overheads for facilitating the presentations of each small group to the larger group

Program

October 9

8.30 National anthem
- Welcome remarks (R. Cantrell - DG)
- Workshop objectives (K. Fischer - DDGR)
- Introduction of participants (P. Borlagdan)
- Overview of RP PPS (D. De Padua)
- Discussion group guidelines (M. Bell)

Coffee

- Small group brainstorming—problem analysis (what are the problems in Philippine PPS, who has them and what is the priority?)

Lunch

- Continue small groups
- Plenary
- Each group present main themes to the larger group
  - Small group? – Priorities and needs
  - Interests and opportunities for collaboration
- Template for project development
- Individual responses

Rules for small group discussions

The following discussion group rules were presented to the workshop group:

1 Success depends on your involvement

2 Use cards (approx. 10 x 30 cm)
   – Brief – Comments on cards must be brief and capture key points
   – Legible – Comments must be able to be read from a distance by others in your group

3 In sessions
   – Seek first to understand before being understood
   (principle of S. Covey from his book "Seven habits of highly effective people")
   – All ideas are valid
   – Seek clarification of ideas not criticism

4 Comments short – comments are allowed but only for clarification. It is important not to get lost in detail and lose the opportunity to develop a framework for the "bigger picture"
   – Facilitator – veto power. Where necessary, the facilitator can halt discussion. This is not to be rude, but just to ensure the groups keep on track. Coffee breaks and lunch are good opportunities to discuss issues of personal interest in greater depth

5 Spokesperson – Each group will nominate a spokesperson to present the output of the smaller group to the larger group

Small group discussion sessions

The facilitator called for identification and grouping of the interest groups in the PPS. The working group was then asked to brainstorm constraints affecting the different groups. As the cards were prepared they were placed under the relevant interest groups. These were reviewed and grouped to reduce the number of categories and eliminate duplication.

After review by the group and re-sorting, the possible cause of each constraint was identified as well as the potential opportunities. These tasks can be done sequentially or simultaneously.

The groups generate what was intended to be an exhaustive list of all the possible constraints with suggested causes and some opportunities.

Finally, one of the groups was asked to list "do-ables"—what was feasible—out of the large number of opportunities identified.

A break was then needed so that the group spokesman could summarize the output into a form to be presented to the larger groups. This allowed opportunity for clarification and identification of any missing items. Again discussion must be limited to clarification at this stage—in depth discussion can be pursued at a latter date.

After the output of each group was presented, it was important to give each individual the opportunity to briefly comment on what they felt the key points were.

Following the meeting, the paper with cards was used to generate the workshop summary.

Logframe structure

The logframe structure shown below was used to identifying the needs of all those groups involved in the production-to-consumption chain affecting the postproduction sector.

Interest group	Needs & constraints priority			Major cause or issues	Opportunity	Who needs to respond?
	Low	Medium	High			

Start with interest groups represented in your workshop group, but comments can be made on any group.

Logical framework

1. List target beneficiaries and target groups

Objective: Efficient postproduction systems, improved quality and reduced losses

2. Identify needs and most important problems for each group
3. Prioritize the problems
4. Indicate which problems could be included in the agenda (and which are outside the agenda)

Target beneficiaries & groups involved

Group	Main interests	Problems & constraints	Priority (low–medium–high)	Feasibility of solution (low–medium–high)
1. Farmers				
2. Service contractors				
3. Machinery and input dealers				
4. Manufacturers				
5. Cooperatives				
6. Rice processors				
7. Food distribution				
8. Extension				
9. Researchers				
10. Government policy				
11. Consumers				

Indicate areas of interest for further collaboration

For each high priority problem of interest, articulate:

Core problem

Core objective

Constraints to achieving the objective (i.e. cause ofproblem)

Potential activity or research output for each constraint

Follow-up agenda

Factors affecting rice quality	Who involved	Importance of factor	Interacting factor
Production factors			
Water management (irrigation and drainage)			Affects mechanized harvest
Variety			
Seed cleanliness			
Pests and diseases			
Nutrition			
Postproduction			
Harvest (cut)	Contractors		
Hauling	Contractors		
Drying	Millers		
Cleaning	Millers		
Storage	Millers		
Processing (Milling)	Millers		

Factors affecting rice quality	Who involved	Importance of factor	Interacting factor
Other factors			
Source of information			
Credit			
Source of equipment			
Market access			

Appendix 3 – Consortium memorandum of agreement (MOA)

MEMORANDUM OF AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

This agreement made and entered into by and among:

THE BUREAU OF POSTHARVEST RESEARCH AND EXTENSION, a government agency attached to the Department of Agriculture created pursuant to Presidential Decree No. 1380 as amended, with its principal office at Muñoz, Nueva Ecija, hereinafter referred to as BPRE and represented in this act by its Executive Director, Dr. Silvestre C. Andales;

THE INTERNATIONAL RICE RESEARCH INSTITUTE, a non-profit international organization supported by the Consultative Group on International Agricultural Research with its principal office at Los Baños, Laguna, hereinafter referred to as IRRI and represented in this act by its Director General, Dr. Ronald P. Cantrell;

THE NATIONAL FOOD AUTHORITY, a government corporation created pursuant to Presidential Decree No. 4 as amended under the Office of the President with its principal office at Quezon City, hereinafter referred to as NFA and represented in this act by its Administrator, Hon. Eduardo Nonato N. Joson II;

THE PHILIPPINE RICE RESEARCH INSTITUTE, a government agency attached to the Department of Agriculture created pursuant to Executive Order 1061 as amended, with its principal office at Muñoz, Nueva Ecija, hereinafter referred to as PHILRICE and represented in this act by its Executive Director, Dr. Santiago R. Obien;

THE UNIVERSITY OF THE PHILIPPINES LOS BAÑOS, a government institution of higher learning created pursuant to Act 1870 as amended, with its principal office at College, Los Baños, Laguna, hereinafter referred to as UPLB and represented in this act by its Chancellor, Dr. Ruben L. Villareal;

WITNESSETH THAT :

WHEREAS, rice postproduction is a very important and necessary component in the rice industry serving as a vital link between production and eventual utilization;

WHEREAS, BPRE is tasked to spearhead the generation, application and extension of appropriate postharvest technologies for agricultural crops, livestock and fisheries, and the corresponding socio-economic components, in order to minimize quantitative and qualitative losses;

WHEREAS, IRRI has its Agricultural Engineering Division tasked to increase the efficiency of the production to consumption continuum and generate and disseminate rice postproduction knowledge and technology through its various R&D programs, database development and information packaging;

WHEREAS, NFA is mandated to coordinate the activities of all government agencies engaged in the study, research and promotion of measures designed to enhance the integrated growth and development of the grains industry;

WHEREAS, PHILRICE is mandated to establish a database system in the different aspects of Rice Engineering, evaluate and assess existing needs of various sectors of the rice industry, and develop, improve and popularize appropriate machinery and equipment suitable for small farms;

WHEREAS, UPLB through the College of Engineering and Agro-Industrial Technology is tasked, in addition to teaching and extension, with post harvest research and development activities on agricultural crops which include rice;

WHEREAS, there is a felt need for critical collaboration to respond to the problems of the rice postproduction industry.

NOW, THEREFORE, for and in consideration of the foregoing premises, the parties hereby agree as follows:

1. *Name of the Consortium*. The BPRE, IRRI, NFA, PHILRICE and UPLB shall establish a Philippine Rice Postproduction Consortium, hereinafter referred to as PRPC.

2. *Function of the Consortium*. The PRPC shall coordinate the collaboration among consortium members in the area of postproduction research and extension to enhance the development of the rice postproduction industry in the Philippines. It shall also identify the priority areas of collaboration.

3. *Organizational and Functional Structure*. A consortium is hereby created to be composed of a lead agency and the members. The lead agency will be changed once a year and shall be rotated among its members. The contact person for each party will be the following Department/Division heads of said institution:

   BPRE – Dr. Rosendo S. Rapusas, Director II, Post Harvest Systems Department

   IRRI – Dr. Mark A. Bell, Head, Agricultural Engineering Division

   NFA –Engr. Cristituto Mangaoang, Director, Technology Resource Development Department

   PHILRICE – Dr. Leocadio S. Sebastian, Deputy Executive Director for Research and Development

   UPLB – Dr. Virgilio G. Gayanilo, Dean, CEAT

The lead agency shall maintain an in-house Secretariat that will serve as clearing house and communication center of the consortium.

4. *Responsibilities of the parties:*

The parties shall:

4.1. Undertake research and development activities on rice postproduction system.

4.2. Participate in the extension activities of PRPC within its institutional limits.

4.3. Provide the extension network and resources for PRPC.

4.4. Upon prior agreement, make available the use of its facilities, whenever possible, to collaborating agencies in line with the purpose of PRPC.

5. *Terms of Collaboration*. The BPRE, IRRI, NFA, PHILRICE and UPLB may enter jointly into contracts and perform/carry out plans, programs and projects necessary for the implementation of this Agreement.

In general, discoveries, technologies and information, inventions, and improvements that are generated from R&D projects that were collaboratively undertaken by the different agencies, shall be jointly owned by the collaborators. These should be subject to the policies, rules and regulations governing copyrightable and patentable works produced by the personnel of the agencies involved.

Any publication arising from the research and other activities undertaken by the consortium members under this agreement shall identify the consortium members as the source of the output. The agencies involve reserve the right to use all data and findings of the undertaking in the pursuit of its institutional programs. All major reports on the projects shall be made in the name of the agencies involved. The names of the principal authors/researchers/project leaders shall be identified and included in the reports. Relevant technologies or information, which are generated outside of this collaboration, may be used by interested parties upon prior consent and duly acknowledging the source, and following the other terms and conditions specified by the technology or information source.

6. *Monitoring and Evaluation*. Each project shall submit a progress report to the consortium on a regular basis. The consortium will meet quarterly to discuss the development of each project. A special meeting will be called whenever necessary.

All parties hereto hereby agree to make an annual review of the work done under this agreement to evaluate its performance, determine the areas for improvement and come up with the necessary recommendations and actions. A yearly status report on the projects shall be prepared jointly by the parties for effective monitoring purposes during the entire duration of this agreement. The review shall be initiated by the lead agency. A copy of the yearly status report shall be submitted to the heads of all parties herein.

7. *Contributions of Parties*. The concerned parties shall provide the resources for their respective projects. Expenses to be incurred during meetings shall be shouldered by the host.

8. *Amendment*. Any amendment to this Agreement shall be in writing and duly agreed and signed by the parties hereto.

9. *Period of Agreement*. This Agreement shall take effect upon its execution and shall be in full force and effect for a period of 5 years, which shall not be later than December 31, 2004, subject to renewal unless terminated anytime by mutual consent of the parties, provided that a 60-day written notice of the parties shall have been served.

IN WITNESS HEREOF, the parties have hereunto affixed their signatures this _____ day of _____ 1999 at _____, Philippines.

BUREAU OF POSTHARVEST RESEARCH AND EXTENSION
SILVESTRE C. ANDALES
Executive Director

NATIONAL FOOD AUTHORITY
EDUARDO NONATO N. JOSON II
Administrator

INTERNATIONAL RICE RESEARCH INSTITUTE
RONALD P. CANTRELL
Director General

PHILIPPINE RICE RESEARCH INSTITUTE
SANTIAGO R. OBIEN
Executive Director

UNIVERSITY OF THE PHILIPPINES
LOS BAÑOS
RUBEN L. VILLAREAL
Chancellor

SIGNED IN THE PRESENCE OF:

_____

_____

_____

ACKNOWLEDGMENT

REPUBLIC OF THE PHILIPPINES)

PROVINCE OF)

MUNICIPALITY OF)

Before me, this _____ day of _____, 1999 personally appeared the following:

NAME	COMMUNITY TAX CERTIFICATE NO.	DATE AND PLACE OF ISSUE
SILVESTRE C. ANDALES		
RONALD P. CANTRELL		
EDUARDO N. JOSON II		
SANTIAGO R. OBIEN		
RUBEN L. VILLAREAL		

known to me to be the same persons who executed the foregoing instrument and who acknowledged to me that the same is their own free and voluntary act and deed of the entities which they respectively represent.

Said instrument refers to a Memorandum of Agreement consisting of six (6) pages including this page on which the acknowledgment is written, signed by the parties and their instrumental witnesses on each and every page thereof.

WITNESS MY HAND AND SEAL on the date and place above-mentioned.

NOTARY PUBLIC

Doc. No. _____
Page No. _____
Book No. _____
Series of 1999