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PRICE RISK & MANAGEMENT IN DRY-LANDS OF PRAKASAM DISTRICT OF ANDHRA PRADESH

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Abstract
Once farmers have decided to engage in farming activities, the production strategy selected is an important means of mitigating the risk of crop failure. Traditional cropping systems in many places rely on crop diversification and mixed farming. Crop diversification and intercropping systems are means to reduce the risk of crop failure due to adverse weather events, crop pest or insect attacks. Risk mitigation 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. Government of India has already recognized the importance of risk management in agriculture and has made great efforts to investigate the possibilities of national level risk management strategy. The need to protect farmers against risk has a concern of agriculture plan. Good risk management decisions depend on accurate information which requires reliable data, for effective decisions to be taken, farmer's need information on many aspects of the farming business.
Key Words: *diversification, risk management decisions, Risk mitigation strategies*

Risk Management

Risk management can be defined as a) The process of identification, assessment, and prioritization of *risks* by organization and b) involves coordinated and prudent application of resources so as to control and minimize the risk by controlling the probability and / or impact of unexpected events. Risk taking, which is also a part of risk management on the other hand, involves seizing opportunities, It is commonly believe that higher the risk higher the rewards. The strategies to manage risk include transferring the risk to another party (diversification), minimizing the risk (avoidance) controlling the downside or reducing the negative effect of the risk (hedging), and accepting some or all of the consequences of a particular risk (risk retention or tolerance).

Marketing Risk / Price Risk

Marketing risks are normally related to an imbalance between supply and demand and its effect on product prices. As supply and demand are inelastic in agriculture, markets are characterized by large changes in prices. growling conditions vary over a period of time leading to over or under supply. this creates price risk.

The importance of agriculture to the national economy is crucial in terms of meeting the growing demands for food and raw materials of the non-farm and urban population, expanding the secondary and tertiary sectors of the economy; Widening the extent of markets for industrial produce; earning the much-needed foreign exchange, maintaining price stability and mobilization of resources for capital formation. The share of agriculture in Gross Domestic Product (GDP) has registered a steady decline from 52 percent in 1950s to 17.7 percent in 2010.

The International Organization for Standardization (ISO) published, guide 73:2009, "Risk management vocabulary" and IEC (International Electrotechnical Commission) and ISO jointly published, ISO/IEC 31010, Risk Management – Risk assessment techniques. Together they provide organizations of all types with a well-stocked tool box for tackling situations that could affect the achievement of their objectives.

Marketing and Price Risk

According to Thakur et. al (1988) found that in the hill regions of Himachal Pradesh, total net returns of farmers are higher when crop output is half of normal crop output as prices under this situation are doubled[1].

This extreme outcome is because of underdeveloped markets as a result of which the Himachal hill regions are poorly linked to major consuming markets[2] (Thakur et.al, 1997).

Fuglie and Ramaswami (2001) compared average seasonal margins in potato between India and the United States. Both markets are characterized by sharply seasonal production and year-round demand. In both countries, cold storage is the principal means of keeping potatoes for year-round supply[3].

Risk Management Strategies

World Bank (2001) highlighted in world development report, difference between on-farm strategies and rise-sharing strategies[4]. Ex ante informal strategies are characterized by diversification of income sources and choice of agricultural production strategy. Once strategy producers can employ is simply to avoid risk. In many cases, extreme poverty makes people very risk averse. After avoiding activities that entail rise but that could also bring larger income gains. Rajagopalan and Varadharajan (1978) in an attempt to study the impact of risk and uncertainties on form production and income in the hilly area, indicated that diffusion of technology helps in minimizing risks and also protects the farmers in general . The study also indicates that the hill farming was not only faced with a Limited scope for diversification, but also an efficient investment decision in favor of modern forming. In order to minimize risks the authors recommended mixed cropping mixed farming and improved marketing practices[5].

Singh and Jain (1983) under took a study to workout risk efficient plans for different size and categories of farms. quadratic programming has been suggested as the most important tool for incorporating risk in farm planning in this study it was assumed that risk in net returns in due

to yield and price factors. The results indicated that a high degree of risk was involved to the existing plans of the farmers. The author's suggested the need to provide alternative plans precisely indicating the degree of corresponding risk involved to the farmers could choose the plans according to their personal attitude the risk this knowledge could be of immense help in form decision making under risky situations[6].

Objectives

1. To survey the opinion of agricultural producers on risk and risk management strategies in agriculture among the producers of Prakasam district.
2. To survey the Marketing risk management strategies currently applied in farming.
3. To analyze marketing risk, for findings, suggestions and with conclusion.

Questions and hypotheses of the research

According to the objectives of the research, the present research is probing to find the answer of the following questions.

Questions

Q.1) What are the causes for crisis situation according to producer in Indian agriculture?

Q.2) What is the experience of farmers of dryland farming related with Marketing risk?

The primary objective of the study is to provide base for debate by surveying Indian literature and analyze risk related data and make suggestions for the decision makers of Indian agriculture for discussing a possible future risk management strategy. Attention on agrarian distress without late is assuming lot of significance and should be handled urgently.

Marketing Risk and risk management strategies

Farmers of various reasons not using MSP:

MSP is a national risk management strategy which is supported by central government to deal with marketing price risk, it is run on the basis of how much the farmer actual cost farmer spend in operation of his farming activity, considering the overall cost into account, the minimum support price is decided by the government. In such case the price decided by government is a supporting price not exact price; farmers are intended to sell for better price that MSP.

Quality produced beyond to a level need to be selected for better or best price in search situation it is important to the farmer to avoid MSP. Quality producer intended for better price than MSP, for better marketing place.

Hedging is another principle where farmers intended to keep the farm produced to a demanding price. In general once the crop enters the market the price will go down after few months there is a gradual rise in price, in such situation farmers are interested for better price. Farmers of paddy (15.2) (21.8), Bajra (17.6) are avoiding to an extent with MSP. Soya been, moog urad, Maize to an extentent not interested in MSP.

With the above discussion it is clearly evident that quality and quantity of produced placed a difference with minimum support price policy. Formers of high quality are facing a peculiar risk in selling their farm produced. Beside it is also observed that the performance of MSP also affect the producer not to sell through MSP. These factors may be like not having access to MSP, not possible to sell through MSP.

Table 1 : Farmers for various reasons not using MSP as a risk management strategy in percentage

S.no	Crop	2018 July – Dec	Crop	2019 Jan -June
1	Paddy	15.2	Paddy	21.8
2	Jowar	13.1	Jowar	6.6
3	Bajra	17.6	Bajra	----
4	Maize	11.2	Maize	11.7
5	Ragi	3.1	Rapeseed / mustard	1.9
6	Arhar(tur)	10.0	Arhar(tur)	5.4
7	Urad	10.3	Masur	0.0
8	Moong	11.3	Moong	0.7
9	Sugar cane	4.8	Sugar cane	1.8
10	Ground nut	5.0	Gram	1.1
11	Coco nut	5.6	Coco nut	0.1
12	Soya bean	11.1	Wheat	1.3
13	Cotton	10.0	Cotton	2.6

Source: SS Report No. 587: Situation Assessment of Agricultural Households and Land and Livestock Holdings of Households in Rural India, 2019

Problem Related to Availability, Quality, and Cost of an Input:

Farmers often encounter various problems related to the availability, quality, and cost of inputs, which can significantly impact their agricultural operations and profitability.

Table- 2

Problem related to availability, quality, and cost of an input

S. No	Problem related to input experienced	Diversified Farming		Non-Diversified Farming	
		No of Respondents	Contribution in percentage %	No of Respondents	Contribution in percentage %
1.	YES	120	74.07%	58	17.79%
2.	NO	42	25.90%	268	82.21%
3.	TOTAL	162	100	326	100

Catogory * Type Of Farming Cross tabulation

Count

		Type Of Farming		
		Diversified Farming	Non-Diversified Farming	Total
Catogory	1	120	58	178
	2	42	268	310
Total		162	326	488

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	147.952[a]	1	**.000**		
Continuity Correction[b]	145.533	1	.000		
Likelihood Ratio	149.662	1	.000		

Catogory * Type Of Farming Cross tabulation

Count

		Type Of Farming		
		Diversified Farming	Non-Diversified Farming	Total
Catogory	1	120	58	178
	2	42	268	310

Fisher's Exact Test				.000	.000
Linear-by-Linear Association	147.649	1	.000		
N of Valid Cases	488				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 59.09.

b. Computed only for a 2x2 table

Inference: **Problem related to input experienced** are dependent on the type of the farming.

ANOVA

Tests of Between-Subjects Effects

Dependent Variable: Number

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11080.000[a]	2	5540.000	.267	.807
Intercept	59536.000	1	59536.000	2.871	.339
Catogory	4356.000	1	4356.000	.210	**.726**
Type Of Farming	6724.000	1	6724.000	.324	**.670**
Error	20736.000	1	20736.000		
Total	91352.000	4			
Corrected Total	31816.000	3			

a. R Squared = .348 (Adjusted R Squared = -.955)

Inference: There is no significant difference among the categories.

There is no significant difference between Diversified Farming and Non- Diversified Farming types.

H_0 is accepted

H_1 is accepted

Correlation:

	Diversified Farming	*Non-Diversified Farming*
Diversified Farming	1	
Non-Diversified Farming	-1	1

Inference: Perfect negative correlation is observed between the farming types.

Interpretation

Production as a source of risk concerns variation in output also arising from availability, quality and cost of an input. With the above assumption it is asked in the research schedule farmers experience on availability, quality and cost of an input. Respondents were asked to answer 'Yes' or 'No', on the problem of availability quality and cost of an input.

It is observed in the research problem related to input experienced are dependent on the type of the farming. Farmers of diversified farming experience this type of risk more sever compare with non-diversified farming. Seasonally farming in the district is of rabi an karif in progress farmers of both rabi and karif are experiencing this type of risk in farming of the district.

Causes for Price evolution of Farm Production in the district

The price evolution in agriculture is influenced by various factors that can cause fluctuations and changes in the prices of agricultural commodities.

Table - 3

Causes for price evolution of farm production in the district

S. No	Causes for Price Evolution	Diversified Farming		Non-Diversified Farming	
		No of Respondents	Contribution in percentage %	No of Respondents	Contribution in percentage %
1.	No Answer	121	74.69%	283	86.86%

2.	Change in subsidies or level of price for income support payment	22	16.66%	28	8.58%
3.	Change in world price	3	1.85%	6	1.84%
4	Change in interest rates and exchange rates	31	19.13%	35	10.73%
5	Competitive market for input and outputs	24	14.81%	48	14.72%
6	Over production or low production	3	1.85%	7	2.14%
	Total	162	100	326	100

Category * Type Of Farming Cross tabulation

Count

		Type Of Farming		
		Diversified Farming	Non-Diversified Farming	Total
Category	1	121	283	404
	2	22	28	50
	3	3	6	9
	4	31	35	66
	5	24	48	72
	6	3	7	10
Total		204	407	611

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.204[a]	5	**.070**
Likelihood Ratio	9.864	5	.079
Linear-by-Linear Association	2.782	1	.095
N of Valid Cases	611		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 3.00.

Inference: **Causes for Price Evolution** are not dependent on the type of the farming.

ANOVA

Tests of Between-Subjects Effects

Dependent Variable: Number

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	60042.500[a]	6	10007.083	4.996	.049
Intercept	31110.083	1	31110.083	15.533	.011
Catogory	56608.417	5	11321.683	5.653	**.040**
Type Of Farming	3434.083	1	3434.083	1.715	**.247**
Error	10014.417	5	2002.883		
Total	101167.000	12			
Corrected Total	70056.917	11			

a. R Squared = .857 (Adjusted R Squared = .686)

Post Hoc Tests

Category

Homogeneous Subsets

Number

Duncan[a,,b]

Category	N	Subset 1	Subset 2
3	2	4.5000	
6	2	5.0000	
2	2	25.0000	
4	2	33.0000	
5	2	36.0000	
1	2		202.0000
Sig.		.520	1.000

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square (Error) = 2002.883.

a. Uses Harmonic Mean Sample Size = 2.000.

b. Alpha = 0.05.

Inference: There is a significant difference among the categories.

"No Answer **"is found in most cases.**

There is no significant difference between Diversified Farming and Non- Diversified Farming types.

H_0 is rejected

H_1 is accepted

Correlation:

	Diversified Farming	*Non-Diversified Farming*
Diversified Farming	1	
Non-Diversified Farming	0.989592	1

Inference: Very high correlation is observed between the farming types.

Interpretation

Marketing problem decisions include buying of inputs such as seeds, fertilizers, insecticides, equipments etc and selling of farm products. Decisions in respect of questions like when to buy, where to buy and how to buy the farm inputs are made so they should decide the proper time and place of purchase of inputs.

Purchase of inputs or combination of inputs should be made at the least cost. Selling requires decisions in respect of questions like when, where and how to sell farm products. Price for a particular commodity is high, farmers produce more and prices eventually fall due to over-supply of the commodity. With the above assumption it is asked in the research schedule causes for price evolution and marketing problems. Respondents were asked to select causes for price evolution.

It is observed in the study causes for price evolutions are not dependent on the type of the farming. Farmers mostly responded with "No Answer". Farmers of the district do not have their control over price of the farm produce. This is a sever risk experienced by the farmers of the district. Thus risk in agriculture is correlative beyond the control of the farmers and need high attention towards risk.

I Price Forecasting*:*

Price forecasting and market analysis play a crucial role in risk management in agriculture. Farm producers and other agricultural stakeholders can make informed decisions to mitigate risks and optimize their operations. Algorithms and data-driven approaches are increasingly employed to improve price forecasting and market trends in agriculture.

Time Series Analysis: Time series analysis algorithms to study price variation such as autoregressive integrated moving average (ARIMA), exponential smoothing methods (e.g., Holt-Winters), and seasonal decomposition of time series (STL), are widely used for farm produced price forecasting, which analyzes previous price data to identify patterns, trends, and seasonality, allowing for the prediction of future prices.

Machine Learning (ML) Models: include regression models, decision trees, random forests, support vector machines (SVM), and neural networks, can be employed for price forecasting and market analysis in agriculture. These models leverage price data and along with other factors which affect farmer and farming activity such as weather patterns, crop yield data, global market trends, effect of climatic event and macroeconomic indicators to make predictions.

Ensemble Models: This model processes multiple individual models to improve prediction accuracy. Methods like bagging and boosting can be applied to create ensembles these models, which are trained on different subsets of the data or with different algorithms. This approach helps reduce bias and variance, leading to more reliable price forecasts for best prediction.

Bayesian Networks: Bayesian networks are probabilistic graphical models that can capture complex relationships between variables. They are used to analyze market dynamics and assess

the impact of various factors on prices variation. Bayesian networks incorporate prior knowledge and update predictions as new data becomes available, making them suitable for dynamic market analysis.

Support Vector Regression (SVR): SVR is a variant of support vector machines specifically designed for regression tasks. It can be utilized for price forecasting in agriculture by mapping input variables (e.g., historical prices, weather data, crop yield) to a continuous output variable (future prices). SVR aims to find an optimal hyper plane that maximally fits the training data while minimizing the prediction error.

Deep Learning Models: Deep learning algorithms, particularly recurrent neural networks (RNN) and long short-term memory (LSTM) networks are adept at capturing sequential dependencies and patterns in time series data. They can be utilized for agricultural price forecasting by considering historical price data and other relevant temporal information.

II Quality cost of an inputs:

Algorithms can be employed to optimize the quality-cost trade-off and enhance risk management in this context. algorithms improve efficient decision on quality cost of inputs in agriculture.

Optimization Algorithms: Optimization algorithms aim to find the best possible solution given a set of constraints and objectives. These algorithms can be utilized to optimize cost of an in-put. Mathematical optimization techniques like linear programming, quadratic programming, or mixed-integer programming can be employed to determine the optimal allocation of resources to achieve the desired input quality within budget limits working for scared resource.

Sensitivity Analysis: Sensitivity analysis algorithms assess the impact of changes in input quality on costs and overall agricultural operations. By quantifying the relationship between input quality and costs, farmers can identify critical factors that significantly affect their risk exposure. Sensitivity analysis can be performed using statistical techniques, regression models, or simulation-based approaches.

Cost-Benefit Analysis: Cost-benefit analyses algorithms help evaluate the economic feasibility of investing in higher quality inputs. These algorithms compare the costs associated with using different input qualities against the potential benefits, such as improved crop yield, reduced losses, or enhanced product value. By quantifying the expected returns and considering the associated risks, farmers can make informed decisions regarding input quality and investment.

Machine Learning (ML) Models: ML algorithms can be employed to assess the relationship between input quality and various outcomes, such as crop yield, disease incidence, or market value. By training ML models on past data that includes information on input quality and associated costs, farmers can gain insights into the impact of different input qualities on agricultural outcomes. This information can then be used to make informed decisions about input quality management and risk mitigation.

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