Agriculture is the backbone of Indian economy rather the way of life for J&K farmers. Hence in material terms, it provides sustenance for the vast majority of their population and accounts for nearly half of Indian national product. On the success of which depends the success of our entire economic growth. Despite growth and development of industries and services even now, much of Indian population depends on agriculture, and industry for its raw material; exports emanate directly or otherwise from the agricultural sector and the increase in the rural income constitutes an expanding market for the domestic industry ostensive due to more purchasing power.

When we discuss about the experience of Indian economy in the new global context, we cannot divorce the discussion from India’s specific historical experience in undertaking the “development projects”. Over the last sixty years, India has shared much of the fundamental contradictions of a mixed economy with other comparable developing nations. These contradictions have not yet disappeared; these continue despite the onset of economic globalization; instead, the task of resolution of these contradictions has been rendered more complicated by the processes of economic globalization. In 1990s, Indian economy has been changing understanding of the relative contribution of agriculture and industry to economic growth. There has been a renaissance or shift-away from an earlier “industrial fundamentalism” to an emphasis on the significance of agricultural development and productivity for the overall development process.

A particularly disturbing aspect of our performance over the last two decades is that agricultural growth has decelerated over the mid 1990s. Agriculture had grown at 3.2% from 1980 to 1996. It decelerated to 2.1% during the Ninth Five-Year Plan. The corner-stone of the Tenth Plan strategy was a reversal of the declining trend in the growth rate of agriculture and with a target for agricultural growth at 4%. Unfortunately, actual performance of agriculture has deteriorated even further and will possibly not exceed 1.5% during the last year of the current Plan. In these circumstances, it is hardly surprising that a perception has grown that the benefits of
growth have by-passed a substantial sector of Indian people, the rich became more affluent, the poor poorer.

The reform process in India after 1991 significantly weakened the institutional support structures in agriculture. The protection offered to agriculture from predatory imports was removed, resulting in a fall in prices of many commodities. As part of fiscal reforms, major input subsidies were brought down relative to the size of the agricultural economy. Public capital formation in agriculture continued to fall, and the growth of public expenditure on research and extension slowed down. The expansion of rural credit was halted, reopening the doors for the informal sector. Public resources were sought to be channelled away from food crops and towards high-value export-oriented crops. Regulated markets came to be treated as obstacles to efficient marketing. Over the period of economic reform, agricultural growth rates slowed down significantly. Most importantly, the rate of growth of food grain production slowed down, and fell behind the population growth rates for the first time after independence. The per capita food grain availability fell from about 175 kg in 1992 to 163 kg in 2001. In a country where about half the children below the age of three are underweight and more than three-fourths of children aged 6-35 months are anaemic, the reduction in per capita food grain availability after 1991 has deep worrisome implications. The spate of farmers’ suicides reported from certain parts of the country reflects the distressed state of agriculture after 1991. Between 1997 and 2008, there were about 170,000 suicides by “farmers” in different states in India.

The suicide of several small and marginal farmers during the last few years is a striking example of mismatch between GDP growth and the wealth distribution in India. The small and marginal farmers have been sidelined to the fringes. A very large number remain steeped in debt. All these years, they have been living on the hope that brighter days would dawn very soon, as promised to them by the powers that be. If bold remedies matching the gravity of the problem are not taken by the government, both union and states, the problem will become further compounded and complex, ultimately, threatening the very fabric of Indian society.

The periodic failure of the monsoons in the last a few years in Jammu and Kashmir where we have had 4 failures in a row is certainly a contributing factor, but the
problems of agriculture go beyond weather. There has been a loss in the momentum which suggests a deeper problem in Indian agricultural strategy. Correcting this must be accorded the highest priority. There has been a distinct slow-down in agricultural growth during the past two decades, in spite of substantial acceleration in the growth of the Indian economy.

The slowdown is accompanied by a significant reduction in the share of agriculture in national product, but without much reduction in the share of workers depending on it for their livelihood. The two faces of the emerging distress are the manifestation of agrarian crisis that threatens the livelihoods of farmers, particularly those of the small and marginal ones; and the agricultural development crisis of reduction in its overall growth rate accompanied by declining profitability. The support systems to farming have weakened, public investments in agriculture have declined and institutions have become unresponsive. In the absence of any breakthrough in cost reducing technologies, the rising input prices have made cultivation un-remunerative. The result is the manifestation of agrarian crisis, often, in the extreme form of distress that results in suicides by some farmers.

Although there are a number of factors behind the present agrarian crisis yet it is the growing indebtedness that compels attention. It is declining earnings that results in the inability to repay debt that triggers farmers’ decision to commit suicide. Hence, indebtedness of farmers becomes a central issue to be addressed. It is in this context that the Government of India has framed national agriculture insurance scheme to support the clearance of indebtedness of farmers (beneficiaries and non-beneficiaries), in its totality with a view to designing and implementing effective policies, programmes and instruments of intervention.

Farmers are exposed the whole year around to a variety of risks, both market-related, such as price variations, and non-market-related, such as unfavourable weather, pests, and diseases. Such risks make agricultural production unstable from year to year, affecting the income and welfare of agricultural producers. If agricultural commodities are important food or export crops, the risks eventually reduce foreign exchange earnings and further lead to a lower national income and to reduced long-term productive investments in agriculture.
Weather plays a fundamental role in agricultural disasters. Thanks to the Government of India and agriculture insurance company of India, for development of agriculture crop insurance and financial markets as a result of which it is now possible to transfer significant portions of weather risks off the farm. A new generation of financial products, known as weather derivatives and weather insurance, enable farmers to make risk management decisions about their operations that are affected by specific weather events, thereby providing them with greater income stability.

Agricultural insurance, a financial tool to minimize the adverse effects of agricultural risks, has been devised to address the agricultural production or yield risks mainly due to adverse climate. As agriculture became more sophisticated, however, producers were demanding insurance to cover a greater number of risks. Complying with this demand and in order to overcome the limitations of traditional agricultural insurance that originated from the characteristics of agricultural risks (occurring over a wide area at the same time, etc.), new insurance products and schemes and alternatives have continuously been developed.

Farmers are exposed to risks arising from rainfall variability, market price fluctuations, credit uncertainty, and adoption of new technology. The diversities in the sources of risks require a variety of instruments for protecting the farmers. In India, these include crop insurance, rainfall insurance, farm income insurance and a calamity relief fund. Most of these measures other than agriculture insurance are in the experimental stage.

Analysis of Need for Rural/Agricultural Crop Insurance in India and Jammu and Kashmir

The ongoing National Agricultural Insurance Scheme is a good step forward to insure risks of millions of farmers whose livelihood depends on the pattern and distribution of monsoon rains in India. However, it suffers from some of the major problems inherent in crop insurance programs throughout the world.

With the passing of Insurance Regulatory and Development Authority (IRDA) Act 1999, Indian insurance sector opened to a healthy competition by facilitating entry of new private insurers into insurance business, hitherto the area of public sector.
Insurance penetration (premium as % of GDP) in India was merely 1.93% showing 0.54% and 1.39% in nonlife and life insurance sectors respectively, which is far below the 16.54%, 13.35%, 11.28% & 11.17% of South Africa, South Korea, Japan & UK, respectively. Being an agrarian economy, there are immense opportunities in agricultural/rural insurance in India. The new areas like weather insurance, rainfall insurance and cyclone insurance give scope even for new private insurers and reinsurers to exploit the opportunities in the niche areas.

Indian agricultural sector still depends mostly on the monsoons. The erratic and uneven distribution of the monsoons perpetuated yield/price volatility and hence farmers’ exposure to risk and uncertainty. In this scenario of high risk and uncertainty of rain-fed agriculture, allocating risk is an important aspect of decision-making to farmers. This indicates a need for contingent plans that will help to improve the handling of risky outcomes across individuals. The design and implementation of contingent contracts is thus an integral part of development process in Indian agricultural sector. In India, traditionally, risk would be managed either privately or through implicit contracts within the family or relation-network (caste groups/extended families/joint families). Such contracts can be quite useful to handle non-covariant risks. However, yield risks are often locally covariant, implying that these traditional contracts within village and families would not perform well to insurance against yield risks. Another form of risk-coping strategy amongst farmers is income diversification/crop diversification that will reduce variance of their income. If benefits of reduced risk exposure from such crop diversification are large, then farmers may be willing to forego some of the possible gains from trade/specialization; that is they would diversify crop rather than specialize in the activities in which they have a comparative advantage. This strategy may seem optimal from individual point of view, but it may undermine the competitive advantage of a nation through specialization that hinders national development. Productivity of labour would likely increase under specialization. Also, agricultural research could focus on fewer products and thereby increase its effectiveness in developing new technologies. Moreover, transportation costs and other market transaction costs would be lowered, thus stimulating trade and increasing the gains from trade. This regional specialization helps in development of infrastructure relating to the production activity.
By reducing the need for farm diversification, these contracts can stimulate specialization. The specializing initiatives in competitively advantageous crops/products by regions will increase efficiency of farms as well as help in easy implementation of research and development and other crop-based government programs through scale economies. The specialization helps in growing off-farm and non-farm employment opportunities to a large section of rural population. Hence a development policy which includes explicit insurance arrangements for both farm as well as non-farm activities/workers helps in economic development of the country through specialization and also helps in increase/stabilization income of the farmers/non-farm workers.

India’s modified crop insurance program is called as national agricultural insurance scheme is implementing since rabi 1999-2000. Union budget 2002-03 proposed setting up of Agricultural Insurance Corporation (AIC) with capital participation from General Insurance Corporation of India (GIC), four public sector general insurance companies viz. 1. National Insurance Co Ltd., 2. New India Assurance Co. Ltd., 3. Oriental Insurance Company. Ltd., 4. United Insurance Company Ltd., and NABARD. The promoter’s subscription to the paid up capital will be: 35 percent by GIC, 30 percent by NABARD and 8.75 percent each by the four public sector general insurance companies.

The authorized capital of the new organization is proposed to be Rs.1500 crore, while the initial paid-up capital would be Rs.200 crore. National Agricultural Insurance Scheme (NAIS) shall be transferred to the new organization and shall form the core of business to begin with. Transition to actuarial regime will be made over a period of time. The new organization will, in due course, cover other allied rural/agricultural risks along with crop insurance. The specific objectives of the program are designed to provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crops as a result of natural calamities, pests and diseases. To encourage the farmers to adopt progressive farming practices, high value inputs and improved technology in agriculture will be provided.

The National Agricultural Insurance Scheme (NAIS), introduced in Rabi 1999-2000, and implemented by the Agricultural Insurance Company of India Limited (AICIL)
is a major public sector initiative to mitigate yield risk. The yield loss assessment is based on ‘threshold yield’ and ‘level of indemnity’. The threshold yield is the three year moving average yield for rice and wheat and five year moving average for other crops. The unit area for assessing the actual yield has been district and the indemnity levels fixed at 90 per cent, 80 per cent and 60 per cent for compensation under the scheme based on crop cutting experiments. The schemes cover a wide range of crops including food crops (cereals, millets and pulses), oilseeds and annual commercial/horticulture crops in respect of which past data on yield are available for sufficient number of years. Sugarcane, potato, cotton, ginger, onion, turmeric, chillies, pineapple, banana, jute, coriander, cumin and garlic have also been covered under this scheme. The entire amounts of crop loan for food crops and oilseeds are insured at a premium rate which is the minimum of a prescribed ceiling or actuarial rate. The prescribed ceilings are 3.5 per cent for bajra and oilseeds during kharif, 2.5 per cent for other kharif crops, 1.5 per cent for Rabi wheat and 2 per cent for other Rabi crops. Premiums for annual commercial/horticultural crops are based on actuarial rates. To begin with, small and marginal farmers were entitled to 50 per cent subsidy on premium which was shared equally by the central and state governments. The subsidy on premium has gradually been phased out and at present only 10 per cent of the premium is available as subsidy. The rates are uniform across states. The claims over and above 100 per cent of the premium amount and administrative costs are borne by the central and state governments. The scheme is implemented through crop loan granting banks for the regions and crops notified by the state governments and are compulsory for farmers taking crop loans from banks and voluntary for non-bank loanees.

Analysis of Agriculture Crops Insurance (NAIS) Salient features

I. Scheme is available to all farmers-loanees and non-loanees both- irrespective of their size of holdings.

II. Compulsory for loanees-farmers and optional for non-loanee farmers

III. Limit for sum assured is the threshold-yield of the crop in the specified area.

IV. Covers all crops for which a reasonable past yield data is available.
V. Premium rates are fixed at 3.5% for bajra and oilseeds and 2.5% for other kharif crops, 1.5% for wheat and 2% for other Rabi crops.

VI. In case of small and marginal farmers, 50% of premium charges are borne by the central and state governments.

VII. Separate agency, namely Agricultural Insurance Company of India (AIC) has been established for implementation of NAIS with the help of rural financial institutions, state governments and farmers.

Due to the high claim/premium ratio, there is need to refine the program to enhance its economic viability, so that the scheme will sustain over time to serve large sections of the farmers to insure their risks and hence productivity and also competitiveness of Indian agriculture will get enhanced by regional specialization. In recent years, some new methods in crop insurance have come up with innovative actuarial technologies.

Agricultural risk is associated with negative outcomes stemming from imperfectly predictable biological, climatic, and price variables. These variables include natural adversities (for example, pests and diseases), climatic factors not within the control of agricultural producers, and adverse changes in both input and output prices. To set the stage for the discussion on how to deal with risks in agriculture, we classify the different sources of those risks.

Agriculture is often characterized by high variability of production outcomes, that is, by production risk. Unlike most other entrepreneurs, agricultural producers cannot predict with certainty the amount of output their production process will yield, due to external factors such as weather, pests, and diseases. Agricultural producers can also be hindered by adverse events during harvesting or collecting produce that may result in production losses. Both input and output price volatility are important sources of market risk in agriculture. Prices of agricultural commodities are extremely volatile. Output price variability originates from both endogenous and exogenous market shocks. Segmented agricultural markets will be influenced mainly by local supply and demand conditions, while more globally integrated markets will be significantly affected by international production dynamics. In local markets, price risk is sometimes mitigated by the “natural hedge” effect, in which an increase
(decrease) in annual production tends to decrease (increase) output price (though not necessarily farmers’ revenues). In integrated markets, a reduction in prices is generally not correlated with local supply conditions, and, therefore, price shocks may affect producers in a more significant way. Another kind of market risk arises in the process of delivering production to the marketplace. The inability to deliver perishable products to the right market at the right time can impair producers’ efforts. The lack of infrastructure and of well developed markets makes this a significant source of risk in many developing countries.

The ways businesses finance their activities is a major concern for many economic enterprises. In this respect, agriculture has its own peculiarities. Many agricultural production cycles stretch over long periods, and farmers must anticipate and make expenses they will only be able to recuperate after marketing their products. This leads to potential cash flow problems, which are often exacerbated by lack of access to credit and the high cost of borrowing. These problems can be classified as financial risk. Institutional risk, that is, risk generated by unexpected changes in regulations that affect producers’ activities, constitutes another important source of uncertainty for agricultural producers. Changes in regulations can have significant impact on the profitability of farming activities. This is particularly true for import/export regimes and for dedicated support schemes, but sanitary and Phytosanitary regulations too can restrict producers’ activities and impose costs on households.

Like most other entrepreneurs, agricultural producers are responsible for all the consequences of their activities. Growing concern over the impact of agriculture on the environment, however, including the introduction of genetically modified organisms (GMO) may cause an increase in producer liability risk, ultimately, agricultural households, along with other economic enterprises, are exposed to personal risks to the well-being of people who work on the farm, and asset-risks, including possible damage or theft of production equipment and assets.

The creation of risk transfer markets for weather events in developing and emerging economies is rapidly progressing. This document describes several sources of risk that create poverty traps for poor households and impede the development process, focusing on low-probability, high-consequence weather risk events as they relate to
rural households. These types of risks are highly correlated and require special financing and access to global markets if they are to be pooled, rendered diversifiable, and improved in pricing. Thus, a significant contribution of this thesis is the introduction of index insurance, highlighting its use at the micro, meso, and macro levels for risk transfer. By using index insurance products, it is possible to organize systems that take advantage of global markets to transfer the correlated risks associated with low-probability, high-consequence events out of developing countries.

While global markets providing reinsurance for natural disasters are both large and growing, they are rarely interested in taking such risk from developing and emerging economies. In part, this is because developing countries have weak primary insurance markets. Before agreeing to provide reinsurance, global reinsurers engage in due diligence investigations of primary insurers and of the risks the primary insurers wish to transfer. Compared to traditional insurance products, index insurance has far fewer problems with hidden information and hidden action. This reduces the reinsurers’ due diligence, and underwriting costs and makes accepting natural disaster risk from new insurance providers in developing countries more attractive. Nonetheless, natural disaster losses can be significant, and carefully crafted ways to finance such losses are critical preconditions for shifting the risk into global markets. Innovation in pooling these risks globally may also facilitate the transfer of natural disaster-risks from developing countries.

Transferring risk out of developing countries is important for a number of reasons. Natural disasters impede development, push households into poverty, and drain fiscal resources. Many natural disasters are directly tied to extreme weather events that can have devastating impacts on agriculture.

Nearly three-fourths of the 1.3 billion people worldwide living on less than US$1 per day depends on agriculture for their livelihoods. In many countries around the world, agricultural development clears the way for overall economic development in the broader economy, forging a strong link between weather, the livelihoods of the poor, and development. Yet, no effective ex-ante solutions for dealing with weather risks in developing countries exist. Rather, developing countries, the World Bank, and the donor community are currently heavily exposed to natural disaster risk via
ex-post responses such as financial bailouts, debt forgiveness, and emergency response. None of these responses are optimal. They fail to provide an effective safety net for the poor; they can be inequitable and untimely; and they create a dependency that has dire consequences. If the planning for and financing of extreme weather events were to occur ex-ante, access to both formal and informal lending should improve. As broader financial services become more accessible to the rural poor, newer technologies will be used, and improvements in productivity and incomes should follow.

Farmers around the world utilize various risk coping and risk management strategies, but many of these strategies are inefficient. The economic development literature is full of cases illustrating how poor, risk-averse farmers often forego potentially higher incomes to reduce their risk exposure. Both individual households and the larger society incur costs for smoothing consumption across income shocks. In many cases, following major income shocks, the poor must resort to high interest rate loans. Many argue that the poor cannot afford to purchase ex-ante insurance protection against extreme weather events, but the widespread use of ex-post loans suggests otherwise.

The challenge remains how to make insurance against extreme weather events both more effective and more affordable. Two major considerations inhibit the development of risk transfer markets for agricultural losses caused by extreme weather events: First, organizing ex-ante financing for highly correlated losses can result in extremely large financial exposure; and, second, asymmetric information problems, such as moral hazard and adverse selection, lead to high transaction costs. The latter also makes it nearly impossible to provide traditional agricultural insurance for small farmers, because the large fixed transaction costs greatly increase the average cost, per monetary unit, of insurance protection for smallholder agriculture. Unfortunately, there are few successful examples to consider; the heavily subsidized crop insurance provided by governments in developed countries is both costly and questionable in terms of net social welfare.

The first chapter of this thesis provides a framework focus on the statement of Problems, motivation of study and the rationale of research, etc. The second chapter illustrates, in more detail, the development of farming in India and historical
investigation of framing problems of farmers in India. The third chapter illustrates in more detail the development of agriculture insurance. It provides a brief history of weather risks together with a description of the various stages of developing such natural hazards, climate change, the identification and quantification of the risk exposure and weather conditions, natural disaster analysis and control of production and natural hazards. The fourth chapter focuses on the profile of study and national agriculture insurance scheme in India in general, and in Jammu and Kashmir State in particular. The fifth chapter is on data analysis. Finally, in the chapter six, focus is on findings, conclusion and recommendations for the role of the NAIS and central and state governments in facilitating the development of innovation in agricultural risk and insurance management.

Agriculture crop insurance in particular is highly sensitive to weather conditions, pest and diseases, and it requires heavy expenditure during the production period and the farmer is not assured of good quality and disease-free crop which is essential for obtaining reasonable yields sufficient to recover expenses. Therefore insurance is considered to be important for those crops and it was decided to undertake an economic analysis of crop insurance for farmers in India general and Jammu and Kashmir State districts in particular with the following objectives:

1. To understand the problems and perceptions of agriculture Insurance beneficiaries in implementation of NAIS in India in general and Jammu & Kashmir State in particular.
2. To understand whether agriculture insurance is feasible or not.
3. To know to what extent the agricultural insurance can ameliorate the problems of agriculturists.
4. To what extent the agricultural insurance can cover the risks in farming.
5. To examine the functioning of agricultural insurance in Jammu and Kashmir whether the scheme is viable.
6. To find out the effect of agricultural insurance on debts of the farmers.
7. To analyze the perceptions of bankers and insurance agencies regarding implementation of the scheme,
8. To suggest interventions for improving the working of national agriculture insurance scheme (NAIS).

To meet the objectives of the study, the data were collected from both primary and secondary sources. Jammu and Kashmir was selected as study area as it was one of the important agriculture growing areas of the country. The primary data were collected from 320 farmers (200 insured and 120 non-insured) from those 8 districts, which were having the highest number of insured farmers in the village. The primary data on various aspects was collected with the help of a questionnaire directly from farmers. In the same way, secondary data regarding various aspects relating to crop insurance were collected from Agriculture Insurance Company of India, Regional Office, Chandigarh and the district level secondary data on various aspects were collected from Directorate of Economics and Statistics, etc.

The challenge of developing effective and efficient risk-transfer markets for crop losses caused by natural hazards has eluded private and public sectors in countries around the world. In the developed countries, the agricultural policy debate has been how and to what extent government should intervene in assisting market development. Now, it seems the debate has been largely resolved as the respective governments have assumed significant obligation to farmers suffering from catastrophic production, resulting in the development and delivery of highly subsidized crop insurance products and significant retention of risk by government.

Indian agricultural sector plays an important role in the country's economy. Not only does it function as an economic output producer but it also serves as a social buffer in times of transition to a market economy. The restructuring process had a strong impact on the economic performance of agricultural enterprises. As the state no longer functions as a back-up financier in times of economic downturn, farmers have to find their own sustainable instruments to manage business risks, which are significant in India due to the acute continental climate and the resulting revenue fluctuations. This chapter summarizes the most important findings generated throughout the research process and concludes with their implications for researchers and policy-makers. This thesis presents both a conceptual backdrop for understanding this system and a progress report on several World Bank and Agriculture Insurance Company of India efforts to assist countries in using their
limited government resources to facilitate market-based agricultural risk transfer when faced with natural disasters.

The present study made use of different statistical techniques such as averages, standard deviation, coefficient of variation, percentages, ratios, composite score technique and normal curve technique. The important findings of the study are summarized in the following paragraphs.

Socio economic characteristics of farmers

Synthesizing lessons from the empirical findings

The results from empirical research are three-fold. First, lessons from the farm survey results will be analyzed. In a second step, the model findings will be discussed with regard to the practical implementation of the present risk management instruments. Finally, the implications for current theory and future research will be presented.

Lessons from farm survey results

The investigation of production conditions, risk attitudes and risk management techniques was a central goal of the discussed farm survey. Analysis of the farm survey data allows drawing of the following conclusions:

► A Majority of farmers’ (beneficiaries and non beneficiaries) education level was illiterate and elementary.

► A majority of farmers (beneficiaries and non beneficiaries) were from small and medium land holding categorise.

► A majority of farmers’ land holdings were from Medium land size.

► A majority of farmers managed farms with family management.

► A majority of farmers (beneficiaries and non beneficiaries) would like to be insuring their crops in the future.

► A majority of farmers (beneficiaries and non beneficiaries) would accept deductibles in insurance contracts, whose sustainable rate is about 10-15 per cent of the sum assured.
Besides natural hazards, among which the predominant role in the perception of farmers is played by drought, changes of prices for inputs and outputs are the major sources of business risk.

The majority of interviewed farmers vote for insurance products against risks caused by natural hazards or price variability.

With respect to the constructed risk aversion index, the respondents can be classified as slightly risk-averse relative to other farmers.

Risk-aversion and other factors influencing the decision-making process result in different risk-management strategies: Besides the application of risk-reducing technologies and cropping patterns, financial responses like maintaining credit reserves and off-farm employment, production responses, and reduction of costs are relevant risk-management instruments. However, risk management programme should be drawn carefully, since the average farmers age is relatively high and younger successors with different educational background will soon take over the management of the farm enterprises. This gives ground for assuming that knowledge dissemination on new technologies will yield fruits.

Lessons from model findings

As was discovered by Lien and Hardaker (2001) the variation of risk aversion has no great influence on the choice of risk management alternatives. Only in some cases the income distribution between different states of nature changes due to a switch between different strike levels. The relative insensitive model behaviour after changes in risk aversion coefficients can be partly attributed to the fully used hedging potential. Thus, the high number of technology and insurance activities increases the probability of the choice of those activities that retain their optimality under different risk aversion coefficients. What can we conclude when the optimal farm plan is not changing much or at all if risk aversion is varied?

Patten et al. (1988) perceive the relative inelasticity of the farm plan to risk aversion as a sign for the discriminative power of risk programming when risk aversion is

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limited to a plausible range. However, one might assume that risk aversion changes if a farmer perceives a technology as yield-stabilizing. This would affect the choice of insurance products. Scenario with a variation of own capital and credit access shows a result that is prevalent in the real world: Agricultural areas remain unused or underutilized, because farmers are risk-averse and reduce the area cultivated if capital is lacking. This increases danger of erosion and desertification of unused and inappropriately used land.

Considering the utility-efficiency of different risk management instruments, we can conclude that separate regional analysis was a reasonable procedure, because no general recommendations can be derived from the efficiency results. Therefore, conclusions regarding the utility-efficiency of the considered insurance instruments will be drawn regionally. According to roger’s theory or diffusion of innovations theory, regardless of the nature and characteristics of people, the properties of an innovation itself affect its rate of adoption in the society.

A large number of insurance products stabilize income efficiently as can be derived from the utility rankings. However, weather index insurance seems to be more appropriate (as can also be concluded from the variation coefficients) in southern Indian agriculture production. This can be explained by the comparatively insufficient precipitation this region receives and the predominant role played by drought compared to other risks.

Area-yield insurance might be a reasonable alternative to weather insurance, since it provides a number of advantages in fighting moral hazard compared to farm yield insurance. Efficiency results as well as the analysis of variation coefficients show its applicability for East and central Indian conditions. However, the advantages providing better access to symmetric information should be evaluated against the potentially lower risk reduction. When introducing area-yield insurance, smaller areas (districts) as the basis for the calculation of the underlying yield index are supposed to provide higher risk reductions than larger areas (divisions).

According to the literature on research and results derived by the farm survey, the testing of different revenue insurance is reasonable and particularly attractive for

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farmers in North West India, where price risk plays a predominant role. A central conclusion can be derived for all considered study farms simultaneously. The choice of the production technology is the decisive factor in risk management. The result can be connected to the evaluation of risk management responses of the farm survey. According to the interviewed farmers, the maintenance of capital reserves and production with low costs are two of the most important objectives in risk management. As results from the diffusion innovation model show, these strategies are not ‘first best solutions’ for all considered farms. When crop production is insured, more intensive production technologies (with higher costs) might be more appropriate than low input technologies.

Implications for current theory and further research

Different crops show different reactions on a change in natural conditions. This made it difficult to formulate states of nature with consistent yield reactions on natural conditions and consistent income levels, respectively. The choice of wheat yields as an indicator for states of nature has pros and cons. On the one hand, it allows a consistent formulation of states of nature over all regions, because wheat is an important part of the crop portfolio in most crop production regions. On the other hand, the income balancing effects of other crops, such as cotton and sunflower, are not reflected in the states of nature formulation. Furthermore, the model allows for a choice of technology according to the utility preferences of the decision-maker, which has a significant impact on the contribution of different activities to the whole-farm income. As shown by the model results in chapters 2-3, a change in technology might increase income in a less favourable state disproportionally compared to a more favourable state. This has the same effect as the described overcompensation of income by alternative crops. These findings provoke the question, how the method of state of nature formulation influences the model results. For future research, alternative methods could be applied to test if model validity can be further improved. One alternative method could be the use of different objective measures that form a Jammu and Kashmir state of nature, such as weather

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parameters and variables that reflect the institutional framework of agricultural production.

The objective of this contribution was to investigate the effects of different risk management strategies on the utility of model decision-makers. Because some of the risk management tools are new, decision-makers at this point may have difficulties evaluating the decisions modelled here. One might expect that as decision-makers become more familiar with the implications of these alternatives, they may exhibit greater readiness to utilize new combinations. For further research, we can conclude that decision-making conditions and criteria vary across geographic regions and by farm type; thus, subsequent risk models should be adapted to the unique conditions of the research domain because standardized modeling formulations can produce spurious results. Obviously, a natural extension of this work is the investigation of other crops and regions.

Future research should test the long-term economic potential of alternative crops under changing natural conditions and prices. Furthermore, different combinations of insurance with hedging products can be tested. Existing regionally specific recommendations for crop production in India are mostly obsolete and a significant part of practical agricultural knowledge was lost with outmigration of experts. There is a need for sound research in the fields of agronomy and plant breeding in order to develop new technologies.

On-farm research combined with precision farming could be one relatively cost-effective way to create regionally adapted recommendations for crop production. Furthermore, by means of panel data analysis, factors influencing diversification decisions of farmers could be investigated. Examples for these proxy variables are market infrastructure, storage facilities, input and output prices.

Implications for policy design

This part discusses the most important findings of the analysis of the current agriculture crop insurance system in India, as well as Jammu and Kashmir State and evaluates additional political instruments to support income stabilization in farming.

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Lessons from the analysis of the current agriculture crop insurance system in J&K

The current agriculture crop insurance system is the result of interaction of a number of factors such as farmers’ demand for a sound risk management instrument, the government’s wish to support the supply of crop insurance, political negotiations of different interest groups, and path-dependence with regard to former agricultural insurance programmes. This mix of driving forces affected the accuracy of insurance objectives and design and caused several deficiencies of the system, such as monitoring and communication problems, insufficient provision of information to farmers and regional administration, and institutional problems (moral hazard and adverse selection, slow processing and high claim rejection rate, and lack of interest of potent insurance companies).

Regarding the chaos theory in this research, several mistakes such as research about need assessment, lack of risk management strategy, etc, has been made during the implementation of the national agriculture insurance scheme in Jammu and Kashmir State. Once a system with failures has been established, it takes time and money to improve it. This lesson can be learned from the long history of subsidization in agriculture all over the world and from recent examples of crop insurance reforms in transition countries as well as India. When having the chance to build up a new system from scratch, particular effort should be put in developing a sound rate making procedure. In this respect, the efforts of the J & K Bank, Agriculture Insurance Company of India, Ministry of Agriculture, State and Central Governments with contribution of World Bank to establish a dense net of weather stations and to promote the introduction of weather-index insurance seem particularly promising. As the model results show, only a sufficiently dense net can reduce risk to a satisfactory level.

The hypothesis that agricultural crops insurance often supports only large-scale farmers cannot be rejected when investigating the data on agricultural crops insurance market development. One of the reason, I do recommend for introducing mandatory agricultural crops insurance in Jammu and Kashmir State is to provide all farmers with access to insurance, regardless of their risk exposure or the size of their enterprises. However, insurance companies have less incentive to insure small, risk-prone farms. The future task of the government will be to find appropriate
enforcement mechanisms to motivate insurance companies to provide insurance to small farms or to transform the mandatory system into a voluntary one. A further government task involves breaking up the path of dependence of crop insurance. The bad image of the entire insurance industry could be primarily overcome by setting right the legal framework, the incentives, and enforcement mechanisms. The objective would be to create an agriculture crop insurance system, in which agriculture insurance companies can generate profits with their clients experiencing justice and income stabilization that provide a sound base for the development of economic activities. Therefore, the identification of preconditions for the establishment of the institution ‘crop insurance’ by the help of indicators could be the first step.

*Evaluation of alternative policy measures*

In recent years, natural disasters, particularly climate-related ones, have increased both in frequency and magnitude. Scientists the world over have agreed that human-induced climate change is exacerbating this impact. Agriculture sector is likely to be affected most due to extreme weather events like cyclone, flood or drought. So, the farmers are hit the hardest. For Natural disaster such as drought, storm, flood prone plain countries like India, structural measures for management of disaster risk and its consequences often were found less effective. So, non-structural measures, like micro-insurance or agriculture insurance are being suggested as a risk management strategy. The rationale is that poverty and vulnerability to climate change feed each other, and this nexus warrants that climate change policies work in concert with poverty reduction policies. However, traditional micro-credits and savings are inadequate when poor farmers with no safety or security nets are exposed to risks beyond their means to cope with. Therefore, micro or crop insurance, customized to specific needs of the poor, may be an effective instrument for the purpose. UN Climate Convention and the Kyoto Protocol have included the provision of insurance as a mechanism to address the risks from climate change. As it is known, insurance is a financial instrument of buying potential risks. But the size of insurance market can be viewed not only as an indicator of development, but also as an indicator of social & cultural fabric of any society. The question of premium cost apart, there is the general expectation that the Government or NGOs will come
forward to rescue in the aftermath of any disaster. The question of the hard-core poor is different. But the non-payment of bank loans or indemnifying them has become a culture in Jammu and Kashmir State of India. What is being referred to be a culture of moral hazard? Against this trend, the Government of India spends huge money for ex-post disaster management, which again has political overtones. On the other hand, private sector to a large extent in India continues to live with the idea that any kind of public welfare program is a government business. The concept of corporate social responsibility is yet be internalized by the larger segment of the private sector in our society.

In many developing countries including India, agriculture crop insurance has been introduced about six decades ago. Some of these countries are continuing, while in some others, it has stopped functioning, because of incurring heavy losses. As a stand-alone instrument, agriculture crop insurance is not financially viable anywhere in the world. Even in the industrialised countries, it continues functioning as a public welfare program. In fact, agriculture sector is subsidized in all countries in many different ways. This happens more when a natural disaster hits the farmers. Therefore, agriculture crop insurance as an instrument of adaptation has to be seen from a wider angle, not just from conventional cost-benefit analysis. The Agriculture Insurance Company of India has again taken initiative in the form of a proposal to introduce National Agriculture Insurance Scheme in 1999, this time in partnership with other agriculture stakeholders. But the private sector is yet to respond. Good news is that the prospect of micro insurance is improving day by day and many of the private insurance companies are considering it as an option. Alternatives to agriculture insurance comprise the whole range of risk management instruments as discussed above.

Reference to result of research in Jammu and Kashmir State and Schlieper\(^5\) research work (1997), we make an interesting suggestion on the integration of crop insurance in an overall risk management framework. Based on thoughts of Noorgard (1976)\(^6\), I also propose the coupling of extension service and insurance and assume that the

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providers of insurance and extension services are identical. The coupling of both services would minimize asymmetric information and allow for a differentiation in premiums. A direct link between behaviour reflected in on-farm risk management and insurance tariffs would create incentives to apply risk-reducing technologies.

Hence to strengthen the link between on-farm risk management and risk-sharing strategies, the government of Jammu and Kashmir, with contribution of Ministry and directorate of agriculture, could promote research in agronomic methods to mitigate the effects of difficult growing conditions. Differences in agro-climatic environments such as soil type and fertility, moisture availability, distribution of seeds, and susceptibility to erosion should be better taken into consideration when developing new technology recommendations. Farmers will not adopt recommendations from the agriculture research system or agriculture crop insurance companies’ policies without the expectation that the costs of the recommendations will be balanced by their benefits. Therefore, researchers have to develop cost-effective technologies, which take into account the still strained financial situation of many agricultural enterprises. These recommendations possess the highest probability of success within the extension system.

Finding of research shows that adoption of agriculture crop insurance is strongly correlated with level of education and age. Educated classes, particularly designed for younger farmers, could help to foster the speed of agriculture insurance adoption. The empirical findings of Bakhshoodeh and Shajari (2006) from Iran also had similar result.\textsuperscript{7}

When deciding about a future strategy for the agricultural sector, the concentration of agricultural production in favourable areas using regional comparative advantages, such as natural conditions, infrastructure and skilled labour have to be taken into account. This policy is widely known as the forming of clusters.\textsuperscript{8} Additionally, policy-makers might facilitate access to credit through subsidizing interest rates. Credit reduces transaction-costs and financial constraints on purchasing a new technology. Alternatives to the purchasing a new technology is

\textsuperscript{7} Bakhshoodeh, M. and Shajari, S., “Adoption of New Seed Varieties under Production Risk: An Application to Rice in Iran”, Poster prepared for presentation at the International Association of Agricultural Economists, Gold Coast, Australia, August 12-18, 2006.

renting and leasing. It allows smaller farmers to use, and less confident farmers to test, the technology.\(^9\) From that point of view, it might be reasonable for the government of India to continue the state-supported leasing programme for agricultural mechanization. A further project to be considered as worthwhile to be continued is the successive development of the crop marketing infrastructure. As described above, the Government of India invested considerable effort and financial means in crop marketing infrastructure within the country and abroad. Given the competitiveness of rainfed crops production in Northern West India, this investment is assumed to pay off since global demand for grain is increasing.

An important and last point to be mentioned is the stability of the state itself. One might ask how political uncertainty affects agricultural risk management. Political uncertainty might indeed hamper the positive impact of international organizations’ work on economic development, in that development projects will not be carried out and/or results of these projects will not be implemented. Furthermore, political uncertainty has a strong impact on foreign investments and the willingness of the international insurance and re-insurance industry to engage in a country. India’s economic success is to a large extent dependent on the future political developments.

**Impacts of Agro Climatic and Social Factors in Agriculture Crops Insurance**

Agro climatic characteristics play a greater role in risk of farming practices. Increasing rainfalls combined with a longer growing season reduce the variability of output, increase the number of possible activities and reduce the covariance among those activities. Hence, the low and medium rainfall zones are highest risky zones, followed by high rainfall SAT and humid tropics. As one goes from dry to wet areas, the progressive reduction in risk reduces the need for various kinds of insurance substitutes’ characteristics of these environments.

**Moral Hazard and Adverse Selection and High Claims Ratio**

The need for individual-based crop insurance is highlighted in the previous section. However, inherent difficulties in getting reliable and authentic actual production histories data are a distance possibility in India. In the absence of the reliable data and asymmetric information among insurer and insured will create many well-

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known problems, outcomes of which will deviate from the pareto optimal conditions. The two distinct sources of deviation from pareto optimality: moral hazard and adverse selection. Moral hazard has been defined in the economic literature as an alteration in input use which deviates from social optimality and which occurs because of incompatible incentives and asymmetric information. In insurance models, moral hazard problems occur because the insured can take actions which affect the probability of losses and cannot be observed by the insurer. Moral hazard occurs after a loan is taken or after the insurance contract is obtained. Moral hazard involves a change in behavior so that the customer represents more risk than what was believed to be the case. Those who are insured may change their behaviour in a way that increases the risks beyond what insurer believed they would be when the insurance was developed. Area-Yield based crop insurance creates problem of adverse selection thus farmers with lower expected yields than the area average could purchase more protection than farmers with yield above the average. Farmers with higher expected yields opted out, and farmers with lower expected yields purchased crop insurance. Thus increasing indemnity payments relative to premiums paid. Moral hazard and adverse selection are avoided if insurance contracts are based on perfect information about each individual’s risk.

Ahsan (1982) argues in the developing country context that public subsidy and public provision of agricultural insurance is to counter the problems of moral hazard and adverse selection. As the public subsidy encourages more participation from the high yield farmers and hence reduce adverse selection. Farm level expected yields and a measure of farm-level variability are fundamental to an individual farmer’s decision to purchase crop insurance.

As level of protection ideally should be tied to some measure of variability; however, for the time being, until well historical data about individual farmers is generated, Indian crop insurance should focus on area yield based insurance approach as it is currently following under National Agricultural Insurance Scheme (NAIS). But the scheme is suffering from heavy losses as claims as percentage of premium is about 340 percent. However, the livestock insurance scheme is not suffering from these losses. Theoretically, if the scheme is to be viable in the long
run, premium payments should equal to the claim payments (indemnity payments) over time, which is also equal to expected loss.

Analysis of Reasons for high claim/premium ration in agriculture crop insurance

1. Most of the farmers in Jammu and Kashmir State do not participate willingly in agriculture crop insurance as farmers expect to receive alternative payments from the government in catastrophic years/ crop failure years irrespective of premium payments.

2. According to finding heavy subsidy on the part of the central and state governments, this may encourage excessive risk taking/claims by Jammu and Kashmir farmers.

3. Rural income earners such as agricultural labourers, traders, processors, and farm input suppliers are equally affected by crop failure but opt out of the agriculture crop insurance scheme.

4. There is no incentive for agriculture crop insurers to practice sound actuarial practices, as losses will be born by the central and state governments.

5. No private sector participation in agriculture crop insurance business due to lack of incentives in Jammu and Kashmir.

6. No branches for more encouragement to the farmers and participation evaluation, development of agriculture crop insurance in Jammu and Kashmir State.

New agriculture crop insurance sector options are under development (weather index insurance); give a ray of hope to farmer’s agriculture crop insurance as there will be greater scope of private sector insurer and reinsurers in the rural insurance business in Jammu and Kashmir.

The advantages of new options of index insurance (weather index insurance): an analysis

Index insurance is particularly suited to developing country such as India where asymmetric information and poor data create classic problems of agriculture crop insurance. In index insurance, there is good historical data available and the new satellite imagery may someday allow insurance providers to offer index insurance that is directly tied to vegetarian growth given specific geographical coordinates. In
the face of liberalization of financial and economic sector and gradual withdrawal of entire subsidies provided by government for crop insurance, there is a greater scope for private sector participation in this growing sector but with very little penetration.

Many traditional rural financial institutions can give advantage of their customer base in loan and deposit market to distribute their insurance policies. The above BASIX and ICICI Lombard is a good example of those innovative insurance products. The portfolio management is an important aspect of successful practice in insurance business. However, the index insurance suffers from basis risk for individuals who may use futures markets or purchase index insurance. Basis risk occurs when an individual has a loss and does not receive payment or when there is payment and the individual has not suffered loss. This will happen as the index insurance that pays, based on an objective measure of weather or area yield. Basis risk is also present in using futures markets to protect against local price movements.

However, the basis risk can be reduced by innovative financial products, which can be sold by rural financial institutions to some form of self-help groups or village panchayats/cooperatives collectively. For example, if a self-help group purchased the index insurance either price insurance i.e., if the realized world price is below a certain predefined price, the group can claim the difference between the realized world price and the predefined price by paying a premium or yield insurance (via weather insurance with claim payments based upon extreme weather event), there are prospect to limit the basis risk.

In this case, the Jammu and Kashmir framers’ parties’, maybe self-help group/cooperative/village panchayat that can redistribute indemnity claim based on the mutual knowledge of its members based on actual loss incurred by the event. Rural financial institutions can also reduce basis risk by incorporating a component of premium attached to the interest payments by taking advantage of their knowledge about their customers in credit repayments and defaults. That is high risk of default farmers can get credit at higher rate of interest and vice versa. Thereby it will reduce basis risk to some extent. An important step in reducing risk of financial institutions in tailoring agriculture crop insurance products is by covering a diversified pool of risk exposure, which allows insurance companies to spread their
risk among customers with different sources of income, over geographic space and time.

1. Quality of data time series and historic data by different agro-climatic regions is available about rainfall and other weather parameters.

2. This option is less costly and easily observable at local level with accuracy.

3. A single indicator of rainfall is sufficient to insure against most of the losses faced by both farmers and off-farm and non-farm entrepreneurs/workers.

4. Even individuals who did not have cultivated area, but likely to be affected by the weather event in the same way as the farmer can also be able to benefit from it.

5. No moral hazard and adverse selection as it is based on area average yield independent of individual performance.

6. It will allow reinsurance by the primary insurer as it is based on standardized/well defined internationally verifiable data.

Finally, the ongoing national agricultural insurance scheme in Jammu and Kashmir State is a good step forward to insure risk of many farmers whose livelihood depends on the pattern and distribution of monsoon rain in Jammu and Kashmir. However, it suffers from some of the major problems inherent in agriculture crop insurance programs throughout India. It exclusively insures farmers’ yields against the average yield of the area. However, most of the agricultural labourers, rural off-farm and non-farm workers are not covered under the scheme even though they are equally, if not more, affected by the failure of agricultural crops. The existing scheme is wholly government scheme with no incentives to private finance players, which hinders competitiveness of the scheme. The average yield of a region/locality is not many times accurately measurable which is basis for calculation of indemnities. Hence to overcome the above problems in agriculture crop insurance, this research studied the advantages of weather insurance against crop field, which overcomes most of the problems mentioned above. In addition to that, it is more compatible with reinsurance practices worldwide, which makes primary insurers cover their local/regional risks by reinsuring themselves with international reinsures.
Political/institutional considerations

One common feature in all of the agriculture crop insurance experiences considered is the participation of different stakeholders with shared interests and responsibilities that vary depending on their role in the development of the agriculture crop insurance sector in Jammu and Kashmir. Their actions are informed by the risks associated with agriculture.

The following consideration is intended to clarify the roles of the actors involved, as well as the choices they must make.

According to research theory, farmers generally adopt a straightforward approach to selecting risk management strategies. These range from measures in the field (good agricultural practices, risk-reduction technologies, etc.) to “self-insurance” (for example, the decision to save during a good harvest to offset possible losses during later harvests) and the transfer of risks beyond their control to firms which specialize in absorbing them namely, insurance companies.

The agriculture crop insurance industry offers coverage based on risk assessments by region and product. Premiums must be set at a rate that allows insurance firms to cover the capital at risk and still remain in operation. Premiums are usually calculated generically, although price reductions may be offered based on commercial loyalty (on the part of the farmer), use of risk-reduction technologies or application of good agricultural practices.

The role of the government in this regard must be considered from different perspectives. Its protective role in the face of catastrophic events is paramount, given its social responsibility towards victims. Appropriate mechanisms, such as national or regional emergency committees, are key to ensuring that such situations are addressed as effectively and efficiently as possible.

To fulfill its role, the government must be capable of generating climate-risk-management data. This is where the meteorological, statistical, technological and other types of information are scattered, and are therefore useless from a risk-management perspective. One of the pressing tasks at hand is the efficient coordination of data sources. Adequate information is the single most important
factor in bringing about a change of attitude among public and private stakeholders. It is the only path from crisis management to risk management.

In terms of the economic role of the state as a mitigator of adverse weather events, countries employ a variety of tools, from the creation of emergency funds (which may or may not be linked to insurance systems) to direct intervention by the government as an insurer or reinsurer. The establishment of some type of link between financial aid and insurance seems to be the most effective approach.

The public sector also plays an economic role by offering premium subsidies to stimulate the agricultural insurance market. The catastrophic nature of agricultural risks is reflected by the fact that premiums are expressed as percentages (other risks, such as those covered by vehicle and home insurance, are expressed as fractions of a thousand). Given the high cost of premiums and the apparent absence of a “culture of insurance” among farmers, the government would be well advised to cover a portion of premium costs, to encourage farmers to acquire insurance. Subsidies can be implemented in a variety of ways. Spain offers one interesting example. Subsidies in that country vary, depending on whether farming is a “main occupation,” whether or not the farmer belongs to a collective, and whether he or she is below a certain age, among other criteria.

Another way of influencing the insurance market through subsidies is to focus on poor, small-scale farmers. While this may be a viable approach, it should be noted that, from an insurance-theory and business perspective, insurance policies should target the largest possible pool of farmers (i.e., farm sizes), bearing in mind the law of large numbers and the principle of mutuality.

The lack of a “culture of insurance” among large-scale farmers, coupled with the absence of incentives for them to invest in such financial tools, hinders the implementation of one of the basic principles of insurance: that which says that risk should be diluted to the highest degree possible, to allow for payouts when necessary. Because aid programs should target the poorer sections of the population, it may be advisable to enact financial support mechanisms for an established term. For example, gradually declining premium subsidies could be offered for a five-year period, to facilitate access to insurance for medium-scale farmers, if nothing else. The objective would be to create the aforementioned “culture,” thus proving to
farmers that, rather than being an unnecessary expense, insurance is an input that protects their income.

Agricultural stakeholders - particularly those who must deal with agricultural risks - can be brought together in a variety of ways. International experience has shown that the most effective way of ensuring the sustainability of a climate-risk coverage system is to establish policies that transcend any one administration. Spain offers one example of this approach. In that country, thanks to the adoption of the Agricultural Insurance Act, a solid system is in place which allows, among other things, for joint public and private participation.

Insurance firms are understandably inclined to avoid clusters of risk (for example, small- or medium-scale farmers involved in capital-intensive production activities close to market), and are reluctant to cover extensive enterprises exposed to systemic risks. Such is the case with stock raising, which involves - among other things - the simultaneous exposure of large quantities of capital to systemic risks. Designing an appropriate coverage system for such activities requires an enormous investment in data-generation and analysis infrastructure.

State-run systems, on the other hand, are characterized by an absence of competition, with all the supply limitations, high fiscal costs and exposure to sectoral demands - many of which lack any technical or commercial basis this entails.

Suggestions

The findings of this survey commissioned to identify agricultural risk-management needs in Jammu and Kashmir State, particularly with regard to the design and implementation of agricultural crop insurance can be summarized as suggestions as follows:

1. Training in agricultural risk management is needed, and special attention should be paid to the diffusion and exchange of national and international experiences.

2. Risk management tools should be designed, based on a comparative analysis of successful internal and international experiences.

3. Assistance should be provided for the design of specialized units or agencies, as well as the training of human resources.
4. Assistance should be provided to institutions for the design and implementation of pilot agricultural insurance projects.

5. Tools should be evaluated for consistency, and their impact on beneficiaries should be assessed.

Regional and international inter-institutional technical networks are also needed to coordinate efforts to design and develop agricultural risk-management tools, approaching them as regional public goods.

The slow progress observed is probably attributable, not only to the complexity of agricultural risk management and agriculture crop insurance, but also to a dearth of information on the subject.

Training is lacking, and few academic and research programs in India and Jammu and Kashmir thoroughly address production risks, or their economic and social consequences. If these shortcomings are addressed, countries may find themselves better equipped to, using cogent arguments, persuade the public and production sectors of the importance of agricultural crop insurance to the stability of farmers’ incomes, and, hence, to the development of the agriculture sector.