

---

## The farmers' coping mechanisms for *El Niño*

---

T.T. Battad<sup>1\*</sup>, D.S. Vargas<sup>1</sup>, M.B. Mangalindan<sup>1</sup> and M.C.M. Vera Cruz<sup>1</sup>

<sup>1</sup>Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines

Battad, T.T., Vargas, D.S., Mangalindan, M.B. and Vera Cruz, M.C.M. (2005). The farmers' coping mechanisms for *El Niño*. *Journal of Agricultural Technology* 1(2): 255-266.

This research was conducted in four regions in Luzon, Philippines in order to gain insights and lessons into the *El Niño* crisis and its effects on the production systems of farmers. A total of 1095 farmers served as respondents. Results reveal that the farmers were on average 48 years old, had finished elementary level, and had 21 years of farming experience. They grew crops and raised animals. They had inadequate capital for farm activities hence, they availed loans from different credit sources. Their major sources of information about *El Niño* were radio and television. Farmers did their best to cope with problems brought about by *El Niño*. *El Niño* brought various effects; there were favorable behavior manifestations like planting of forest and fruit trees by farmers and the existence of *bayanihan* in the *barangays*. On resource allocation, the farmers increased the area planted to rice, the quantity of fertilizers, insecticides and herbicides used varied, and expenses on clothing, education, house construction/repair, medical expenses and social obligations were reduced. The test of relationship of variables revealed a highly significant relationship of socio-demographic characteristics with level of awareness; highly significant and positive relationship between levels of awareness and attitude formation, and highly significant relationship between attitude and decision to allocate resources.

**Key words:** communication channels, coping mechanism, diffusion-adoption process, *El Niño*

### Introduction

*El Niño* is a climate anomaly causing a 40 percent reduction in rainfall. It brought extensive damage to Philippine economy particularly in the agriculture sector. Concepcion (1998) noted: "The drought in crop year 1982-83 had the most serious damage to *palay* production while the 1992-93 dry spell brought the biggest destruction to corn crops in the past 26 years within six crop years' drought episodes which occurred in the Philippines. These are crop years 1977-78; 1978-79; 1982-83; 1990-91; 1991-92; and 1992-93. In terms of peso value it was in 1992-93 that the damage on rice and crops reached the "billion peso mark".

---

\*Corresponding author: T.T. Battad; e-mail:training\_dir@yahoo.com

Subsequently, to mitigate the effects of *El Niño*, the government through the Department of Agriculture had interventions to help the affected areas. These interventions included distribution of vegetable seeds and garden kits for crop production, veterinary drugs, minerals and vitamin supplements for livestock; and conduct of information dissemination on management measures to be adopted during *El Niño*. These were particularly done in Region IV (DA-RFU report, Region IV).

Government agencies in other regions covered in the study had their own intervention schemes to mitigate the effects of *El Niño*. These were soil conservation and efficient water management; fingerlings stocking, production of alternative feeds for livestock; planting of short maturing drought tolerant crops and varieties; balanced fertilizer nutrition; zero tillage practices; farm residue utilization, reforestation, and information, education, communication campaign (Concepcion, 1998).

Similarly, the farmers have their own initiatives and coping mechanisms on *El Niño* to which this research had been addressed. This research was undertaken to document their coping mechanisms, which may be useful for policy formulation and dissemination to all concerned.

## **Objectives**

The general objective of the research was to gain insights and lessons on the *El Niño* crisis and its effects on the productivity and production systems of farmers. Specifically, the research aimed to describe the demographic and socio-economic characteristics of farmers; determine the level of awareness, and attitudes of the farmers about *El Niño* and the governments projects, initiatives, and action plans in response to *El Niño*; identify the communication channels or sources of information about *El Niño* and the government's response to *El Niño*; and determine the farmers' decisions for coping mechanisms into the *El Niño* crises. Moreover, it aimed to find out the relationship of demographic and socio-economic characteristics with level of awareness; perception about *El Niño* with attitude formation; knowledge with attitude formation, and attitude formation with decision. Finally, it determined the problems encountered and needs of farmers to cope-up with the *El Niño* crisis.

## **Methodology**

### ***Research framework***

This research project used the innovation – decision process model of Rogers and Shoemaker (1971) as a guide (Fig. 1). The research conceptualization from where the study was based consists of four functions or stages as follows:

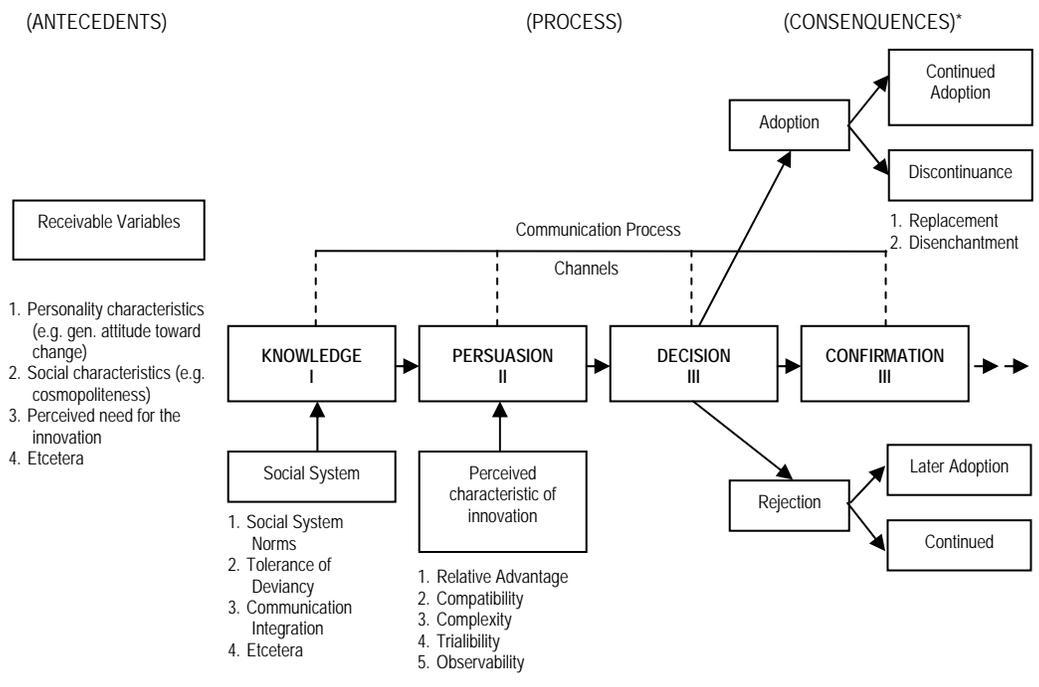
- I. Knowledge – The individual is exposed to the innovation's existence and gains some understanding of how it functions;
- II. Persuasion – The individual forms a favorable or unfavorable attitude toward the innovation;
- III. Decision – The individual engages in activities which lead to a choice to adopt or reject the innovation; and
- IV. Confirmation – The individual seeks reinforcement for the innovation-decision he has made, but he may reverse his previous decision if exposed to conflicting messages about the innovation.

The model contains three major divisions: (1) the antecedents (2) the process and (3) consequences.

This particular research project used the model of Rogers and Shoemaker (1971) with some modification (Fig. 2). Antecedents would include the farmer-respondent's demographic/socio-economic characteristics, which are perceived to be related to the respondents' awareness. The channels are perceived to be related to four stages namely; awareness, attitude formation, decision, and confirmation. Assumed to be related to attitude formation are the effects of *El Niño*. The respondents' attitude whether negative or positive will lead to decision on what would be their coping mechanism, resource allocation, and management strategies. It also includes decision to adopt or reject the projects of the government and other organizations. The confirmation stage however was not included in this research.

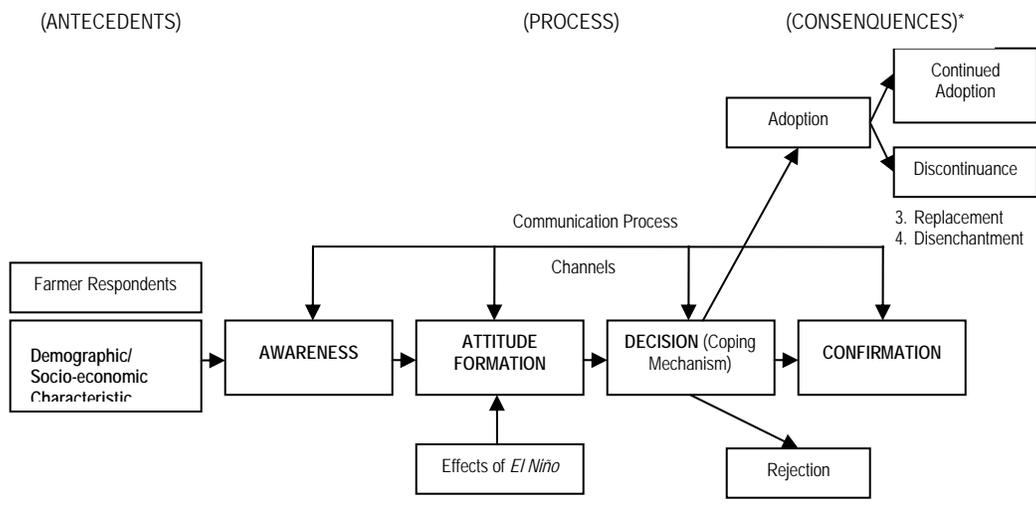
### ***Population and sampling procedure***

The research was conducted in Luzon covering Regions I, II, III and IV. Highly affected areas with small chance of recovery and high production loss were the basis for the selection. Two provinces were selected from each region after which two towns were selected through purposive sampling. Thirty percent of the total farmers per *barangay* was taken by simple random sampling.



\* For the sake of simplicity the consequences of innovation was not shown in this paradigm but only the consequences of the process

**Figure 1.** Paradigm of the innovation-decision process Rogers and Shoemaker (1971).



**Figure 2.** Conceptual model used in this research on farmers' coping mechanisms on *El Niño*.

**Table 1.** Respondents of the study on *El Niño*

<b>Region</b>	<b>Total Farmers Affected</b>	<b>No. of Respondents</b>	<b>Percent (%)</b>
1 <i>Ilocos</i> Region	651	198	18.08
2 <i>Cagayan</i> Valley	933	284	25.94
3 Central Luzon	1265	382	34.88
4 Southern <i>Tagalog</i>	770	231	21.10
<b>Total</b>	<b>3619</b>	<b>1,095</b>	<b>100.00</b>

## Results and discussion

### *Demographic and socio-economic characteristics of the respondents*

The respondents had a mean age of 48. The age range of 20 to 93 years old implied wide dispersion among respondents in terms of age.

Few females (18%) represented the group. A great majority (96%) of the respondents were married. More than half (56%) of the respondents reached only elementary level, some (32%) have reached high school and very few (10%) stepped to college level.

From among the respondents, the *Ilocano* group was mostly found in Regions 1 and 2, 87 and 52 percent, respectively. Majority (69%) of the *Tagalogs* were in Region 3.

The average number of the household members was 5. Approximately 48 percent had other sources of income in all regions. They engaged in handicraft, poultry and other agriculture related income generating projects to supplement farm income. The respondents gross income from the farm ranged from below PhP20,000 to PhP81,000 and above for both wet and dry seasons. Other farmers (31%) in four regions reported no income during dry season since they were not able to plant. It was observed that close family ties existed among the farmer respondents. Four and more members of the family who contributed to family income had the greatest percentage of share to household and farm expenses.

Majority of the farmers in Regions II, III, and IV planted rice only and the rest planted rice and other crops. However, in Region I, more farmers were engaged in rice and tobacco. The farmers were cultivating at least 1.9 ha. Less than half of them (37%) had 21 years or more experience in farming.

The majority (76%) of the farmer respondents availed credit as farm capital with average amount of PhP15,000 for dry season cropping. The sources of credit were banks, individuals, cooperatives, usurers, traders, close friends and relatives. There was an improvement in loan repayment in dry season 1998 as compared to dry season 1997 because farmers would like to maintain their credit lines during the presence of *El Niño* crisis. Interest charges were 5 percent to more than 30 percent per annum.

The majority (58%) of the respondents sold their *palay* at P6-7 per kilo to private traders/buyers as their regular buyers or “*suki*” (46%) who give higher price to their products. They sold small quantities of vegetables and legumes.

### ***Sources of information about El Niño phenomenon and its effects***

A variety of sources of information of farmers about *El Niño* was noted. A great majority (93.2%) of the farmers had broadcast media as their sources of information. Some had limited materials like pamphlets, brochures, magazines and handouts as sources of information on reduced yield and effects. On the other hand, the technicians disseminated more specific information like unavailability of feeds for their animals. Friends, relatives and neighbours also served as sources of information of the farmers.

### ***Awareness about El Niño induced problems and effects***

The farmers in all the four regions were aware of the *El Niño* induced problems such as suppressed tropical cyclone activity, diminished rainfall, drought, low water supply and unavailability of feeds. The farmers in Regions I to IV were aware that delayed planting of rain fed and irrigated crops, crop failure, reduced pest and diseases (rats) and forest fires were the effects of diminished rainfall, drought and low water supply to them.

### ***Level of awareness on government's intervention about El Niño crisis***

The farmers in the four regions were not aware of government interventions about *El Niño* crisis. Albeit, broadcast media as prominent source of information among farm-families was limited only to short messages (radio/TV plugs) to keep the farmers aware of the *El Niño* phenomenon such that they were not able to listen to the program airing interventions. If ever, the recall process is difficult and they could not refer to the message unless it is tape recorded.

In order to supplement broadcast media to explain the science and technology interventions, printed materials were prepared, and *fora* and seminars were organized. However, farmers do not often read these materials nor attend these *fora*.

### ***Effects of El Niño on the production systems of farmers***

The effects of *El Niño* on the farmers' production system were noted in this research. In land preparation, the majority of the farmers (65%) reduced the number of times of plowing and harrowing due to lack of water.

Older seedlings were transplanted in dry season 1998 than in dry season of 1997 by majority of the respondents in Region 1. In the dry season of 1997, more farmers in all regions did three or more than three times irrigation. Due to difficulty in removing the weeds, the majority of the farmers weeded their crops twice in both seasons. Frequency of fertilizer application and spraying of insecticides and pesticides varied in all regions with a decreasing trend in percentage of farmers who practiced.

There was no effect in the practices in terms of harvesting, hauling their harvests, storing, drying and marketing. It was only in the quantities that there were changes.

### ***Farmers' coping mechanisms***

Results showed that Regions I–IV were very much affected by the *El Niño* crisis particularly in rice production. Planting was delayed and there was no yield due to drought. As coping mechanisms of many farmers, they constructed water pumps and shallow tube wells in order to have water supply. According to some farmers, they could not do anything to cope with the crisis but to limit their expenses in the farm and in the household. A few others went to fishing, tricycle driving, vending/selling, raising animals, and carpentry.

Vegetable production was also affected. The farmers coped by constructing shallow tube wells and sharing water pump with others.

In Region I, livestock production was affected especially in raising swine. As coping mechanism, hog raisers frequently bathed their pigs while some sold their animals.

Food security in all the regions was affected by the *El Niño* crisis. Rice, vegetables, egg, milk and fish supplies were affected. In order to cope with this, the majority of the farmers borrowed money to buy rice; and reduced expenses, skipped meals and did not buy rice anymore but instead ate sweet potato. Few others looked for a job in order to have money to buy rice.

A great majority of the farmer respondents (87%) in the regions covered coped with the crisis by not buying and eating vegetables. Some (9%) farmers in Regions I, III, and IV planted vegetables for their home consumption while other farmers (4%) in Regions I, II, and III, borrowed money for buying vegetables.

Also, many farmers (94%) in the regions studied, reduced consumption of egg, milk, and fish and some did not include these products in their diets. Some farmers borrowed money and few could not do anything but to look for a job so that they could buy their food.

Income from farm production was very much affected in Regions I and II because of low yield due to drought. More than half (54%) of the farmers in Region I borrowed money from relatives, friends and neighbours to support and sustain family needs, while waiting for the next cropping season; 47.9 percent of the farmers in Region II reduced their household and personal expenses.

The effects of *El Niño* on the health of the people were seen in their consultation with the doctor. Although more than the majority in Regions I and IV did consult doctors, a great majority in Regions II and III were not able to consult with the doctor due to lack of money.

The rivers in Regions II and III were affected as the water level went down and some dried up. Forest fires affected Region II. Forests in other regions were also affected and remedied by planting forest and fruit trees by some farmers.

Water utilization in the farm was very much affected in Regions II and III, while water utilization in homes in Regions I, III, and IV were affected as deep wells and water pumps were drained. To cope with these problems, many (70%) farmers shared pumps with neighbors, fetched water in pumps located few kilometers away from their houses while others had to dig deeper and install additional water pumps.

The trees and grasses in mountains dried up due to drought. Water level in dams in Regions II and III went down which meant inadequate water supply to fields of farmers.

### ***Decision on resource allocation***

Resources allocated in the farm were land, labour, material inputs and financial resources. The average area planted to rice increased from 2.03 ha to 2.7 ha with the presence of *El Niño*. This may be due to their need to compensate the losses by planting more. As regards to labour, the farmers

(45.3%) involved one to two persons in their farm activities who were either members of their family or their neighbours.

On material inputs, the kinds of fertilizer, insecticides, pesticides, and herbicides used by the farmers varied. The average number of bags used was 6.

More farmers allocated PhP11,000 to PhP30,000 for their food for both before *El Niño* and with the presence of *El Niño*. However, with the crisis, the expenses on clothing, education, house construction/repair, medical expenses, and social obligations were reduced.

### ***Expectations and technical assistance received from the government regarding El Niño problem***

Despite the government's action plans and initiatives on the *El Niño* crisis, the farmers expected to receive from the government the following support services: credit assistance, input resources, irrigation pump, income generating projects, technical assistance, and training.

Of the government initiatives on *El Niño* crisis, the farmers were benefited on the government's distribution of shallow tube well pumps. The project was implemented by the Department of Agriculture office where the farmers qualified as recipients being a member of a cooperative through a soft loan scheme. The scheme provides easy term repayment plan for all the recipients.

Technical assistance through training was also provided /sponsored by government agencies and non-government organizations. Farmers were not assisted through farm and home visits.

### ***Relationship of the different variables***

There were demographic and socio-economic characteristics found to be related with level of awareness of the respondents. A highly significant relationship between the level of awareness were the wet season net income and the distance of farm from residence; and a significant relationship was found between ethnic group and number of family members who contributed to the family income. However, a negative significant relationship was noted between years in farming and level of awareness. Thus, the hypothesis that demographic, socio-economic characteristics are not related with level of awareness especially in the mentioned variables is rejected.

A highly significant and positive relationship existed between levels of awareness and attitude formation; hence, the hypothesis on this is rejected. This implies that the more farm production, food security, income, health

condition, environment and water utilization were affected by *El Niño*, the more the negative attitude of the respondents was formed toward decision to allocate resources.

In a similar light, the higher the level of awareness of the respondents on the effects and problems of *El Niño* phenomenon, the more favourable is the attitude of the respondents towards *El Niño*. This implies that they could really plan ahead on what to do when *El Niño* crisis comes.

A highly significant relationship was found between crops, food and education with the decision of the respondents to allocate resources, and a significant relationship of social obligations with decision to allocate resources was noted, thus rejecting the hypothesis on this.

### ***Problems encountered and needs of farmers to cope with the El Niño crisis***

The drought has hindered growth and maturity of about 80 percent of the rice planted in Region I, which resulted to reduced yield and losses and reduction of the farm area cultivated. Corn planted in Region II was heavily damaged due water stress. The crops in Region III were not able to survive and resulted in product losses. On the other hand, pest infestation occurred in Region IV causing the death of animals.

The farmers deemed it necessary for government to give price support for input and product, restructuring of credit, provision of training, technology and good quality seeds.

### ***Conclusion and recommendations***

Based on the results of the research, the following conclusion and recommendations are made:

The farmers may still be considered productive and physically fit to do farming activities considering their mean age of 48. Women could also farm as 18 percent of the *El Niño* farmers were females. In this regard, involvement of women in farming activities should be looked into in order to document the division of labour as well as their access to and control over the farm resources and others. Results would thereby serve as bases for decision making.

Industriousness is one trait shown by rice farmers and at the same time growing other crops and raising some animals. It appears that there is a wide room for implementation of an integrated farming system in their farms; hence farmers should be assisted in establishing these projects.

On the effects of *El Niño*, there were favorable behavior manifestations among the farmers. For example, the planting of forest and fruit trees by some

farmers in the forest could be used as models so that other farmers may follow. Financial support should be provided by government and non-government organizations concerned. "Plant now pay later plan" is something to be considered so that farmers may plant trees not only in the forest but also in their farms and backyards as well.

Another manifestation of good behaviour is the sharing of the use of pumps of many farmers with others. This means that "*Bayanihan*" still exists in the *barangays*. This may be used as a strategy in the provision of equipment and facilities to farmers.

On the problems, and needs identified by the farmers, it is suggested that the government organizations concerned should consider the provision of price support for input and products, restructuring of credit, provision of continuous training, technology and good quality seeds.

Furthermore, provision of farm to market roads and post-harvest facilities should be programmed as soon as possible.

Considering the result of this research, it may be concluded that demographic and socio-economic characteristics of the farmers were related to level of awareness on *El Niño* and its effects.

The level of awareness of the farmers on *El Niño* phenomena and its effects were found to be related to the formation of attitudes of the farmers toward the *El Niño* crises. Apparently, they have formed either positive or negative attitudes in taking actions to prepare for the crises or when the crises already hit the country depending on the intensity of the effects on them.

The attitudes of farmers based on the intensity of the effects of *El Niño* crises led to making decisions on resource allocation in the farms and home. It may be observed that the more intense the negative effects, the lesser the resources that they allocate to livestock production, food and poultry income.

Relative to the findings on relationships of variables considering the innovation-decision model, it may be inferred that there are characteristics of farmers related to their level of awareness; the level of awareness is contributing to the attitude formation; and the attitude formation is related to decision to allocate resources. Albeit, the confirmation stage was not included, this research partly confirmed the model considering the first three stages and considering further the variables studied.

The farmers revealed distinct characteristics; hence it is recommended that these characteristics be looked into in planning and implementing communication strategies relative to making the farmers aware of *El Niño* phenomenon.

Since awareness is the first stage and very crucial in the adoption process, it is therefore recommended that a strong communication campaign

program be planned and that a more aggressive partnership with organization and groups with the strong commitment and concern for development be implemented to ensure a more participative involvement.

### **Acknowledgements**

The members of the research team would like to convey their sincerest gratitude and appreciation to Department of Agriculture-Bureau of Agricultural Research for the financial assistance in the conduct of this research.

### **References**

- Concepcion, R.N. (1998). *A Framework of Analysis on the El Niño Episodes in the Philippines*. Bureau of Soil and Water Management, Diliman Quezon City.
- Rogers, E.M. and Shoemaker, F.F. (1971). *Diffusion of Innovations*. 2<sup>nd</sup> Edition New York: Free Press.

(Received 7 October 2005; accepted 16 December 2005)