

Economic Status of Farmers on Disaster Prone Community: A Case Study

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Abstract - Climate change has started to significantly affect agriculture and rural landscapes. The Province of Pangasinan including Bayambang is highly vulnerable to natural disaster like flood (NSO, 2010). Farming is one of the sources of income and considering the status of the lands cultivated by the farmers, tenancy and income on invested capital, this study described the economic status of farmers in Tanolong, identified their needs and at the same time address to the fourth fold program of Pangasinan State University which is the extension and community service through a proposed Contingency Logistic Plan as intervention measures to create awareness and prepare farmers relative to climate change.

The study used the descriptive method of research. It was found out that farmers have minimal capital that resulted to adverse effect on their income; do not own the land cultivated, there is poor production; and decreased the number of harvested crops. The used fertilizers does not guarantee good production of crops. The fruit bearing trees are out of season due to climate change. The crops were damaged by off season-flood and heavy rains. Climate change brought destruction to crops which could not easily adapt to the soil and strange insects appeared accompanied by disease. Thus, there is a need to partake a Contingency Logistic Plan that serves as the planning framework for the farmers on production, capital flows, control system, communication required in today's farming environment.

Keywords: Economy, crops, Agriculture, Farmers, Production, Sales, Inventory, Financial Management, Distribution, Contingency Logistic Plan

INTRODUCTION

Agricultural food production and water management are increasingly becoming global issues that are fostering debate. Significant degradation of land and water resources including the depletion of aquifers has been observed in recent decades and the effects of global warming on agriculture and of agriculture on global warming is still not fully understood. One-third of the world workers are employed in agriculture and second to services sector, although percentages of agricultural workers in developed countries has decreased significantly over the past several centuries [1].

Climate change has started to significantly affect agriculture and rural landscapes: In recent years both droughts and floods attributed to changing climatic conditions have been getting more pronounced. Rising temperatures are expected to bring crop-shrinking heat waves, melting glaciers and ice sheets, and rising sea levels, with major consequences for global food security [2].

Moreover, Climate change literature consistently states that countries located in tropical areas are more susceptible to the impacts of climate change. Southeast Asia countries which comprises Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore Thailand, Timor-Leste and Vietnam[3]. With its fast-growing population and increasing dependence on natural resources and agriculture, has already been experiencing climate change-induced phenomena, aside from pre-existing climate conditions and events.

The recent report of the Asian Development Bank (ADB) in 2009 revealed that: the mean temperature in Southeast Asia increased by 0.1-0.3 °C per decade during the last 50 years of the 20th century. Declining rainfall was observed between 1960 and 2000, sea levels rose by 1-3 mm per year, number and intensity of extreme weather events, such as heat waves, droughts, landslides, floods and tropical cyclones increased.

The Philippines has always been a hotspot of typhoons. On average, 20 typhoons are hitting the country every year leaving thousands dead and millions of property wrecked. Its archipelagic feature and geography made Philippines a natural disaster hotspot. Three of the most devastating typhoons experienced by the Filipinos are typhoons Ondoy, Pepeng and Santi which landed in the Philippines between September and October, 2009. The effects of these typhoons were readily felt by the agriculture sector. Millions of crops and livestock were destroyed and were deeply submerged in the flood. Soil erosion threatened millions of lives. All these result to declining productivity with the threat of aggravating economic conditions of the poor. Typhoon Ondoy having an international name Ketsana hit the country last September 26, 2009. According to Philippine Atmospheric Geophysical and Astronomical Services (PAGASA) as of October 2, 2009, 629,466 families or 3,084,997 persons were affected in different regions. The impact was also heavily felt by the agricultural sector particularly among northern regions. After the typhoon farms were classified as “with” or “without” chance of recovery [4].

As cited by Tingco, Sison and Pambid [5], the Province of Pangasinan in particular is highly susceptible to natural disaster. The project, Mapping Philippine Vulnerability to Environmental Disasters included the province in the list of top ten provinces that are risk to earthquake due to the Manila Trench. Moreover the Department of Environment and Natural Resources Mines and Geo- Science Bureau (DENRMGB) ranked Pangasinan as third most flooded prone and landslide prone province in the Philippines as of 2011. This concurs with the declaration of Regional Disaster Risk Reduction and Coordinating Council (RDRRMC) that Pangasinan is the most flooded prone province in Region 1. Finally, in 2013 report of the World Bank entitled in “Getting a Grip of Climate Change in the Philippines”, Pangasinan was considered as one among those provinces which have very risk for typhoon winds, strong winds and heavy rainfall and consequently with very high risk flooding.

The Pangasinan plain suffered from recurrent and destructive floods. The catastrophic floods of July-August and May inundated the entire Pangasinan Plain including the flood plains of the Tarlac River. The target areas for this flood forecasting and warning subsystem are: a) The entire Pangasinan Plain

including the major city/municipalities of Dagupan, Lingayen, Bugallon, Sta. Barbara, Bayambang and Rosales; b) The central part of Tarlac province including the municipalities of Gerona, Tarlac, Paniqui and Moncada.

The region’s economy is highly dependent on agriculture. For 2008, the agri-fishery sector comprising 31 % of the total regional output slightly slowed down from 2.3 % in 2007. The continued slump in the livestock and poultry industry pulled down the overall industry growth. Aside from this, floods brought by continuous heavy rains damaged agricultural crops and facilities. Production of rice and corn increased at a slower rates resulting to lower yields or productivity. The condition has implications on food sufficiency with production growing at a lower rate vis-a-vis population growth rate.

According to National Statistics Office [6] Bayambang is a first class municipality in the (central part of Southern) province of Pangasinan, Philippines. According to the 2013 census, it has a population of 111,521 people. Its municipality includes Barangay Tanolong a mountainous and plain area which serve as a basin of flood during rainy days and climate disturbance. Tanolong has a population of 3,446 residents as of 2014, a land area of 496.58 hectares and the residents’ major occupation is farming. Farmers grow crops such as corn, rice, onion, fruits and vegetables.

In view of this, this study was conducted in order to determine the economic profile of farmers in terms of capital, income per year, land ownership status and number of land areas utilized or cultivated. To assess the status of farmers on disasters relative to productivity, agricultural practices, environmental effects, rural space and adaptation; and to determine the problems encountered by the farmers in terms of sales, production, distribution, inventory and financial management relative to climate change. Based on the findings of the study, it is to propose a Contingency Logistic Plan to prepare farmers on climate change.

Farming is one of the sources of income and considering the status of the lands cultivated, tenancy and income on invested capital, the researcher was inspired to prolong this research to identify the needs of farmers and address to the fourth fold program of Pangasinan State University which is the extension and community service through a proposed a Contingency Logistic Plan as an intervention

measures to help prepare farmers relative to climate change.

METHODS

Research Design

This study used the descriptive method of research. According to Ariola [7], descriptive research is designed for the researchers to analyze, interpret and report the present status of the study, matter, or problem, or the cross-section of the present times. Based on the findings of the study, is to propose a Contingency Logistic Plan to prepare farmers on climate change.

Subjects of the Study

This case study used focused group discussion among purposely selected 23 farmers in Barangay Tanolong, Bayambang, Pangasinan, Philippines. The study was conducted from January to December 2014 to cover the whole year cropping season of the farmers. The study was delimited to farmers for farmed land only and no aqua famers. Each farmer was given a corresponding number code to guide the researchers during the focused group discussion.

Instrument

The main data gathering instrument used in the study was the interview guide divided into three parts. The first part (Part I) focused on the profile of farmers of barangay Tanolong in terms of capital, income, land ownership status and number of land areas utilized/ cultivated. The second part (Part II) dealt in the status of farmers on disasters relative to productivity, agricultural practices, environmental effects, rural space and adaptation. The third part (Part III) centered on the problems encountered by the farmers on disasters relative to sales, production, inventory, distribution and financial management.

Procedure

The researcher asked permission from the barangay official of Tanolong, Bayambang to administer the focused group discussion. After the approval of the barangay officials, the researchers formed a focused group discussion of two. Some farmers answered individually some in groups of two or three in agreement with the group decision. The farmers of barangay Tanolong were called twice. The first time the researchers came, it was just getting to

know them, familiarization and orienting them about the procedure during focused group discussion. The second time the researchers came it was the final data gathering. They brought with them tape recorders and colored flash (key) cards. There were two additional trained research technicians to operate the recorders and collect the colored key cards.

Data Analysis

To obtain good results, coding of similar responses was subjected for frequency count and percentages. Common responses were coded and counted particularly in determining the profile of farmers; the status of farmers on disasters relative to productivity, agricultural practices, environmental effects, rural space and adaptation, identification of problems encountered by farmers. Ranking was also used to determine the degree of seriousness of problems encountered by farmers.

RESULTS AND DISCUSSION

This portion of the study dealt on the Economic Profile of Farmers in terms of capital, income, land ownership status and number of hectares utilized/cultivated, the status of farmers on disaster relative to productivity, agricultural practices, environmental effects, rural space and adaptation; and the problems encountered by the farmers on disaster relative to sales, production, inventory, distribution and financial management.

Table 1. Profile of Farmers in terms of Capital

Parameters	f	%
50,000 & below	9	39
51,000-100,000	5	22
101,000-150,000	4	17
151,000-200,000	3	13
201,000 & above	2	9
Total	23	100

The data reveals that 9 out of 23 farmers have invested in an amount ranging from P 50,000 or below. This implies the significance of raising a capital. The high cost of capital which includes seeds, fertilizers, machine rental, pesticides and herbicides is initially the investment decision of farmers. Farmers are raised minimal capital because they are afraid to take the risk due to the effect of disaster. The higher the investment, the higher risk is expected which denotes a significant factor to engage in farming due to capital risk and climate change.

Focused group discussion revealed that, farmers are afraid to invest more capital due to unexpected disaster. The farmers based their capital from the previous farming production. This means that when the past production level was low; the present year capital will be also be less. Farmers number 14, 15, 17,18, and 20, from group 2 said, “*If I have a good harvest then I will invest more during the coming year. However, sometimes I increase my capital even if I loss in order to regain my initial investment from the first cropping*”.

The response given by farmers14,15,17 and 20 suggest that their investment is like a gamble which has no basis at all. Sometimes they win sometimes they loss. However, experience is important in capital forecast. As cited by Penman [8] relative to the factors affecting investments revealed the critical role in investment expectations differs on every investor. When, agribusinessmen forecast a capital, the forecast is based on their experience from the past. When there is an increase in their profit levels may be they expected to be more optimistic about the future than others whose performances were less bright. There are countless cases in the agricultural sectors where the availability of capital goods- tools, chemicals, equipment, road, ports and disasters due to climate change can make difference between the low and high capital levels. The Analysis of Equity Risk and Return pertains to the valuation involve in both risk and expected return where the required return also referred to as the cost of capital- is the return that the investor demands to compensate for the risk bears in making the investment. Both asset pricing models like the Capital Asset Pricing Model CAPM and the fundamental analysis of risk aim to determine what this return should be. This analysis of equity and return is not familiar to the farmers thus they gamble during capitalization.

On the other hand, the Harrod-Domar Theory denotes the key factor in economic growth- is physical capital like machines, money and others [9]. The theory claims that more products can be produced through the use of machines and the needs of money to sustain the production. Hence, Capital is the essential resource to farmers. When the farmers were asked if they have their own machines, farmer number 2 said, “*we do not own any machine but we usually rent kuliglig for hauling, thresher and other machineries. For plowing we usually use cows and carabaos*”. Only one farmer responded that he has

two machineries which include *kuliglig, water pump and hand tractor*. These responses imply that majority of the farmers depend on machine rentals which add up to their capital and expenses.

Table 2. Profile of Farmers in terms of Income from Harvest

Parameters	f	%
50,000 & below	8	35
51,000- 100,000	6	26
101,000- 150,000	4	17
151,000-200,000	3	13
200,000 & above	2	9
Total	23	100

The data shows the income from harvest ranges from P 50,000 or below, which is just break-even relative to their investment/capital. According to the Bureau of Agricultural Statistics, a farmer’s annual average income is about P20,000 this is less than P2,000 a month [10]. The data from the Department of Agriculture shows that farming in the Philippines cannot support a family of four because the P2,500- P5,000 per month income according to NSO [6], the family is considered poor. “Being a farmer is like being a priest; you take a vow of poverty and make a pact with the Lord that no typhoon will come and destroy your crops” [11].

According to the Department of Agriculture [12], the agriculture and fishery sectors contribute nearly 20 percent to the country’s gross domestic product. Agriculture Secretary Proceso Alcala noted that there is a need to raise the income of farmers to entice the younger generation and overseas Filipino workers to go into agriculture. As cited by Karla [13], a good financial study is measured through the income which reveals the performance of the agribusiness in a given period and such financial return are thoroughly measured on the funds needed for the pre-operating expenses, fixed assets and working capital. Thus, the ultimate objective of agribusiness is profit and this is possible if it can satisfy the needs of the farmers in a community.

Table 3 reveals that majority of the farmers do not own the land they cultivate. The land is usually owned by others, leased, and rented. According to Fajardo [9], the key factor in economic growth is land. This means that agricultural land plays the key factor in economic development. Such theory was earlier supported by the Physiocrats.

Table 3. Profile of Farmers in terms of Land Ownership

Parameters	f	%
Rent	5	22
Owned	4	17
Partly Owned	2	9
Financial lease	1	4
Owned by others	11	48
Total	23	100

They claim that all wealth comes from the land. People cannot live without food and natural resources that come from land resource. This implies that since the farmers do not own the land they cultivate thus, the income and capital will decrease due to high land rentals and expected expenses.

Table 4. Profile of Farmers in terms of Land Area Cultivated/tilled

Parameters	f	%
1 hectare or less	10	43
1.01 – 3 hectares	5	22
3.01- 5 hectares	4	17
5.01- 7 hectares	2	9
7.01 & above	2	9
Total	23	100

Table 4 presents the profile of farmers in terms of land area cultivated or tilled. The data implies that farmers cultivate one hectare or less to three hectares only. Farmers cultivate 1 or less than one hectare and most of the land cultivated by them are owned by others. Considering this situation, farmers’ per capita income and number of production has a domino effect towards their productivity and resources on the land cultivated by them.

As cited by farmer number 12, “ *I cultivate only half a hectare, my harvest is only ten sacks of rice per cropping season and the expenses for seed, fertilizer and pesticide cost more or almost equal to the invested amount or my capital*”. Nevertheless, *I have to plant rice though the return is break even because we do not have something to eat for the coming year.*”

This response above indicates that land is an essential factor in production and in generating income. If there is a limited area to be utilized and land is rented the crops could not grow freely with abundance which has an adverse effect on the output production of crops and income. Under the working

capital management, there should be better flow of resources from production, sales, to income and capital [14]. The number of production on agriculture is based on the number or size of land cultivated. Hence, the more number of hectares utilized has a great impact on the production of crops for the crops to grow freely. This theory has its implication to increase more production on a given alternative measures based on the number of hectares utilized.

A 2009 survey by the Canada-based International Development Research Centre (IDRC) showed that all regions in the Philippines are vulnerable to extreme weather events, some of which are linked to climate change. The Global Climate Risk Index (CRI) of German Watch ranked the Philippines among the countries that experienced the greatest loss from weather disturbances in 2011. In the past two years tropical storms have battered the southern island of Mindanao, a region largely untouched by natural disasters in recent decades. The eastern coast of the southern island of Mindanao, where 80 percent of the population relies on subsistence farming, was hit by the Category 5, winds of at least 250km per hour [15].

Gathered data from different responses of farmers during the two group discussions revealed the summarized indicators of production due to agricultural practices, environmental effects, space and adaptation.

The agricultural sector is the provider of food and raw materials. If the productivity of agriculture is low due to climate change, there will be decreased amount of harvest thus, the prices of food and raw materials will tend to increase, (Climate Change Advisory,2009). This implies that if the prices of seeds, fertilizers, and pesticides used in farming becomes low the cost of capital decreases thus there is a possibility for increased income for an equal amount of production.

According to the farmers, the *practice of the use of foliar fertilizer does not guaranty good harvest or productivity because of climate change*. Flowering of fruit bearing trees are out of season or damaged caused by heavy wind and rains. The practice on the use of pesticides and herbicides add to the cost of capital however, it is not a guarantee for increased farm production and income due to flood, growth of grass, pests and diseases brought about by climate change. Assurance of good harvest is high when the environment/soil type favors the crop planted in it. However, due to unexpected disaster and rain the

crops planted in the good soil were washed out. Though the land they cultivate may be large like more than one hectare but not all can be planted for crops like rice because low land can be high risk for stagnant water during flood. Variety of plants is vague for them. Some farmers responded that adaptations of plants/crops to certain type of soil and sprayed insecticides/pesticide can also cause damage to the crops. Expecting a high productivity due to increased capital for pesticides rather caused declined of crop production due to less adaptation of the crop to the chemical or resistance of the pest to the chemical.

The following table is the summary and analysis of the responses of the farmers during group discussion. There were five indicators identified that affects harvest and its causes.

Table 5. Status of Farmers on Disasters relative to Productivity, Agricultural Practices, Environmental Effects and Rural Space

Indicators	Cause & Effect
Productivity	Poor quality of crops result to less quantity of crops resulting to poor production and decrease the number of harvested crops
Agricultural Practices	The use of fertilizers does not guarantee good production of crops, The fruit bearing trees are out of season “ due to climate change”.
Environmental Effects	The crops were damaged by flood, wind and heavy rains. Crops encounter disease brought about by increased temperature or climate the change.
Rural Space	Due to heavy rains & unpredictable rainfalls, the space for crops are not fully utilized for it serves as basins of stagnant water.
Adaptation	Climate change brought damaged to the crops and could not easily adapt the soil, strange insects and infertility of the soil.

As cited by Lasco et al. [16] farmers in the Philippines have already reported a number of climate change-related abnormalities in terms of resurgence of pests and diseases in rice, corn and fruit trees. For instance, farmers have reported that a very destructive rice disease called ‘tungro’ has reappeared and that

damages of corn plants by corn stem borer has been reduced, and even were reported to disappear in some places. Fruit trees are severely affected by surges in temperature and sporadic rainfall, which caused massive flower abortion failed fruit development and a massive attack of scale insects and aphids.

The study on Climate Change Adaptation for Smallholder Farmers in Southeast Asia reveals that the increase in incidence of observed climate extremes such as floods, droughts and tropical cyclones in the region have caused extensive damage to life and property. Occurrence of storms (including local and tropical storms, and tropical cyclones) in the region has increased from under 20 from 1950 to 1959, to over 120 from 2000 to 2009 [16].

Table 6 shows the problems encountered by farmers relative to finances, production, sales, distribution and inventory. In business these key factors are interrelated in supply chain functions [18].

Table 6. Problems Encountered by Farmers relative to Financial, Production, Sales, Distribution & Inventory

Indicators	%	Ranking
Financial	36	1
Production	32	2
Sales	12	3
Distribution	12	4
Inventory	8	5

Financial management is the primary problem encountered by farmers which include capital and the proper handling of resources. Having cash is not an assurance of a successful agribusiness most especially for small entrepreneurs like farmers. Financial problem is eventually followed by poor production, sales, distribution and inventory management [17].

Money is the most important resource of any agribusiness without money, there is no business at all. Money is needed to start a business, to sustain activities like planting production and marketing. Good financial management can ensure financing priorities and should be established in accordance with organizational objectives [8].

Two of the farmers from the focused group number one said that, “*when they borrow money as capital, not all was used for farming; a portion was spent to buy food for the family*”. The response of the two farmers lacks planning and priorities for adequate funding farm production when needed. Hence, funds were obtained and used inefficiently.

Production is the second problem encountered by farmers due to changes in crop phenology which provide important evidence of the response to recent regional climate change. Hence, crops in seasons becomes “out of season”, the bearing fruits is unpredictable in time. In case of flood, the crops are ruined which result to crop failures and losses. Crops are often subject to unwanted environment forces such as floods, typhoons, locust and others. In view of this, farmers must anticipate these problems and have precautionary measures to safeguard their production and minimize possible loss.

Sales are another problem, this happened when there is low production due to poor quality of crops or low output. Poor distribution to reach end users, where most harvested crops are being damaged, spoiled results to high price when it reaches the end users due to lack of supply. Farmers sell their crops in bulk to some middle men. Sales of crops to middle men decrease the profit of the farmers due to cheap price offered by the business men.

In view of this, the right distribution channel depends on the target market. All other things being equal, the most economical and most profitable channel of distribution should be chosen. The relevant factors in selecting the most appropriate distribution channel are the buyers, location, how can they be reached and when to buy? [18].

Moreover, the aforementioned characteristics of buyers can indicate their population and location. It is cheaper for a producer to deliver products directly to a large number of buyers who are concentrated in a very few adjacent areas than in many scattered regions. Product characteristics influence choice of distribution channel such as perishable products should be delivered through direct marketing.

Inventory is the proper handling of goods from production, storage, sales and distribution to end users; to avoid damage, spoilage and other related factors due to mishandling. Once these products are unsold or had been in storage for long period of time there is a tendency of obsolescence, deterioration of its physical and chemical content and other catastrophes relative to risk inventory.

CONCLUSION

The economic status of farmers on disaster prone area like Tanolong are poor which includes poor quality and quantity of crop yield resulting to poor production. Agricultural practices which includes use

of fertilizers, pesticides, herbicides and inappropriate seeds for a type of area plus climate change brings confusion to the farmers. The effect of environment and unpredicted heavy rainfall on harvest eventually damage crops resulting to low production and sales. Moreover, climate change has an effect to the rural space and adaptation of crops. Farmers suffered severe loss due to unpredicted heavy rainfalls due to climate change.

In view of this, financial management, prioritization and crop seeds characterization are the primary problems encountered by the farmers relative to climate change which further reveals that poor production boils down to poor sales. According to farmers, borrow money as capital for farming portion of it will be spent to buy food for the family. Thus, having cash is not an assurance of a successful business most specially for small entrepreneurs like farmers but the need of financial planning is enhanced. Financial problem and small capital eventually follows poor production, sales, distribution and inventory management. Poor production encountered by the farmers of barangay Tanolong, is caused by changes in crop phenology which provide important evidence of the response to recent regional climate change. Crops in seasons becomes “out of season” the bearing of fruits is unpredictable. In case of flood, crops are ruined which results to crop failures.

Crops are often subject to unwanted environment forces such as floods, typhoons, locust and others. Farmers have poor technology to anticipate adverse climate change. Farmers have low technology applied on the different crops in specific area and selection of species of crops to be planted in a type of soil in a particular time.

Sales as a problem of the farmers relatively happen when there is low production due to poor quality of crops or low output. Farmers have poor strategies on marketing that result to poor sales. Poor distribution crops is relative to climate change where most of their crop are being damaged and spoiled, that results to high price when it reaches the end users.

Farming inventory and handling of good crops from its production, to process, to finished products and finally to distribution possibly cause obsolescence, deterioration of physical and chemical content of crops.

RECOMMENDATIONS

In view of the results of the study, there is a need to partake seminars on Contingency Logistic Plan to create awareness and prepare farmers relative to climate change. Farmers should be trained on new technologies on crop handling, seed selection, environment bioremediations, accurate weather forecasting, and adaption of crops to certain chemicals. Farmers should also attend seminars in sales handling, fund prioritization and farm management to increase drop production.

Contingency Logistic Plan, a designed which includes the different angles of concerns of farmers relative to climate change and the effect of such change on their production, distribution, inventory, sales and financial status. In this way, farmers will be trained and be aware of possible loss on their production shortages and take safety measures to lessen the impact of climate change in their crops and resources. It serves as the planning framework for the farmers on production, capital flows, control system, communication required in today's farming environment.

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