

Management of Climatic Changes and Risks Involved in Agriculture

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Abstract

Agriculture is distinguished by complexity and challenges which affect productivity and competitiveness directly. Disaster management is a comprehensive tool for farmers to eliminate bias. Droughts, flooding, and hurricanes, all of which are caused by climate change, are common occurrences. These factors are affecting many individuals and businesses in the very same area at that time. Despite this, there indeed exists a paucity of collected works on the use of various risks management strategies at the very same time, as well as the potential for qualitative data were obtained. A broad ranges of adapting strategies have also suggested to have a prospective to lower the incidence of agricultural practices to climate change-allied threats, specifically in the brief period. The government has implemented multiple schemes for protecting farmers from agricultural hazards, like with the climate-based crop insurance scheme. This paper is developing the practice of identifying and determining methods of agricultural adaptation for climate change. The topic of disaster risk reduction and management was discussed, followed by a study of model compilation. This authors conclude with an agricultural production insurance study that focuses on behavior concerns.

Keywords: Adaptation, Climate Change, Farmers, Crop Insurance, Policy, Response Options, Weather.

Introduction

Agriculture is a dangerous business as it is vulnerable to natural adversities such as flooding, droughts, and cyclone. Agriculture accounts for 24% of GDP in India, and any disruption in its production has a multiplier impact on the country's economy. Since economic and agricultural growth are inextricably related, policymakers and researchers face a major challenge in managing agricultural risks. Underinvestment in agriculture stems from risk aversion, resulting in inefficiency. Crop insurance assists in the stability of farm production and profits for farmers. It aids in the efficient distribution of resources in the manufacturing process. The Indian government has expressed concern about the rising risk in agriculture, which has resulted in the unfortunate phenomenon of farmer suicides, such as that which occurred in Maharashtra. In the face of uncertainty and danger in agriculture, numerous schemes have developed over time in various countries to protect farmers, including guaranteed prices, subsidized credit, and crop insurance, which are of immediate concern in the short term.

Around 100 million people live taken into account \$1 a day. 3-quarters including its population depends on agriculture and much more than half are mainly lives on the line by farming or farmed animals (International Fund for Agricultural Development 2001) [1]. Furthermore, the economic ramifications of snow conditions environmental hazards are particularly prone for poverty reduction. Many poor and working class have sources of revenue which, although still not engaged in agricultural production, are linked to successful crop yields or otherwise extremely susceptible to heavy climate variability.

Non - insured climate hazards attribute to both the economic insecurity of poor families both individually and collectively. Although many agricultural workers almost always mention health problems as their highest risk, unsaved weather risks often contribute to the existence of economic insecurity, both directly and indirectly. For instance, drought conditions may directly destroy productive assets building up across years of horrendous consumption at high potential costs. Households that suffer the consequences of such events already have complexity restoring and starting the prolonged terms of obtaining capital assets[2].

Adapting agriculture requires a large number of suppliers with a multitude of often interconnected responsibilities. The adaptive procedure requires personal growers, businesses, and private industry and corporations. Government agencies and companies should appreciate the importance of producer decisions on personal and corporate initiatives. Selections for farming adaptation are components of something more thorough procedure at any and all stages, where certain decisions are being made 'progressively' in something like a 'response' way, during real time. Several of the supporters must understand that, if any at all, growers recognize environmental issues in specific as part of their forward management practices.

In other countries, a lot of mechanical mitigation measures are being used to safeguard themselves against weather damage. Exemplars including supplementary irrigation to mitigate for deficient rains, or dams and water management levees. Just from the other hand, similar methods of structural mitigation really aren't generally pragmatic, believable or cost effective. The financial impact of hazard could be decreased in families' saving, diversifying, sharing occupancy, decreased risk outputs and assets that require less expenditure in unstable production assets.

1.1. Weather Index Insurance:

The potential of weather index insurance being utilised in recent times aim of providing risk mitigation alternatives also for rural poor has also been investigated by several researchers and development institutions. In addition to the original losses of insurer, the Weather Index insurance pays expenses depending on the performance including its climate index which again is closely associated with perceived losses. But in the most fundamental sense, a weather index determines a synoptic weather variable (for instance, rainfall or temperature) throughout a specified period beyond a certain weather station.

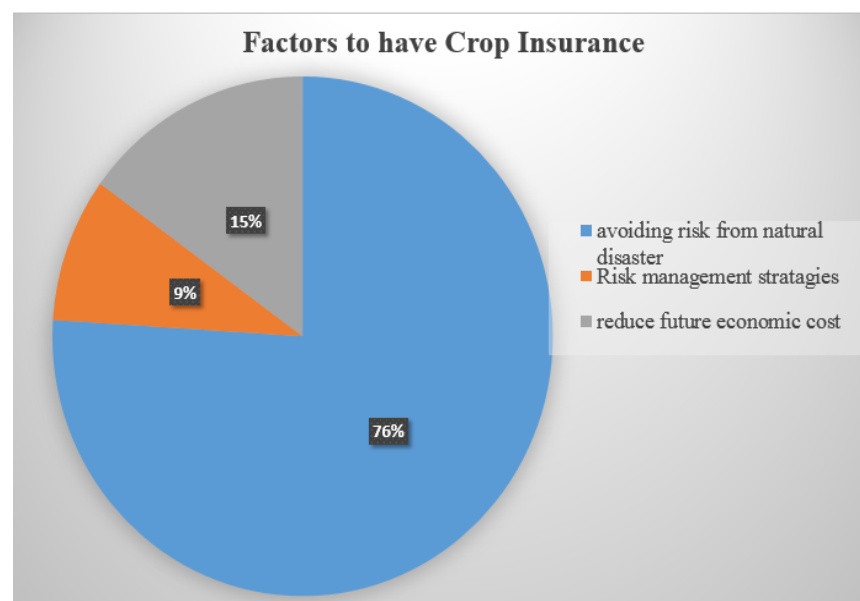


Figure 1: Pie Graph Showing Reasons Why Every Farmers Consider Crop Insurances

The weather index insurance providers establish a minimum as well as a limitation determining the number of scenarios covered by compensation payments. If the value of the index exceeds the threshold, the insurance policy pays compensation if the weather forecasting elements is excessively higher (e.g., excessive rainfall or exceptionally hot temperatures). The top bounded is greater than the bottom boundary. The justifications why growers have had to take agricultural subsidies in to the consideration in Figure 1.

The protection is grounded solely on precipitation assessed at any weather station, not on damages suffered by the policyholder. Weather index insurance has many benefits over conventional insurance policies:

- a) The insurance policy is simple, which makes the transactions procedure simpler.
- b) Covers being compensated purely over the basis of the fundamental directories realized value.
- c) There is no need to make an estimation of the policyholder's actual loss.
- d) Individual policyholders are not confidential giving to risks contact, as is case for conventional insurance policies.
- e) There's no reason to think the policyholder knows more about the underlying index than the insurer. As a result, there is little risk of adverse selection.
- f) Furthermore, since the policyholder has little control over the comprehension of fundamental climate indices, little risks regarding ethical menace.

Due to its ease of selling and losses modification, the absence of antisymmetric specific details as well as the aspect that insurers may not be categorized by risk exposure, operating costs are low when compared with standard insurance plans. Without a detailed farming experience insurance policies can be sold and maintained by insurance companies, although no farm risk analysis or improvement is necessary. Diseases, infestations of insects or any number of other conditions than the index based weather factor may lead to decline. Secondly, the climatological variables for determining indexes cannot protective layer dynamically. As a result, climate non-constant's measurement over any farmhouse or in the home can vary significantly from the measurement at the weather station.

1.2. Data Collection and Management:

The insurer as well as the purchase owner should always believe that perhaps the index is really being properly calculated and as such the data is safe from interfering also with efficiency of weather index insurance. A reliable government or private source of publicly available weather data is needed to calculate the underlying index to generate this trust. New product development since the underlying index builds on publicly accessible information, competitors can easily copy a weather index policy once a weather index insurance program is developed and sold to a provider for sale. Insurance companies from the private sector are hesitant to spend in the growth and research required to market the products insured on the Climate Index.

Consequentially, governments and donors have continued to finance feasibility analyses and pilot testing for changing weather financial instruments. Governments and donors may should provide a resource of contingent resources by delivering weather index assurance firms[3][4]. Some data indicate that some of those at risk don't really understand the probability among the most severe and rare vulnerabilities. However, the potential for such a incident cannot be neglected by same weather index insurance companies.

Premiums paid seem to have been billed for something like the chance, including some that are much more excessive than many of those found in the statistical information, of exceedingly exceptional weather events. Insurers and reinsurers seem to be rather conservative in the measurement of premium weight, as the occurrence and severity of such extreme events cannot be measured using data. This creates a difference between what customers are prepared to pay for severe weather coverage and also what suppliers are preparing to take into consideration. Crop insurance is widely acknowledged as a key tool for ensuring farm income stability by fostering technology, facilitating investment, and rising credit flow in the agricultural sector.

Crop insurance encourages farmers' self-reliance and self-esteem by allowing them to seek compensation as a matter of right in the event of crop failure. As a result, it softens the blow of crop loss by ensuring farmers' safety from natural disasters beyond their control. In recent years, India's central and state governments have implemented a number of crop insurance schemes as a safety net. Recognizing the value of crop insurance as a method for managing risk and uncertainty in agriculture, the current study looked at farmers' knowledge of crop insurance and perceptions of various agricultural risks. This study enlightens identifies:

- (a) Numerous agricultural options available for risk mitigation in the event of a disaster, and it is somewhat generic,
- (b) Because of unplanned urbanization, chronic poverty, and habitat depletion, agriculture insurance could have the ability to reduce disaster danger,
- (c) Filling the gap in expertise for a better financial process, minimal product diversification capacity, and high administrative operating costs,
- (d) A list of the various forms as well as level of climate adaptation that are possible in the agriculture sectors, and
- (e) A collection of agricultural adaptation options of dealing straight through risk posed by weather alteration.

2. LITERATURE REVIEW

2.1. Weather Data:

Comprehensive and reliable weather data for the past and future is a prerequisite for the emergence of a competitive weather risk market. Historical data, usually at least 30 years of regular information on key parameters, must be available and affordable. Operational weather stations must be established, as well as the basis weather variables and cleaning procedures. The World Meteorological Organization(WMO) collects Surface Synoptic Observations (SYNOP) data from all countries' weather stations [5].

Many countries have adequate weather data for a long period of time. Nonetheless, the availability and accuracy of rainfall measurements was jeopardized in certain countries for a variety of reasons. Although the consistency and comprehensiveness of the databases are often strong, and the databases are often cleanable and accessible, numerous emerging nations don't have simple or inexpensive entree to climate information. Furthermore, in developed economies with weaker institutional structures, ethical risks problems to climate information is collected collection are compounded.

Finally, the lack of widely agreed excellence controller protocols, and diverse appearances of non SYNOP information[5] – differing meanings of everyday average or thorough going temperatures information. There are a number of options for obtaining safe and accurate rainfall data:

- a) First and foremost, incentive systems must be oriented toward precise data measurements.
- b) Secondly, evaluating historic original information and costing assembled information and comparing the weather station series against third-party information helps in gaining a comprehension of the cleansing techniques utilized by climate models.
- c) Thirdly, weather services, such as that of the climate services of Moroccca, may also be tightly intertwined in OECD countries to significant established climate services. These agreements might make a contribution to just the implementation of global quality standards.
- d) Fourth, the possibility of data tampering can be effectively mitigated by using the weather risk provider's fallback stations as well as cross checks within adjoining postings [6].

Data tampering can also be prevented by contract design. Proportional contracts, for example, have less incentives for exploitation than digital contracts, which have payoff that are fix on a “all or nothing” basis.

Furthermore, weather risks are linked within an area. Local insurers with insufficient geographic diversification find it difficult to pool losses and have affordable insurance coverage due to this spatial covariance. Although primary insurers can move risks to a foreign reinsurance market in principle, there is little risk transfer from

emerging markets for a variety of reasons. Due to a absence of standardization as well as unequal knowledge amongst brokers, the sizes of climate risks keep on available for writing was small, and transaction costs are high [7].

Finally, government risk assessment initiatives will overwhelm confidential risk management. Many nations have made advantage of several of interventions to support agriculture. Governments decrease the probability through, for instance, stabilization of prices, subsidies of crop return health coverage and relief of drought. Most of the schemes have accumulated substantial public money, including crop protection, but very little proof is given that they have a positive effect on agricultural lending or construction. They instead helped farmers earn a good risks and concerning key on states humanitarian assistance [8].

2.2. Vulnerability to Weather-Shocks:

Most families and businesses in developing countries depend on agriculture and agribusiness for their primary source of income; in 1999, 69 percent of the population in low-income countries lived in rural areas, compared to 50 percent in middle-income countries and 23 percent in high-income countries. In low-income countries, agriculture accounted for 27% of GDP, compared to 10% in middle-income countries and just 2% in high-income countries[6]. These figures understate the importance of agriculture for economic development, which is amplified by multiplier effects, the role of agricultural exports as a source of foreign exchange (over associations with agriculture to additional financial fields), and the overarching importance of subsistence farming for the majority of the population's livelihood.

Agriculture is inherently reliant on the vagaries of nature, such as rainfall variations. This puts farmers' productivity (or yield) at risk, affecting their ability to repay debt, pay land rents, and provide for their families' basic needs. Weather events, on the other hand, are essential for rural lending institutions and agribusinesses because they decide borrowers' and input providers' risk exposure. Since weather conditions influence a large portion of business activity, many developing countries in Sub-Saharan Africa and other areas of the world have high vulnerability to rainfall variability in both agriculture and GDP[9].

Ultimately, the impoverishment of farmers and producers becomes macroeconomic vulnerability. Emerging nations also rely too much on the climate, and furthermore suffer the most dramatic disasters, several of which are compounded by weather threats (due to potentially dangerous natural circumstances). The World Bank has estimated that somewhere between 1988 to 1997 natural catastrophes claimed 50,000 lives per year and caused more than US\$ 60 billion in serious trauma[6].

The vast majority of these costs were borne by developed countries: In 1990 and 1998, the total annual cost of floods in Asia, which understandings 70percent of the floods, was estimated at US\$15 billion in the 1990s. These figures are likely to grow in the future, based on current trends. El Nio occurrences, which are associated with unusual floods, droughts, and storms, have become more common in the last ten years [10].

2.3. Traditional Weather Risk Management is Expensive and Unproductive:

Farmers have often been exposed to weather threats in developing countries and have been there for a long period of time achieve goals for limiting, minimizing, and managing such risk[11].Traditional risk management requires actions prior to the actual possibly dangerous occurrence. Former tactics including neutralizing stocks as a financial safety net and diversifying the activity of revenue by adjusting the allocation of labor (working in small farm, non-farm, and seasonal migration) or modifying farming methods (planting different crops, like planting in different fields and staggered over time, intercropping, and relying on low risk inputs).

Company might also insure by increasing their capital and diversifying their business activities. Irrigation schemes and conservation tillage that preserves soil and moisture are used by communities to mitigate weather risks. Farmer seeking off field jobs, distressed cattle and farms properties and deriving reserves from relatives, and neighbors are all examples of ex-post strategies.

Although risk management has helped developing countries deal with weather threats, it has serious weaknesses[12]. These techniques are expensive because they frequently reduce vulnerability in the shorter terms while increasing vulnerability in the long run. When a farmer diversifies, for example, he foregoes higher incomes because of specialization in exchange for low income inconsistency. An agriculturalist that vends creative possessions. Similarly, if a company chooses of drawing credits lower to its optimum amount in directive to maintain a credit reserve in case of a weather shock, it loses out on lucrative market opportunities.

Furthermore, some informal risk management tactics are unsuccessful when it comes to dealing with weather threats. Weather-related events are a form of covariate risk since they usually impact a large number of households in a city or area at once. However, informal agreements tend to break down in great stress' times, such as crop failure due to drought, since all members in group, "danger pools," are unnatural at same time. The village's overall revenue is limited, resulting in the breakdown of community-based informal insurance arrangements [13].

Livestock prices would collapse when supply outstrips demand, much as they did in examples of the farmers tries selling live stocks in making ends meet afterward a scarcity. Similarly, as farmers pursue off-farm jobs in the wake of natures' disasters, the unexpected increase in labor source reduces marketplace salaries.

2.4. Climate Inducements for Agricultural Variation:

In the present typical vegetation period conditions and likely future similar practices the impact of temperature on agriculture was presently considered. Average temperature and precipitation changes are frequently the target of traditional scenarios of changing climate. Other climatic traits such as seasonal growth and frost timing and environmental parameters like pesticides and diseases have also from the past been considered, inevitably for an average year. Even though the climate change, involving stability and exceptions, has significant impacts, agricultural adaptation alone does not work or improve as a response to certain climate stimulation. Economic circumstances, policies, the atmosphere, population, and technology, among other non-climatic factors, all have important consequences for agrarian decision making. [14].

The impacts of changing markets, trade deals, mineral rights, and government grants and services and support are going to exacerbate adaptations. In reaction to non-climatic considerations, in wide variety of markets, as well as different climatic conditions, agricultural improvements are frequently made. Non-climatic factors can either aggravate, exacerbate or dampen the effects of climate change. The hazard should be reduced or mitigated. Adaptive agricultural decisions are being made with regard to the combined impact of climate and non-climate circumstances that commercial growers feel politically.

3. DISCUSSION

Farmers in emerging and transition economies must consider risk when making investment and financing decisions (Figure 2). Agricultural insurance, while being one of the most commonly listed risk management methods, might be playing critical roles in handling the hazards associated with farming. In practice, agriculture insurances are always used in conjunction with a broader range of risk management strategies, of which good farms administration exercises are a key component. Agriculture insurance schemes may help farmers reduce their disaster risks.

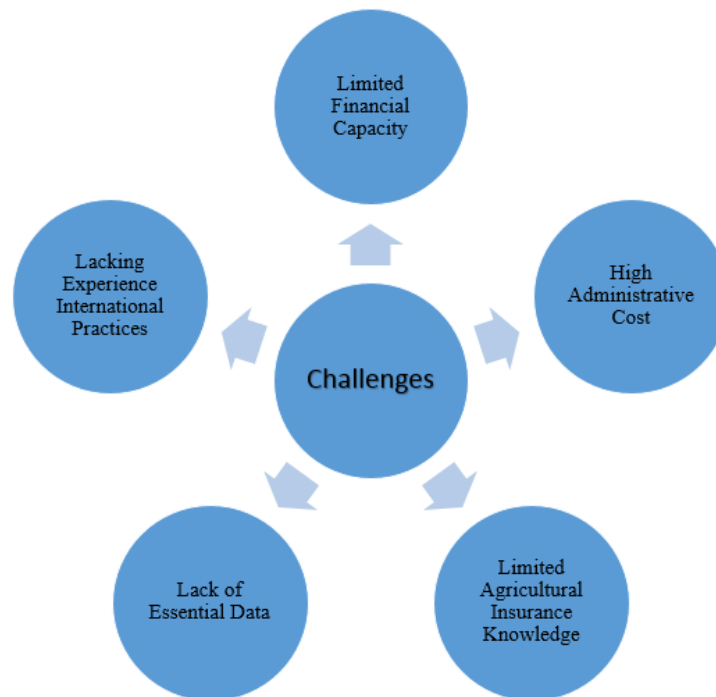


Figure 2: Challenged Faced by Insurance Companies in Order to provide Services.

The ensuing commendations be able to endorse farming insurance and decrease calamity risks in agriculture productions;

3.1. Governments' initiative:

The governments may be acting like reinsurance firm in the event of agricultural losses. When native insurer and foreign reinsurer which are unable to offer additional loss coverage, the government should provide compensation for agrarian crops and cattle insurances initiatives.

3.2. Companies with community insurances:

Public insurance companies could form public-private partnerships with domestic private insurance companies, non-governmental organizations, and other agricultural insurance schemes. These collaborations may help the local agricultural insurance sector with both financial and operational support.

3.3. Design and implementation of agricultural insurance products:

In the formulation and construction of agricultural insurances, protective corporations may segment technical exercising. Through that same collaboration you will be able to refine the methods for risk management and loss adjustment and to train insurance personnel and increase awareness among farmers.

4. CONCLUSION

Premium rates will still have to be charged at all for the probability, such as the one that are much more serious than any of those contained throughout the historical information, of exceedingly extraordinary weather events. Insurers and reinsurers appear to be extremely conservative in the estimation of premium load, as the occurrence and severity of such extreme events cannot be measured using data. This reflects the difference between how much customers are willing and able to pay for unusual weather insurance and also what retailers are preparing to take into consideration. Insurance cover is internationally accepted through promoting modern technologies, supporting investment, and expanding recognized as an expense throughout the agriculture industry as the key framework for implementing agricultural income stability.

In order for weather modification risk assessments one or both risk assessments in farming be realistic, well-founded forecasts of the possible use of response options must be included. This necessitates an understanding of agricultural decision-making mechanisms, as well as how future climate change adaptation blends into current government, business, and producer management decision-making, as well as the pressures and triggers for adaptation. Simultaneously, any attempt to facilitate and support the introduction of agricultural adaptation options should provide an assessment of the options available.

Investment and productivity expansion can be precipitated by proper risk transmission technologies which make a contribution to poverty reduction in rural areas in lower-income countries. The weather index insurance is a compared to other countries simple and effective notion, which would otherwise appropriately spatially transfer weather risks within certain conditions. While experience so far has been too small and too new to draw a general conclusion about the long term sustainability of the weather insurance index, experience in Mexico and India indicates that all these products might have been a helpful methodology for something like the profit sharing to the rural population, at least in some places. Agriculturalists having a choices' variety for dealing agrarian threats, and several uses many of them at the same time. However, there is no research on the influences that inspiration the uses of two or more risks organization tools in this context.

Throughout the field of agricultural production methods, contemporary evidence on the impact and susceptibility of extreme weather events gradually recognizes the key role played by adaptation. This paper inventories many more kinds and levels of ecological sustainability in the agricultural production possible. It also relies on agriculture sector adjustment options in efforts to answer climate change impacts explicitly. There seems to be an extremely large number of different as well as currently adaptation strategies, including one with a large number of different characteristics, in 4 categories. This paper also offers foundation for recognizing the various agricultural choices available, the forms themselves are somewhat generic. Obviously, complex adaptation steps for specific farm systems, territories, and farmers will want to adapt to native requirements and resolution manufacture procedures. This study also explores Disaster risk reduction adverse effects of agricultural insurance due to unauthorized industrialization, widespread poverty, and degradation of ecosystems. The decrease of threaten the survival through business strategies can play a significant role in decreasing potentially disastrous dangers. Secondly, the absence of expertise in the area of efficient business frameworks, analysis of specific for product differentiation and high operating administrative expenses was investigated.

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