Revitalizing Peanut Farming in Enrile, Cagayan, Philippines

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Abstract

The sustainability of a peanut farming community hinges on understanding the key production players in the supply chain. This agenda-setting paper focused on presenting and analyzing the production and marketing experiences of 75 peanut farmers in Enrile, Cagayan, Philippines, using the case methodology through farmer surveys, key informant interviews, and secondary sources of information. This paper aims to present sustainability perspectives to revitalize peanut farming in the area and address the issues encountered in the production and marketing of peanuts. The results of this study showed that peanut farming in the community can be revitalized and sustained through instituting effective flood control measures, improving peanut farming practices, employing market-driven strategies supported by supply chain and quality management, nurturing the next generation of peanut farmers, and establishing better linkages with support institutions and industry.

Keywords: Cagayan; peanut farming; sustainability

Acronyms:

DA – Department of Agriculture
NRDP – National Research and Development Program

Introduction

Peanut (*Arachis hypogae*a L.) is an herb belonging to the legume family (Fabaceae) notable for bearing fruits called pods underground. It is known by many names in various regions: *pindar*, groundnut, earthnut, and goobernuts, just to name a few (Huelgas et al., 1990). Locally, it is known as *mani*. Peanuts originated from South America, specifically Bolivia and nearby countries, and it spread throughout tropical and sub-tropical Asia from the Philippines, where the Spaniards introduced the crop from Mexico during the early colonial period (GMC, n.d.). Peanut, being an alternative crop, is well-suited to cropping schemes in light to medium textured soils in rotation with other annual crops. It is usually intercropped with a variety of crops, such as corn, sugarcane, mungbean, soybean, upland rice, cassava, okra, and coffee (Palomar, 1998).

In the Philippines, the most popular form for consuming peanuts are boiled, roasted, fried, and processed into peanut butter (Garcia et al, 1990). It can also be made into peanut flour, brittles, and other confections, both for domestic consumption and dollar-earning export (Cagampang and Lantican, 1975). With peanut seed containing an average of 25%–30% digestible protein (GMC, n.d.), it is a good source of protein isolates to fortify bakery products, milk substitutes, instant food, and simulated meat products (Huelgas et al., 1990). Peanut is one of the major sources of vegetable oil and oilseed in the world (Enicola, 2009).

According to the Statistics Division of the Food and Agriculture Organization of the United Nations, approximately 23.95 million ha worldwide are cultivated with peanut, with total production reaching 36.45 million tons and an average yield of 1520 kg/ha in 2009 (FAOSTAT, 2011). Nigeria is the top producer of unshelled peanut (3.8 million tons), comprising 10% of total world production, though it hardly exports. Other key producers include the United States, China, Myanmar, India, and Argentina, and all except Myanmar export this commodity. The European Union, Indonesia, Russia, and Mexico are the world's main buyers (Dy, 2009).

In Asia, where smallholder farmers mostly grow the crop with limited inputs, production reaches 50% of global area and 64% of global production. But between 2000 and 2009, area for planting the crop declined annually at 1.1%. However, production declined only 0.1% because of the annual increase in productivity at 0.9%. The major gains in production came from China, India, Myanmar, Indonesia, and Vietnam, but not the Philippines (ICRISAT, 2011).

According to Huelgas et al. (1990), exploiting the potential of peanut as a commercial crop has not been fully realized in the Philippines despite efforts of the government. However, some improvements have been made in the past. During the 1970–1986 period, peanut production fluctuated because of

changes in the hectarage of land planted to peanut and the fact that the crop is grown mainly as an intercrop. With the advent of National Research and Development Program (NRDP), the 1980s saw the highest volume of peanut production (Huelgas et al., 1990). From 1994 to 1996, the country experienced an increase in peanut production at 36,000 metric tons from 31,000 metric tons in 1991, but this is still not enough to surpass the reported production of the crop in 1986 at 45,175 metric tons (Galvez et al., 2002). In 2010, production was down to 3,940 metric tons from 4170 metric tons, declining by 5.49% from its 2009 level. The decrease was attributed to crop shifting to eggplant in Nueva Vizcaya and to corn in Cebu, as well as the prolonged dry spell during the early part of the year that delayed cropping and reduced harvest in Sultan Kudarat, a province in Southern Philippines (BAS, 2011).

Because of insufficient production, local production in the Philippines has not been sufficient to meet the increasing demand for domestic needs, necessitating imports. From 1987 to 1996, there was an increase of over 341% on peanut imports (Galvez et al, 2002). In 2010, the country's peanut supply amounted to 60,000 to 70,000 tons, with over 50% of this supply coming from imported sources. While the production areas for peanut in the country planted to peanut have slowly increased in 2011 after declining in the 1990s (BAS, 2011), various challenges have cropped up, such as the presence of cheap imports, low interest at present to diversify into cereal production, weak link between local production and processors in urban areas, and relatively low seed multiplication rates that limit rapid expansion (Enicola, 2009).

Existing literature looked at methods, such as improved varieties and diversified farming, to increase productivity of farmers. Technical and policy issues were also formulated for the production, processing, and marketing of peanut and peanut-based products in the Philippines. However, peanut farming practices are normally influenced by the farmers' location and access to information. Researches on the status and prospects of the whole Philippine peanut market may have left out important insights that are unique to certain communities. Hence, this study specifically looks at the experiences of peanut farmers in the municipality of Enrile, Cagayan, Philippines. This paper attempts to answer the research question "How can the peanut farming community in Enrile, Cagayan, be revitalized and sustained?"

Materials and Methods

The study used the case method, and primary data were obtained through farmer surveys and key informant interviews. Secondary information was taken from relevant literature. The survey and interviews were conducted from January to April 2011. Peanut farmers were the target group of the surveys. A sample of 105 farmers was drawn from a list of 525 farmers obtained from

the office of the municipal agriculturist. However, during the conduct of the study, only 75 peanut farmers were interviewed as some farmers could not be located, were not available for interview, or refused to participate in the survey. The sample size was determined through sampling fraction and proportional allocation to get representative respondents from the nine barangays (villages) that participated in the study. The descriptive method was employed in analyzing the data.

The Study Area

Cagayan Province is found at the northernmost part of the country, bounded on the east by the Pacific Ocean, the south by Isabela province, on the west by Cordillera Mountains, and on the north by the Balintang Channel and the Babuyan Group of Islands. The province is made up of plains and valleys, bordered by mountains and crisscrossed with rivers and creeks. Agriculture is the primary industry of the province, with rice and corn crops covering most of the total agricultural land. Land is also allocated for production of other produce such as coconut, mango, and banana (NSO, 2002).

Cagayan is one of the top ten peanut-producing provinces in the country (Palomar, 1998). In 1997, production in the province was at its peak, with a production volume of about 1,963 tons per hectare. This can be attributed to the increase in land area (1753 ha) planted to peanuts in Cagayan that year. Moreover, during the eight-year period from 2000 to 2007, production volume ranged from a low of 1477 to 1963 metric tons. For the years 2008 and 2009, there was an increase in production of 1,811 and 1,876 metric tons, respectively, from an average of 1,644 metric tons for the years 2000–2007 (BAS, 2011).

The municipality of Enrile is located at the lower leftmost part of the province of Cagayan (Figure 1). It spans an area of approximately 18,450 ha with a population of 30,101 people (NSO, 2010). Of this total hectarage, about 233.5 ha of arable land is devoted to peanut production. The municipality has a generally flat terrain with two distinct seasons: dry from December to May and wet for the rest of the year. Economic activity in Enrile is dominated by agriculture with rice and corn as the other major crops.

Enrile is a leading producer of peanuts, with almost 80% of the whole population engaged in the production of peanuts and other agricultural crops. Peanuts, being one of the major agricultural products of the town, serve also as the major source of income for the farmers. It is usually grown as cash crop in areas planted with corn and have distinct wet and dry seasons. Although returns are not that high, peanut is still produced as food by majority of the farmers.

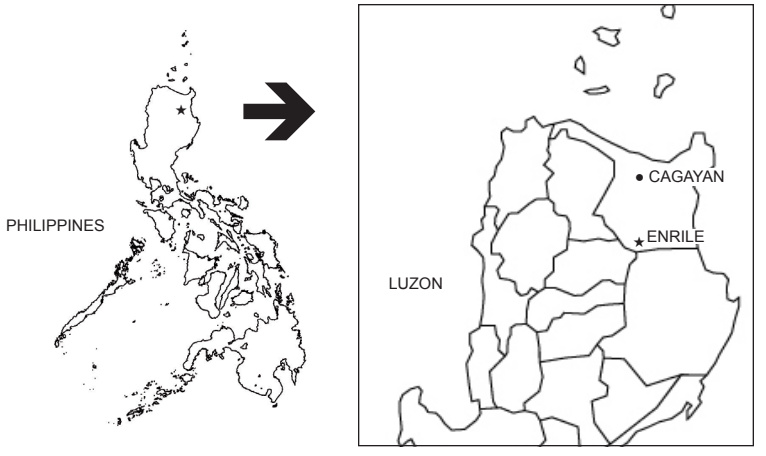

Figure 1. Map showing the location of Enrile, Cagayan, Philippines

Being the hub of peanut production in Enrile, 9 *barangay*s (villages) out of 22 *barangay*s located in East Enrile were involved in the study. These nine *barangay*s—namely, Divisoria, Lemu Sur, Lemu Norte, Inga, Maracurru, Alibago, Magalalag West, Magalalag East, and Lanna—are bounded in the east by the Cagayan River. This makes the area prone to river flooding, posing a severe risk of damage to agricultural crops.

Results and Discussion

Socio-Economic Profile of Farmers

The profile of the 75 farmers interviewed is detailed in Table 1.

Peanut farming in Enrile is a male-dominated enterprise, with only 27% of the respondents being female. Typically, men engage in farming as it involves a series of labor-intensive activities while the women stay at home and manage the household. Only a few couples tend to fully engage in farming, with the wives in charge of weeding and gleaning as well as helping out in the selling of the peanut crop.

The oldest peanut farmer is 75 years old while the youngest is 30 years old. About 58.67% of the peanut farmers belong to the older group (beyond 50 years old) of the population. This suggests that there is declining interest in peanut farming among the younger generation of the community. The children of peanut farmers who are able to finish their primary and secondary schooling in the area either opt to study in universities or work outside of the province in nonfarming jobs once they graduate or find employment elsewhere. This may be explained by perceived higher incomes from employment where

Table 1. Socioeconomic profile of peanut farmers in 9 *barangays* (villages) in Enrile, Cagayan, Philippines

Socioeconomic Profile	Number of farmers (n = 75)	% to total
Gender		
Male	55	73.33
Female	20	26.67
Age		
<41	4	5.33
41–50	27	36.00
51–60	24	32.00
>60	20	26.67
Household size		
1–3	5	6.67
4–6	33	44.00
7–9	27	36.00
>9	10	13.33

Socioeconomic Profile	Number of farmers (n = 75)	% to total
Level of educational attainment		
Primary		
Undergraduate	10	13.33
Graduate	23	30.67
Secondary		
Undergraduate	12	16.00
Graduate	13	17.33
Tertiary		
Undergraduate	12	16.00
Graduate	5	6.67
Land tenure status		
Land owner	53	70.67
Tenant	22	29.33

Socioeconomic Profile	Number of farmers (n = 75)	% to total
Years in peanut farming		
<10	17	22.67
10–20	18	24.00
>20	40	53.33
Time devoted to peanut farming		
Full-time	61	81.33
Part-time	14	18.67
Initial capitalization (PhP)		
5000–10,000	60	80.00
10,000–20,000	15	20.00

starting monthly salaries, for example, in the business outsourcing centers are at PhP 15,000 while a peanut farmer earns considerably less.

All of the respondents are married, and majority of them (80%) have big families, with household sizes ranging from four to nine members. About 7% of the farming families have three members, 44% have four to six members, 36% have seven up to nine members, and the remaining 13% have ten or more members in their family. This implies that having more children means additional unpaid labor for peanut farming, particularly in gleaning, which they do when they are home from school. Whatever the children earn from gleaning the produce of neighboring farms becomes their allowance for school.

In terms of educational attainment, majority of the farmers have had some form of primary education (44.00%). The others reached either the secondary level (33.33%) or the tertiary level (22.67%) as their highest educational attainment. There is also a decline in the number of farmers who finish each level. Among the 33 farmers who have had primary education, more than half (23) graduated; among the 25 who have had secondary education, half (13) graduated; and among the 17 who have had tertiary education, less than half (5) graduated. Farmers with the lowest educational attainment belonged to the older group. They reported that in their younger days, farming was the priority, not education.

More than half of the peanut farmers (53%) have been planting peanuts for more than 20 years. The rest of the respondents have either more than 10 years (24%) or less than 10 years (23%) experience in peanut farming.

Most of the peanut farmers (71%) own their farms with hectarage ranging from 0.25 ha to 5 ha. Many of the land owners inherited their farms. The rest (29%) are tenants, renting lands owned by people who are not into farming. According to the municipal agriculturist of Enrile, peanut farms are classified according to size as follows: small (0.49 ha and below); medium (0.50 to 1.49 ha) and large (1.5 ha and above). The results show that 65% of the respondents' peanut farms are large farms, 24% are medium-size farms, and 11% are small farms. Most of the farms are located in the *barangay*s (villages) of the farmers. Due to the proximity, the farmers report that they just walk or travel using *carabao*s (water buffalos) or cows to their respective farms. Only two farms are outside the *barangay*s where the farmers live.

Farming is the only source of income for the majority of the respondents. Most of the farmers (81%) are full-time producers of agricultural crops. On the other hand, the remaining 19% are part-time producers. These are the farmers with other business interests, like owning *sari-sari* (mom-and-pop) stores or *talipapa* (wet market) stalls. Some of them are also employed as teachers or staff in government offices.

Majority (80%) of the respondents have capital outlays of PhP 5,000 to PhP 10,000 per cropping season for their peanut farming operations. These

respondents are farmers with land areas of 1 ha and below. Peanut farmers with land areas of more than 1 ha invest PhP 10,000 to PhP 20,000 per cropping season for peanut farming. Most of them (91%) use their own money as working capital, which come from their savings from harvest of other agricultural products. The remaining farmers (9%) get their capital from their other non-agricultural income sources (e.g., *sari-sari* stores and public utility vehicle operations).

Production Practices

Propagated cultivars. Peanut farmers in Enrile, Cagayan, only use what they call the traditional or "native" small-seeded cultivars. These cultivars typically have two, sometimes three, seeds that are pink. Normally, these cultivars mature 105 days after planting. These may grow either bunchy or similar to runners. These crop cultivars are typically 12–15 inches tall, with a pod count of 12–16 per plant, and have a fairly high shelling recovery at 75%. Two seeds of such cultivars usually weigh 1 g. Generally, these cultivars have a pod yield of 770 kg (0.77 tons) per ha.

According to the wholesalers, small-seeded varieties are required by millers and processors since their existing equipment were designed for shelling and grading small- to medium-sized pods only. Thus, farmers do not plant the new higher-yielding and large-seeded cultivars introduced by the Department of Agriculture (DA), such as UPL Pn10, BPI Pn9, NSIC Pn11 (Namnama 1), NSIC Pn12 (Ilocos Pink), NSIC Pn14 (Namnama 2), and Asha. These are generally large-seeded varieties that give an average pod yield of 1,800 to 2,500 kg/ha, a yield which is two to three times more than the pod yield of the traditional cultivars planted.

Such practice of using traditional peanut varieties is consistent with the findings of Moxley et al. (2002). Despite the availability of improved peanut varieties, most farmers still use the native cultivar (Moxley et al., 2002). The decision to use new improved cultivars is influenced by the number of years in peanut farming, as well as the farmer's years of schooling and contact with extension workers. The problems commonly faced by the farmers are pests and diseases, floods and drought, and marketing of produce. Farm supplies are commonly obtained from traders whom they pay after harvest. Ultimately, the availability of seeds will determine what cultivar will be planted by farmers.

Labor. In the area, peanut farming is considered a labor-intensive enterprise, which may explain why peanut farmers in Enrile are primarily men (73.33%). Farmers are inclined to take advantage of an abundant and cheap resource of family labor in the locality since about 80% of the farmers have four to nine family members.

For every hectare planted to peanut, direct labor accounts for 62% (PhP 6,570) of the total production cost (PhP 10,600). To briefly illustrate the inefficiency of peanut production, the cost structure of an owner-operator, who owns a 1-ha peanut farm for more than ten years, is presented. Net income from the production and marketing of peanuts based on total revenue of PhP 15,400 amounts to PhP 4,350 per cropping. The total cost that represents the opportunity costs of family labor for land preparation, planting, weeding, harvesting, gleaning, and other unpaid labor together with the value of unsold seeds to be used for future production amount to PhP 10,600. Although there is a positive return of 28%, most farmers think that they incur too much cost in producing peanuts, such as in this sample case since direct labor comprises 62% of the total production cost. If revenues were higher or production efficiency increased, farmers may be less conscious of the cost incurred.

Farming method. There are two distinct cropping seasons for peanut farming in Enrile. These are referred to as *dawarawat* (wet season) and *zinanavun* (dry season). During *dawarawat*, peanut farmers plant during the month of May; and during *zinanavun*, they plant during the month of December. According to Palomar (1998), higher yields and quality of beans are produced during the dry season because of the decreasing rains and increasing sunlight, though he states that the dry season occurs between October and early November, much earlier than the dry season planting in Enrile.

Up to now, farmers use the traditional method of peanut farming, which involves the use of manual labor and/or animal labor since these resources are readily available and do not require any cash outlay. The farms are rainfed and no fertilizer is applied to the crop because the farmers cannot afford to buy fertilizer. The farmers in Enrile intercrop the peanuts with corn, which is known to result in higher yield (cf. Misbahulmunir et al., 1989).

The production process of peanuts includes the following activities: preparing the land (42 man-days), planting (10 man-days), weeding (22 man-days), harvesting (6 man-days), hauling (5 man-days), gleaning (18 man-days), drying and packaging (8 man-days), and, at times, even shelling (16 man-days) as some of the peanuts are also shelled for the next cropping season. Thus, the entire production process can take from 111–127 man-days. Preparing the land or field involves four operations, which include clearing the field, plowing and harrowing, and furrowing. Clearing the field is carried out right after the harvest season of the cropping year preceding it. In Enrile, this operation is accomplished solely by family members in order to reduce cost. After clearing the field, plowing and harrowing are done twice per cropping season. The first plowing operation, which is done manually using either a *carabao* or cow and a wooden or steel harrow follows, immediately after clearing the field while the second plowing is done during planting.

Farmers report that procuring seeds for planting is not a problem for them since they reserve about 15% (equivalent to about 115 kg of shelled peanuts per hectare) of the previous harvest for the next cropping season. In his study, Huelgas et al. (1990) observed that farmers typically set aside approximately 165 kg of unshelled seeds for this purpose.

Adoption of new technologies. The peanut farmers still rely on labor-intensive traditional farming methods. The farmers claimed that they get minimal trainings and seminars from the Department of Agriculture. Yet only 16% of the farmers attended the free trainings and seminars that the municipality or provincial government provided. Those that did attend thought the trainings they received were ineffective.

The low turnout in the trainings and seminars can be attributed to three factors. First, these trainings and seminars are usually conducted an hour's drive away in Tuguegarao City, which is considered too far by the farmers. Second, the timing of these trainings and seminars coincided with the production seasons, which are busy times for the farmers. With peanut farming being a labor-intensive enterprise, the farmers could not afford to be away from their farms when so much needs to be done. Thirdly, most farmers are still not open to farming innovations, especially the adoption of new technology. So when the local government offerred free transportation for the farmers to attend the trainings, still only a few came. Most of the trainings focused on improvements in farming practices and technological advances, which did not pique the farmers' interest. The farmers stick to their own farming styles, which are hard to challenge, and strictly adhere to their traditional production schedules. This can be attributed to the fact that most of the farmers belong to the older group, which explains the resistance to change.

Flooding. Farmers cite flooding, which usually occurs during the months of September, October, and November, as one of their main production problems. The flooding is caused by the overflowing of the Cagayan River due to heavy rains. The flooding in October 2010 badly affected the wet season harvest. Farm lands were eroded, and to a great extent, sand brought by the flood covered the soil, making it more difficult for farmers to till their lands. Such chronic flooding, therefore, adversely affects not only their farm output and profitability but also disrupts their daily living.

To address this issue, the Philippine government has mapped out plans to institute flood control-related structural, nonstructural, and supporting measures, such as widening of the bottleneck at Tupang and carrying out a dike system scheme, a bank protection scheme at 72 sites in the Cagayan River, and a multipurpose dam scheme, as well as improving the flood forecasting and warning system and strengthening the program on river administration (Department of Public Works and Highways, 2011).

Pest and diseases. Farmers also consider pests such as weeds and green worms and diseases as the main reasons for low production. Two of these diseases, for example, are the early leaf spot and late leaf spot, which are caused by two common fungi, *Cescospora arachidicola* Hori and *Phaeoisariopsis personata*, respectively. These pathogens are both soilborne. The former attacks plants prior to the latter, but both may appear within 3 to 5 weeks after sowing. The diseases damage the plant by forming lesions on the leaves and forcing the leaflets to shed, thereby incapacitating the photosynthetic functions of the plant (McDonald et al., 1985). According to literature, pod losses due to the diseases can reach over 50%, with slight variation depending on geography (Waliyar, 1990; Singha et al., 2011; Ijaz, 2011). The traditional cultivar planted in Enrile is highly susceptible to these pests and diseases.

Marketing Practices

Market and price. Peanut farmers in Enrile need an assured market because peanut is a seasonal crop. They consider access to market information as an important aspect of marketing. Through this, they can channel their product to the most appropriate market. Basically, farmers want to receive a price good enough to cover their costs in peanut farming. However, farmers, as price takers, receive a relatively low price for their produce. The prices they usually get (PhP 22 per kilogram) are not high enough to compensate for their efforts in farming. Direct production costs per kilogram of peanuts sold run up to an estimated PhP 13.77 per kilogram. Most farmers complain that there are no price differences with respect to quality variations with traders or wholesalers quoting one price regardless of such variations.

The trader or wholesaler sets the price of the peanut produce. The price, which fluctuates because of the seasonality of sales and demand and supply considerations, depends on the grade and cultivar. Peanut traders and wholesalers prefer the small-seeded varieties since the grading and shelling machines that millers and other processors use are suitable only for local small-seeded varieties.

Since the farmers belong to the same community, it is easy to exchange price information among themselves. The farmers can easily decide to sell when they think the price is good enough. The sources of price information are limited to the traders, neighbors or other producers, and friends or relatives with whom the farmers have regular dealings. Price information is often relayed verbally.

All of the farmers are paid cash upon pickup of their produce, although some farmers stated that they sometimes prefer to be paid in advance. The

advance payment is normally used for the improvement of their farming operations with hopes for a better yield.

Marketing channel. The farmers sell their peanuts to at least three market outlets: traders, an assembler-wholesaler, and a miller-wholesaler (Figure 3). The traders in Enrile are the direct contacts of the assembler-wholesaler based in Tuguegarao City and the miller-wholesaler based in Sta. Maria of Isabela, a neighboring province. The Tuguegarao City-based assembler-wholesaler links with a processor based in Bulacan province while the miller-wholesaler sells the produce to a peanut processor based also in Isabela province. Wholesalers pay a higher price per kilogram for peanuts (PhP 24–27 per kilogram) than the peanut traders (PhP 22 per kilogram). Most of the farmers sell their produce to peanut traders near their residences. During harvest season, these peanut traders go from house to house to purchase peanuts in sacks directly from the farmers. This way, they incur minimal transportation cost and spend less time and effort in transporting their products. Hence, peanut farmers find it more convenient to sell their harvest to peanut traders rather than to wholesalers. Moreover, cash conversion is quicker rather than having to bring the produce to alternate markets with higher buying prices. Around 60% of the farmers sell their produce to peanut traders, and the remaining 40% sell directly to wholesalers. The farmers who practice bulk selling of their produce are the ones who prefer to sell directly to wholesalers.

Some farmers are bound to sell to specific buyers (traders) by a written contract, which is drawn when the latter extends loans to the former. These loans or cash advances are obtained by the farmers for their initial capitalization requirements which may include *carabao* rental, cost of farming implements

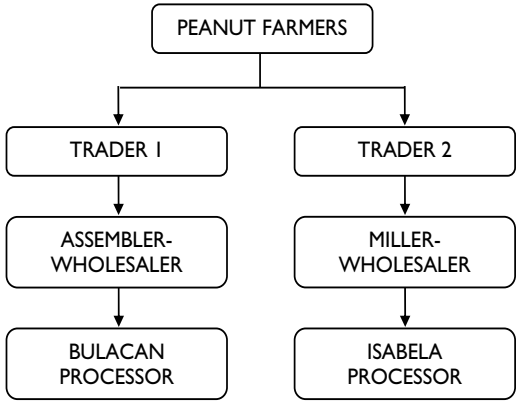

Figure 3. Supply chain of peanuts in Enrile, Cagayan, Philippines

and *vornal* (payment for hired labor) and also for immediate financial needs of their families such as food, clothing and school expenses. Basically, the money owed by farmers to these traders is repaid not in cash, but with the equivalent volume of peanut crops according to the prevailing peanut buying prices at the time of negotiation.

Transportation. Transportation costs of about 40% of peanut farmers selling directly to wholesalers vary depending on the vehicle used and the distance covered in transporting the product. An estimated PhP 450 which accounts for 4% of the total cost is spent for transporting peanut produce to the buying centers of the wholesalers. Farmers who sell their peanuts to peanut traders might pay at most PhP 5 per sack for the use of a *calesa* (horse-drawn carriage), which can accommodate 10 sacks, or a tricycle, which can transport 7 sacks per trip. On the other hand, farmers who sell their produce directly to wholesalers via jeepney incur a higher transportation cost of at least PhP 15 per sack depending on the weight of the produce since buying centers of wholesalers found in Tuguegarao City and in Sta. Maria, Isabela, are far from the peanut farms, which are an hour's drive away from the town proper.

An Agenda for Action

To revitalize and sustain the peanut farming business in Enrile, Cagayan, the following agenda for action is offered to deal with the environmental, sociocultural, and administrative constraints of the industry.

1. *Employing flood risk mitigation measures in current peanut farm locations*

Severe flooding brought about by climate change has affected production levels in the area, necessitating the need to adopt flood control practices and explore planting options in relatively higher places with available planting space found to be ideal for peanut farming. Flooding risk mitigation measures must continually be implemented relative to planting schedules.

2. *Improving peanut farming practices*

Encouraging farmers to shift to the new higher-yielding peanut varieties must be pursued aggressively by the Department of Agriculture (DA), together with improving their crop management activities, such as fertilization, pest and disease management, and water management. However, this must be a strategic move done hand in hand with the acquisition of shellers by miller-processors who can process the output of these new large-seeded cultivars. Availability of new higher-yielding peanut cultivar seeds must be assured to boost yields.

3. *Expanding market reach*

The trading and manufacturing of peanuts in the Philippines is concentrated in the National Capital Region (NCR) and composed of small-, medium-, and large-scale players, which represents 58% of the country's firms involved in the industry (Galvez et al., 2002). In a survey of Philippine peanut manufacturers, Lustre et al. (2002a) identified raw material cost, quality of raw material and product, and lack of peanut availability as major constraints to expanding markets, as well as the lack of appropriate equipment, technology, and packaging. While many of these problems have R&D solutions, some like unavailability of raw and packaging materials and equipment need to be addressed separately.

Traditional markets used by peanut farmers limit their profitability as they accept prices specified by their trader-buyers. Expanding market coverage can be achieved through effective linking with peanut-processing companies in requiring the large-seeded varieties. Efforts must be made to sell beyond the municipality's borders. To do this, more market-oriented farmer-group strategies at the farmer association level with the assistance of the DA's market linkaging group which would enhance product quality could be adopted. To address the limited profitability issue, diversified farming is one solution being recommended to increase the earning capacity of farmers. Floresca (2000) studied the sustainability of diversified model farms in Santiago City, Philippines, and came up with these strategies: "(a) monitoring of prices and volume of high value vegetables at the Santiago City market for proper production timing; (b) integrated pest management to reduce pesticide application and soil fertility assessment using soil test kits for proper fertilizer application; and (c) on-farm trials on local seed production of some high-value vegetables."

4. *Nurturing the next generation of peanut farmers*

The peanut farming community in Enrile is a dying breed unless efforts are exerted by the aging peanut farmers to encourage younger people to go into peanut farming. A pilot Family Farm School similar to Opus Dei's Dagatan Family Farm School in Lipa City, Batangas, in the area can be established to entice the younger generation to get a proper education and, at the same time, spend time working on their farms.This can be initiated by the peanut processing companies as part of their corporate social responsibility activities.

5. *Linkaging with support institutions*

Lustre et al. (2002b) evaluated the prevailing government programs and regulations related to peanut and found that these "do not play a visible and significant role in strengthening the market." They further opined, "There is a need to link government programs for increasing supply of peanuts with

the needs of processors. Furthermore, a need to strengthen the capability of the industry to access market opportunities for peanuts through existing programs that enhance and promote quality and provide market information also exists."

Therefore, besides what government agencies such as the Department of Agriculture and the Philippine Council for Agriculture, Aquaculture, and Natural Resources Research and Development (PCAARRD) are currently doing in terms of peanut research, these agencies, together with the provincial and municipal governments, can map out all the peanut supply chain players in the country and link them together. In addition, training seminars for peanut farmers geared towards meeting quality standards and volume requirements of the market can be developed by the DA-Agricultural Training Institute. CSIR (2001) showed that continuing support on research studies, technology transfer, and education programs are important to the development of the peanut industry. This would include researches on food safety, production efficiency, socio-economic forces, postharvest and marketing technologies, and training, information, and program support. Efforts on improving postharvest, utilization, and marketing increase demand for quality healthy and safe peanuts and peanut products. Moreover, they help improve profits and trade.

6. *Collaborating with the industry*

It is recommended that industrial partners should be identified to mitigate quality problems on peanut. This may involve collaboration in terms of "controlling rancidity in peanuts during storage and developing fortified peanut-based children's snacks from peanut fines" (Galvez et al., 2002). The goal of the partnership is to facilitate technology developments that will benefit both the producers and processors of peanuts. Such value addition in processed peanuts translates to higher prices.

7. *Enhancing government programs on developing the peanut industry*

A previous study pointed out that existing government programs for the peanut industry are focused more on the production of peanuts (Galvez et al., 2002). The study recommended that regulations and programs should also be directed to the development of the market for peanuts. Other areas that need enhancement are supply, product quality, marketing, and policy for improving peanut exports.

References

Bureau of Agricultural Statistics (BAS). 2011. 23 February 2011. http://www.bas.gov.ph.

Cagampang, I.C., and R.M. Lantican. 1975. Peanut botany and culture. Agrix Publication, Quezon City, Philippines.

Council for Scientific and Industrial Research (CSIR). 2001. Peanut CRSP external panel evaluation. CSIR, Accra, Ghana. 29 May 2011. http://agris.fao.org.

Department of Public Works and Highways.201a. The review of 1987 master plan. 24 September 2011. http://www.dpwh.gov.ph/infrastructure/JICA2/PAGES/objectives&progress1.html.

Dy, R.T. 2009. Food for thought: How agribusiness is feeding the world (with special focus on the ASEAN). University of Asia and the Pacific and Comprehensive Initiative for the Transformation of Organizations Foundation, Pasig City, Philippines.

Enicola, E. 2009. Peanut situation and outlook 2009. Paper presented at the Investment Forum for Peanut, Philippine Council for Agriculture, Aquaculture, and Natural Resources Research and Development (PCAARRD), Los Baños, Laguna, Philippines, 29 October 2009.

Floresca, J.P. 2000. Sustainability evaluation of diversified model farms of the "Redidreksyon" program of the local government of Santiago City, Philippines. Undergraduate Thesis, University of the Philippines Los Baños, College, Laguna. 29 November 2011. http://agris.fao.org.

Galvez, F.C.F., A.O. Lustre, A.R. Cariso, G. Agustin, E.V. Edra, L.S. Palomar, and A.V.A. Resurreccion. 2002. Technical and policy issues related to strengthening the market for peanuts. Monograph series no.1. United States Agency for International Development—Peanut Collaborative Research Support Program. July 2002. http://www.fdc.net.ph/files/publications/monograph1.pdf.

Garcia, V.V., S.M. Rubico, R.C. Arenas, and R.D. Valmonte. 1990. Peanut consumption patters in the Philippines. Book series, no. 91. Philippine Council for Agriculture, Forestry and Natural Resources Research and Development, Los Banos, Laguna.

Guyana Marketing Corporation (GMC). 2011. Peanut production. Farmer's manual series. GMC, Georgetown, Guyana.

Guzman, E. 1983. Production and marketing of peanuts at farm-level in Enrile, Cagayan. University of the Philippines Los Baños, College, Laguna, Special Problem.

Ijaz, M. 2011. Epidemiology and management of Cercospora leaf spot of peanut (*Arahis hypogaea* L.) in Punjab. University of Arid Agriculture, Rawalpindi, Pakistan, PhD Thesis. 23 February 2011. http://eprints.hec.gov.pk/7302.

Kanro, M.T., M.Z. Ruchjaningsih, A. Imran, and Nurjani. 1999. Performance of groundnut farming in Bulukumba District, South Sulawesi (Indonesia). Paper presented at the Seminar Nasional Hasil Pengkaijan dan Penelitian Teknologi Pertanian Menghadapi Era Otonomi Daerah, Palu, Indonesia, 3–4 November 2009. http://agris.fao.org.

Moxley, R.L., A.R. Librero, and A.G. Tidon. 2002. Adoption/diffusion process, persistence, and socio-economic impact of new peanut varieties. Paper presented at the 2001 Regional Research and Development Symposia, PCAARRD, Los Baños, Laguna, July–September 2001. PCARRD Highlights 2001: 160–161.

Palomar, M.K. 1998. Peanut in the Philippine food system: A macro study. Peanut Techno-guide. Agribusiness Week. 20 February 2011. http://www.agribusinessweek.com/peanut-techno-guide/.

Singh, M.P., J.E. Erickson, K.J. Boote, B.L. Tillman, J.W. Jones, and A.H.C. van Bruggene. 2011. Late leaf spot effects on growth, photosynthesis, and yield in peanut cultivars of differing resistance. Agron. J. 103(1): 85–91.

Waliyar, F. 1990. Evaluation of yield losses due to groundnut leaf diseases in West Africa. Summary Proceedings of the Second ICRISAT Regional Groundnut Meeting for West Africa, Niamey, 11–14 September 2011.