An exploratory study on document the major Income Risk encountered by the Small and Marginal farmers in Irrigated Agro Ecosystem of Tamil Nadu

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Abstract

The study proposes to assess the major risks encountered by the small and marginal farmers in the irrigated ecosystem of Tamil Nadu with help of a risk matrix. A total of 240 respondents were selected for this study which consists of 80 small and marginal farmers each from three districts representing three irrigation systems *viz.*, tank irrigation (Sivagangai district), cannel irrigation (Thiruvarur district), and well irrigation (Namakkal district) respectively. There are 34 risks identified in these irrigation systems, out of which 20 risks were found to be plotted between catastrophic to critical categories. In that, five risks viz., delay in the release of water in cannel/tank and water scarcity, lower than the cost of production, insufficient revenues to cover farm operational expenses, less insurance claim/coverage, and late disbursement of loan from cooperative society were assessed as the catastrophic risks encountered by the small and marginal farmers in the irrigated agro ecosystem of Tamil Nadu. This research study helps the policy-makers to utilize the above said findings and to develop the risk management strategies for the major risk faced by the small and marginal farmers in irrigated agro-ecosystem of Tamil Nadu.

Key-words: Risk, Risk Matrix, Scatter plot, Small and Marginal farmers, Irrigation.

1. Introduction

The history of agricultural development in India's food crisis was eradicated ~~to~~ by the introduction of the High Yielding Varieties (HYV) program~~me~~ in rice and wheat during the 1960's but fails to eradicate social stability. The popular package program~~me~~ was implemented only in the irrigated agro-ecosystem gave windfall benefit to the rich farmers who could able to afford the cost of additional inputs like hybrid seeds fertilizers and plant production chemicals (Bhattacharya et al., 2013). The small and marginal farmers in the irrigated agro-ecosystem could not cope ~~up~~ with the ~~high~~ highly intensive ~~input~~ input-oriented agricultural practices. So they sold the land to the rich people or wealthy and followed the subsistence backward agriculture. As a result, richer become richer but poorer become poorer.

In recent years the policy-makers have planned more intensive-~~input~~ input-oriented agricultural practices ~~in order~~ to meet the food requirement of ~~ever~~ ever-increasing

population. In this scenario, the marginal and small farmers are ~~definitely~~ going to be affected by the second green revolution attempt, such as doubling the farmers' income, as they are more intensive input-oriented agricultural ~~practises~~ practices compared to any previous productive-oriented attempt. Small and marginal farmers are facing a plethora of risks related to crop production, marketing the produce, linkage with financial institutions, mobilizing human capital, and getting institutional support. Early studies also indicated that farmers are facing risks like timely unavailability of farm inputs, high costs of seeds and fertilizer, high machinery cost, less MSP, exploitation of middle~~-~~men, less financial support, ~~non-~~ non-availability of labo~~u~~r, lack of insurance coverage, etc (Girdziute, 2012; D. Arias et al., 2017). In addition to that nowadays, farmers ~~they~~ are additionally under pressure due to climatic risks like heavy rainfall, drought, flood, etc. (Akumaga and Tarhule, 2018; Schmitt Olabisi et al., 2018; Tiepolo et al., 2018).

In this context, most of the risk documentation~~s~~ is on a macro level, but limited or no study on risk documentation~~s~~ on the different irrigated agro~~-~~ecosystem levels. Hence, the study carried out documentation of major risk encountered by the small and marginal farmers in different irrigated agro-ecosystem of Tamil Nadu.

2. Materials and methods

2.1. Methodology

In this study, the methodology followed by the World Bank (2016) to assess the risks in agriculture is used. Here, the severity of risks were assessed through two dimensions namely the extent of occurrence of risks among the farmers and the intensity of risks as perceived by the farmers in terms of psychological stress that they have undergone while encountering the event of a risk. Pursuing through the literature and consultation with experts 34 risks were identified.

The extent of occurrence of the risk among the farmers measured in terms of percentage and perceived intensity of risks in terms of the mean score were worked out which is presented in Table 1. Similarly, the intensity of risk was measured through the continuum of very extreme, extreme, moderate, and lesser with the score of four for very extreme to one for lesser. The mean score of perceived intensity of risk and extent of occurrence of risk were plotted in the risk matrix scatter plot method to identify the severity of risk in terms of catastrophic, critical, considerable, and mild by following World Bank methodology depicted in ~~the~~ figure 1.

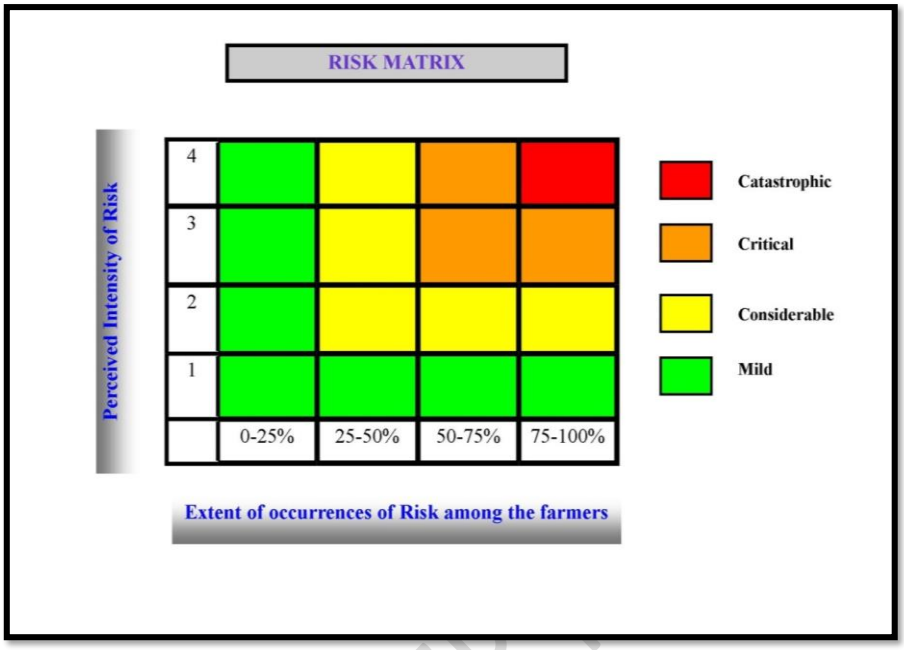

Fig 1. Risk Matrix (Source: World Bank 2016).

2.2. Study area

In this study small and marginal farmers of irrigated agro-ecosystem forms the universe of the study. Ultimate sampling units were selected from the multistage random sampling method.

The study was conducted in three districts namely Sivagangai, Thiruvarur and Namakkal district that represent a major types of irrigation systems of Tamil Nadu i.e., tank, canal, and well irrigation respectively.

From the selected districts, one block per district was selected. Kalaiyarkovil block from Sivagangai district (tank irrigation), Kottur block from Thiruvarur district (canal irrigation) and Rasipuram block from Namakkal district (well irrigation) for their dominance of particular irrigation method.

From the selected three blocks, four villages per block were selected, and thus, from the 12 villages, 20 farmers per village who are having small and marginal holdings were selected, which constituted a total of 240 respondents for the study. The responses were obtained through a structured interview schedule.

3. Result and Discussion

By following the methodology, the responses received from 240 respondents related to 34 identified risks in the two dimensions i.e., the extent of the incidence of a risk event and perceived intensity of risk were tabulated. The extent of occurrence of the risk among the farmers measured in terms of percentage and perceived intensity of risks in terms of the mean score were worked out which is presented in Table 1. Then these values were plotted in risk matrix scatter plot method diagram (fig 2). This gave the result of the relative severity of risks in terms of catastrophic, critical, considerable, and mild.

From ~~the~~ figure 2, it can be understood that the most serious catastrophic risks are water scarcity, less Minimum Support Price (MSP), insufficient revenues to cover farm operational expenses, ~~less~~ fewer insurances claims/coverage, and delay in disbursement of loans from cooperative societies.

The first and foremost catastrophic category of risk faced by the small and marginal farmers is water scarcity. The cannel irrigated system farmers suffered due to the late release of water from Mettur dam for raising of kuruvai crop in time. Moreover, most of the farmers reported that inspite of the availability of sufficient water in the cannel the improper maintenances of sluice and water cannel have resulted in water scarcity for raising the field crops. In the tank irrigated system ~~to~~ the farmers suffered for the above mention reason. In addition to that farmers ~~in~~ in-tank fed, areas reported absences of proper administration of water distribution led to water scarcity. In some places, the priority is given ~~for~~ to ~~pisiculture~~ pisciculture over ~~the~~ agriculture also led to conflict in the usage of water which ultimately resulted in the suffering of small and marginal farmers for want of irrigation water. Water scarcity in well irrigation systems is more prevalent in Tamil Nadu due to uneven distribution and the vagaries of the monsoon every year. Hence, in the summer months, almost all the farmers found it difficult to raise the crops in their limited area under cultivation. The same findings are observed by (Selvaraj and Ramasamy 2006).

The less Minimum Support Price (MSP) for the produces is the second major catastrophic risk assessed by the small and marginal farmers in all the three irrigated sources. All ~~the~~ three irrigated farmers indicated the escalated cost of production as the major problem. Also, the tank and ~~well~~ well-irrigated farmers encountered an additional risk other than the escalated cost of production is the ~~over~~ over-exploitation of middlemen. As a result, the middlemen reduce the market price for their ~~personal~~ gain. Hence, the MSP has not been sufficient to cover the cost of cultivation which has witnessed a sharp escalation in recent years. The same findings are observed by (Ramana murthy and Rekha mishra 2012).

Table 1: To document the major income risk encountered by the small and marginal farmers in the irrigated agro-ecosystem of Tamil Nadu

S. No	Income risk	Prevalence of risk n=240		Perceived intensity of risk Mean score
		No	Per-cent	
A.	**Production risk**			
1.	Unavailability of farm inputs in time	185	77.08	2.59
2.	Delay in release of water in cannel/ tank / water scarcity	233	97.08	3.17
3.	Problem in supply of electricity	52	21.67	3.10
4.	Poor maintenances of canals/tanks/well	156	65.00	3.12
5.	Lack of drying yard	210	87.50	2.53
6.	Lack of rural amenities	142	59.17	3.18
7.	Lack of drainage facilities	152	63.33	2.50
8.	Silting and damage of parapet wall	41	17.08	2.54
B.	**Market risk**			
I.	Institutional risk			
9.	Lower than the cost of production	232	96.67	3.38
10.	Less number of direct procurement centers (DPC)	153	63.75	2.15
11.	Less number of regulated market	156	65.00	1.72
12.	Less number of the storage facility	231	96.25	2.67
II.	Operational risk			
13.	Lack of information on market facilities	62	25.83	3.00
14.	Favoritism of private mandis	56	23.33	2.84
III.	Process risk			
15.	Non observation of stipulated marketing procedure	125	52.08	2.94
16.	Exploitation of middleman	176	73.33	3.18
17.	Delayed cash payment	55	22.92	3.60
18.	Lack of access to commission agents	28	11.67	2.75
C.	**Financial risk**			
I.	Formal institution support			

19.	Inadequate finance support from Nationalized bank	231	96.25	1.51
20.	Insufficient supply of loan amount from ~~Co~~ Cooperative society	179	74.58	3.29
21.	Lack of active farmers associations	211	87.92	2.63
22.	Delay in the disbursement of loans from cooperative societies	209	87.08	3.16
II.	Informal institution support			
23.	Non availability of money lenders	26	10.83	3.42
24.	Insufficient revenues to cover operational expenses	226	94.17	3.13
D.	**Human resource risk**			
25.	Non availability of labour during season	176	73.33	2.82
26.	Migration of problem	199	82.92	2.82
27.	Occupational hazards	190	79.17	2.67
E.	**Institutional risk**			
28.	Lack of farm subsidies	213	88.75	2.81
29.	Limited supply of farm implements from Government sector	204	85.00	2.71
30.	Unawareness about policy/ schemes/ programmes	148	61.67	2.74
31.	Poor compensation measures from insurances sectors	219	91.25	3.24
32.	Policies are a priority to give large farmers than small and marginal farmers	215	89.58	2.68
33.	Lack of availability of advisory services	216	90.00	2.72
34.	Unawareness ~~on~~ of recent agricultural technologies	184	76.67	2.59

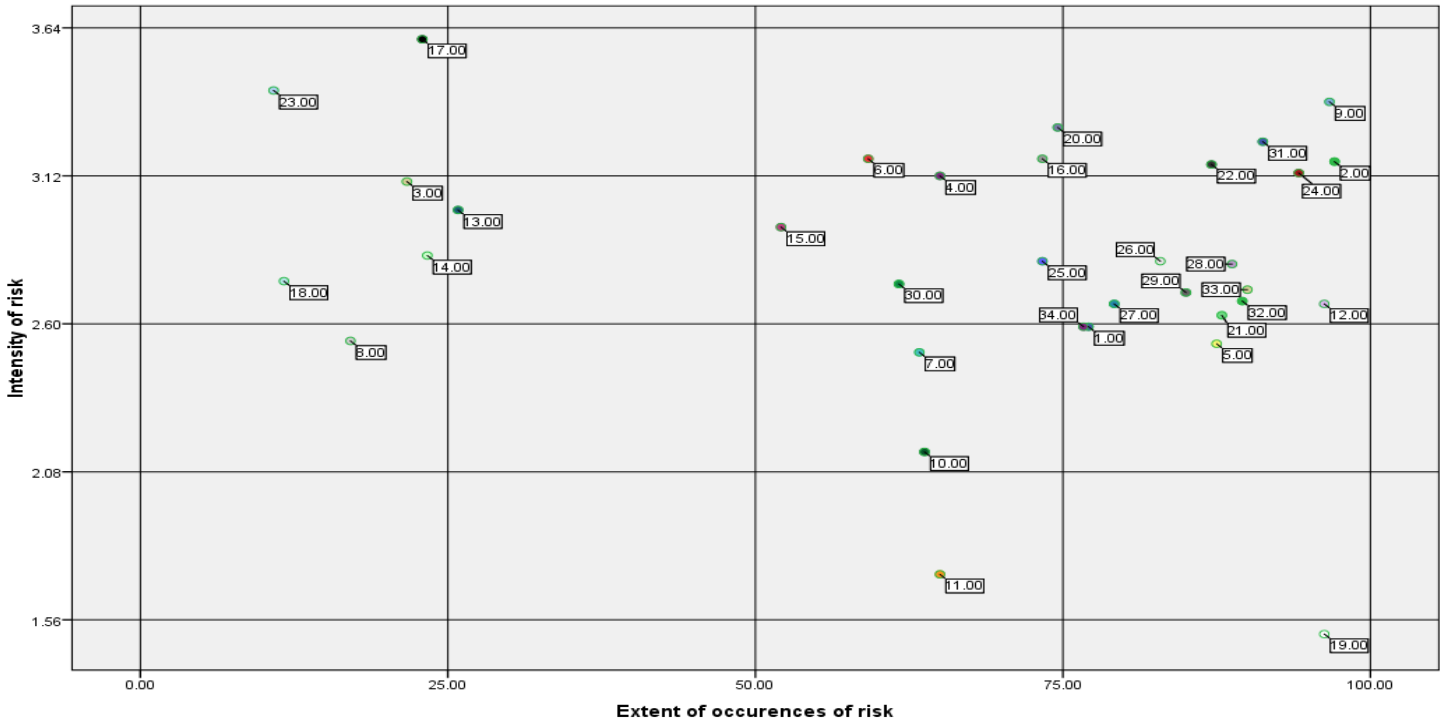

Figure 2. Scatter plot matrix to extent occurrences of risk and intensity (severity) of risk among the small and marginal farmers in irrigated agro-ecosystem of Tamil Nadu.

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The next important catastrophic risks faced by the farmers are the lack of revenues from agriculture to cover the operation expenditure of crop raised for ensuring season. Agriculture is ~~the~~ an occupation that thrived among the small and marginal farmers because of adequate support rendered by the government through schemes and policies. In the absence~~s~~ of subsidies and incentives none of the small and marginal farmers going to endorse ~~to~~ agriculture due to alarming high farm input costs and operational costs. Most of the farmers reported that the implementation of the MGNREGA program~~me~~ though ~~give~~ giving ~~sustinences~~ nourishment to the farm families, ~~have~~ has accelerated the labo~~u~~r cost ~~is~~ in unimaginable proportion. In addition to that, poor market prices realized at the time of harvest also added as another root cause for poor income from the agricultural sector. The same findings are observed by (Kumar, 2013).

Nearly 90 % of small and marginal farmers reported that they were facing the most intensive problem of inadequate compensation measures at the time of crop loss due to the improper fixation of insurances amount and less coverage. Though the farmers in cannel fed and tank fed irrigations were covered under the insurances scheme like PMFBY through the intensive effort made by the extension officials the compensation percentage workout for crop loss is barely minimum to meet out the real expenditure incurred to raise the crop. In many cases, when the small and marginal farmers l~~o~~ose the crop due to climate ~~factor~~ factor-like drought, or heavy rainfall, the farmers could not able to get the required compensation as the area ~~were~~ was not notified. Further, the delay in disbursement of insurance measures is also made them ~~to~~ state insurance coverage is one of the most intensive risks. The same findings are observed by (Uvaneswaran and Mohanapriya 2014).

In Tamil Nadu, the cooperative societies and regional rural banks are very well rooted, and traditionally, these institutions were relied upon to get credit for farming operations. Moreover, the waving of the loan then and there-by the Government made these institutions more lucrative in the eyes of the farmers. However, the small and marginal farmers have expressed that they were marginalized in receiving loans by ~~assigned~~ assigning more priority to the larger land-holder than them. The release of money is split~~ted~~ doses with long intervals and delays in the disbursement of loans also make the farmers could not use the money for ~~the~~ intercultural operations. Hence, nearly 90% ~~per cent~~ of the small and marginal farmers irrespective of irrigation systems reported that delay is the disbursement of loans in co-operative societies as their most intensive problems. The findings of the study are ~~in accordance with~~ by those Padma and Senthil ~~kumar~~ Kumar 2018.

Between 75 to 90% ~~per cent~~ of respondents have faced critical risks like migration and shortage of labo~~u~~rs, lack of farm subsidies, lack of farm advisory service, limited facilitation of government to sustain farming operations, operational health hazards, Priority is assigned to large farmers rather than small and marginal farmers in availing benefits from policies and schemes, lack of ~~viberent~~ vibrant farmers associations and ~~less~~ a smaller number of storage facilities.

Between 50 to 75 per cent of respondents have faced considerable risks like less MSP, lack of rural amenities, poor maintenances of canals~~-~~/tanks / well, inadequate finance support~~–~~ from ~~co-~~cooperative societies, exploitation of ~~middleman~~ middlemen, ~~non-~~non-observation of stipulated marketing procedure, ~~non-~~non-availability of labo~~u~~r during peak season, unawareness about policy/ schemes/~~-programme~~ programs.

Conclusion

It is concluded that catastrophic risks *viz.*, water scarcity, lower than the cost of production, insufficient revenues to cover operational expenses, less insurance coverage, and delay in disbursement of finance from cooperative society were assessed as major risks of small and marginal farmers in the irrigated agro ecosystem of Tamil Nadu.

To overcome the water scarcity, popularization of ~~water-~~water-saving technology viz., crop diversification, strengthening of WUA in tank and cannel irrigation system for distribution of water and proper maintenance of water bodies through the due share of participation from small and marginal farmers should be made. The implementation of MGNREGA has to be planned by fixing the operational period without affecting the agricultural labo~~u~~r requirement and farm subsidies must be continued to sustain the livelihood of small and marginal farmers. Instead of a blanket approach to fix the compensation measure through crop cutting experiments, ~~index-~~index-based insurances must be conducted.

Since~~,~~ cooperative banks are the lifelines of marginal and small farmers, they should be given ~~first-~~priority in loan disbursement. Similarly, appropriate policies and program~~me~~s should be initiated or strengthened to assist small and marginal farmers in overcoming catastrophic risks.

References

Akumaga, U., Tarhule, A., 2018. Projected changes in intra-season rainfall characteristics in the Niger River basin, West Africa. Atmosphere 9 (12). https://doi.org/10.3390/atmos9120497.

Arias, D., Pedro A. Vieira and Paulo M. Mendes., 2017. Managing Extreme Agriculture Risks in Brazil.International Journal of Safety and Security Engineering. Vol. 7, No. 3 (2017) 419–430.

Bhattacharya, Pranap and Abdul Majid (2013), "Impact of Green Revolution on Output, Cost and Income of Small and Big Farmers." *Economic and Political Weekly* 11.52 (1976): A147-150.

Girdziute Laura 2012. Risk in Agriculture and Opportunities of their Integrated Evaluation: Elsevier – Social and Behavioural Science 62 (2012) 783-790

Komarek, A.M., De Pinto, A., Smith, V.H., 2020. A review of types of risks in agriculture: what we know and what we need to know. Agric. Syst. 178. https://doi.org/10.1016/j.agsy.2019.102738.

Kumar, A., 2013. Income and Livelihood Issues of Farmers: A Field Study in Uttar Pradesh, Agricultural Economics Research Review, Vol.26:89-96.

Ramana Murthy. R.V and Rekha Misra 2012. Pricing of Paddy: A Case Study of Andhra Pradesh. Department of Economic and Policy Research Reserve Bank of India. Mumbai.

Schmitt Olabisi, L., Liverpool-Tasie, S., Rivers, L., Ligmann-Zielinska, A., Du, J., Denny, R., Marquart-Pyatt, S., Sidibe, A., 2018. Using participatory modeling processes to

identify sources of climate risk in West Africa. Environ. Syst. Decisions 38 (1), 23–32. https://doi.org/10.1007/s10669-017-9653-6.

Selvaraj, K. N. and C. Ramasamy. 2006. Drought Agricultural Risk and Rural Income in the Water-limiting Rice Production Environment, Tamil Nadu. Economic and Political weekly, 41 (26):27392746.

Tiepolo, M., Bacci, M., Braccio, S., 2018. Multihazard risk assessment for planning with climate in the Dosso region, Niger. Climate 6 (3). https://doi.org/10.3390/ cli6030067.

Uvaneswaran. S.M and T. Mohanapriya 2014. Farmers Perception and Awareness about Crop Insurance in Tamil Nadu. A descriptive Analysis, International Journal of Marketing Research Review, ISSN:2321-346-Online ISSN: 2347-1670-Print Impact Factor Value: 0.162, Volume 2, Issue 3 (March, 2014)

World Bank, 2016. Agricultural Sector Risk Assessment: Methodological Guidance for Practitioners. World Bank Group, Washington, pp. 130 100320-GLB, Agriculture Global Practice Discussion Paper.