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Effect of agricultural insurance program on income loss reduction: A comparative study of upland and lowland farmers in Japan and the Philippines

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ABSTRACT. This paper aims to inquire how agricultural insurance can be an effective and efficient coping mechanism to prevent the poorest in remote rural areas of East Asia and the Pacific from falling into the poverty trap when faced with natural disasters. Field research was conducted to examine upland and lowland farmers' experiences with agricultural insurance and program implementation by insurance providers in Japan and the Philippines. Secondary data such as online articles, journals, books, news and annual reports, and online websites of government insurance providers in the Philippines and Japan were collected. Primary data were analyzed using descriptive and cost and returns analyses. The results of the country case studies of the Philippines and Japan highlight the major differences between agricultural production and agricultural insurance systems. Agricultural insurance can be a standalone risk management tool for Japanese farmers because the Japanese agricultural insurance provider has sufficient capital from the premium payments it receives from its beneficiaries. In contrast, the main agricultural insurance provider in the Philippines has little capital due to the low premium payments it receives especially that only a few farmers sign up for its programs. For this reason, the company cannot make large compensation payments to its beneficiaries and cannot be used as a standalone risk management tool in the Philippines.

Keywords: *Agricultural insurance program, effectiveness, disaster management, food security, area studies, East Asia and the Pacific*

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INTRODUCTION

As the world continues to battle climate change, natural disasters have slowly become a regular part of people's lives. There are a variety of ways to cope with these natural disasters. For instance, a country's government can build infrastructure to protect its citizens from frequent disasters. In Japan, where earthquakes are common, the buildings are designed to be earthquake-proof. The Netherlands, a country known for its low elevation, boasts of the best flood control system in the world. On the other hand, individual citizens can also cope at the household level. They can use their savings or avail themselves of insurance in times of need. Most developed countries have the capacity to employ these adaptation strategies as most citizens are sheltered comfortably in their homes built from strong materials. However, it is a different case for developing and low-income countries, as their governments and citizens do not have the same capacity to cope with climate woes. Farmers are among the most vulnerable to the impacts of climate change. Thus, this study aims to provide perspectives on how developing countries in disaster-vulnerable areas can employ better coping strategies to avoid the poverty trap during disasters, especially in the agricultural sector.

The East Asia and the Pacific region, which consists mainly of emerging states, is the most exposed region to environmental and geological disasters, according to the World Risk Report (UNU-EHS, 2018). The region's proximity to the Pacific Ring of Fire makes it susceptible to environmental disasters, such as typhoons and floods, as well as geological disasters such as volcanic eruptions and earthquakes. Of the 10 most vulnerable nations, 7 are found in the region.

As the frequency of extreme weather events such as droughts and floods due to climate change increases, boosting farm production becomes a challenge (Kurukulasuriya & Rosenthal, 2003, pp. 7-23). Developing countries, which still depend on agriculture as the foundation of their economies, are impacted the most by this occurrence. Any poor harvest due to extreme climatic events would significantly affect the viability of the agricultural economy, especially for smallholder farmers who cannot recoup their investments (Magno & Bautista, 1989). Farmers' businesses are often precarious that a minor calamity can weaken a household for several years, especially in rural areas. Natural disasters and shocks jeopardize already low and irregular wages and can have long-term outcomes on livelihoods and welfare schemes (Turk, 1999, pp. 30-38).

Nevertheless, there are other risk management tools or coping mechanisms, which can help reduce farmers' climate-related losses (Reyes et al. 2015, p. 2). Agricultural insurance, which is a monetary tool used to protect risks in farming activities caused by natural disasters, pest infestations, and plant diseases, is a mechanism agricultural producers can use. Dickson (1960, p. 324) describes crop insurance as "The form of risk management used primarily to insure against the risk of uncertain loss." The author adds that insurance is described as "the reasonable shifting of the risk of a loss from one enterprise to another in exchange for a payment. Agricultural insurance is not limited to crops, but also covers livestock, forestry, and even aquaculture." Iturrioz (2009, p. 2) refers to agricultural insurance as a special type of asset insurance applied to agricultural ventures. The study also mentions that due to the concentration of this insurance line, the current institutions in the market can either have their own department for agricultural business or pass on the underwriting to institutions specialized in it.

Each year, there is significant agricultural damage due to natural disasters. Japan and the Philippines are two of the nations in East Asia and the Pacific that are highly susceptible to these occurrences. Of all the nations in the region, Japan is a leader in adapting to natural disasters. In terms of vulnerability to disasters such as earthquakes, cyclones, flooding, and droughts, the island nation has a similar score to most nations in the region but ranks lower in terms of risk. To illustrate, Japan placed 29th in terms of natural disaster risk, while the Philippines placed third, although the vulnerability scores are not far apart. Japan totals 46.55 and the Philippines totals 49.94 (UNU-EHS, 2018). This is because Japan scores well on adaptive capacity indicators (e.g., governance, healthcare, and social and material security) and coping capacity in relation to impending natural events, climate change, and other challenges. This means that although Japan experiences the same number of natural disasters each year, it is better able to adapt than most of its neighboring countries.

Over a 10-year period, from 2006 to 2015, the total cost of damage caused by major natural events and disasters in the Philippines was valued at about USD 7.2 billion (BusinessWorld, 2018). The nation's farming sector is extremely dependent on weather and climate variability, and any weak yield due to natural disasters causes a major risk to agricultural activities (Magno & Bautista, 1989).

The "Great East Japan Earthquake" was one of the gravest natural disasters that caused substantial loss to Japan. According to Nanto et al. (2011, pp. 2-6), the material damage was valued to be between USD 195 billion and USD 305 billion, which is akin to the gross

domestic product of Greece at the time. Over 27,000 people in Japan were killed or went missing, and more than 202,000 houses and other structures were damaged in whole or in part. In addition to the adverse effects of the earthquake and tsunami, there is an ongoing crisis, which is the aftereffects of the radiation due to nuclear reactors, at the Fukushima nuclear reactors (Nanto et al., 2011, pp. 2-6). Moreover, the summer of 2018 was disastrous for Japan as the island nation was hit by numerous earthquakes, floods, typhoons, and high heat temperatures (CNN, 2018). Since both nations are hit by several natural disasters annually and the agricultural sector of both countries is highly vulnerable to risks, they would gain from insurance as a mechanism to cope with such risks.

Study Objectives

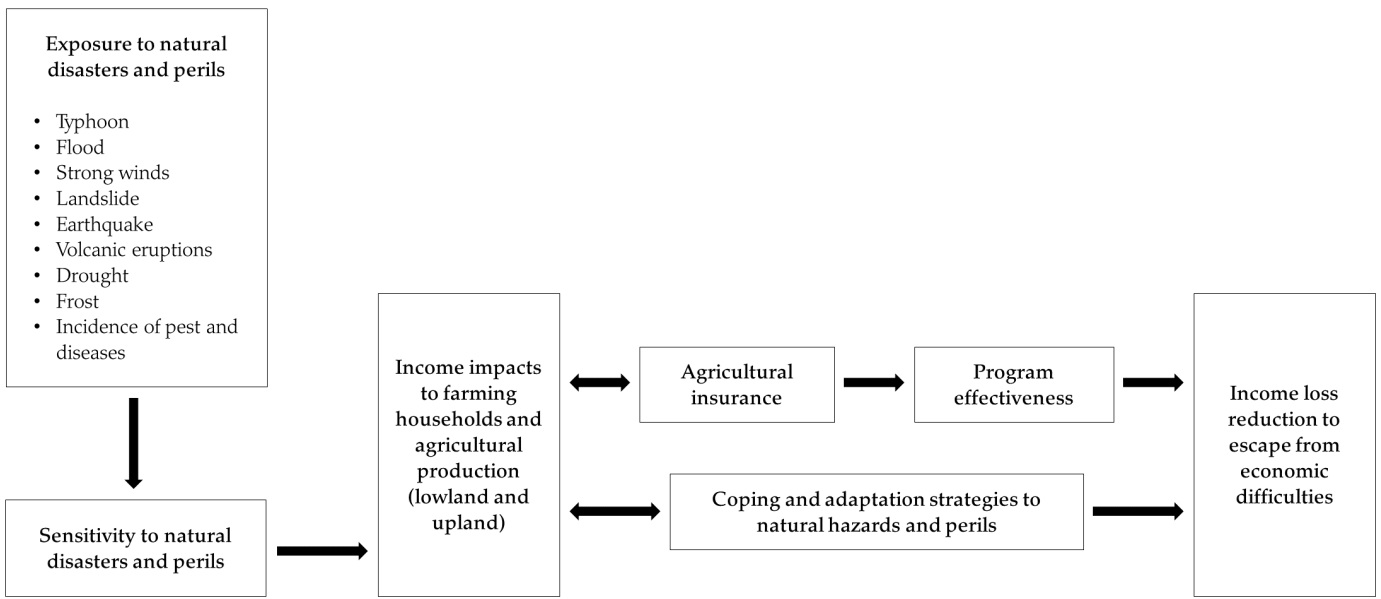
This study seeks to answer how agricultural insurance can reduce income losses and potentially be an effective and efficient tool for disaster management in Japan and the Philippines. Specifically, this study aims to: 1) compare the program implementation of these various agricultural insurance products; 2) evaluate the effectiveness of agricultural insurance in income loss reduction; 3) explain the reasons for participating and not participating in agricultural insurance programs; and 4) recommend strategies based on the lessons learned in Japan.

METHODOLOGY

Conceptual Framework

This study investigated the role of agricultural insurance in reducing economic losses due to natural disasters and peril exposure in rural areas of the Philippines and Japan. Agricultural insurance protects farmers from damages and income losses. The successful adoption of crop insurance, however, depends on the effectiveness of its implementation. As well, crop insurance complements rather than substitutes, other coping mechanisms in protecting the poor farmers against income loss risk. Natural disasters and perilous exposure include typhoons, flooding caused by typhoons and heavy rains, strong winds, landslides in high elevation areas, earthquakes, volcanic eruptions, drought in the Philippines, unusually cold weather or frost in Japan, and the incidence of pests and diseases (Figure 1).

Figure 1
Conceptual framework



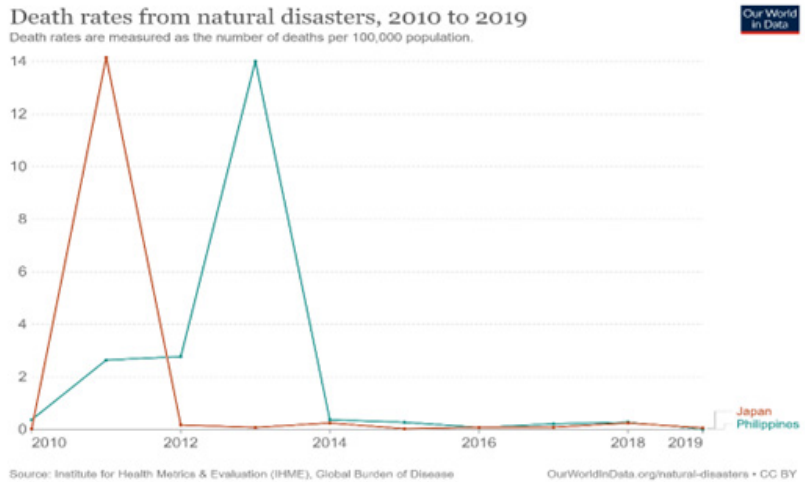
For agriculture, the aforementioned disasters mean damages and result in income losses. People who are exposed to disasters have varying degrees of sensitivity, i.e., some are more resilient than others. Small farmers who operate in marginal lands and rainfed production systems, such as the Filipino farmers, are the most vulnerable to these disasters (Ludi, 2009, pp. 1-2). The reduction of the impacts on farming households and agricultural production will be determined by the adaptation strategies that are available to them that will determine their capacity to reduce income losses, and in the Philippine farmers' case, escape poverty. Agricultural insurance, in particular, is a coping strategy a farmer can use after the occurrence of a natural calamity. It provides indemnity payments to the damaged farms that can reduce the income losses of the farming households.

Sites

The World Economic Situation and Prospects Report of the United Nations (2018) classifies Japan as a developed nation; the Philippines as a developing nation. Both countries are located in the East Asia and Pacific region, which has the highest risk in terms of disasters, whose staple food is rice, and whose rice crop is vulnerable to natural disasters (Rauhala, 2011). Additionally, the Philippines is among Japan's largest trading partners in the region. Sharing disaster risk reduction and management practices in agriculture can be beneficial for both countries to achieve and maintain food security, as the Philippines can learn from Japan. The former could reduce poverty caused by natural disasters, while the latter can continue to import agricultural products from the Philippines to feed its aging farmers. Both countries have comparable experience of natural disasters as evidenced by their identical death rates due to disasters (Figure 2).

The sites for this study were the Gifu Prefecture in Japan (Figure 3) and Laguna Province in the Philippines (Figure 4). Both sites are agricultural areas with similar experiences of lowland and upland disasters. Fieldwork was conducted in Laguna Province in July, August, and September 2018; Gifu Prefecture in February, March, June, and July 2019; and Laguna Province again in August and September 2019. Given the differences in disaster vulnerability and cropping systems in the lowlands and uplands, they were selected as the main analyses points. In this study, upland areas are those located in elevations higher than 148 m above sea level, while the low elevations or lowlands are less than 20 m above sea level (Villano et al, 2016, pp. 45-70).

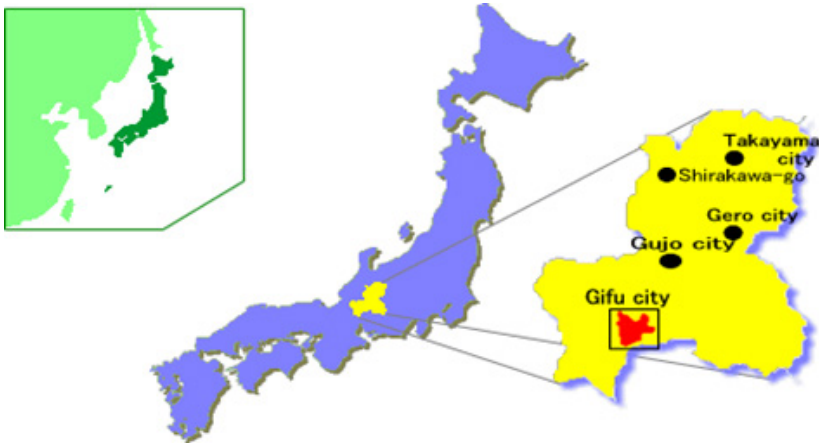
Figure 2
Death rates from natural disasters in the Philippines and Japan, 2010-2019
(Source: Compilation by Ritchie and Roser (2021) from the data by the Institute for Health Metrics and Evaluation (IHME), Global Burden of Disease)



Gifu Prefecture, Japan

The fieldwork in Japan was conducted in Gifu Prefecture in the Chubu Region, specifically in the cities of Gifu and Motosu (lowland) and Takayama City in the highlands of Hida (upland). The prefecture has a large variety of agricultural products suited to the natural conditions of each region in Japan and are grown all year. The warm climate in the plains of southwestern Gifu makes it suitable to grow rice. On the other hand, vegetables, including kashu, which are grown during summer and fall, tomatoes, spinach, and natsu daikon (summer Japanese radish), are produced in the cooler summer climates of the high-altitude plateaus in the Chuno, Tono, and Hida Regions, which are in the central, eastern and northern regions of Gifu, respectively. Beef, which is a delicacy of the Hida area, along with dairy cattle, is raised in the mountains. River fishing is also being practiced in Gifu. The key product of which is "Ayu" or the sweet fish, and aquaculture, which grows rainbow trout and "Amago" or the red spotted masu trout (Gifu Prefectural Government, 2019).

Figure 3
Map of Gifu Prefecture in Japan
(Source: The official website of the Gifu Convention and Visitors Bureau, 2020)



Laguna Province, Philippines

The fieldwork in the Philippines was conducted in the agricultural municipalities of Santa Cruz (lowland), Liliw, and Nagcarlan (upland) in the province of Laguna. The municipalities of Santa Cruz and Liliw are vulnerable to climatic hazards like typhoons and floods while the municipality of Nagcarlan is vulnerable to typhoons (Rola et al, 2016).

Agriculture and fisheries are among the main natural resources of the province owing to its proximity to Laguna Lake and the surrounding lowlands. The top five crops produced are rice, corn, coconuts, mangoes, and bananas. Other crops grown in the province include coffee, pineapple, lanzones, rambutan, and sugarcane. Some 30,619 ha are devoted for rice cultivation. The municipality of Los Baños is also the site of several research institutions, such as the International Rice Research Institute, the ASEAN Center for Biodiversity, and the Southeast Asian Regional center for Graduate Study and Research in Agriculture (Provincial Government of Laguna, 2019).

Figure 4
Map of Laguna province in the Philippines
(Source: OpenStreetMap, 2022)

Types of Data and Data Collection Methods

Data collection included key informant interviews (KII) and farmer surveys. The key informant interview was used to generate program-level data, with respondents being insurance providers and their staff members. In-person interviews were conducted to understand farmers' barriers to adoption and the impact of a farm-level insurance program and learn their views on the effectiveness of farm insurance. There were 70 farmers in the Philippines and 88 farmers in Japan who were interviewed. Due to time and funding constraints, the author selected the minimum samples in the selected study areas. "Small Sample Theory" by Lehmann (1999, pp. 418-426) asserts that when a population is homogenous, a minimum sample of 30 can already represent the population. In this study, the study areas in each of the case countries are similar in terms of elevation, farming system and practices, and disaster experiences. In both countries, the farm locations are in high and low

elevations. In the study areas in the Philippines, the farming system and practices are the same in each of the elevations. The lowland farmers' main crop is lowland rice, while the upland farmers' crops consist of root crops such as sweet potato, and high-value crops such as tomato, cabbage, and winter melon. On the other hand, the lowland Japanese farmers also grow lowland rice as their main crops, while the upland Japanese farmers grow high-value crops such as strawberry, tomato, and lettuce, as well as beef. All farmers in the study areas have experienced typhoon and heavy rain. Given these conditions, the population chosen in the study sites can be considered homogenous.

In the Philippines, the farmer-respondents were selected using the random sampling method based on a list provided by the respective local government units. The Japan Agriculture Group provided a list of family farms and enterprises from which the farmer-respondents were randomly selected. The 70 respondents from the Laguna Province comprised 35 respondents in the lowland area of Santa Cruz, and 18 and 17 respondents in the upland areas of Nagcarlan and Liliw, respectively. The 88 respondents in Gifu Prefecture, on the other hand, comprised 22 respondents each in the lowland cities of Gifu and Motosu and 44 respondents in the upland city of Takayama. Agricultural insurance providers from the Philippine Crop Insurance Corporation (PCIC) in the Philippines and the National Agricultural Insurance Association (NOSAI) in Japan were interviewed.

Data Analysis

Descriptive statistics such as means, frequencies, and percentages were calculated and used to describe the socioeconomic characteristics and the number and types of agricultural insurance policies used by the farmers interviewed. Additionally, the main reasons given by the surveyed farmers for participating or not participating in an agricultural insurance program were also analyzed using descriptive statistics.

In evaluating the effectiveness of agricultural insurance products in both countries, a cost and returns analysis was conducted to determine the reduction in income loss. Cost and returns analyses were conducted per farm and per hectare to determine the extent of total income losses incurred by lowland and upland farmers prior to receiving indemnity payments. Gross margin was used as a measure of profit in agricultural production and was calculated as follows:

$$\text{Gross Margin} = \text{Gross Return} - \text{Total Variable Cost}$$

A positive gross margin means that agricultural production is profitable. Conversely, a negative value of gross margin indicates a loss in agricultural production. Moreover, other effectiveness measures such as the awareness and accessibility of the beneficiaries of agricultural insurance products, helpfulness of staff of the insurance providers, and expectations met by the insurance product were studied.

RESULTS AND DISCUSSION

Agricultural Insurance Programs in Japan and the Philippines

The NOSAI administers Japan's state agricultural insurance programs. The first insurance policy was introduced in 1929 when the Livestock Insurance Act was passed as a new disaster protection mechanism. There are two types of agricultural insurance programs in the country: national and optional programs. The national program covers rice, wheat, livestock, and barley while the optional program covers fruit and fruit trees, field crops, sericulture, and greenhouses (NOSAI, 2022a).

Since 1981, the PCIC has served as the national organization that implements insurance programs for rice, corn, high-value crops, livestock, non-agricultural assets, fisheries, and risk insurance in the Philippines. The program has since expanded its coverage from rice and corn to other crops and services such as life and accidental death insurance for farmers and their families. Like most agricultural insurance programs in other countries, the scheme offers premium subsidies (Virola, 2017). The PCIC envisions to provide insurance coverage to farmers in the Philippines against damage to crops and other agricultural assets due to natural disasters, pests and diseases, and other hazards (PCIC, 2022a).

Agricultural and Socioeconomic Profiles of the Respondents in the Philippines and Japan

Table 1 compares the agricultural and socioeconomic profiles of respondents in the selected areas of Laguna and Gifu Prefecture. The main distinctions between the Japanese and Filipino agricultural producers are farm structure, size, and ownership. Filipino farmers operate as individual farms and may either own (27%), rent (50%), or lease (23%) the land they farm. Japanese farmers, on the other hand, own the land and operate either as a family farm, a farm company, or a farm corporation or firm.

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Table 1
Agricultural and socioeconomic profiles of the respondents in the Philippines and Japan

Item	Philippines (n=70)	Japan (n=88)
Type	Individual farmer	Family farm / Farm business company
Ownership	Landowner (27%), Lessee (23%), Tenant (50%)	Landowner (100%)
Location	Lowland – Santa Cruz Upland – Nagcarlan and Liliw	Lowland – Gifu and Motosu Upland – Takayama
Average number of crops and livestock	3 (mode=3)	2 (mode=2)
Average farm size	1.4 ha (mode=1 ha)	6 ha (mode=6 ha)
Membership in cooperatives	71% member 29% non-member	100% member
Yearly income from farming	USD 8,564/farmer	USD 62,582/farmer USD 750,984/farm
Average age	55 (mode=51)	71 (mode=70)
Average years of education	10 (mode=10)	15 (mode=15)
Current other occupation	Non-farm work	No

In addition to their agricultural endeavors, Filipino farmers pursue off-farm endeavors during the lean months. Nearly all of the Japanese farmers interviewed had full-time occupations before farming. They have also committed to doing full-time farm chores upon retirement from their corporate jobs. Prior to entering farming, their wives were farming full-time. This is the case with "family farms" while farm leaders were involved in farming full-time at the beginning of their careers.

Unlike Japanese farmers, Filipino farmers operate on individual farms as either farm owners, tenants, or lessees. Most of them do not own their farmland. In Japan, two crops are grown on an average of 6 ha of farmland compared to 3 crops on 1.4 ha of farmland in the Philippines. All Japanese farmers are members of the Japan Agriculture Group and other various cooperatives. The same cannot be said among farmers in the Philippines.

Agricultural producers in both countries are aging. In Japan the age range of the farmers interviewed was 70-84. The age range of the Filipino farmers interviewed was 51-77. The average number of years of schooling among Filipino farmers is 10 (graduating from high school); 15 for Japan plus holding bachelor's degrees in various fields such as business administration, commerce, and agriculture. In terms of cooperative membership, all of the Japanese farmers are members of the Japan Agriculture Group while only 71% of Filipino farmers are cooperative members.

There is a significant difference between the average income of Japanese and Filipino farmer-respondents. The average annual income of a Japanese farm is USD 750,984 while the average annual income of a Filipino farmer-respondent is USD 8,564. The average annual income of Japanese farmer-respondents is USD 62,582, which is about six times higher than the average annual income of Filipino farmer-respondents.

The comparison of the agricultural production of the respondents in the selected case countries is summarized in Table 2. The Japanese farmers, with an average annual cost of USD 39,816 per ha spend much more in growing their crops than the Filipino farmers, who spend an average of USD 1,583 per year. Interestingly, upland farmers in both study areas spend more per hectare than their lowland counterparts. The figures suggest that there is a large difference between production costs, income, and risk of income loss in disaster years between Japanese and Filipino farmers.

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Table 2
Comparison of average agricultural production per hectare during normal year and year with extreme events

Income	Philippines			Japan		
	Lowland (n=35)	**Upland (n=35)**	**All (n=70)**	**Lowland (n=44)**	**Upland (n=44)**	**All (n=88)**
Production cost						
US Dollar	1,407	1,887	1,583	22,127	88,594	39,816
Profit (normal year)						
US Dollar	2,290	3,577	2,761	44,460	274,043	114,566
Profit (extreme event year)						
US Dollar	1,726	1,778	1,745	31,523	191,830	80,475
Net difference (profit during the extreme event year - profit during normal year)						
US Dollar	-565 (25% of income)	-1,799 (50% of income)	-1,016 (37% of income)	-12,937 (30% of income)	-82,213 (30% of income)	-34,091 (30% of income)

Although Japanese farmers could suffer higher-income losses in a disaster year, they earn much more than their Filipino counterparts, and their savings would be sufficient as a buffer against losses caused by natural disasters. The figures also show that farmers in the uplands are generally better off than farmers in the lowlands. Upland farmers generally spend more on production because they grow high-value crops that may require more expensive fertilizers and pesticides. On the other hand, these crops appear to be "high risk with high return" in terms of investment. Upland commodities are more susceptible to the effects of natural disasters and pests, but they can provide more income if the product is properly protected.

Extreme Events that Affected the Respondents' Farms in the Philippines and Japan

Generally, Filipino farmers were affected more by destructive natural disasters from 2009 to 2019 than their Japanese counterparts (Table 3). Among natural disasters, farmer-respondents in both countries experienced typhoon the most. Flooding brought about by typhoons and heavy rains are prevalent in the Philippines. Japanese farmers, however, reported more pest and disease problems than the Filipino farmers.

Table 3
Comparison of the average number of extreme weather events that affected the respondents' farms from 2009 to 2019 in the Philippines and Japan *(Source: Author's survey)*

Item	Philippines (n=70)	Japan (n=88)
Typhoon[2]	10.00	6.00
Flood[1]	5.20	0.57
Landslide	0.21	-
Earthquake	0.06	-
Pest and diseases	1.98	4.29
Drought	1.07	0.29
Total	**18.56**	**11.15**

Note:
[1]Flood is the most dominant extreme weather event in the Philippine lowlands; typhoon in uplands
[2]Typhoon is most dominant extreme weather event in both elevations in Japan

Even though both countries experienced earthquakes, these disasters were not strong enough to cause damage and disruption in farming activities. Drought was experienced in both areas, with Filipino farmers being more susceptible to it than their counterparts in Japan. A reason for this is the problematic deployment of agricultural technologies in the Philippines. Shallow tube wells are a common site in Japanese farms that use heavy irrigation, which can be useful in times of drought. Lowland rice farming systems are present in both countries, and that particular farming system heavily relies on irrigation. The lowland rice farming systems in the Philippines generally have less modern technology and not all farms have shallow tube wells and pumps. This makes Philippine farms more susceptible to drought.

The most common natural disaster that the farmer-respondents in the lowland areas in the Philippines experienced was flooding; typhoons in the uplands. Typhoons topped the natural disasters experienced by Japanese farmers, upland and lowland.

Yearly, almost the same number of natural disasters frequent both the Philippines and Japan. Yet, the results of the case studies show that Filipino farmers are more affected by these disasters. The Philippines lacks the agricultural technologies and infrastructure that can help its farmers combat the effects of natural disasters. Japanese farmers, on the contrary, are equipped to deal with disasters such as drought. Japan has massive infrastructure such as flood control gates and boulder walls to protect their farmers from flooding and landslides, respectively. Hence, Japanese farmers are generally more resilient in dealing with natural disasters. These case study results justify the World Risk Report 2018 by the United Nations University - Institute for Environment and Human Security (UNU-EHS) (2018), which indicated that Japan ranked lower (29th out of 172 countries) than the Philippines (3rd) in terms of risk even though both countries have similar exposure scores.

According to the report by the United Nations International Strategy for Disaster Reduction (2018), climate-linked calamities dominated all disasters over the past 20 years. It added the most frequent disaster was floods followed by typhoons, earthquakes, and extreme temperatures. The results of the case studies validated these findings.

Insurance Administration of the PCIC and NOSAI

Japan's and the Philippines' main agricultural insurance providers are both public entities. The government of the Philippines and the PCIC do not require Filipino farmers to enroll in agricultural

insurance programs. They also do not market their insurance programs through either the local government units, farmers' cooperatives, irrigators' associations, or financial and lending institutions such as the Land Bank of the Philippines. As mentioned earlier, and as confirmed by the farmer-respondents in the Philippines, oftentimes, enrolling in the PCIC's agricultural insurance programs is linked to borrowing. For instance, the Land Bank of the Philippines lends money to farmers mostly through farmer-cooperatives, and as a requirement to borrow money, the crop should be insured.

The Japanese government, on the other hand, requires some farmers to enroll in the NOSAI's nationwide programs until 2031. To date, NOSAI has optional programs, where farmers may opt to enroll or not. In 2031, all programs would be optional. The Japanese farmers employ effective coping strategies, and, in addition to NOSAI, there are numerous private institutions that also offer agricultural insurance. This justifies the Japanese government's decision to make all agricultural insurance programs of NOSAI optional, which gives the farmers more power to choose other agricultural insurance schemes that suit their needs.

NOSAI has 6 major insurance programs, 2 of which are nationwide in coverage that require farmers to enroll and where the government provides 50% premium subsidies. On the other hand, the PCIC has 7 major insurance programs and 1 special insurance program, which provides 100% premium subsidies to the farmers and fishers listed in the special directory.

Estimation of Damages and Delivery of Indemnity Payments

To claim indemnity payments, the insured farmer or any immediate family member must fill out the "PCIC Indemnity Form" and submit it to the nearest PCIC Regional Office within 45 calendar days from when the damages were incurred. A team of adjusters consisting of 2 members, 1 from PCIC and the other from either the Department of Agriculture, Department of the Interior and Local Government, Department of Agrarian Reform, National Irrigation Administration, or a concerned lending institution such as the Land Bank of the Philippines, will visit the damaged farm to inspect the damages. The verification of the damages will be categorized into three: 1) Total loss: 90% and above; 2) Partial loss: more than 10% and below 90%; and 3) No loss: 10% or less. According to the PCIC officials, the team of adjusters is expected to arrive and inspect the damaged farms within 3 calendar days after the receipt of the indemnity form. The officials of the PCIC mentioned

that the indemnity payment is paid as quickly as possible, i.e., not later than 60 calendar days from the submission by the affected farmers of the complete claims' documents to the nearest PCIC regional office (PCIC, 2022b).

Meanwhile, in Japan, in the event of a disaster and the expectation of payment of mutual aid, NOSAI will conduct a "loss assessment" to determine the extent of damage. If the Japanese farmers suffered agricultural losses due to natural disasters or other reasons, they are required to submit a "notice of damage" to NOSAI Associations. When the NOSAI confirms receipt, damage assessors selected by the NOSAI union chief (although for municipalities, the mayor of the municipality will select the assessors) will examine the "actual measurement" versus the "expected yield" for all the damaged farms. This inspection is termed "Exhaustive Survey". The survey will be conducted in groups of three, but the group may consist of more than three people if the damaged farm area is considered large.

The farm area to be surveyed is called the "evaluation area" and will be assessed in 1 to 2 days depending on the farm size and the number of people in the group of inspectors. Before the team of inspectors visits a damaged farm, the damage assessment committee will first conduct a sampling assessment. After they have completed the initial investigation, the team of inspectors will conduct a sampling assessment in each area where the sampling assessment by the damage assessment committee was conducted. This is done to balance the sampling survey groups. Based on the results of these investigations, the union leader holds a damage assessment meeting and finds a reduction in the amount of co-payment for each farmland (NOSAI, 2022b).

The Ministry of Agriculture, Forestry, and Fisheries then examines the results reported by the NOSAI associations, decides the amount of indemnity payment, and issues the certification of approval. On the other hand, for livestock, prefectural veterinarians inspect monthly. If they need insurance, they can file and receive it after 2 months.

According to the NOSAI key informants, the stages of filing and receiving insurance are the following: 1) submission of the insurance slip; 2) separate inspection of crop damage by three different inspectors; 3) inspection by people from the prefectural level of crop quality if the submitted insurance slip is up to date; 4) inspection by people from the Central government; 5) finalization of all the damage estimates in November regardless of when the damage was incurred then the indemnity payouts will be released in December.

Other Agricultural Insurance Sources Available in the Philippines and Japan

Aside from agricultural insurance products of the PCIC, Filipino farmer-respondents also enrolled in microinsurance, a type of insurance whereby farmers pay a small amount of premium but get a small amount of indemnity payments (Table 4). To insure their agricultural assets such as machinery and agricultural buildings, Filipino farmer-respondents also enrolled in *Kaunlaran sa Laguna Insurance,* which is a local provincial insurance. On the other hand, Japanese farmer-respondents enrolled in KYOSAI to insure farm types of machinery aside from using NOSAI. The average premium per ha that the Filipino farmer-respondents paid is USD 17 while Japanese farmer-respondents paid an average insurance premium amounting to USD 200 per hectare, which is about 10 times higher than the amount per hectare the Filipino farmer-respondents paid.

Table 4
Other agricultural insurance sources used by the respondents in the Philippines and Japan

Types of Insurance	Philippines (n=70)	Japan (n=88)
Government insurance	PCIC	NOSAI
Other insurance used in agriculture	CARD Microinsurance, *Kaunlaran sa Laguna Insurance*	KYOSAI
Average premium per hectare	USD 17	USD 200

Effectiveness of the Agricultural Insurance System

Table 5 summarizes the mean score ratings of the system of agricultural insurance programs of the PCIC and the NOSAI as claimed by the farmer-respondents. The farmer-respondents were asked to rate the effectiveness of the agricultural insurance programs of the NOSAI and PCIC from 1.00 to 5.00, with 5.00 being the highest. Additionally, the respondents were also asked to rate the overall agricultural insurance system, using the following system indicators: 1) knowledge of enrollment in agricultural insurance programs of the insurance providers;

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Table 5
Comparison of the mean score ratings of the system of agricultural insurance programs in selected areas in the Philippines and Japan

Tools	Philippines			Japan		
	Lowland (n=35)	**Upland (n=35)**	**All (n=70)**	**Lowland (n=44)**	**Upland (n=44)**	**All (n=88)**
Enrollment in program	2.93	2.70	2.83	4.80	4.00	4.57
Filing of applications for cover	2.78	2.40	2.62	4.80	5.00	4.86
Knowledge about the program	2.71	3.80	3.17	3.80	4.50	4.00
Access	3.57	2.90	3.29	4.80	5.00	4.86
Helpfulness of the staff	3.93	3.50	3.75	5.00	5.00	5.00
Meet expectations	3.36	3.40	3.37	5.00	5.00	5.00
Average distance (in km) of nearest insurance provider office	4.71	10.00	6.92	1.10	4.00	1.93
Overall agricultural insurance system rating	**8.14**	**7.00**	**7.69**	**6.00**	**5.00**	**5.60**

2) knowledge on filing for application for cover; 3) knowledge about the insurance programs; 4) access to the insurance programs; 5) helpfulness of the staff; and 6) expectations met. Aside from these, the respondents were asked to rate the overall agricultural insurance system rating from 1.00 to 10.00, with 10.00 being the highest.

The Japanese farmer-respondents gave higher ratings across all system indicators compared with their Filipino counterparts. This indicates that the agricultural insurance programs of the NOSAI were more effective than the agricultural insurance programs offered by the PCIC. The Japanese farmers answered that they were knowledgeable about the insurance programs and their processes and that the staff of the NOSAI were very helpful, and the programs met their expectations. Moreover, NOSAI appeared to be accessible to farmers as evidenced by its many offices across the prefecture. The average distance of NOSAI's offices to the Japanese farmer respondents' farms is 1.93 km.

On the other hand, the nearest PCIC office to the Filipino farmer-respondents' farm is almost 7 km. Additionally, Filipino farmer-respondents mentioned that they have little knowledge about the processes of the PCIC even though they gave fair scores as to how PCIC staff members assisted and met their expectations. Filipino farmers gave a high mean rating of 7.69 out of 10.00 in terms of the overall effectiveness of the PCIC's agricultural insurance programs, while Japanese farmers, in contrast, gave a lower mean rating of 5.60 out of 10.00 in terms of the overall effectiveness of the agricultural insurance programs of the NOSAI. Even though the PCIC's agricultural insurance programs were only fairly effective, the Filipino farmer-respondents still gave a high rating in terms of overall effectiveness. This is because, from the perspective of Filipino farmers, agricultural insurance somehow gives them fighting stance in times of natural disasters.

Conversely, Japanese farmer-respondents gave a low rating to NOSAI's agricultural insurance programs because even though they were evidently effective, the Japanese farmers are unhappy with the overall agricultural insurance system of the NOSAI. Additionally, some farmer-respondents also mentioned that there is lack of variability in NOSAI's agricultural insurance programs. In 2031, the scenario is likely to change as nationwide programs will be optional. That way, Japanese farmers would have more choices and freedom as regards the coping mechanisms to employ and perhaps enroll in other private agricultural insurance programs.

In terms of profit loss reduction, Japanese farmers receive more per hectare than their Filipino counterparts (Table 6). The average profit loss per hectare of the Filipino farmer-respondents during a disaster year was USD 1,016, and the Filipino farmers received an average indemnity payment of USD 242 per hectare, which reduced their income losses albeit by a small margin only.

A study by Rola and Querijero (2017) showed that the indemnity payments received by the farmers were effective in reducing the farmers' income loss. However, it took 103 days after the filing for the payment to arrive, which was too late for the farmers as the cropping season had already passed. The Japanese farmer-respondents' average profit loss per hectare during a disaster year was USD 34,091 and received an average indemnity payment of USD 25,568 per ha. The Japanese farmer-respondents received 10,465% or about 105 times more indemnity payments per ha than the Filipino farmer-respondents.

While the Filipino farmers emphasized that receiving even a small amount of indemnity payments would already give them enough cover, the insurance pay-outs they received were inadequate to save their agricultural production entirely; hence, they must resort to other coping mechanisms. Japanese farmers, meanwhile, enjoy the luxury of recovering at least 80% of their agricultural profits, which is enough to save their farming activities amid destructive natural disasters.

Participation in Agricultural Insurance Programs

The dominant reasons for participating and not participating in the NOSAI and PCIC's agricultural insurance programs are listed in Table 7. The answers of farmer- respondents are almost identical. The Filipino farmers view their participation to PCIC as a coping strategy and as a requirement for loans in financial institutions such as the Land Bank of the Philippines. On the other hand, the top reason as to why Filipino farmers did not participate in insurance programs is that their farms are not much susceptible to disasters, and they have enough savings to cushion the effects of natural disasters. Moreover, some Filipino farmers especially those who do not belong to a cooperative are unaware of PCIC; hence, they could not participate in its programs.

Japanese farmers producing crops under the nationwide insurance programs of the NOSAI were required to insure their crops. Farmers not covered by the nationwide programs participated in NOSAI's insurance programs as they view it as a coping strategy. A farming

Table 6
Profit loss reduction before and after agricultural insurance of the farmers, per hectare, in selected areas in the Philippines and Japan

Currency	Philippines (n=70)			Japan (n=88)		
	(Profit loss during disaster year) before agricultural insurance	(Profit loss during disaster year) after agricultural insurance	Average indemnity payment	(Profit loss during disaster year) before agricultural insurance	(Profit loss during disaster year) after agricultural insurance	Average indemnity payment
US Dollar	2.93	2.70	2.83	4.80	4.00	4.57

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Table 7
Comparison of participation in agricultural insurance programs in the Philippines and Japan

Item	Philippines			Japan		
	Lowland (n=35)	**Upland (n=35)**	**All (n=70)**	**Lowland (n=44)**	**Upland (n=44)**	**All (n=88)**
Dominant reason for participation	Requirement for loan; Coping strategy	Coping strategy	Coping strategy	Coping strategy	Coping strategy	Coping strategy
Dominant reason for non-Participation	Don't need insurance	Don't need insurance	Don't need insurance	Don't need insurance	Don't need insurance	Don't need insurance

corporation respondent insured his farm machinery as a coping strategy. Like Filipino farmers, the main reason some Japanese farmers do not participate in NOSAI's agricultural insurance programs is that the crops they produce are not covered by the nationwide program. They added their farms are not that susceptible to natural disasters, and it would be better for them to use their savings or use multi-cropping as a coping strategy instead of availing themselves of agricultural insurance.

Other Problems Encountered in Implementing the Agricultural Insurance Programs

There are many issues that must be addressed in the management of the agricultural insurance programs of PCIC. While NOSAI may, at some point, be considered exemplary, Japanese farmers were not pleased with its services. The lack of knowledge among Filipino farmers about the operations, for example the documentary requirements, of the PCIC's agricultural insurance programs causes the domino effect of inefficient program implementation by the PCIC. Additionally, the inadequate number of PCIC staff members is also responsible for this inefficiency. In times of widespread disaster, the PCIC responds faster to the needs of farmers in easy-to-reach areas than those in remote locations. Filipino farmers cited ineffective implementation, the gap in loss assessment, poor marketing of insurance products, and lack of access to agricultural insurance as their main problems in implementing the PCIC's agricultural insurance programs.

The PCIC educates farmers in English about its operations. Most Filipino farmers interviewed are not well-adept with the English language. Thus, Filipino farmers' low English proficiency contributes to the delay in enrolling in an agricultural insurance program and applying for coverage. Another problem with the PCIC is its record-keeping. Until 2013, there was no permanent staff member to oversee record-keeping. Most of its records are also not digitized. To address this issue, PCIC implemented an Automated Business System in 2013 to improve data retention and promote the digitization of its data; however, some data were already lost due to the poor record-keeping in the previous years.

Japanese farmers, meanwhile, were also unhappy about the damage estimation of the inspectors from NOSAI. Oftentimes, the damage estimates by the inspectors are lower than the farmers' estimates. Issues such as this, however, could be raised in farmer associations. For example, a local farmer association raised the issue some time in 2010. Consequently, the damage inspectors became kinder, resulting in more

comparable damage estimates with farmers. The government requires the farmers to enroll in NOSAI's nationwide programs whereby they are provided 50% insurance premium subsidies. After 2031, the government will cease providing subsidies and will no longer require farmers to avail themselves of insurance. This could influence enrollment in NOSAI's insurance programs in the future, and a decrease in the number of insurance policies will result in a decrease in NOSAI's income from insurance premium payments.

In terms of participation, Japanese farmers can communicate their needs using the NOSAI website. Given, however, that majority of the farmers are old, they have difficulty using this facility. Hence, they are only able to voice their opinions during the meeting with NOSAI. Another issue mentioned by the key informants was agricultural insurance is not really a necessity for the farmers, as they have other coping mechanisms such as availing themselves of other insurance. Japan also has an impressive infrastructure (Figure 5) compared to other countries, which could reduce the impact of severe natural disasters.

Figure 5
Flood control infrastructure in Gifu, Japan

Additionally, the Japanese government provides subsidies to the agricultural sector should a major disaster occur. Most farmers are enrolled in the nationwide programs because the government requires them to. When the time comes that insurance is not a requirement, they could opt not to use agricultural insurance anymore and use other coping strategies instead. For these reasons, the agricultural insurance programs and NOSAI are likely to be obsolete in the future.

Agricultural Insurance Implementation Lessons from Japan

Unlike Japan, the Philippines does not have a centralized federation of cooperatives focused on agriculture. Instead, the Philippines has the Cooperative Development Authority, which regulates Filipino cooperatives of all types in the country. Unlike Japanese farmers, for whom membership in the Japanese Agriculture Group is mandatory, Filipino farmers' membership in agricultural cooperatives is voluntary. Because of this, many farmers in the Philippines work individually. Consequently, access to information among non-cooperative members is challenging. Japanese farmers, on the other hand, not only strive to educate themselves, but farmer-groups also tend to share technical information whenever they can. Additionally, the government regularly provides new information to Japanese farmers to improve agricultural activities.

The centralized agricultural association of Japan is the National Federation of Agricultural Cooperative Association (ZEN-NOH). The Japan Agricultural Cooperatives Group is an organization composed of agricultural cooperatives whose goal is to protect and improve farmers' agricultural management and livelihood in the spirit of mutual aid. On the other hand, ZEN-NOH is responsible for the marketing and supply business of the JA Group. It aims to bring producers and consumers together, revitalize production centers, and protect society and the environment. Through integration with the Japan Agricultural Cooperatives prefecture-level associations under an organizational restructuring aimed at strengthening its business foundation, the ZEN-NOH Group currently has 32 prefectural headquarters and one prefectural office across the country (ZEN-NOH, 2022). Japanese farmers can also purchase agricultural inputs, machinery, and technology from the ZEN-NOH Group.

Additionally, farmers also receive information such as prices of agricultural products and information about NOSAI. Thus, every Japanese farmer knows about the existence of NOSAI and its programs and processes. The group ZEN-NOH makes life easier for both consumers and farmers.

In the Philippines, on the other hand, there is no centralized federation of agricultural cooperatives with this kind of structure. A centralized agricultural cooperative could prove effective in empowering Filipino farmers, as Japan has done with the ZEN-NOH. In addition, under such a structure, the PCIC could more easily market its products and insure all Filipino agricultural producers. The government does not require Filipino farmers to insure their farms unless they receive a loan from financial institutions such as Land Bank of the Philippines. On the other hand, NOSAI requires Japanese agricultural producers who grow rice, wheat, barley, and livestock to obtain insurance, but key informants said it runs only until 2031. A farmer-respondent shared these crops are essential to Japan's food system, which may be the reason the government requires farmers who grow these crops to have insurance with a 50 % premium subsidy. The staple food in the Philippines is rice, but so are corn, livestock, and fish. In this scenario, the Philippines can learn from Japan. The PCIC could require these types of agricultural producers to purchase insurance to protect them and ensure food security in the country.

Climate change is a real threat, especially to disaster-prone developing countries like the Philippines. If PCIC compensation payments are too low, Filipino farmers will not be able to use agricultural insurance as their sole mechanism to cope with natural disasters. Instead, they must rely on other coping strategies to minimize the impact and damage from these extreme events. Japanese farmers not only receive subsidies from the national government in the event of destructive disasters, but they are also assured of up to 80% compensation relative to their income. The PCIC can learn from this system and could provide compensation payments to Filipino farmers that are also around 70 to 80% of their income. This could be possible if the PCIC increases its premium payments, for which the Philippine government could provide initial subsidies. The government can also promote a culture of insurance by educating farmers about its benefits. The PCIC could subsidize income insurance only if farmers practice good record-keeping. Most Filipino farmers, however, do not keep records of their agricultural expenses and profits, making it difficult for the PCIC to implement income insurance, just like in Japan.

The results of the case studies show that the Philippines can learn from Japan. NOSAI alone may be the only coping strategy that Japanese farmers can adopt to minimize the impact of extreme events. In addition, the coping strategies used by Japanese farmers have been proven to be effective, but some believe that agricultural insurance is no

longer necessary. If Filipino farmers could rely on agricultural insurance as an effective standalone coping strategy, they need not resort to other coping strategies such as borrowing from formal and informal sources and could instead use their extra money to build savings.

CONCLUSION AND RECOMMENDATIONS

The results of the country case studies of the Philippines and Japan show the major differences between agricultural production and agricultural insurance systems. Agricultural insurance can be a standalone risk management tool for Japanese farmers because Japan's agricultural insurance provider has sufficient capital from the premium payments it receives from its beneficiaries. In turn, the insurance association can give high indemnity payments, high enough to cushion the impacts of natural disasters. In contrast, the Philippines' main implementer of agricultural insurance has low capital build-up due to the low premium payments it receives because of low farmer enrolment in its programs. For this reason, the corporation could not give high indemnity payments to its beneficiaries and its insurance program could not be used as a standalone risk management tool in the Philippines. In Japanese culture, insurance is more of a total approach and not just for agriculture. A Japanese person will have insurance on almost everything such as in health, accident, fire, building, vehicle, or bicycle, among others. On the other hand, Filipinos do not have this kind of mindset. They do not look at any kind of insurance as an investment but view it as a cost. Filipinos most likely spend their disposable income on leisure activities, material things, and special occasions such as birthday parties and weddings.

Based on the case study findings and lessons learned from the Japanese agricultural system, the following recommendations are proposed to improve the agricultural insurance system in the Philippines and other disaster-prone developing countries.

1) The Philippines' and other developing countries' agricultural insurance systems can learn lessons from Japan in terms of its structure.

   There should be a targeted agricultural cooperative or federation of agricultural cooperatives or simply an association of all farmers that connects farmers directly to markets and institutions to market their products. All Japanese farmers are members of the Japan Agriculture Group, whose National

Federation of Agricultural Cooperative Associations (ZEN-NOH) maintains the link between consumers and producers and provides information about the processes and services of NOSAI. Therefore, the bulk of the profit goes directly to the Japanese farmer groups. There is no setup similar to this in the Philippines.

Moreover, many Filipino farmers are not members of a cooperative. Because of this, the bulk of the income mostly goes to the middlemen. Establishing a centralized agricultural cooperative or an association of agricultural producers can also serve as a marketing channel or linkage in which the cooperatives, irrigators' associations, farmers' organizations, and individual farmers can market their products directly to consumers and in the process, increase the farmers' share in profit. Lastly, the centralized agricultural association can be a "one-for-all" organization for farmers, which can limit their transactions to the important institutions involved in the agricultural sector and save resources.

Moreover, these changes can diminish opportunities for fund mismanagement and other possibilities of corruption, as well as strengthen transparency in the agricultural sector. Having this structure will empower Filipino and other developing country farmers in three ways: 1) improved access to credit; 2) improved access to agricultural insurance; and 3) improved access to farming information, including climate information and agricultural extension advisories.

2) The Government should provide premium subsidies for farmers to change farmers' mindset and encourage them to participate in agricultural insurance programs.

To change the cultural perspective of Filipino farmers and those in other developing countries about insurance as an investment rather than a cost, the government should first provide premium subsidies. To make this scheme sustainable, the government may shoulder a bigger proportion of the premium of farmers in the first year of implementation; and gradually decrease government share, until the farmers are willing to fully pay for the insurance premium. The specific percentages can be a subject of future study. The goal is to demonstrate to farmers the benefits of investing in agricultural insurance, thus, gradually changing their mindset.

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