



OPPORTUNITIES FOR VALUE ADDITION AND MARKET LINKAGE FOR KALINGA HEIRLOOM RICE USING RAPID VALUE CHAIN ANALYSIS

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Abstract: *With the aid of Sustainable Food Value Chain Analysis (SVCA), the study sought for other market potentials and opportunities for value addition and market linkages of Kalinga heirloom rice. A brief production cost analysis was conducted to determine the costs incurred as the product moves from conception until it reaches the final consumers. A value chain map was also illustrated where actors, their functions and activities in the different stages of the chain were identified. Likewise, the end markets, business enabling environment, vertical and horizontal linkages, major constraints as well as opportunities for upgrading were also recognized. Because of the nature of traditional rice farming which is labor intensive, the production cost on the part of the farmers is excessive and the period for cultivating even small areas of farm became more extensive. Finally, replacement of the traditional farming methods with mechanized farming by providing pre-harvest and post-harvest facilities, organizing farmers' field school, provision of village-type customized rice mill and processing center, rehabilitation of communal irrigation systems and restoration of damaged terraces and conduct of trainings on processing of heirloom rice were recommended.*

Keywords: *Heirloom rice, sustainable food value chain, value chain map, cost analysis, market linkage*

RATIONALE

In the early days, the vast majority of rice growers in Upper Kalinga are subsistence farmers producing traditional rice varieties for home consumption only. There are instances where rice paddies are not sufficient to sustain the supply of rice especially for big families; hence they resort to slash and burn agriculture in order to augment the shortage. Conversely,



there are some farmers who own to some extent, significant areas of paddies and forested lands suitable for slash and burn agriculture. They are the ones who reap surplus yield which they sell or barter with other farmers, friends and family networks or in local markets and storeowners for other basic necessities.

Among such farmers, traditional forms of cooperation often exist, primarily to manage labor shortages that are tied to traditional slash-and-burn extensive agriculture practices, but commercial linkages are minimal. Unmet labor requirements can be filled in by a system called *abbuyug* wherein a *bayanihan* mechanism of contributing the equivalent of one-day work for another person is done without pecuniary remuneration.

Small-scale farmers generally employ a low level of mechanization for soil preparation, milling, reaping and threshing because of land fragmentation and limited resources. Manual plowing is done through their feet (*dalnok*) or through draft carabao power for those with available means. They either harvest or process rice manually, or pay for harvesting, threshing and rice milling. Manual threshing by smallholders leads to poor grain quality. Rice production has not been able to match the increases in demand triggered by population growth, rapid urbanization, increasing incomes and urban consumers' preferences in terms of cost and ease of cooking.

The construction of the Chico River Irrigation Project in 1972 that irrigates around 19,827.3 hectares of agricultural land in Tabuk City has significantly influenced the lives of traditional rice growers in Upper Kalinga. Some of the farmers either left or sold their upland farms and migrated in Tabuk where farming was more rationalized and production is high-yielding.

There were no definite and rigid end markets for Kalinga heirloom rice until the entry and intervention of Revitalize Indigenous Cordilleran Entrepreneurial initiatives, (RICE) Inc. and 8th Wonder that initiated the revitalization of the Cordillera heirloom rice including those varieties that are grown in Kalinga. One of the objectives of the project was to look for potential market of the Cordillera heirloom rice in order to make it as a source of livelihood for heirloom rice producers.

The marketing of heirloom rice started in 2006 and was then recognized as special premium rice in the foreign and local markets. More farmers became interested to participate in the export business but a lot of them did not make it due to the stringent requirements in the quality control. Other factors that adversely affected the farmers include lack of access to



land transportation, unpredictable weather condition, difficulties in manual processing and contamination. Eventually other concerns were resolved with the used of customized village type machineries and consistent training on quality control and management.

With the rising demand for heirloom rice from the local and foreign market, in 2007, terraces farmer's leaders from the provinces of Ifugao, Mt. Province and Kalinga organized a region-wide cooperative to consolidate effort to cater market demand and organized the Rice Terraces Farmers' Cooperative (RTFC). This opportunity had given hope to the farmers, mitigating labor migration, thus, ensuring cultivation and maintenance of the rice terraces. With a good market abroad for the heirloom rice, the intensification of production has attracted a growing number of farmers in Kalinga. While there is a promising demand for traditional rice in the foreign market, the issue of meeting high quality standards imposed by the latter remained a serious concern among the farmers.

It is for these reasons that a value chain analysis of the Kalinga heirloom rice has to be conducted in order to seek for other market potentials and identify opportunities for value addition and market linkages.

OBJECTIVES OF THE STUDY

General: Identify opportunities for value addition and market linkages for heirloom/traditional rice using value chain analysis

Specific:

1. Conduct a rapid value chain analysis of the traditional/heirloom rice under the component of the project "Linking smallholders to value chain";
2. To develop a value chain framework/system that would integrate all the identified activities and processes including primary and support services that are capable of encouraging entrepreneurs desirous in taking advantage of the numerous potentials available in the market;
3. To identify the end markets, business enablers as well as the horizontal and vertical linkages;
4. To identify obstacles and offer potential solutions through an intervention matrix to show the various constraints and opportunities for upgrading vis-à-vis the solutions and providers of the solutions and



5. To propose strategic interventions to the government and private sector stakeholders regarding the improvement of organization and performance of the rice chain with a view to increasing efficiency and competitiveness.

METHODOLOGY

Value Chain Analysis

This study followed a value chain approach called sustainable food value chain analysis (SVCA). Sustainable Food Value Chain is the full range of farms and firms and their successive coordinated value-adding activities that produce raw agricultural materials and transform them into food products that are sold to final consumers and disposed after use, in a manner that is profitable throughout the chain, has broad-based benefits for society, and does not permanently deplete natural resources (Ardhana, 2016). The chain actors who actually transact a particular product as it moves through the value chain include input (e.g. seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and final consumers.

The researchers gathered the farmers at the Golden Berries Hotel, Tabuk City, Kalinga, Philippines last September 29, 2014 and collected pertinent data from them by means of interviews and group discussions. Key questions during the interview were as follows:

1. What is the average yield per hectare? What are the costs attributed in the production of traditional rice from seed to shelf?
2. Where are the high-potential areas for rice production that should be the target for interventions to increase food security and rural incomes by raising production, yields, on-farm consumption and the marketed surplus?
3. Where are the key end markets in both local and foreign markets? What are the characteristics of demand in these markets, including consumer preferences? What are the competing sources of supply, including food aid? And what, as a result, are the challenges and opportunities in these end markets for heirloom rice?
4. What constraints in the business environment and/or along the value chain need to be addressed to increase the supply and availability of heirloom rice?
5. What competitiveness strategies should the farmers adopt to increase productivity and improve competitiveness?
6. What interventions, actions or investments can have the greatest impact on food security and rural incomes?



RESULTS AND DISCUSSIONS

Production Cost Analysis

PRODUCTION COST OF KALINGA HEIRLOOM RICE (PALAY)	
High Quality Traditional Rice Variety Seed	
(Land Area: 1,000 sq. m.)	
LAND PREPARATION COSTS	
Clearing - 2 laborers @ P200/day (2 days)	800.00
First & second Plowing	2,000.00
Seed pulling & Transplanting - 10 laborers @ P200/day (1 day)	2,000.00
Meals & Snacks	1,000.00
Total	5,800.00
PRE-HARVEST/MAINTENANCE COSTS	
Water maintenance - Twice a week@P100/shift (2 x 4 weeks x 4 months)	3,200.00
Clearing during booting stage - 2 laborers @ P 200/day (1 day)	400.00
Birds watched during milking stage to maturity - P100/day (25 days)	1,250.00
Meals & Snacks	1,000.00
Total	5,850.00
HARVESTING AND POST-HARVEST COSTS	
Harvesting - 10 laborers @ P200/day	2,000.00
Drying - 2 laborers @ P200/day (3 days)	1,200.00
Threshing - 3 laborers @ P200/day (1 day)	600.00
Meals & Snacks	1,000.00
Total	4,800.00
TOTAL PRODUCTION COST/1,000 sq. m.	16,450.00
TOTAL PRODUCTION COST/HECTARE (10 X 16,450)	164,500.00

The farmers classified their production costs based on the stages of traditional farming which include land preparation, maintenance and harvest, and post-harvest activities. Since traditional farming is labor-intensive, the major cost attributed to it is direct labor which on the average is P200 per day. During cultivation, most of the farmers resort to the system called *abbuyug* wherein a *bayanihan* mechanism of contributing the equivalent of one-day work for another person is done without pecuniary remuneration in order to satisfy unmet labor requirements. Because of this, it is a common perception of the farmers that they do not incur labor cost when they cultivate their farms themselves or by using the *abbuyug* system. However, when direct labor cost is attributed to their daily activities, it turned out that to cultivate a 1,000 square meter terrace would cost them P16,450 and with that area,



the average yield is 7 cavans of palay. Consequently, a one-hectare farm would cost the farmer P164,500 to cultivate with an average yield of 70 cavans of palay.

VALUE-ADDED COST OF KALINGA HEIRLOOM RICE	
High Quality Traditional Rice Variety Seed	
Land Area: 10,000 sq. m. (1 hectare)	
Average Production/hectare: 70 cavans @ 50 kg/cavan	
Average Production/1,000 sq. m. : 7 cavans @ 50kg/cavan	
Transshipment from farm gate to processing center - P100/cavan	7,000.00
Milling fee - P120/cavan	8,400.00
Processing fee - 4 laborers @ P200/day (2 days)	1,600.00
TOTAL VALUE-ADDED COST	7,000.00
TOTAL COST/HECTARE	
Production Cost	164,500.00
Value-Added Cost	17,000.00
TOTAL COST	181,500.00

A farmer may choose to sell his palay to the Rice Terraces Farmers Cooperative (RTFC) or incur additional value-added costs in order to sell it as clean rice. Value added cost include transshipment from farm gate to processing center, milling and processing fees. Based on the data from the farmers, they will incur additional value-added cost of P17,000 to further process 70 cavans of palay into clean rice.

RETURN ON INVESTMENT	
(When sold to RTFC as palay by farmer)	
High Quality Traditional Variety Seeds	
Land area: 1 hectare (10,000 sq. m.)	
Ave. Production/ha. - 70 cavans	
One (1) cavan - 50 kgs	
Price/kg - P40	
Price/Cavan - P2,000	
Total Revenue (70 cavans x P2,000)	140,000.00
Less: Production Cost	164,500.00
TOTAL PROFIT (TOTAL LOSS)	(24,500.00)

When the farmer decides to sell his crop as palay, the price per kilogram is P40 pesos and the cost attributed to it will only be production cost. It turned out that a farmer is at a loss when he directly sells his palay which is barely noticed precisely because of not taking into account the cost of labor incurred.



RETURN ON INVESTMENT (When sold in the local market as clean rice by farmer) High Quality Traditional Variety Seeds	
Note: Palay is produced by the farmer and directly sell it as clean rice.	
Land area: 1 hectare (10,000 sq. m.)	
Ave. Production/hectare: 70 cavans @ 50kgs/cavan (3,500 kgs/ha.)	
Milling Recovery - 65% (3,500 kgs x .65) = 2,275 kgs	
Processing Recovery - 75% (2,275 kgs x .75) = 1,706.25 kgs (Clean Rice)	
Broken - 15% (2,275 kgs x .15) = 341.25 kgs	
Fine Darak - 10% (2,275 kgs x .10) = 227.50 kgs	
Clean Rice (1,706.25 kgs x 100/kg) - Local Market Price	170,625.00
Broken (341.25 kgs x 40/kg)	13,650.00
Fine Darak (227.5 kgs x 12/kg)	2,730.00
Total Revenue	187,005.00
Less: Total Cost	181,500.00
TOTAL PROFIT (Amount actually received by the farmer)	5,505.00

When the farmer chooses to sell his crop as clean rice, he will incur value-added costs apart from the production costs of his palay. He will pay for the transshipment of his crop from farm gate to the customized rice mill in Tabuk City and milling fee of P120 per cavan of palay. There are personnel of the RTFC tasked for the processing of milled rice and are paid P200 per day which is also shouldered by the farmer. The market price for traditional rice in the local market is P100 per kilo and after taking into account production and value-added costs, the farmer would realize a net of P5,505.

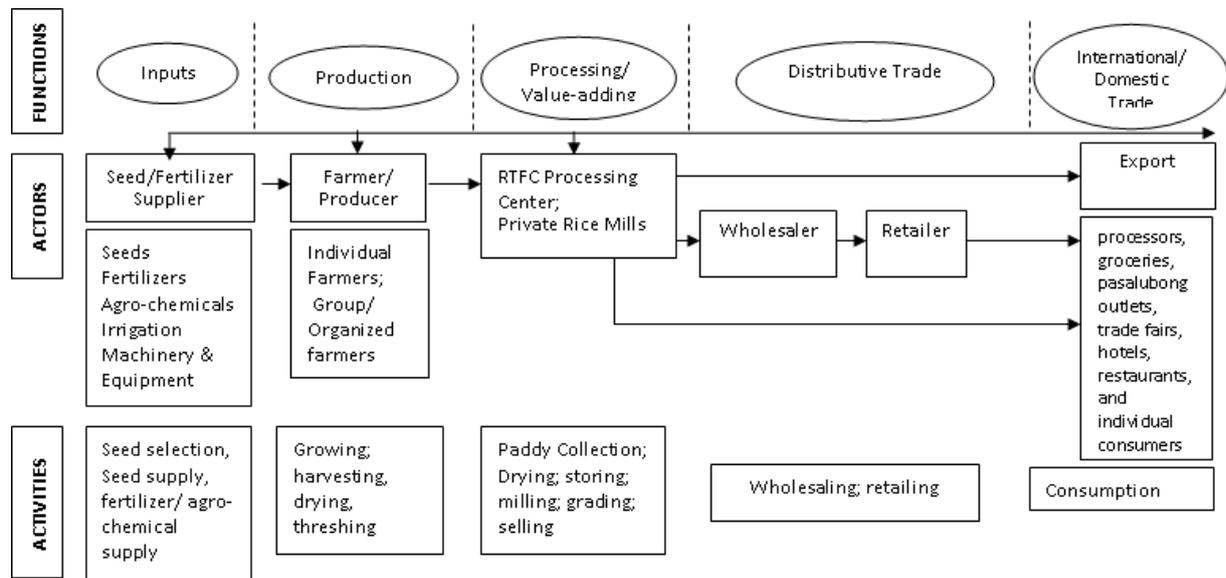
RETURN ON INVESTMENT (When exported as clean rice by farmer) High Quality Traditional Variety Seeds	
Note: Palay is produced by the farmer and directly sell it as clean rice.	
Land area: 1 hectare (10,000 sq. m.)	
Ave. Production/hectare: 70 cavans @ 50kgs/cavan (3,500 kgs/ha.)	
Milling Recovery - 65% (3,500 kgs x .65) = 2,275 kgs	
Processing Recovery - 75% (2,275 kgs x .75) = 1,706.25 kgs (Clean Rice)	
Broken - 15% (2,275 kgs x .15) = 341.25 kgs	
Fine Darak - 10% (2,275 kgs x .10) = 227.50 kgs	
Clean Rice (1,706.25 kgs x 65/kg) - Export Price	110,906.25
Broken (341.25 kgs x 40/kg)	13,650.00
Fine Darak (227.5 kgs x 12/kg)	2,730.00
Total Revenue	127,286.25
Less: Total Cost	181,500.00
TOTAL PROFIT (TOTAL LOSS)	(54,213.75)



In 2006, RICE, Inc. and 8th Wonder initiated the revitalization of the Cordillera heirloom rice and were able to locate potential markets for traditional rice in the United States. The farmers then started exporting their traditional rice through these NGOs. Export price is relatively lower at P65 per kilo than local market price which is P100 per kilo. However, the farmers prefer to sell their produce to the export market which is more stable as against the local market where demand is unpredictable.

VALUE CHAIN ANALYSIS

Heirloom rice supply chain of economic activities (From seed to shelf)



The supply chain of Heirloom rice starts from farmers that grow rice. Farmers may directly sell their *palay* (rice grain) to the Rice Terraces Farmers' Cooperative (RTFC) which owns a processing center including a customized rice mill in which case only production cost is incurred by the farmer. The RTFC will buy rice from the farmers as raw material and processed it into clean rice and sell it to wholesalers and retailers or directly to local or foreign markets. Conversely, farmers who are members of the RTFC may have their *palay* processed into clean rice by availing the milling services of the cooperative in which case they may incur additional cost including milling, transshipment from farm gate to processing center and packaging. Whether or not the farmer sells his product as *palay* or clean rice, profit is unlikely to be realized by him considering the costs being incurred.

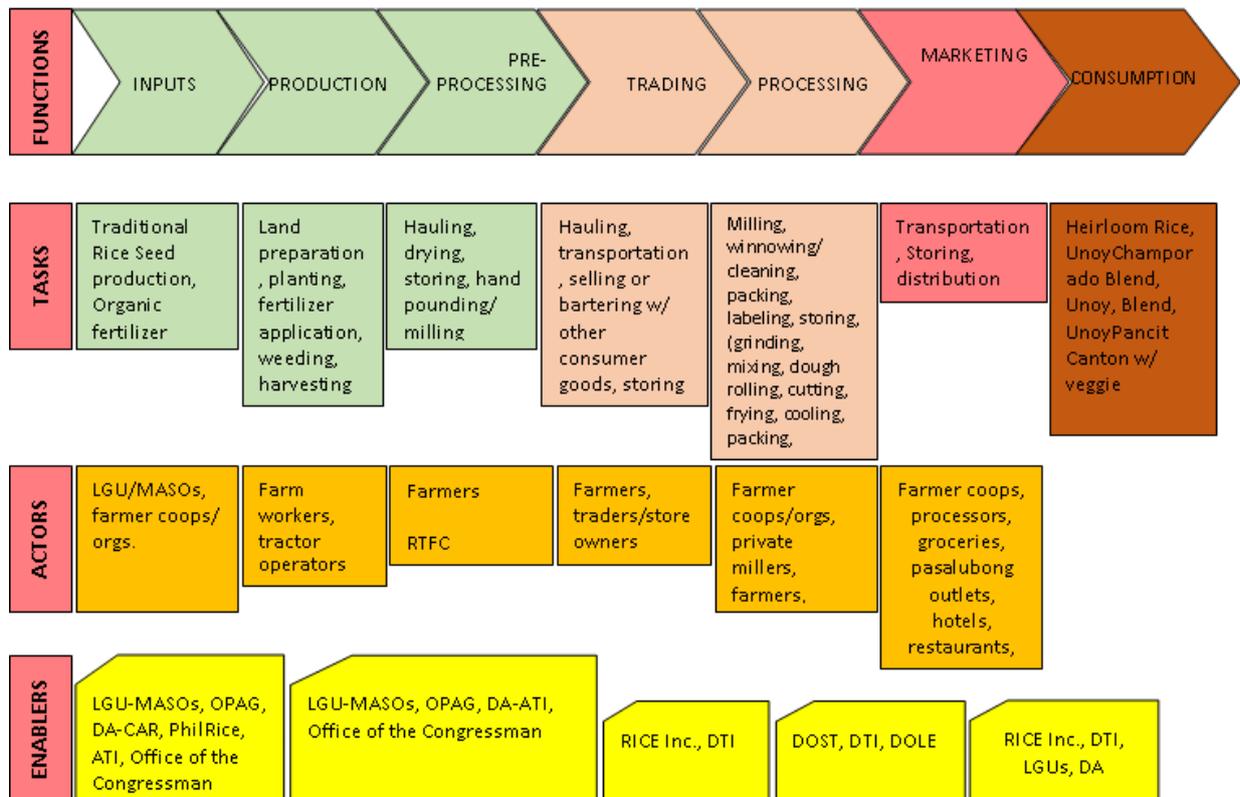
In interviewing the heirloom rice supply chain members, several problems arise. For example, farmers, as the initial source of the chain, have to take risk in rice growing. The risks involve weather, pests and diseases, drought, lack of farm implements and high costs



of inputs. The RTFC is also subjected to certain risks including unpredictable market demand.

It is highly improbable to increase yield due to limited farm terraces and farming is essentially organic hence there is a need to look for ways to increase the value of the product as it moves from farm gate to final consumers if only to improve the gain receive by the farmers.

Value Chain Map



End Markets

There were no definite and rigid end markets for Kalinga heirloom rice until the entry and intervention of RICE, Inc. and 8th Wonder that initiated the revitalization of the Cordillera heirloom rice including those varieties that are grown in Kalinga. One of the objectives of the project was to look for potential market of the Cordillera heirloom rice in order to make it as a source of livelihood for heirloom rice producers.

Since then, the volume of traditional rice varieties usually produced for family consumption gradually increased because there is a potential market for the product both local and overseas. Local end markets include rice terraces farmers' cooperatives, processors, groceries, pasalubong outlets, trade fairs, hotels, restaurants, and individual consumers



while export market include countries that are identified by RICE, Inc. and 8th Wonder to which they have commercial dealings.

Farmers' Cooperative. These cooperatives also known as Rice Terraces Farmers' Cooperative (RTFC) were organized by the farmers themselves with the purpose of seeking assistance and support for the maintenance and preservation of culture, custom and tradition in rice farming and to sustain partnership with NGO's and line agencies for the revival and promotion of quality heirloom rice to be marketed in both local and international market. Sometimes RTFC purchases *palay* from the farmers and does the processing such as milling and packaging and sell it to local or international consumers. Otherwise, it may purchase clean and processed heirloom rice from the farmers and sell it as a retailer to final consumers.

Processors. There are buyers of heirloom rice who use it as the main ingredient for certain finished products such as champorado, blend, pancit canton w/ veggie, among others. The processing will add more value to these finished products which command a better price to the advantage of the processors. The finished products are sold in groceries, pasalubong centers or directly to individual consumers.

Groceries. Groceries which are mostly situated in Tabuk City are among the considerable end market for Kalinga heirloom rice especially that they are flocked by consumers from time to time. According to store owners, heirloom rice products that are properly packed catch the attention of their consumers and buy them together with grocery items. Likewise, the vibrant appearance and the aromatic smell of heirloom rice make it more attracting on the part of consumers.

Pasalubong outlets. The One Town, One Product (OTOP) program of the Department of Trade and Industry bring about the opening of Pasalubong centers in the province where heirloom rice is also retailed. For instance, heirloom rice products displayed at the pasalubong center located at the Tabuk City hall had been among the favorite items bought as pasalubong by tourists visiting the city.

Trade Fairs. Kalinga is known and well-heelled with festivities which are celebrated annually. Every municipality has also its own festival which is likewise celebrated every year during their foundation day. More often than not, trade fairs which are sponsored by the Department of Trade and Industry are conducted during festivals on the notion that the



number of visitors is at peak level during these occasions. Heirloom rice is sold by retailers in trade fairs during festivals which usually last for 2 to 3 days.

Hotels and Restaurants. Another end market for heirloom rice is hotels and restaurants operating within the province. Hotels have their own *pasalubong* centers where local products including heirloom rice are exhibited and sold to their patrons. On the other hand, there are restaurants that include heirloom rice in their servings instead of the typical commercial rice. Dishes which are served with heirloom rice command a higher price.

Individual Consumers. A small percentage of the end market consists of individual consumers from Baguio City and Manila who occasionally buy heirloom rice when their need arises. They send their orders through text messaging or telephone calls to RTFCs and the latter will send to them using provincial operation buses based on the specified quantity and other descriptions.

Business-Enabling Environment

The Business Enabling Environment (BEE) is the set of policy, institutional, regulatory, infrastructure and cultural conditions that govern formal and informal business activities. It includes the administration and enforcement of government policy, and national and local institutional arrangements that affect the behavior of relevant actors who, together, comprise many of the important players in the business enabling environment (Goodpaster, 2011).

Kalinga Heirloom rice faces certain major obstacles and multiple challenges relative to its business-enabling environment both in the national and local level ranging from corruption, inefficient government bureaucracy, poor infrastructure—notably poor roads and inefficient, expensive and congested port facilities—to lack of access to credit. Poor infrastructure with regard to irrigated farming, transportation, and the provision of power, generally for processing and lack of producer land rights that limits access to finance are among the obstacles faced by farmers. The Bureau of Customs (BOC) has historically been perceived as corrupt. Many within both the government and the trade community believe that the BOC has not implemented required reforms and that broad-based government commitment and BOC leadership is required to improve trade facilitation.

Vertical Linkages

The term —vertical linkages in value chains refers to the strength of vertical cooperation among value chain actors: i) in getting a product from input supply to consumer; ii) in



transmitting information (prices, quality requirements and quantities demanded) from buyers down the chain to suppliers; iii) in conveying incentives from buyers willing to pay a premium for quality products to suppliers; and iv) in informing producers of input suppliers' willingness to provide technical information or extension services for commercial purposes. Even where this information does flow easily up and down the chain, a lack of trust is an obstacle to vertical coordination. Where the relationships between actors vertically linked in value chains are lacking in trust or social capital, the competitiveness of the value chain can be compromised (Campbell et. al., 2009).

Vertical linkages in the Kalinga Heirloom rice value chain are generally unorganized or fragmented with limited coordination between actors at different levels due both to poor infrastructure as well as distrust on the part of farmers of markets in general and private sector actors such as buyers, traders and input suppliers in particular. High transportation costs, inadequate investment in processing, and predatory behavior among value chain actors result in weak vertical coordination and very high costs.

This disabling environment has led to: a) the ineffective transfer of information, including market signals that might stimulate improvements in product quality, b) unclear incentives for investing in new technologies to improve productivity, and c) limited engagement between producers and larger buyers. These problems result in weak vertical coordination, low yields and very high costs of production as shown in the production cost analysis. Marketing is not well organized and the volumes marketed are not great, despite unmet demand for the high quality heirloom rice produced.

There are substantial gaps in the input, production, post-harvest, processing and aggregation functions. With little private investment, the vertical relationships that have formed in the heirloom rice are short-term in nature and driven by adversarial negotiating perspectives, leading to a high degree of distrust between value chain actors. Most farmers perceive heirloom rice as an alternative source of income and are unlikely to make substantial investments in improved productivity. The lack of information transmitted down the chain also prevents input suppliers from being able to deliver seeds and other inputs at the right volumes and price, and farmers from getting the knowledge needed to make informed investment decisions.



Horizontal Linkages

The organization of Rice Terraces Farmers' Cooperatives and other farmer's associations has caused both formal and informal horizontal linkages among heirloom rice farmers because of long-term cooperative arrangements among them that involve interdependence, trust and resource pooling in order to jointly accomplish common goals. The linkages helped the farmers to share their skills and resources with one another and enhance product quality through common production standards. Such linkages also facilitate collective learning and risk sharing while increasing the potential for upgrading and innovation. Smallholder producer groups including those organized in the village-level and are under the umbrella of the RTFC Kalinga Chapter have strong potential to increase farmers' bargaining power in the marketplace.

Nevertheless, these horizontal linkages have not really helped the farmers reduce transaction costs specifically the cost of inputs and services (including financial services). As shown in the production cost analysis, farmers are incurring losses especially when they directly sell their paddies to RTFC. The linkages also failed to create economies of scale and increased efficiency and competitiveness of the heirloom rice industry.

MAJOR CONSTRAINTS

Farmer Level

At the farm level, the major constraints identified by the farmers are pests and diseases (Birds, rats, snails, chicken, rice bug, stem borer, mole cricket), lack of draft animal and farm implements (multi-tiller for land preparation), lack of pre and post harvest facilities, damaged irrigation canals and rice terraces, soil nutrients deficiency, lower yield, high costs of inputs, lack of accessible customized rice mill and low price of palay and clean rice.

Milling Sector

Low Levels of Milling Technology - The RTFC which takes charge of milling heirloom rice uses old machine that is inadequate for sophisticated sorting of varieties and results in higher levels of broken rice than more modern machines. The machine is fully depreciated and is capable only of milling 5 to 10 cavans of paddies in one day. A new customized rice mill which was installed by DA-CAR is not yet fully operational because of some lacking accessories.



Market

There may be numerous market opportunities for traditional rice in the local market but these are not consistent. Most of them are seasonal buyers and demand is unpredictable. The foreign markets are stringent when it comes to quality control hence there are farmers whose rice are rejected not having passed the quality control requirements. These problems of the farmers both in the local and foreign markets are adversely affecting the marketing of their products.

Opportunities for Upgrading

The following are the opportunities for upgrading for Kalinga heirloom rice:

Fields of Action	Upgrading strategy
Strengthening business linkages and opportunities	<ul style="list-style-type: none">• Collaborative quality management• Greater production volume• Formation/strengthening of farmer's associations• Improvement of terms of contracts• Industrial investment (machines/equipment)
Increasing supply/production volume	<ul style="list-style-type: none">• Quality improvement• Production expansion for both domestic and international markets• Cost reduction• Diversification/product innovation
Improving policies and market regulations	<ul style="list-style-type: none">• Quality improvement by introducing standards• Reduction of transaction cost

CONCLUSIONS

1. Because of the nature of traditional rice farming which is labor intensive, the production cost on the part of the farmers is excessive and the period for cultivating even small areas of farm became more extensive.
2. Unaware of the basic principles of accounting and bookkeeping, the farmers who are supposed to benefit by and large from the crop that they are producing are instead at loss when they directly sell their palay to millers such as the Rice Terraces Farmers Cooperative. The same is true when they export their produce as clean rice to foreign markets where demand is stable but price is relatively lower.
3. There is a high demand for traditional rice both in the local and foreign market however the supply is hardly met by the farmers because of factors such as limited



farm areas for production, high production cost attributed to manual farming, high transportation costs, lack of processing facilities and lack of training on quality control.

4. The value of traditional rice rapidly increases after milling until it reaches the final consumers hence more often than not, it is the wholesalers of palay or clean rice who buy from the farmers and retail it to final consumers who most likely benefit or receive higher revenue instead of the farmers.
5. The high demand for traditional rice is substantiated by numerous end markets identified during the value chain analysis including local markets such as Rice Terraces Farmers' Cooperatives, processors, groceries, pasalubong outlets, trade fairs, hotels, restaurants, and individual consumers while export market include countries that are identified by RICE, Inc. and 8th Wonder to which they have commercial dealings.
6. There are numerous major constraints that were identified during the value chain analysis. At the farm level, the major constraints identified by the farmers are pests and diseases (birds, rats, snails, chicken, rice bug, stemborer, mole cricket), lack of draft animal and farm implements (multi-tiller for land preparation), lack of pre and post-harvest facilities, damaged irrigation canals and rice terraces and soil nutrients deficiency. There is also low level of milling technology as the only customized rice mill used by the farmers has fully depreciated. The unpredictable demand for traditional rice in the local market as well as the stricter requirements of the foreign market on quality control are also identified by the farmers as major constraints in marketing their product.

RECOMMENDATIONS

Based on the findings of the study and conclusions, the following alternative courses of action are recommended:

1. Replacement of the traditional farming methods with mechanized farming by providing pre-harvest and post-harvest facilities such as hand tractors, threshers and construction of multi-purpose drying pavement.



2. Organizing farmers' field school where trainings and seminars on organic farming, pests and diseases management, marketing, bookkeeping and quality control are conducted.
3. Provision of village-type customized rice mill and processing center in order to get rid of transportation costs when the farmers bring their palay to Tabuk City for milling.
4. Rehabilitation of communal irrigation systems and restoration of damaged terraces to increase yield and improvement of farm to market roads.
5. Conduct of trainings on processing of heirloom rice to other finished products as identified in the value chain map. The processing will add more value to these finished products which command a better price.

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