

Decision Determinants of Indigenous Corn Farmers in Northern Philippines

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Abstract

This study which focused on factors and challenges affecting the decision-making of indigenous corn farmers ascertained the determinants that make farmers decide to engage in and continue corn farming activities in Paracelis, Mountain Province, in Northern Philippines. Determinants of decision and motivational factors of corn farmers were examined based on survey responses of 120 indigenous corn farmers by applying chi-square test analysis. Results showed that there were some decision and motivational factors that were significantly related to specific characteristics of corn farmers and there were also similarities of factors that affected the decision making of farmers in terms of engaging in and sustaining corn farming activities. Among the identified driving forces, financing capability and availability of land area were highly related with farm size and with a farmer's educational attainment. Knowledge or experience and interest in corn farming were also related with educational attainment. All the identified driving forces were found to be unrelated to farmers' age. The motivational factor identified as "personally satisfying" was found to be related with age, educational attainment and years in the farming business. Factors which affected a farmer's decision to sustain corn farming activities ("sustaining" factors) such as availability of different networks is highly related to educational attainment, years in the farming business and farm size while high market price of corn was the only "sustaining" factor linked to educational attainment. Based on these factors and cited problems in corn farming, recommendations were offered to address the issues raised by farmers.

Keywords: Decision Factors, Corn, Indigenous Farmers, Motivational Factors, Philippines

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I . Introduction

Increasing the productivity and income of farm families has always been the main focus and objective of all agricultural programs in the country. But due to the differentiation that affects the production process, farmers are unable to maintain and sustain an acceptable level of economic status. These affect how they make decisions towards farming.

Decision making has long been considered an important aspect of farm management. The success or failure of farmers depends on how they allocate their resources. Since the decision making process involves alternative choices, risk and uncertainties, many farmers rarely make or find it difficult to make sound decisions. Corn farmers, in particular, face this kind of challenge as corn is considered to be a crop which is prone to climatic variability and disease and pest infestations. It is easily affected by prices in the markets as well as economic swings.

Farming systems in the Philippines have evolved with all the changes that have happened for the past couple of years. Although these exist now in various levels of family enterprise, there are still many places where subsistence farming persists. Such may be referred to as small-scale farming, which is practiced by farmers themselves and their families. Thus, success in such an endeavor can be primarily attributed to making relevant decisions attuned to the constantly changing environment.

Most farmers consider a set of factors which they focus on to see if these benefit the alternative they have chosen before coming up with a decision. They make decisions because it looks right, sounds right or makes sense to them. They resort to a series of actions to

solve and address concerns relative to their farming system.

II . Review of Related Literature

The decision-making cycle of a corn farmer usually starts with problem identification relative to the situation encountered in the farming business. This is immediately followed by the collection of necessary data that are thought possible for the occurrence of the problem. For most corn farmers, their common problem is infestation of pests and diseases, particularly, the Asian borer, corn earworm, white grubs and the disease known as maize downy mildew followed by the detrimental effect of weather (Gerpacio, Labios, J., Labios, R. and Diangkinay, 2004).

In the Philippine setting, farmers usually gather possible data from their fellow farmers and often from consulting governing institutions (Palaje, 2012). Farmers have their routines in adopting technologies. After managing the collection of necessary data, the farmer may lay out all possible alternatives gathered from his or her understanding of a particular situation. This stage requires much time. Thus, farmers evaluate the options and examine each to determine which are viewed as plausible. The farmer may then decide to take the best alternative, turn this into a decision and possibly implement such chosen alternative as the solution to his or her problem. The implemented solution is then monitored and examined to see if changes occur when comparing the present with the previous situation. If there are no good changes observed or should the situation become worse, then the farmer will identify again the source of the problem and most

likely, repeat the whole process (Bejo, 2011).

Figure 1 shows a family’s definition or attitude towards a problem. If the family views any problem in their farm as a challenge or opportunity, they are more likely to cope with and adopt it. For example, if they viewed debt as necessary for the farm to be sustained, they take this in a positive light.

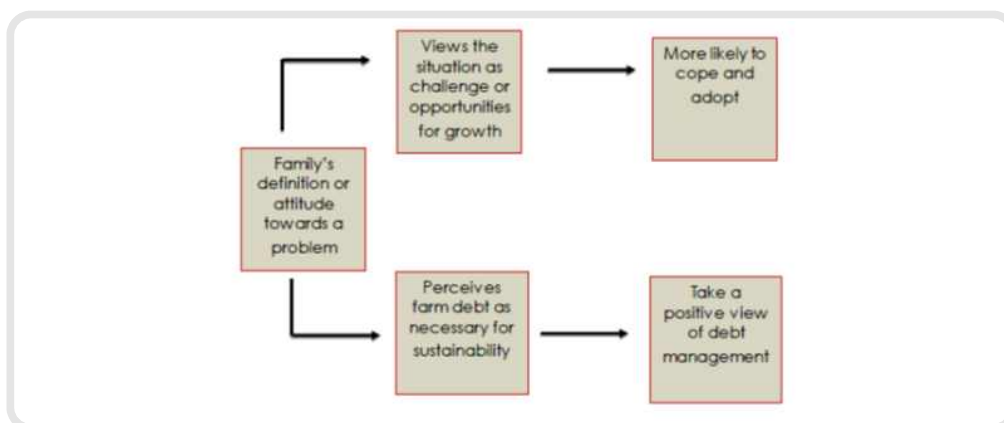
Previous Philippine studies which centered on factors affecting farmers’ decisions relative to crop choice are not abundant. In fact, the exploratory study of Mojica, Madamba and Sabado (2010) is an initial attempt to contribute to the extant literature and such a study focused on identifying the decision factors of organic vegetable farmers or specifically, the motivators of vegetable farmers for engaging in and sustaining organic farms. This study also sought to determine the motivators and constraints in shifting from organic farming to conventional farming. Findings revealed that personal and philosophical factors as well as environmental factors primarily motivated vegetable farmers to go into organic farming while economic and business factors figured prominently as

motivators for organic vegetable farmers to sustain operations. No dominant motivating factors were noted for potential shifters to organic vegetable farming in view of numerous constraints.

2.1. Cultural Practices of Philippine Corn Farmers

In spite of the massive government campaigns designed to increase agricultural production in order to close the gap between supply and demand for agricultural crops (rice and corn), some farmers still cling to a number of superstitious beliefs associated with farming. These beliefs determine to a great extent the conduct of their farming activities from seed selection, planting, transplanting and harvesting (Ontok, 1984). Good luck and bad luck beliefs influenced decisions on the timing of and cultural approaches to certain farm operations. Though not with scientific basis, these beliefs and practices are part and parcel of the indigenous make-up of local farmers (Reyes, Domingo, Mina and Gonzales, 2009).

Fig. 1. Adoption Model of Family Describing Their Capacity to Meet Obstacles (Bejo, 2011).



2.2. Technology Adoption of Philippine Corn Farmers

The final decision to adopt a new idea or package of technology is usually the result of a series of influences operating through time. While it is believed that adoption of technology would give higher yield on a farmer's field, the identification of different factors that affect the farmer's decision to adopt or not a certain practice is still a problem (Reyes et al., 2009).

Quimpo (1987) and Palaje (2012) reported that the most common reason for the non-use or non-adoption of technologies was the cost of adoption. The farmer's lack of reliable knowledge and the high cost of using these technologies along with the lack of capital are the constraints in investing in modern crop production.

2.3. Constraints in Philippine Corn Farming

Extreme climatic conditions such as flooding during the wet season, the effect of drought and the abrupt climatic change prevent high volume production of corn and is therefore considered as the major problem of corn farmers. Pests and diseases are one of the main causes of yield losses of Filipino corn farmers every year. Weeds are also an extensive problem in corn production that may cause a yield loss of 100% if no hand weeding nor herbicide is applied. The soil fertility constraints likewise seriously affect the corn areas in the country.

Some government regulations and laws also serve as deterrents to the development of the

Philippine corn industry. For instance, the Local Government Code of 1992 caused the Department of Agriculture to entrust its extension service mandate to local government units (LGUs), particularly the Municipal Agriculture Offices (MAOs). This has led to a wide variation in the quality and effectiveness of government extension services across municipalities. MAOs have limited human and financial resources to bring sufficient and timely extension services to all barangays, thus leading to insufficient agricultural extension assistance to the farmers. Gerpacio et al. (2004) stated that the inability of government extension services to provide sufficient and updated information on agricultural technologies contributed to poor farm productivity.

2.4. Farming Decisions Affected by Climate/ Weather

In Southeast Asia, the Philippines is among the hardest hit by natural disasters, particularly typhoons, floods and droughts. These natural disasters have negative economic and environmental impacts on the affected areas and the people who live there. Furthermore, the agriculture and natural resources sectors are highly vulnerable because they are directly exposed to natural disasters and their unwelcome consequences.

Climate is one of the several factors that affect corn production. As in many parts of the world, highly variable climate is one of the sources of uncertainty and risk in many agricultural systems in the Philippines. Climate variability comes in different forms such as floods, drought, or tropical cyclones. In addition, climate variability associated with impacts on crop production varies from year

to year.

According to Holmes and Predo (2007), there are factors that affect the farming decisions of farmers such as capital, cost of inputs, price of corn and climate information. Most of the farmer-respondents reported that capital was the major factor that affects their farming decisions. Some farmers also said that climate information was another factor that affects their farming decisions. More than half of the farmers (52.9%) said that the date of planting was the major factor affected by climate variability while 10.3% claimed that amount of capital was the most important factor. Approximately 18% said that plant or crop variety would be the main factor to consider. Majority also of the farmers mentioned that climate variability will likely affect the starting date of planting.

2.5. Socio-economic Characteristics of Philippine Corn Farmers

Most Filipinos consider education for their children to be a top priority, and even resource-poor families will strive to send their children to school. Education is an important factor that can encourage farming households to try out and adopt modern technologies that improve farm production.

Philippine corn farmers may be classified as landowners, tenant/sharecropper farmers and mortgage payers, agrarian reform beneficiaries (ARBs) and certificate of land transfer (CLT) holders or landless laborers. Most of the landowners in the country are located in Mindoro Occidental while Isabela province has more tenants/share-croppers than landowners, although it also has the highest proportion of CLT awardees (Gerpacio et al., 2004).

Given the backdrop of farmer characteristics

and the numerous factors that affect their farm-related decisions plus the apparent dearth of research studies, this study delved on the factors and challenges affecting the decision-making of another farming community engaged in farming a different crop. Thus, this study revolved around indigenous corn farmers and particularly aimed to ascertain the determinants that make farmers decide to engage in and continue corn farming activities in Paracelis, Mountain Province, in Northern Philippines based on the general study framework of Sabado (2009) which in turn generally adopted the framework of Fairweather (1997).

III. Methodology

3.1. Sources of Data

The respondents of the study were obtained from the record of the Municipal Agricultural Office of Paracelis. Stratified random sampling with proportional allocation was adopted in identifying the respondents who were interviewed. This was done by dividing the municipality into nine (9) barangays, which served as the strata. Respondents to be interviewed from each barangay were then taken through simple random sampling which were generated through the aid of a random generator. This was done to have a high precision of data results and to minimize the cost of tapping respondents (e.g. transportation cost). This also ensured that every part of the population, i.e. every stratum, will be better represented.

3.2. Survey

Data were collected through conducting face-to-face interviews, focus group discussion (FGDs) and distribution of self-administered survey questionnaires to 120 selected farmers and key informants in the area of the study.

3.3. Statistical Analysis

The information acquired from the questionnaires and interviews were analyzed qualitatively and quantitatively through the use of averages, frequency count (the number of respondents exhibiting the characteristic) and percentage distribution (the ratio of that number to the total results obtained in the survey). Tabulation of results as well as statistical tools such as the chi-square test of independence under the statistical software SAS JMP was also adopted to analyze the relationship between the identified decision factors with the socio-demographic characteristics of the farmers.

IV. Results and Discussion

4.1. Profile of the Farmers

Table 1 presents a summary of the farmers' profile. Out of the one hundred twenty farmers interviewed in the study, about 35% or 42 farmers belonged to the age range of 31-42 years old. Thirty-eight farmers (31.6 %) belonged to the age range of 43-55 years old followed by the 19-30 age bracket (25%) and the oldest age range group of above 55 (8%). The youngest farmer within the oldest group is 56 years old. The corn farming industry in

the locality was dominated by farmers with ages ranging from 31 to 42 years followed by farmers within the age bracket of 43 - 55 years. Meanwhile, most of these farmers were in their forties.

Seventy-one percent (71%) of the farmers were male and twenty-nine percent (29%) were female. Sixty-five percent of the farmer respondents were married, twenty-eight percent (28%) were single and seven percent (7%) were widowed. Among the eighty-six (86) farmers who were married and married but widowed, sixty-five (65) have household sizes ranging from 0 - 5 members.

On the other hand, forty-eight (40%) of the 120 farmers had a household size of 6-9 members. Seven (7) farmers (6%) had a household size of greater than ten (10) members.

Most of the interviewed farmers had a primary level of education. Thirty-eight (38) farmers or thirty-two percent (32%) of the farmers were elementary graduates while fifteen percent (15%) were high school graduates. Twenty (20) farmers or about seventeen percent (17%) were high school undergraduates and only fifteen percent (15%) of the 120 farmers finished secondary education. Fifteen (15) of the one hundred twenty (120) farmers started college education but were not able to finish it. Meanwhile, eleven (11) or about 9% finished their college degrees. Most of these farmers did not continue to study due to financial problems. Hence, they went into corn farming.

4.2. Profile of the Farms

Forty-eight percent (48%) of the farmer respondents were considered as farm owners. Most of these farm owners inherited their

farms from their forefathers, so, as they grew up, they also engaged in corn farming and directly utilized the land. Forty-six percent (46%) or fifty-five (55) farmers were considered as tenants. The land owners provide all the necessary inputs and other requirements and then the tenants provide the labor and management in the farm. These tenants pay a fixed amount to their landlords based on whatever volume of harvest they have per cropping. Only a few (6%) farmer respondents were part-owners.

Having extensive experience in corn

farming helps farmers in making decisions relative to the productivity of his farm. It was observed and reported that corn farming has been sustaining the farmers' families for several years. The length of years in operation ranged from 1-18 years as shown in Table 2, with at least 48% of the farmers operating for 5-10 years, followed by farmers (38%) operating for less than a year and 10 years and above (15%).

Furthermore, majority (84%) of the farmers interviewed had a farm size of 1-4 hectares. Half of these farmers had 1.0-2.0

Table 1. Profile of the Farmers

Characteristics	Frequency n=120	Percentage (%)
Age		
19-30	30	25%
31-42	42	35%
43-55	38	32%
56 and above	10	8%
Sex		
Male	85	71%
Female	35	29%
Civil Status		
Married	78	65%
Single	34	28%
Widowed	8	7%
Household Size		
0-5	65	54%
6-9	48	40%
10 and above	7	6%
Educational Attainment		
Elementary Undergraduate	18	15%
Elementary Graduate	38	32%
High School Undergraduate	20	17%
High School Graduate	18	15%
College Undergraduate	15	13%
College Graduate	11	9%

Source: Field survey

hectare corn farms. Twenty-seven percent (27%) had a farm size of >2-3 ha. Eight (8) farmers also had farm sizes of >3 -4 ha. Seven percent (7%) or eight (8) farmers, on the other hand, had farm sizes of less than one hectare (<1 ha.). Meanwhile, eleven farmers (9%) have farm sizes of more than four hectares (>4 ha).

4.3. Decision Factors

There are several reasons why a farmer wants to engage in, sustain, or quit from corn farming. Specific reasons given include farm location, farm profile, and the socio-demographic profile of the farmers. They may also be affected by the market, their environment, or their status of living or personality. As shown in Table 3, corn farmers consider not just the monetary and environmental benefits of doing corn farming. Other benefits may include physical, mental, emotional, social, and personal factors. These benefits drive them to sustain their current farming practices.

The driving forces for engaging in corn farming are categorized into three; the personal, climatic and market factors. Personal factors include the farmer's interest towards corn farming and his knowledge in doing farm activities as well as his capability to finance his own farm. The favorability of climate condition, soil fertility and availability of land area are considered under environmental factors.

As shown in Table 3, the profitability of the corn farming business and the farmer's interests in corn farming mostly motivates a farmer to engage in corn farming for the first time. Their knowledge and experience in corn farming activities also influence such farmers to engage in corn farming. The high prices of corn in the market, the financial capability of an individual to finance his/her farm are the other identified market factors that drive farmers to engage in corn farming for the first time. This also shows that market factors mostly influence the decision of farmers to engage in corn farming. Farmers are more

Table 2. Profile of the Farms

Characteristics	Frequency n=120	Percentage (%)
Farm Tenure		
Farm owner	58	48%
Tenant	55	46%
Part-owner	7	6%
Years in Corn Farming		
Less than 5 years	45	38%
5-10 years	57	48%
More than 10 years	18	15%
Farm Size		
Less than 1 ha.	8	7%
1-4 ha.	101	84%
More than 4 ha.	11	9%

Source: Field Survey

aware of profitability benefits from corn farming. These driving forces are also the documented driving forces of corn farmers from past literature.

4.3.1. Personal and Philosophical Factors

4.3.1.1. Interest in Corn Farming

Seventy-four (74) of the 120 farmers mentioned that their interest in corn farming is the main factor that drives them to become corn farmers. They mentioned that they love farming activities. Almost 100% of these seventy-four (74) farmers stated that since childhood, they were already in corn fields assisting their parents in doing corn farming activities. Some farmers also said that they were interested in corn farming because they wanted to witness the fruits of their work.

4.3.1.2. Knowledge and Experience in Corn Farming

Sixty-six (66) farmers reported that their vast knowledge and experience in corn

farming activities have made them confident in performing more complicated practices in the farm though they were not able to finish elementary or high school. They considered themselves as quite proficient since they are good in doing different corn farming activities.

4.3.1.3. Financial Capability

Twenty-eight (28) corn farmers expressed that they were financially stable and therefore they can sustain their farm operations. Corn farming requires capital, thus, only a few have considered this as a driving force which was why they were into this kind of business.

4.3.2. Market Factors

4.3.2.1. Profitability

More than half (60%) of the interviewed farmers chose to engage in and continue corn farming because of the higher corn price in the market as compared to other crops they grew like banana, rice, fruit crops and vegetables. These farmers said that in times of economic downturn, corn was usually the

Table 3. Driving Forces for Farmers Engaging in Corn Farming for the First Time*

Driving Forces	Frequency n=120	Percentage (%)
Personal Factors		
Interest in corn farming business	74	62%
Knowledge and experience in corn farming activities	66	55%
Financing capability	28	23%
Environmental Factors		
Availability of land area	47	39%
Market Factors		
High price of corn	72	60%
Profitability	94	78%

* Multiple responses of farmers

most demanded grain in the market aside from rice. Ninety-four (94) farmers specified that corn farming was profitable.

4.3.2.2. High Price of Corn Products

Seventy-two (72) of 120 farmers went into corn farming because they saw premium prices for corn products. The price of corn in the market was higher compared to other crops such as banana and fruit trees and thus, profit from corn farming was likewise high even after expenses are deducted.

4.3.3. Environmental Factors

4.3.3.1. Desired Farm Size and Location

Thirty-nine percent (39%) or seventy-four (74) farmers considered the availability of land area as a driving force which explained why they were in corn farming right now. They said that they have the desired farm size and location. Twenty-five out of these 47 farmers disclosed that their farm was strategically positioned along the highway which was accessible to delivery trucks during the transport of harvest to the drying area or to the market. Most of these farmers were from Barangays Butigue and Bananao. Also, farmers from Barangay Bacarri considered the nearness and accessibility of their farms to the market which was in Tabuk City.

The fertility of the soil in some parts of the municipality encourages the vigorous growth of crops especially rice, corn, tobacco, vegetables and fruit trees. In transforming vacant land areas to corn farms, one factor to be considered is the fertility of the soil. Fertile soil leads to fast and healthy growth of any crop. Farmers said that they engage in corn

farming since they noticed that their land was fertile and good for corn cropping. Based on the data of the municipal agriculture officer (MAO), the northern part of the municipality had the most fertile soil. Thus, most of the farmers who agreed that soil fertility drives them to engage in corn production are farmers from Barangays Bunot, Poblacion and Bacarri. However, for farmers who were utilizing their farm for many years, soil fertility depletion of their farms was a big problem.

4.4. Socio-demographic Characteristics of Farmers vis-à-vis Driving Forces

To closely identify the group or groups of farmers who were mostly affected by specific decision factors, cross tabulation of the identified driving forces with the socio-demographic characteristics of the farmers was done. The age, educational attainment and number of years in corn farming of the farmers as well as the farm sizes were cross-tabulated with identified driving forces of farmers. The significant relationship of the identified decision factors with the characteristics of the farmers was also analyzed using the chi-square test of independence. Decision factors with p-value of less than 5%, the level of significance, were considered as related or associated with a specific characteristic of the farmers. Table 4 summarizes the relationship of farmers' socio-demographic characteristics with identified driving forces.

4.4.1. Age of Farmers

The age of the farmer was found to have no relationship with any of the identified driving forces. Based from Table 4, the p-value of each driving force was greater than the

value of alpha (α), the level of significance, which is 5%. Thus, this means that there is no significant relationship between the ages of the farmers with the identified driving forces relative to engaging in corn farming.

4.4.2. Educational Attainment of Farmers

Educational attainment of farmers was found to be highly related with some of the identified driving forces such as financing capability (p-value of .08%), knowledge and

experience in corn farming (p-value at .07%), interest in corn farming and availability of land area with p-values of 0.44% and 3.56%, respectively. Farmers with formal education were the ones who were mostly influenced by these driving forces.

All farmers who finished high school and college levels of education in the municipality considered mostly financing capability, knowledge and experience, and interest factors as their driving forces. These factors drive them to embrace corn farming for the first time. Some of these educated farmers

Table 4. Relationship of the Socio-demographic Characteristics of Farmers with Identified Driving Forces

Socio-demographic characteristics		Interest in corn farming business	Knowledge and experience in corn farming activities	Financing capability	Availability of land area	High price of corn	Profit-ability
Age	Frequency						
19-30	30	17	14	10	16	13	10
31-42	42	20	38	26	18	30	7
43-55	38	28	32	20	10	21	8
56 and above	10	9	6	10	3	8	3
Total no. of farmers	120	74	90	66	47	72	28
p-value		0.313	0.0966	0.5154	0.312	0.3692	0.1267
Educational attainment	Frequency						
Elem U-grad	18	8	7	2	3	16	18
Elem Grad	38	12	8	3	10	20	22
High Sch U-grad	20	10	10	3	7	15	15
High Sch Grad	18	18	15	4	15	12	15
College U-grad	15	15	15	6	7	5	15
College Grad	11	11	11	10	5	4	9
Total no. of farmers	120	74	66	28	47	72	94
p-value		0.0044	0.0007	0.0008	0.0356	0.2459	0.2933
Farm size	Frequency						
< 1 ha.	8	8	8	2	7	3	5
1-4 ha.	101	62	51	15	29	58	78
> 4 ha.	11	4	7	11	11	11	11
Total no. of farmers	120	74	66	28	47	72	94
p-value		0.2295	0.2357	<0.0001	0.001	0.1891	0.6387

mentioned that they were interested in corn farming for they have finished a degree that was related to agriculture. They said that they have pictured a bigger opportunity in corn farming as compared to other farming businesses such as rice and vegetables. They also mentioned that they have good financial management skills and a wide range of knowledge about the proper techniques and procedures such as sourcing of inputs which they think are essential in the corn farming business. As mentioned by 11 college graduate farmer respondents, they were aware of the different procedures and techniques in corn farming, most specifically, in terms of adoption of new technologies. They were knowledgeable about the benefits brought about by new technologies such as new corn varieties. Good educational background also led farmers to be interested in corn farming. The higher the educational attainment of the farmer, the more knowledgeable, interested and better financially capable he is. The price of corn and profitability factors were found to have no relationship with the educational attainment of farmers. However, educated farmers were responsive about the prices being offered in the market. They were aware that these traders are taking advantage of farmers since they have control over the market price.

As opposed to farmers with no formal education, they looked at the price being offered to them as good or even high. Based on the statements of these farmers, they lacked price information and awareness about the right price for their corn. Some also admitted that they lacked knowledge in properly utilizing the available resources they have as well as understanding and being familiar with the newly introduced production technologies.

4.4.3. Farm Sizes

The farm size of the farmer also appeared to affect his decision in terms of engaging in corn farming or not. As noted in Table 4, the financing capability factor has a p-value of less than 5% (<.01%) which means it is highly related with the size of the farmer's corn farm. Also, the availability of land area was found to be significantly related with farm size. It has a p-value of 0.10% which was lower than the level of significance.

The bigger the size of the farm, the bigger the required capital or financial capability of the farmers since this requires higher production and maintenance cost. In addition, to have a bigger farm size, suitable land is needed. Land availability pushed farmers to acquire larger farms. This usually resulted to the need of farmers to have bigger capital to properly finance their business farms.

4.5. Motivational Factors in Sustaining Corn Farming

There are motivational factors or incentives in corn farming besides its complexity. Farmers were motivated since they thought or perceived that they were better off focusing on this crop from the economic and personal viewpoints. In Table 5, one could categorize the motivational factors in sustaining corn farming into two: the personal and market factors. Personal satisfaction, on the other hand, is considered as a personal factor. Market factors include the high price of corn, stable market, profitability and availability of different networks. These factors continuously motivated the indigenous farmer respondents to continue doing corn farming activities in the municipality of Paracelis, Mountain Province

in Northern Philippines.

4.5.1. Personal Factors

Seventy five (75) farmer respondents mentioned that they were personally satisfied while working on their farms. They were satisfied since they have fixed suppliers of inputs, a stable market for their produce every cropping season and also because of the good quality and volume of their harvest during the two cropping seasons. Some considered farming as a form of physical exercise which eliminates stress and sickness.

Meanwhile, farmers also stated that they were satisfied in corn farming since this was the main income source of their everyday living. The money they borrowed from suppliers that should have been used in the farm was also consumed to meet the daily requirements of their family. Farmers reported that without their corn farm, there would be inadequate funds to meet their family's needs. Some also said that they might have moved to the forested areas for slash and burn and hunting activities, if not for corn farming.

4.5.2. Market Factors

4.5.2.1. Stable Market

The market for corn was one of the common factors that were considered by the farmers on why they opted to still engage in corn farming activities given its complexity. Eighty eight (88) farmers or about seventy three percent (73%) said that they had a stable market for their produce any time. Some farmers also said that throughout their corn farming years, they were able to establish a good relationship with their buyers. They gained the loyalty of their buyers and counted them as regular suppliers, commonly known as "suki".

Livestock industries in the country mainly depend on corn as their major ingredients in formulating feeds, and corn is also widely consumed, according to many researches by many institutions, thus, it always has a stable market through time. Based on the statements of the interviewed MAO representative, corn farming in the municipality had a sure market as compared to rice, even if rice produced in the area is considered by the Department of Agriculture as a high class commodity.

Table 5. Motivational Factors in Sustaining Corn Farming*

Motivational Factors	Frequency n=120	Percentage (%)
Personal factors		
Personally satisfying	75	63%
Market factors	72	60%
High price of corn	88	73%
Stable market	94	78%
Profitability	55	46%
Availability of different networks	75	63%

* Multiple responses of farmers

4.5.2.2. Profitability

Seventy-eight percent (78%) of the farmers confirmed that they were motivated in performing daily corn farming operations because they gained revenue despite the complexity of corn farming. The rest of the farmers said that they were not given the chance to have higher income. However, they admitted that the lack of sound financial management brought them into this kind of situation. According to the municipal corn coordinator, Mr. Rogelio C. Ngafitna, the profitability of a farmer depended on how he managed his financial assets since there were many suppliers or traders, organizations and individuals in the municipality who were willing to lend or provide financial assistance from land preparation until harvesting time (Ngafitna, 2013, personal communication). Thus, financial management conducted by farmers was crucial in determining whether or not a farmer will profit from corn farming. He also said that one common sign that corn farmers were earning from their farm was a change in their lifestyle. Farmers now were able to improve the structure of their houses and some were able to finance their children's schooling. This observation was apparent during the actual field interview.

4.5.2.3. Availability of Different Networks

Having a stable market and having an available market are different from each other. If the demand is stable, it is more desirable for the business since demand never fluctuates. Market availability, on the other hand, means that the business has a sure distribution channel for its products. The stability of demand pertains to consumer

preference whereas the availability of networks pertains to the availability of outlets (Sabado, 2009).

There were many buying stations in the municipality and its nearby areas aside from farmer cooperatives and organizations. It was a common practice in the locality that the input suppliers were also the ones who delivered the product to the market or were the buyers of the corn produce. Forty-six percent (46%) or all tenant farmers were motivated not to stop or fully shift to other types of crop farming because of the presence of these different networks such as local traders and suppliers in their area. They stated that they were able to sell their products at the right time and at the right price.

4.6. Socio-demographic Characteristics of Farmers in Relation to Motivational Factors

Chi-square test of independence was used in determining the significant relationship of the identified motivational factors with the characteristics of the farmers. It was revealed in this study that some of the motivational factors such as personal satisfaction were related to the following socio-demographic characteristics of farmers: farmer age (p-value of 0.01%), educational attainment (p-value of 0.02%) and years in the farming business (p-value of 0.047%). High price of corn was found to be related with the educational attainment of the farmer. The availability of different marketing networks in the municipality was also related with the years in farming business of the farmer and educational attainment as well as his farm size (e.g., p-values of 0.030%, 0.015% and 0.037%,

respectively). Table 6 shows the relationship of the identified motivational factors with the socio-demographic characteristics of the farmer respondents.

4.6.1. Age of Farmers

“Personally satisfying” has a p-value of less

than 5% thus, this was the only identified motivational factor that was associated with the age of farmers. It can be noted that as a farmer gets older, he is more satisfied in corn farming. It can be observed in Table 6 that they are motivated to sustain corn farming because of profitability, high price of

Table 6. Relationship of the Socio-demographic Characteristics of Farmers with the Identified Motivational Forces

		Personally satisfying	Profitability	Stable market	High price of corn	Availability of different networks
Age	Frequency					
19-30	30	8	19	20	20	16
31-42	42	27	35	30	20	17
43-55	38	30	30	30	27	12
56 and above	10	10	10	8	5	10
Total no. of farmers	120	75	94	88	72	55
p-value		0.0102*	0.06579	0.9347	0.517	0.0633
Educational attainment	Frequency					
Elem U-grad	18	17	17	10	18	15
Elem Grad	38	30	30	26	16	10
High Sch U-g	20	12	18	20	13	8
High Sch Grad	18	10	15	15	15	6
College U-grad	15	4	8	10	8	6
College Grad	11	2	6	7	2	10
Total no. of farmers	120	75	94	88	72	55
p-value		0.0237*	0.5047	0.6705	0.0305*	0.0243*
Years in farming business	Frequency					
<5 years	45	20	29	28	30	23
5-10 years	57	37	47	42	32	15
>10 years	18	18	18	18	10	17
Total no. of farmers	120	75	94	88	72	55
p-value		0.0477*	0.3178	0.3064	0.7683	0.0015*
Farm size	Frequency					
<1 ha	8	8	2	3	8	2
1-4 ha	101	55	81	74	53	42
>4 ha	11	11	11	1	11	111
Total no. of farmers	120	74	94	78	72	155
p-value		0.00958*	0.0995	0.2637	0.074	0.0375*

* motivational factors related to specific socio-demographic factors (p<5%)

corn and stable market as well as the availability of distribution networks. These contributed to farmer satisfaction as the farmer gets older in the corn farming business.

4.6.2. Educational Attainment

Educational attainment of the farmer was significantly related with some of the motivational factors such as personal satisfaction, high price of corn and the availability of different networks. The more educated the farmer, the wider his range of contacts. He had networks or contacts with the local traders and distributors as well as financial providers like private lending institutions. Farmers with formal education were also found to be motivated with the offered price of corn products. They were aware that the price in the market is low considering the cost that they have incurred during the cropping season. Moreover, less educated farmers are more satisfied than the educated farmers. These groups of farmers were not aware of the proper price for their produce. They viewed the price being offered as high compared to other crops. Thus, this made them more satisfied than the more educated ones.

4.6.3. Number of Years in Farming

The number of years in farming of farmers was found out to be related with motivational factors like personal satisfaction and availability of different networks. Based on the computed p-value (0.015%), availability of different networks is highly related to the number of years the farmer was in corn farming. Farmers said that as time goes by, their relationship between the local traders and distributors become more stable and

strong. Some also mentioned that they have gained the loyalty of local traders which made it easier for them to sell their products to the market. With this, the acquisition of needed inputs was not considered as a big problem during the start of each cropping season. This also resulted to farmer satisfaction as they became older in the corn industry. The longer a farmer was in corn farming, the more satisfied he becomes since commonly, farmers who were already in the corn farming business were viewed by the traders and suppliers as partners. This means, they recognize them as credible farmers.

4.6.4. Farm Sizes

The availability of different networks was found out to be the only motivational factor that was related with farm size considering its p-value of 3.75%, which is lower than the significance level of 5%. The bigger the farm, the more marketing networks are needed. Large scale farmers usually have large volumes of harvest, thus, the need for reliable marketing networks to sell their produce on time and at the proper price.

4.7. Factors that Influence Farmers to Partially Shift to other Crop Farming

In this study, it was found out that the factors that influenced farmers to leave corn farming as their main source of livelihood and shift to other crop farming types were the problems they encountered. These problems restricted them from sustaining corn farming activities and provided the trigger for them to move out and look for better business opportunities. These could cause them to leave corn production as their main source of

occupation.

Moreover, one common problem always mentioned by the farmers whenever they were asked about what prompted them to shift to other crop farming business activities was the complexity of operations in corn production. They were aware that doing corn farming alone is very difficult and at times close to impossible. Corn production requires sufficient time and efforts particularly since there were no big or massive equipment and machineries adopted by farmers. Corn farming also involves proper techniques to be able to cope up with the effects of different factors in the industry.

4.8. Current Problems Faced by Farmers

There were two categories of problems which farmers faced that were identified in this study. These are comprised of major and operational problems. Major problems were encountered by the farmers throughout the whole duration of farming and had great impact on their operations. Relative to production, these include the lack of inputs, insufficient output of the farm, lack of machineries and post-harvest facilities. For the marketing aspect, pricing presence of competitors and distribution facilities were the problems. Moreover, lack of source of funds, poor financial management and insufficient income were also considered by the farmers as problems.

In addition, other challenges cited were the unpredictable weather (also climate variability), drought and the presence of birds, pests and diseases which affect the yields of corn farmers and cause increases in production costs. Among the most pressing concerns aired

by the farmers was the absence of localized climate/weather forecasts. The national weather forecasting government agency known as the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) comes up with only national and regional advisories. Farmers really needed to be provided with specific localized meteorological services if they were to truly gain an edge in the battle against climate variability. Another issue was the lack of time-series data that can be used for developing forecasting models. There were also no meteorological stations in the municipality or in nearby areas.

Lastly, operational problems like lack of technical skills and experience and lack of laborers were found to affect corn farm operations.

V. Conclusion and Recommendations

Some decision and motivational factors were found to be significantly related to specific socio-demographic characteristics of indigenous corn farmers in Northern Philippines. Moreover, there were also similarities of factors which appeared to affect the decision making of farmers in terms of engaging in and sustaining corn farming activities. Among the identified driving forces, financing capability and availability of land area were found to be highly related with farm size and with a farmer's educational attainment. Knowledge or experience and interest in corn farming were also related with educational attainment. All the identified driving forces were found to be unrelated to farmers' age. "Personally satisfying" was a motivating factor found to be

related with age, educational attainment and years in the farming business. Factors which affected a farmer's decision to sustain corn farming activities ("sustaining" factors) such as availability of different networks is highly related to educational attainment, years in the farming business and farm size while high market price of corn was the only "sustaining" factor linked to educational attainment.

To address the problems, challenges and opportunities in indigenous corn farming in Northern Philippines, the following recommendations were given to major stakeholders.

5.1. For Current Corn Farmers in the Municipality

Problems like high price of needed inputs and the fluctuation of prices of corn products and lack of machineries, equipment and infrastructures can be solved through the formation of farmer's alliances or by tying up with co-farmers. Farmers may establish alliances or an organization that would help provide the needed inputs at cheaper prices and help them in marketing their produce to identified markets. This organization can also provide market information such as the prevailing prices offered by the traders. Also, for those farmers who have no capability to avail of equipment, they can capitalize in acquiring effective and efficient machineries together with their fellow farmers. Scheduling the usage of purchased equipment should be made and this must be based on terms and conditions that lengthen the life of such assets or at the very least assure the farmers of their good condition. This makes it possible for farmers to avail of equipment at a lower cost since they have other farmers to help shoulder the cost.

The insufficiency of output from the farm was the primary problem of the farmer respondents due to different corn farming constraints. Farmers had implemented all the possible solutions they know but still this problem persists. It is seen that this can be addressed by acquiring larger tracts of farming land since most of the farmers had only small farm areas although this recommended solution is not suitable to most farmers since acquisition of additional land is costly.

Another solution is the proper maintenance of the soil such as proper application of fertilizer to maintain good soil quality since this problem is also caused by the depletion of soil fertility. To resolve both the problems in soil fertility and pest infestations which cause the insufficiency of output, it is also recommended to all farmers to do scheduling of planting aside from application of fertilizer. Soil fertility restoration can be achieved by letting their farms rest for a certain cropping season, most probably in the second cropping since lower productivity is expected during this season. They may also do intercropping with tobacco and rice crops to maximize the use of their land. This diversification also helps in regulating pest and its infestations.

Application of organic fertilizer such as manure, dried leaves and branches to the farm and the use of new and available seeds for better production must also be considered by the farmers in the municipality. Farmers must do soil testing before fertilizer application is done since based on key informant interviews, farmers only applied fertilizer upon observing that there is a need for it. Improper use of fertilizer results to soil damage whereas the use of new and available seeds like genetically modified organisms (GMOs) and improved

varieties of hybrid crops which promote high yield, better germination rates and more tolerance to pest manifestations and droughts can have a greater chance of increasing their income and reducing their cost.

With regards to financing problems, farmers may avail the help of lending institutions aside from relatives and suppliers/traders to resolve the shortage of funds. They can borrow money from banks that provide agricultural credits or loans. According to the MAO, the only requirement for access to these lending institutions is the availability of the titles of the land, and so farmers could take advantage of this. Borrowing from the bank does not only address the money problem but also the financial management challenges of the farmers.

It is also recommended to farmers who only depend on corn farming to look for other sources of income. They may also engage in rice, banana, tobacco, vegetable and fruit trees planting since these crops are also suitable in the area. This solution can increase the income of the farmers and can properly help them finance their corn farm expenses.

5.2. For Farmers Planning to Engage in the Corn Farming Business

Entry in the corn industry in the municipality is easy. However, it is advisable for new entrants to be first familiar with the business they are getting into. Observation must be done about the existing situation of corn farms in order to formulate necessary actions in putting up the business. It is advisable and recommended for such prospective farmers to consider operating at a larger scale of production and choose a good location so that they can take advantage of the

good income that they will get through high volumes of produce sold and low labor and marketing costs. Also, they should tap available sources of funding like crowdfunding, aside from borrowing from relatives and traders so that reliable equipment can be acquired to properly sustain the productivity of the farm. The new entrant must also view his farming also as a business and not merely as a way of life with priorities focused on profitability and environmental protection concerns.

5.3. For Governing Institutions

The need to help smallholder rice and corn farmers to overcome environment and socio-economic challenges is evident. A more critical concern is how to proceed in giving such assistance. The government and non-government organizations have been busy trying to come-up with the best means to solve the perennial socio-economic problems in rural farming communities including the indigenous corn farmers of Northern Philippines. Some efforts produced commendable results but many more failed and were just written as records of unsuccessful development initiatives. The need for focused assistance to farmers, wider communication channels and establishment of appropriate financing or loan packages by microfinancing institutions are among the most cited suggestions of the corn farmers. Thus, the study findings are not limited to interpretation by the Philippine government and non-government institutions only. For example, it was found that financing capability and availability of land area for farming were highly related to farm size and a farmer's educational attainment. By knowing which factors drive and motivate farmers to

engage in, sustain or quit corn farming, other administrative units or governments of foreign countries are able to better plan their food production systems in terms of resource allocation. It is from this perspective where this study is able to elicit more concrete policy implications for government and non-government organizations to act on.

5.4. For Investors

Manufacturing enterprises such as canning and feed mill production are a big opportunity in the municipality of Paracelis, Mountain Province, Northern Philippines which is home to numerous indigenous corn farmers because of the availability of corn from its vast corn fields. The municipality is also proximate to big markets such as Santiago City, Isabela, in Northwestern Philippines. Its crossroads location makes it a future trading hub in the Eastern Cordillera area or as a primary agriculture growth center of the Cordillera Administrative Region (CAR).

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