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Performance of Weather Index Based Insurance for Cotton in Karnataka

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ABSTRACT

In the Developing countries like India the crop failure due to reasons of excess of rainfall and lack of rain fall is a common phenomenon. To compensate with the crop failure the Crop insurance is an immediate resort available to the farming community across the country.
The WIBI-Weather Index Based Insurance scheme in Karnataka is the instrument available to farmers and more particularly for the cotton growing farmers. However the common notion is that farmers are not satisfied by crop insurance facility. The present study attempts to understand the performance of WIBI and examines the satisfactory levels of the cotton growing farming in this regard. The detailed analysis of both positive and negative perception of farmers towards weather based insurance is given. The paper highlights that the WIBI performance is marginally satisfactory and covers more of low rain fall risk than the high rainfall risk.

Keywords: Perception, risk, Crop insurance, Weather index based insurance.

INTRODUCTION:

Agriculture plays a very significant role in Indian economy in terms of its GDP. Agriculture and allied sector supports livelihood to a majority of rural mass consisting about three fifth of its population spreading through length and breadth of the country. The agriculture sector of India has occupied 43% of India's Geographical Area. Agriculture is still the only largest contributor to India's GDP even after a decline in the agriculture share of India. But it continues to be the most vulnerable sector despite the improvement in scientific and technological innovations in the country.
In India, agricultural risks are becoming more worst owing to various factors such as climatic variability and change, frequent natural disasters, uncertainties in yields and prices, weak rural infrastructure, imperfect markets and lack of financial services etc. It is estimated that 50% of the damage caused to agriculture production in India is mainly due to uncertainty in climatic condition (Bhise V.B. et al). In such cases the farmers of our country have to depend larger upon crop insurance to mitigate the risk associated with agricultural sector. However, the poor development of risk management tool like crop insurance in the country gives huge opportunities for the emerging agricultural insurance like Weather Index Based Insurance to pull the producer out of the poverty trap by protecting him from lean income shocks and by ensuring that a fair share of the price reaches the producer. A large number of private insurance companies have been operating in the Indian Insurance Market since October 2000.

Risks in Agriculture:

The agricultural sector is exposed to a variety of risks which occur with high frequency. The risk includes high variability of production outcomes, production risk, Input and output price volatility is also an important source of market risk, many agricultural production cycles stretch over long periods of time, and farmers must anticipate in for seen expenses,are only able to recover once the product is marketed leading to financial risk.

Adoption of new technologies in modernized agriculture such as introduction of genetically modified crops causes yet an increase in producer liability risk. These risks are manageable to some extent however the risk caused by the change in climatic condition or Natural calamities like rising temperatures, erratic rainfall pattern, increase in the severity of droughts, floods and cyclones have caused huge losses in agricultural production and the livestock population needs to be protected and insured.

Weather Risk:

It is the fact that climate and weather are significant factors affecting agriculture production around the world. In agriculture, risk means the possibility of a dry year, or an extreme frost which in turn, it will result in a substantial loss of crop or income. Similarly**,** weather risk can be considered as those risks associated with change in weather condition such as erratic rainfall pattern, snow, storms, wind velocity, fog, variation in temperatures, floods, cyclones etc. these factors significantly affect agriculture production. Both seasonal and regional variations in weather directly influence the crop yield potential. The major source of farmers income is from agriculture, Weather risk is uncontrollable, the change in weather condition might be complete or partial which decreases the production of crop yield and it directly affect the farmers' agricultural income causing a chronic state of poverty among farmers. Extreme weather events, such as droughts and floods, can directly destroy productive assets which have been accumulated with high cost through years of inevitable consumption. Households who are forced into poverty by such shocks often find it difficult to recover and restart the long process of accumulating productive assets once again (Carter et al.2007).

The weather risk has created problems to farmers in many ways like it affects the production yield which directly increases the cost of production and causes less profit, increases the debts of farmers to a considerable extent bringing them to insolvent position, affects the financial stability of the farmers which indirectly leads to poor health, scarcity of food, unhygienic environment causing chronic diseases and all these factors ultimately lead the farmers to commit suicide.

To mitigate the risk associated with the crop grown and to gain financial stability farmers need to depend on Insurance. Among the insurance there are two types:

A. Crop Insurance (CI)
B. Weather Index Based Insurance (WIBI)

Crop Insurance:

Crop insurance is the oldest and traditional form of insurance. It was very popular in the beginning stage. However, over a period of time, due to the introduction of new form of insurance like Weather Index Based Insurance (WIBI) farmers preferred weather based insurance rather than crop insurance. This is because in crop insurance the compensation was given only after proper examination of the crop field, and in case of natural disaster like floods, the farmers had to claim within 48 hrs and if there is delay in claim by the farmers the insurance companies would refuse to pay the compensation even if the farmers had paid the premium within the due time. The crop insurance also failed to re-structure their policy scheme which had lots of inconsistency. Crop insurance had deficiencies like multiple agencies, adverse selection, lack of uniqueness, reliable methodology for crop yield verification and reporting system, more administrative cost, difficulty in getting the compensation, lack of quick settlement etc., these led the farmers to lose the hopes on crop insurance. Due to these deficiencies farmers had to depend on other insurance scheme like Weather Index Based Insurance (WIBI).

Weather risk insurance (WRI):

Weather risk insurance is a type of insurance used by the farmers for protection against financial loss that may be incurred due to erratic rainfall pattern, snowfall, storms, wind velocity, fog, variation in temperatures, floods, cyclones or other adverse effect, measurable weather conditions. This weather risk insurance is popularly known as Weather index based insurance.

Weather Index Based Insurance (WIBI):

Weather index based insurance is an alternative to traditional Crop insurance for agriculture products. Weather index based insurance provides compensation on the basis of rain fall data. The insurance companies obtain rainfall data on the basis of publicly verifiable of standard measure and a factor based on the compensation is given. The main aim of Weather index based insurance is to protect the farmers against weather related shocks such as shortage or heavy rainfall. The main reason to develop Weather Index Based Insurance is to avoid the adverse selection, to minimize administration cost and most importantly it renders quick compensation settlement to farmers.

Importance of WIBI:

WIBI is transparent which leads to high level of client comfort. It allows the policy holder to have access directly to the factors on which the payouts are calculated. It is possible to calculate payouts and pay policy holders on a timely basis. This feature is potentially attractive to farmers. In WIBI administration is easy which leads to low management expenses. It has multiple effects on the economy as it enables access to factors of production. The risk taking capacity of farmers, banks, micro finance lender and agro based industries will be enhanced. Transfer of risk to international market finance through reinsurance is quite easy. Using WIBI reinsurance, insurance as an insurance portfolio would make it easier for local insurers to offer traditional farm-level agricultural insurance without the threat of large financial losses that could result from a natural calamity or any disaster.

Comparison of Crop insurance and Weather index Based Insurance:

Parameters	Crop Insurance	Weather Index Based Insurance
Adverse selection and moral hazard	Yes	No
Transparence	Low	High
Premium	Highly subsidized	Market rate
Basis risk	Low	Low
Administration cost	High	Medium
Submission of Farmers documents	Required	Not required
Field verification	Required	Not required
Compensation	Not unique	Unique
Patter	Conventional type of insurance	Modern and scientific type of insurance
Nature of the Insurance	Rigid	Dynamic
Service perception of the farmers	Not good	Good
Product types	Varieties	Only weather index based insurance product
Claim settlement	Between 6 to 24 months	Less then 30 days

The cotton economy of Karnataka:

Karnataka has occupied 4.51% of cotton crop area in the country in 2015-16, with a contribution of 3.61% of the production at the all-India level in that year (Source: Directorate of Economics and Statistics, Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India). Of which 20% of its cotton area was under irrigated conditions of farming.

After Gujarat and Andhra Pradesh, Karnataka has the largest area under hybrid Cotton seed production in the country. Karnataka is the first state in south India to produce hybrid cotton seeds for commercial cultivation. Cotton seed production began in Karnataka in 1970, by the early migrant farmers of Andhra Pradesh. Gradually local farmers are also adopted the seed production activity. Cotton is an important commercial crop which is cultivated in most parts of the districts of Karnataka, mainly grown in Dharwad, Gadag, Haveri, Belgaum, Bellary, Bijapur, Shimoga, Chamarajnagar, Mysore and Davanagere However, Dharwad, Bijapur, Chitradurga, Bellary and Raichur are labeled as traditional cotton growing districts of the state. yet, there is a spectacular shift in cotton growing areas in Karnataka, it has spread from traditional growing areas to non-traditional growing ones like Mysore, Shimoga, Chamarajnagar, Davanagere, despite this, the total area under cotton cultivation has drastically reduced from 10.4 lakh ha (1977-78) to 6.24 lakh (1990) due to various reasons as per Cotton Advisory Board Estimates during 2015-16 the area under cotton was 4.5 Lakh ha with a productivity of 246 kg/ha, which accounts for 6.50 lakh bales (1 bale = 170 kg).

Table 1: Yields of Cotton in Karnataka over the years -1996-97 to 2016-2017

year	Area (in lakh hectares)	Production (in lakh bales of 170 kgs)	Yield (kgs per hectare)
1996-97	6.68	9.00	229
1997-98	5.18	7.50	246
1998-99	6.08	8.75	245

year	Area (in lakh hectares)	Production (in lakh bales of 170 kgs)	Yield (kgs per hectare)
1999-00	5.40	7.00	220
2000-01	5.60	7.75	235
2001-02	5.91	7.00	201
2002-03	3.93	5.00	216
2003-04	3.13	4.20	228
2004-05	5.21	8.00	261
2005-06	4.13	6.00	247
2006-07	3.78	6.00	270
2007-08	4.03	8.00	337
2008-09	4.08	9.00	375
2009-10	4.55	12.25	458
2010-11	5.45	11.10	346
2011-12	5.54	14.00	430
2012-13	4.85	17.00	596
2013-14	6.62	23.00	591
2014-15	8.75	31.5	612
2015-16	6.33	20.00	537
2016-2017	4.64	21.00	769

Source: Office of the Textile Commissioner, Mumbai.

Table 2: Area occupied by Cotton crop in Karnataka (1997-2017)

Year	Area (in lakh hectares)
1996-97	6.68
1997-98	5.18
1998-99	6.08
1999-00	5.4
2000-01	5.6
2001-02	5.91
2002-03	3.93
2003-04	3.13
2004-05	5.21
2005-06	4.13
2006-07	3.78
2007-08	4.03
2008-09	4.08
2009-10	4.55
2010-11	5.45
2011-12	5.54
2012-13	4.85
2013-14	6.62
2014-15	8.75
2015-16	6.33
2016-2017	4.64

Source: Office of the Textile Commissioner, Mumbai

Table 3: Cotton Production in Karnataka

Year	Production (in lakh bales of 170 kgs)
1996-97	9.00
1997-98	7.50
1998-99	8.75

Year	Production (in lakh bales of 170 kgs)
1999-00	7.00
2000-01	7.75
2001-02	7.00
2002-03	5.00
2003-04	4.20
2004-05	8.00
2005-06	6.00
2006-07	6.00
2007-08	8.00
2008-09	9.00
2009-10	12.25
2010-11	11.10
2011-12	14.00
2012-13	17.00
2013-14	23.00
2014-15	31.50
2015-16	20.00
2016-17	21.00

Source: Office of the Textile Commissioner, Mumbai

Table 4: Cotton Consumption by Organized Sector Textile Mills (Non-SSI Mills) and Small Scale Spinning Mills (SSI) Units in Karnataka

Year	Non-SSI mills ((In lakh bales of 170 kgs each)	SSI mills ((In lakh bales of 170 kgs each)
2000-01	149.36	10.97
2001-02	147.00	11.70
2002-03	142.42	11.63
2003-04	150.39	12.99
2004-05	163.98	16.57
2005-06	180.00	20.00
2006-07	194.89	15.88
2007-08	195.67	19.13
2008-09	190.00	19.00
2009-10	207.00	20.00
2010-11	246.00	20.00
2011-12	223.58	22.12
2012-13	251.74	23.59
2013-14	268.03	25.2
2014-15	278.55	26.28
2015-16	274	27
2016-2017(P)*	275	28

Source: Office of the Textile Commissioner, Mumbai

The large seed companies are involved in the production and marketing of hybrid cotton seeds in Karnataka namely Proagro, Emergent Genetics, Advanta, Mahyco-Monsanto, Nuziveedu and JK Agritech. In addition to the private seed companies, the government owned corporation KSSDC (Karnataka State Seed Development Corporation) is also actively involved in production and marketing of varieties of hybrid cotton seeds. The Karnataka State Seed Development Corporation covers nearly 20% of the area under cotton seed production in the state. Both private and the Government companies are dependent on local farmers for production and multiplication of seeds, where make Buy back arrangements with seed farmers and act as intermediaries called Seed Organisers who mediate between the companies and the farmers.

There is a reduction in the area of cotton cultivation in traditional areas and expansions of cotton cultivation in non-traditional areas are noticed in Shimoga, Mysore. Parts of South Canara, North Canara and Chamarajanagar.

Davanagere districts have been reported to have taken up cotton cultivation. Cotton cultivation is drastically reduced at Bijapur, Bellary and Raichur districts.

The interspecific hybrids released originally for irrigated areas are popularly grown in rain fed tracts of traditional and non-traditional areas. They occupy 35-40% of total cotton area in the state although large number of varieties were recommended and grown earlier, and now only few verities are cultivated. Similarly, along with officially recommended and cultivated hybrids, many private hybrids varieties (hybrid cottons released by private companies) are cultivated in the large areas.

The production of cotton in the state has affected to a greater extent due to change in weather conditions. Despite recent floods in northern districts and subsequent damages to the standing crops, Karnataka is the sixth largest producer of cotton in the entire country and is likely to increase its cotton production by 15 per cent to a little over one million bales by the end of this year The state which produced 9 lakh bales of cotton from 3.90 lakh hectares in 2008-09, had earlier set a target of 25 per cent growth in cotton output and 21 per cent increase in area under cultivation at 4.90 lakh hectares. However, according to an assessment of crop damages conducted by the state agriculture department, states that nearly 51 per cent of the 2.91 lakh hectares under cotton has been partly damaged in northern Karnataka during the year's kharif season. Majority of the damage to the crop was in the district of Belgaum, affecting 18,730 hectares, followed by Davanagere, which has lost 16,584 hectares and Dharwad 16,565 hectares. Gulbarga and Raichur districts have lost 15,228 hectares and 13,456 hectares respectively.

LITERATURE REVIEW:

Pertaining to WIBI elaborative studies have been reported to understand various scholars' opinion and relevant studies are summarized and presented.

Surminskiand Delioma(2013) made a detailed study and analysed 27 insurance schemes that transfer the risk of economic losses arising from floods in low and middle income countries, focusing on the linkages between financial risk transfer and risk reduction the study suggests that utilizing risk transfer for reduction of risk is far exhausted only few schemes showing an operational link between risk transfer and risk reduction. Risk rising levels pose a threat to the insurability of floods, which suggests a closer linkage between risk transfer and risk reduction in order to make it more sustainable and robust tool.

Musai et al.(2013) investigated on the impact tea crop insurance in development of tea industry. This impact was done on a variety of qualitative and quantitative techniques result studied that most of the farmers in the region are not satisfied with the performance of insurance, where Tea industry has faced several problems, such as imports of large amounts of foreign tea, non-existence of statistics and data, unsuitable conditions of harvest.

Prabhu (2013), has studied the rainfall variability and coffee yield for three Coffee growing neighboring districts of Karnataka state, the rainfall index insurance is an effective rainfall risk absorption mechanisms. The scheme has many advantages such as no moral hazards, adverse selection, less administration cost; quick payout etc., Hence the rainfall index insurance is superior to crop insurance. During monsoon and post monsoon period the volatility of rainfall varies across these districts. However the results were contrary for pre-monsoon period.

Raushan Bokusheva & Breustedt (2012) suggested that index based crop insurance is one of the risk reduction methods in agriculture sector. Its operation is based on historical rainfall data hence it is one of the most reliable predictor of future risk reduction. They also pointed out that, the traditional yield crop insurance is more reliable instruments of yield risk management than the index based crop insurance. However, in many times farmers take wrong decisions at the time of selection of the policy in case opted by the traditional crop insurance.

RESEARCH GAP:

The review of literature reveals that current state of research related to WIBI is in budding stage. Not much research has been done so far regarding the cotton for WIBI scheme in Karnataka, and so more research has to be done in this field in-order to find out wholesome treatment to the problem of weather risk management as far as cotton crop is concerned. The major issues are the establishing the degree of impact of weather risk on cotton yield, developing appropriate indemnity schemes for compensating the losses incurred by Cotton growers and evolving a broader policy framework for finding solution on a long-term basis.

OBJECTIVE OF THE STUDY:

To evaluate the Performance of Weather index based insurance for cotton in Karnataka

(Ho): The progress of WIBI programme for cotton is not satisfactory

(H1): The progress of WIBI programme for cotton is only marginal

SCOPE OF THE STUDY:

The scope of this study is to assess the impact of weather risk on cotton yield and to analyse the extent of change of weather condition on cotton growers. It also covers the detailed notes on the intensity of benefits gained by existing WIBI scheme. The study deals with a thorough study of existing WIBI in terms of product design, price, marketing network, claim settlements and Regulations. It is very much necessary to identify the ground realities, problems relating to weather index based insurance and evaluating the performance of WIBI for Cotton crop particularly in the state of Karnataka.
The research is restricted and limited as it is carried only in selected districts of karnataka namely Chitradurga, Davanagere, Shimoga and Tumkur. The present research work is focused on the primary data which is collected through the questionnaire concerning especially from cotton growers, and secondary data has been collected from Newspapers, magazines, statistical hand books, Government records conference proceedings, relevant books, journals, research papers monographs etc., The study therefore may be helpful in modifying the existing product design which will be supportive to mitigate weather risks. The study mainly focuses on cotton crop as it is one among the major commercial crops of the state of Karnataka.

NEED FOR THE STUDY:

India has largest area under cotton cultivation in the world. 23.5%. However production and per hectare yield of cotton is less when compared to developed countries of the world, it is because of the changes in climatic condition. In such cases farmers need to opt for crop insurance or Weather index based insurance. In the present situation farmers prefer to opt for WIBI because it has more immense benefits than Crop Insurance (CI).
Literature survey further support that there is a need of extensive research that has to be reviewed on WIBI. The Literature survey reveals that Crop insurance has many disadvantages, whereas WIBI has theoretically proven that it is the best when compared to CI. And also the efficiency of WIBI research has also to be evaluated on this particular scheme. It is also observed that not much work has been reported so far regarding the popularization and implementation of WIBI among cotton farmers and the benefits of WIBI on economical stability, increase in production, increase in living standard etc., on cotton farmers. More research work has to be done to assess the contribution of WIBI in the economical growth and development of the nation.

RESEARCH METHODOLOGY:

Research Methodology:

The research work has been carried out on the basis of primary and secondary information. Efforts have been made to collect data regarding the performance of Weather index based insurance in Karnataka.

Primary Data:

The primary data is collected through a structured questionnaire which has been be designed and circulated among the prospective respondents. The respondents are selected on simple random sampling method, 486 cotton growing farmers are interviewed. The Respondents have been distinguished based on their educational standards, age group, experience in cotton cultivation, land owned etc., from whom the questionnaire schedule have been filled from asking questions in regional language. The primary data is also collected through interaction and oral discussions with the insurance agents and prospective customers of Weather index based insurance.

Secondary Data:

The secondary data was collected in printed form from various sources such as district statistical hand books, census tracts of Karnataka, newspapers, magazines, conference proceedings, relevant published books, journals, research articles and other published documents of both national and international standards. Annual reports of private sectors followed by website for secondary data.

Sample Size:

The study is carried out in four Districts of Karnataka State namely Chitradurga, Davangere, Shimoga and Tumkur. As most of the cotton growers are from these regions sampling is done randomly from selected 486 Cotton growing farmers for (WIBI) interaction with a structured household questionnaire.

Statistical tools:

For the analysis and interpretation of primary and secondary data a range of statistical techniques like, Factor analysis is used.

DATA ANALYSIS AND INTERPRETATION:

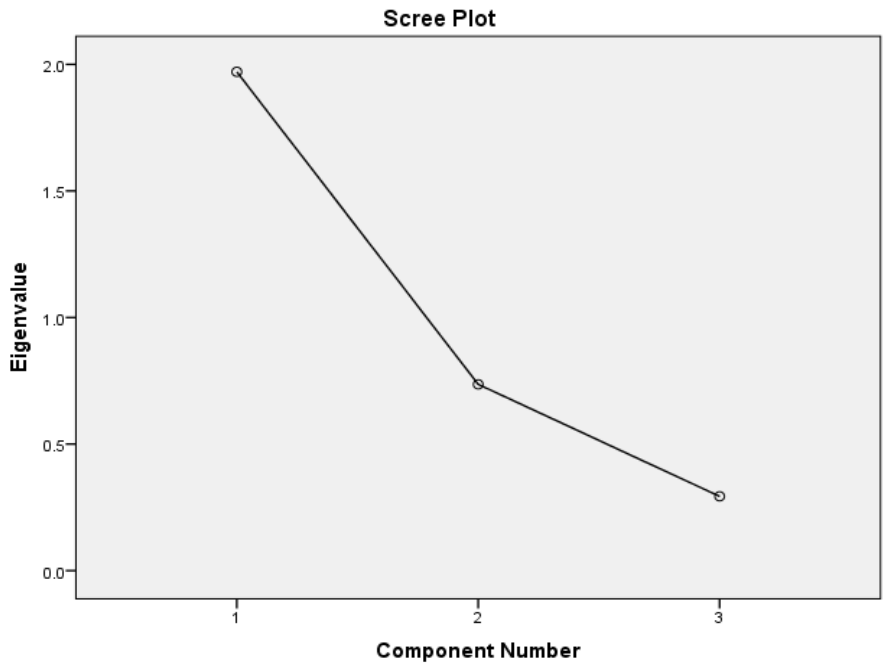
The performance of WIBI is examined based on the assumptions like the progress of WIBI programme for cotton is only marginal and even the performance of WIBI is not satisfactory followed by the hypothesis as stated.
Null hypothesis (Ho): "The progress of WIBI programme for cotton is not satisfactory."
Alternative hypothesis (H1): "The progress of WIBI programme for cotton is only marginal."
To identity the reality of the ground truth, the variable of risk coverage has been extracted the from variable matrix, item picked from the master table, they are the extent of weather risk protection covered by WIBI for cotton, followed by level of deficit weather risk covered by WIBI and finally extent of excess weather risk covered by WIBI are considered in order to test the hypothesis as shown in the following table.

Variable	Initial	Extracted
Risk coverage		
A. What is the extent of weather risk protection is given by Weather Index Based Insurance scheme for Cotton?	1.000	0.409
B. What is the level of deficit weather risk (low rainfall risk) covered by the Weather Index Based Insurance scheme for Cotton?	1.000	0.917
C. What is the extent of the excess weather risk (high rainfall risk) covered by the Weather Index Based Insurance scheme for Cotton?	1.000	0.812

Inference: The cotton growers reported that the level of deficit weather risk (low rainfall risk) covered by the Weather Index Based Insurance scheme for Cotton is the major risk covered by the WIBI scheme for cotton crop, followed by the extent of the excess weather risk (high rainfall risk) covered by the Weather Index Based Insurance scheme for Cotton.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.584
Bartlett's Test of Sphericity	Approx. Chi-Square	412.751
	Df	3
	Sig.	0.000

The KMO test conducted on the factor analysis score is 0.584 with the significant level of 0.000
From the above inferences it is clear that the risk cover by the WIBI during the low rainfall period is predominant than the high rain fall risk. Therefore total risk protection provided by WIBI is only marginal, hence the alternative hypothesis (H1) is accepted and null hypothesis is rejected.



CONCLUSION:

The WIBI is designed to cover the overall risk of the cotton growing farmers. The factor analysis results shows that WIBI is marginally successful and found covering only low rain fall risk as first order of priority followed by the high rain fall risk. The overall weather risk protection is covered by Weather Index Based Insurance scheme for Cotton is only marginal (Factor extracted with Eigen value =0.409)

LIMITATIONS:

The study has certain limitations as the study is focused only on cotton crop and therefore the research findings may not give generalizability to other crops and even the cotton growing farmers of the remaining states other than Karnataka.

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