



## **APPLIED RISK MANAGEMENT TOOLS AND DECISION - MAKING OF INDIAN FARMERS: A CASE STUDY**

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### **ABSTRACT**

*Agricultural in India involves variety of risk this risk arise from climate variables frequent natural disasters, manmade disaster, pest out breaks accidental factors, borrowing money can also be risky with unexpected changes in interest, risk also occurs as a result of changes in government policies, rural infrastructure, finally there are risks related to the health and prosperity of the farmer and his family and the supply of labour for the farm, all these event severally affect farmers through loss in farm production and farm income and they are beyond the control of the farmers. These factors not only endanger the farmer's livelihood and income but also undermine the viability of the agriculture sector and its potential to become a part of the solution to the problem of endemic poverty of the farmer's and the agricultural labor. Risk management is involves choose among alternatives that uncertain outcome and varying levels of expected returns. Risk management decision include pooling, sharing and transferring of risk, making good decisions is the hardest part of the farming activity. Risk perception can vary from farmer to farmer which depend on his experience and on the degree of his/her risk aversion. Farmers risk exposure varies substantially from Indian to other; Indian farmers run their farm business in limited infrastructure and gamble with monsoon. The inability to manage risk and accumulate and retain wealth sometimes referred to as "the poverty trap".*

**Key words:** Risk, Risk Management, decision-making

## **1. INTRODUCTION**

Government of India has already recognized the importance of risk management in agriculture and has made great application to investigate the possibilities of national level risk management system. The need to protect farmers against risk has a concern of agriculture plan. Once farmers have decided to engage in farming activities, the production strategy selected is an important means of mitigate the risk of crop failure. Risk reducing strategies are often used in combination with one another, because no single strategy can cover all of the risk likely to be encountered, farmer's need to consider the risks simultaneously and to develop an integrated approach for better management. They need to recognize the advantages and disadvantages of each risk management option both individually and in combination. Individual farmers should select an appropriate strategy based on their goals, attitudes towards risk and their personal and financial situations. Agricultural producers should not limit their risk management strategies only to lessening and offsetting the problems caused by weather and natural events. Their effective responses to the diver's professional, economic and political challenges are also increasingly crucial to successful farming. Beside it is also equally important to answer the question. What are the tools and information source applied by the farmers to deal with risk and their adequacy? Agriculture has always been the ministry of India economy because of its high share in employment and livelihood creation notwithstanding its reduced contribution to the nation's gross domestic product (GDP). The share of agriculture in the gross domestic product has registered a steady decline from 36.4 percent in 1982-83 to 17.7 percent in 2010 yet this sector continues to support more than half a billion people in India providing employment to 47.9 % of the workforce in the year 2010. Risk is one of the factors affecting agriculture producer directly or indirectly, risk proneness in the absence of effective mechanism for protection against risk has several adverse implications for stability of agriculture production, farm income, and livelihood, investment in farming and application and adoption of improved technology. In the recent times the farmer's suicides are increasing, because of agriculture distress. Farmers course of action to low risk low yield cropping pattern instead of high risk and high yield cropping pattern to mitigate the twin risk of yield and price. It is to be noted that the suicides of farmers as an indication of our failure to manage risks in agriculture. Agricultural risk is associated with negative outcomes that stem from imperfectly predictable biological, climatic and price variables. There is a need to control the downside or

reduce the negative effect of the risk from its consequences. According to ISO, organizations manage risk by identifying it, analyzing it and then evaluating whether the risk should be modified by risk treatment in order to satisfy their risk criteria<sup>1</sup>. According to IEC the standards on risk management deals with risk assessment concepts risk assessment process, selection of risk assessment techniques, and also highlighted the questions. According to ISO risk management can be applied to an entire organization, at its many areas and levels, at any time, as well as to specific function, projects and activities<sup>2</sup>. With these new standards in risk management, present study focused on risk management in agriculture on farming activity, thus provides the scope for our present study.

### **Objectives**

- To explain the concept risk, risk management and decision-making to deal with risk
- To survey the opinion of agricultural producers on risk and risk management tools in agriculture among the producers of prakasam district dry land farming.
- To examine crisis situations and their possible causes based on producers experience.
- To survey the risk management tools and information sources currently applied in farming and also those that producers plan to apply in the future.

### **Research Methodology**

Prakasam district is purposively selected for the purpose of the study, district is none among the few and district is recognized as first suicides on account of crop failure in Indian agriculture. Survey method is used for data collection, primary data collected on farmers risk perception, experience, information source from among the formers of the district and problems experienced while dealing with risk. Personal interview schedule method is used for data collection, information collected by using face-to-face information collection mode. Stratified sampling method is used for sampling plan, rating scale method and other simple statistical tools; percentages, averages are used for analysis purpose.

### **Review of Literature**

According to Binswanger (1980), who conducted investigation with individuals in rural India with real monetary payoffs, 300 individuals were randomly picked from the six villages that formed the field subjects for the ICRISAT study. In his experiment, Binswanger offered the subjects the

choice of lotteries with different payoffs. From the choices made by the subjects, it is possible to infer their risk aversion. From analyzing the pattern of such choices, Binswanger found that most farmers in the ICRISAT villages were intermediate to moderately risk averse.

### **Research gap**

Study by Binswanger (1980), Lipton and Longhurst<sup>4</sup>(1989) and Walker and Ryan<sup>5</sup> (1990) focused on behavior studies in Indian agriculture that is on decision making and attitude of farmers. World Bank report<sup>6</sup> (1997) and Planning commission<sup>7</sup> (2007) of India outlined risk management in agriculture, report highlighted different types of risks and risk management strategies. With new incant of knowledge present study aims to reduce the vacuum in behavior studies with focus on farmer's decision making under risk, experience and applied strategies for their farming activity.

### **Source of data**

Primary data collected from among the producers of prakasam district, there is no relevant data available for the present study, for the purpose study planed in the district. Due to illiteracy among the farmers and no farm records, information collected by using face to face mode of interview method.

### **Sample size**

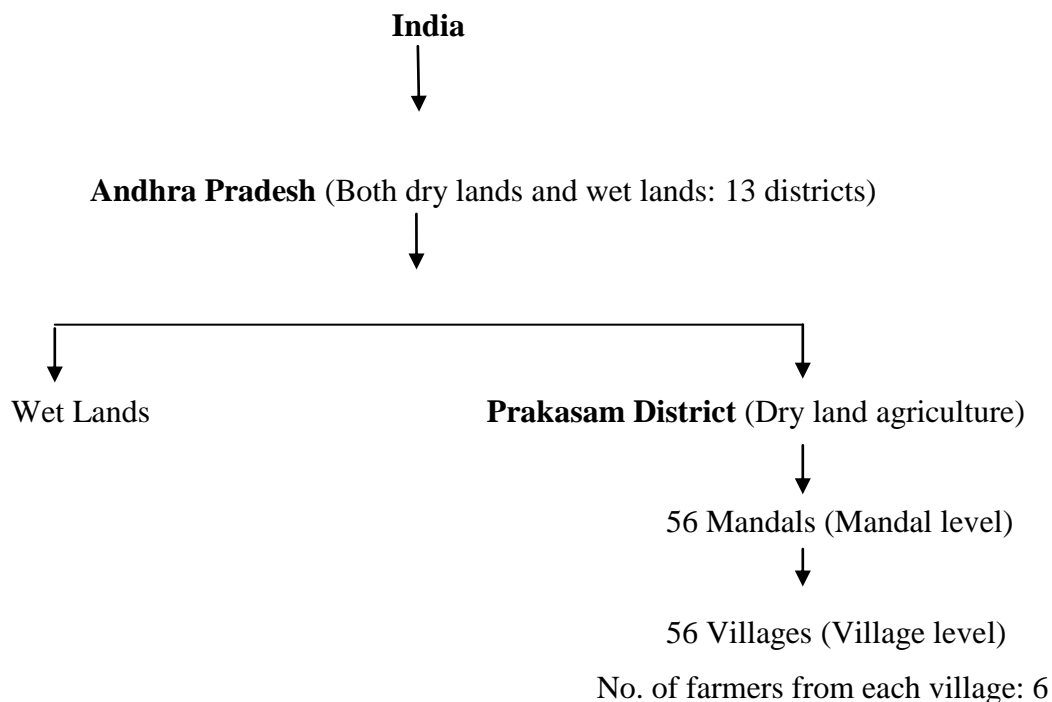
Five hundred and four farmers are randomly selected for the purpose of the study from the district, 504 from 56 mandals of the district, mandal as a unit nine members from each village of single mandal are selected.

### **Sampling process**

The primary objective of the study is to provide basis for debate by surveying Indian literature and analyzing risk related data and make suggestions for the decision makers of agriculture for discussing a possible future Indian risk management strategy in agriculture. The government of India already recognized the importance of risk management in agriculture and made great efforts to investigate the possibilities of a national level risk management system. Beside national level strategies there is a need for enhancing the regional level risk management strategies. The present study aims at district level risk management strategies applied and factors affecting the applied risk management strategies among the producers of dry land District. The objective of the survey

is to explore farmer's point of view and his experience on risk and risk management strategies, for the purpose face-to-face survey method is used to collect information. Tests applied to analyze the opinions of farmers regarding each risk factor, the reasons and consequences of crises where such incident occurred, to compare the risk management instruments and their capability and information sources currently and information sources currently applied in farming. Statistics is concern with the aggregate and not just the individual data items or isolated measurement of certain variables. Stratified sampling method is used for the survey; the point of this method is to divide the heterogeneous population into homogenous subgroups, so called strata. Strata are mutually exclusive, so every element in the population must be assigned to only one stratum. The elements of the sample are randomly selected from each stratum, the main characteristic of the proportional allocation is that it uses a sampling fraction in each of the strata that is proportional to that of one's found in population the sample can be considered representation which makes it possible to examine the features of the population on a relatively small sample.

**Figure- 1: Sample Selection of the study**



## 2. Results

### 2.1 Factors affecting farming activity

Success of agricultural production depends on the combined effect of several risk factors in case of which the subjective opinion of the farmers define how risk they consider each of these factors.

Decision of what resources and to what extent to use to offset these risks also depends on how farmers judge these factors. With the above illustration it is asked in the research schedule, factors affecting their farming activity.

**Table 2.1 Showing Factors affecting farming activity**

S. No	Risk factors ( source of risk)	overall average respondents on scale (1 to 7)
1.	Illness	3.7 (Moderate Effect)
2.	Debt	5.23 (Large Effect)
3.	Political measures	3.67 (Moderate Effect)
4.	Technology process	2.63 (Negligible Effect)
5.	Weather and natural disasters	6.97 (Large Effect)
6.	Monsoon delay & climate change	5.73 (Large Effect)
7.	Animal disease and epidemic	2.21 (Negligible Effect)
8.	Difficulties in selling farm products	2.63 (Negligible Effect)
9.	Volatility of prices	5.68 (Large Effect)
10.	Input market	4.81 (Moderate Effect)

Respondents were asked to rate the listed factors according to farmers personal opinion. Respondents had the possibility to rate each factor on a scale of 1-7 where 1 means that the given factor has no effect on farming while in case at agricultural production. As per the table 2.1, overall average show that debit, delay in monsoon and effect of climate change, weather and Natural disasters volatility of price has large effect on farming, illness of the farmer political measures and inputs market has moderate effect and Technology process, animal disease and epidemic and difficulties in selling farm products has negligible effect.

## **2.2 Applied risk management instruments**

Besides knowing farmer's subjective perception on the effect of given factors and experiences related to risk or even crisis, it is highly relevant to identify specific risk reduction methods applied by the farmers.

**Table2.2 showing applied risk management instruments**

<b>S. No</b>	<b>Risk management instruments</b>	<b>No of farmers</b>	<b>Contribution in percentage %</b>
1.	Crop insurance	74	15.16
2.	Livestock insurance	49	10.04
3.	Property insurance	5	1.02
4.	Marketing contracts	17	3.48
5.	Production contracts	26	5.32
6.	Vertical integration	14	2.86
7.	Off -farm employment	48	9.83
8.	Off- farm investments	--	--
9.	Diversification	44	9.01
10.	Hedging	15	3.37
11.	Holding financial reserves	66	13.09
12.	Using government programs	98	20.08
13.	Holding farm inputs and farm...	15	3.07
14.	On farm employment	189	38.72
15.	Total	504	100

In research schedule, several widely used risk management instruments are listed, from which the farmers had to select the ones they currently used popular risk management instruments include. According to the table2.2, on-farm employment 189 farmers in (38.72%), crop and livestock insurance 74 farmers in (15.16%) and 49 in (10.04%), off-farm employment 48 farmers in (9.88%), sale of assets 217 in (43.05%) and holding financial reserves 66 in (13.09%). Beside there are other tools used in dealing with risk which include holding of farm inputs and farm produced 15 in (3.07%), using government programs 98 in (20.08%), hedging 15 in (3.37%) diversification 44 in (9.01%), off-farm employment 48 farmers in (9.83%), vertical integration 14 in (2.86%), Production contract 26 in (5.32%), marketing contract 7 in (1.38%), property insurance 5 in (1.02%). Sale of assets and use of government programs are the main tools mostly farmers relay on.

## 2.3 Farmer's information source

Table 2.3 showing Farmer's information source

S. No	Risk management instruments	No of farmers	Contribution in percentage %
1.	kisan call center	48	9.83
2.	Educational courses	3	0.61
3.	Personal data	--	--
4.	Farmers union	73	14.95
5.	Radio programs	--	--
6.	Technical books	7	1.43
7.	Other farmers	67	13.72
8.	TV programs	421	86.27
9.	Print press	28	5.73
10.	Suppliers	53	10.86
11.	Buyers	18	3.68
12.	Internet	5	1.02
13.	Consultant	7	1.43
15.	Total	504	100

According to the table 2.3, widely used information sources are listed, from which farmers had to select the ones they currently use, Most of the farmer's 421 in (86.27%) dependent on T.V Programs as a source of information. Beside T.V programs farmers also use other farmers 67 in (13.72%), farmers union 73 in (14.95%), suppliers 53 in (10.86%) and kisan call center 48 in (9.83%). Other sources for information are also used in farming internet 5 in (1.02%), buyers 18 in (3.68%), print press 28 in (5.73%), technical books 2 in (1.43%), educational courses 3 in (0.61%), consultant 7 in (1.43%) and print press 28 in (5.73%). Hence it can be construed that majority of the farmers mainly depend on T.V programs as a source of information. Radio programs, personal data collection and educational courses are not popular information sources.



## 2.4 Main attributes of crisis situation

**Table2.4 showing Main attributes of crisis situation**

S. No	Attributes of Crisis	Crop Production	Live Stock Production
1.	Affected Revenue as a Percentage of Total Revenue	61.47	10.32
2.	Average frequency of crisis situation	02.96	01.44

Agriculture is associated with many types of risk that expose farmers to potential losses. It is important to understand what accidental loss occurs in farming, main attributes of crisis situation, affected revenue as a percentage of total livestock and frequency of crises situation. With the above illustration it is asked in the schedule attributes of crisis situation experienced in crop production. The overall average percentage loss in farming is 61.46 and number of occurrences of crises situation is overall average of frequency of crises situation that is 2.96 in average. It is also asked in the schedule attributes of crisis situation experienced in livestock production. The overall average of affected revenue as % of total revenue of live stock production is 10.32%. Overall average frequency of crisis situation is 1.44 in livestock production, according to the table2.4.

## 2.5 Farmer's management practices on the operational side of farming activity.

**Table-2.5 Farmer's management practices on the operational side of farming activity**

S. No.	Farmer's management practices	No. of respondents	Contribution in Percentage (%)
1	Hired Custom Service	448	91.80
2	Lease Equipment rather than brought	24	4.91
3	Rent Equipments rather than brought	13	2.66
4	Share Expenses with land lords	20	4.09
5	Using Multi year lease	43	8.81
6	Crop Share land Rent	112	22.95
7	Total	488	100

Efficiency may be defined as the capacity or ability of the farm business as a complete unit or any single enterprise thereof to achieve the desired goal. Efficiency can be related to the operation of the farm business as a whole. The choice making from among the various alternatives has thus become a real problem. Our objective is to select the least cost or most efficient method keeping in view the amount of work to be done on a given farm situation. With the above objective it is asked

in the research schedule, farmer's management practices on the operational side of farming activity. Respondents were asked to select the listed practices according to farmer's personal experience, management practices in farming, hired custom service 448 farmers in (91.80%), crop-share land rent 112(22.95%), lease equipment rather than brought, 24 in (4.91%), rent equipment rather than brought 13 (2.66%) and share expenses with land lords 20 in (4.09%). Hence it can be construed that majority of the farmers depend on hired custom service.

## 2.6 Farmers selecting source of finance

**Table-2.6 Source of finance among the farmers of the district**

S. No	Source of finance	No. of Respondents	Contribution in Percentage (%)
1	Self Financing	364	74.59%
2	Institutional Sources	122	25.00%
3	Relatives	83	17.00%
4	Friends	73	14.95%
5	Money Lenders	19	3.89%
6	Other Sources	93	19.05%
7	Total	488	100

It is also asked the research schedule, farmers source of finance, as per the table 2.6, self financing farmers 364 in (74.59%), Institutional sources 122 in (25.00%), friends 73 in (14.95%), money lenders (3.89%) and other sources 93 (19.05%). Hence it is construed that majority of the farmers have to depend on self finance for their farming activity.

## 2.7 Policy instruments currently used

**Table-2.7policy instruments currently used by the farmers of the district**

S.I No.	policy instruments Currently used	No. of Respondents	Contribution in Percentage (%)
1	Relaxations in Grain Procurement	47	9.63
2	Kisan Credit Card	0	0
3	Infrastructure (Irrigation Systems)	16	3.27
4	Services Provided	24	4.91
5	Cash Transfer	165	33.81
6	Supply of Fodder	5	1.02

7	Crop Insurance	97	19.87
8	Re-Scheduling of Loans	101	20.69
9	Pest Management System	117	23.97
10	Supply of Quality Seeds	17	3.48
11	Total	488	100

According to the table-2.7, policy instruments currently used by the farmers for his farming activity, Farmers using relaxations in grain procurement 42 in (9.63%), Irrigation system (Drip, sprinklers etc.) 16 in (3.27%), Information service 24 in (4.91%), cash transfer 165 in (33.81%), supply of fodder 5 in (1.02%), crop insurance 97 in (19.87%), rescheduling of loans 101 (20.69%), pest management system 117 in (23.97%) and supply of quality seeds 17 in (3.48%).

### **2.8 Member of any Cooperative or producers collaboration or has own written business plan.**

Selling agricultural products through contracts or cooperative is less risky due to provisional factors and conditions. Selling the products individually is probably the most risky way or marketing the products, especially where there is increased competition and the farmer lacks bargaining power.

**Table -2.8 Member of any cooperative or producers collaboration or has own written business plans**

S.No	Risk management instruments	No of Respondents	Contribution in percentage %
1.	YES	466	96.82%
2.	NO	22	3.18%
3.	TOTAL	488	100

With the above assumptions it is asked in the research schedule, farmer member of any collaboration, cooperative or has own written business plan. 466 farmers in (95.49%) responded 'No' and 22 farmers in (4.5%) respondents 'Yes'. Hence it can be construed that majority of the farmers are not a member of cooperative collaboration or has own business plan.

## 2.9 Causes for not preferring crop insurance

**Table-2.9 Causes for not preferring crop insurance in the District**

S.I. No.	Causes for not preferring crop insurance	No. of Respondents	Contribution in Percentage (%)
1	Have Bad Experience with Insurance	8	11.76
2	Do Not Believe Insurance can pay off its cost	46	67.64
3	Insufficient Liquidity	8	11.76
4	No Answer	6	8.82
	Total	68	100

It is also asked in the research schedule farmer's opinion on causes for not preferring crop insurance. According to the table-2.9, farmers responded, insufficient liquidity 8 in (11.76%), have bad experiences with insurance 8 in (11.76%), no answer 6 in (8.82%) and do not believe insurance can pay off its cost 46 in (67.64%).

## 2.10 Labor back up machinery used by the farmer

**Figure-2.10 Labor back up machinery used by the farmer to reduce labor related risk in farming activity.**

S. No	Labor back up machinery used by the farmer	No of Respondents	Contribution in percentage %
1.	YES	18	3.68%
2.	NO	470	96.31%
3.	TOTAL	488	100

According to the table 2.10, farmers respond to labor back up machinery used by the farmer to reduce labor related risk in farming, Farmers 470 in (96.31%) says 'No' and 18 in (3.68%) says 'Yes'. Hence it is construed that farmers are not using labor back up machinery in farming to deal with labor related risk.

### 3. FINDINGS

- There are various factors affecting farming activity these factors mainly include debt, weather and natural disaster, delay in monsoon and effect of climate change and volatility of price and input market. This factors causing low yield, low income, loss of income, loss of revenue and threatening the livelihood of the farmer.
- Suicides of farmers as an indication of our failure, to manage risks in agriculture the study is an important step towards strengthening risk management in Indian agriculture. The agrarian distress of late is assuming lot of significance and should be handled urgently.
- The percentage of loss in farming of the district is 61.47%, compared with crop production loss the revenue of live stock is low and it is 10.32%.
- Although there are various information sources available to the farmers, they are mainly dependent on T.V programs and farm unions to support their decisions. Scientific data analysis is missing in decision making under risky situation. 86.27% of the total respondents dependent on T.V programs as source of information.
- 96.31% of the farmers have no labor back up machinery used to reduce labor risk in farming this shows the need for mechanization in agriculture.
- 62.90% of the total respondents have no answer on government policies affecting their farming, this shows farmers are not affected by government policies at large extent. However this type of risk is going to increase in the farm of policy regulations and environmental regulation in coming future.
- Most of the inputs like tractors are used by the farmers by hired custom service that is of 91.380%, lease equipment rather than brought, rent equipments rather than brought and share expenses with land lords are of minimum or negligible use.
- Farmers dependent on crop insurance in 19.87%, re-scheduling of loan in 20.69% pest management in 23.97% and cash transfer in 33.81%, policy instrument to support their farming activity.
- Climatic events, delay in monsoon and affect of climate change animal disease and epidemic and market conditions are the causes for crises in farming 91.8% believe climate event,

96.72% believe delay in monsoon and affect of climate change and 96.93% believe market condition are the causes for critic situation on farming availability.

- 20.08% of the farmers dependent on government programs which reveal very low penetration of risk management tools in agriculture and also reveal farmers mostly dependent on government programs.
- Price supports have been the principal means by which farmers have received some protection against market risks. The price support policy has its limitations as well. In some of the crops, the support prices have been consistently fixed higher than the counter-factual market price. As a result stocks have ballooned. As these policies are not sustainable indefinitely, farmers face a policy risk depending on the way stocks are reduced.

#### 4. CONCLUSION

Risk exposure of agricultural holding will increase in the future which make farmers face huge losses more frequently. To deal with risk in agriculture it is the duty of the farmer to apply adequate risk management strategies and tools. Global economic environment, affect of climate change, poor management practices enhances the problem of risk in Indian agriculture. Applying low risk technologies, diversification, agricultural insurances, hedging, contracting, policy regulations, information support, effective use of natural resources and professional training will play an increasingly important role in the risk management practices of the farmers. There is a need for holistic approach to bring farm stability, profitability, effective use of natural resources, effective use of government programmes and skillful management; it is possible by selecting integrated farming as low risk activity.

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