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RISK AND UNCERTAINTY IN AGRICULTURAL PRODUCTION IN CUTTACK

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Introduction

Though a number of crops are grown in the State of Orissa, rice is by far the most important crop so much so that it is not an exaggeration to say that complete specialisation in rice farming exists over the entire region. Other competitive, supplementary and complementary crops are very minor both in total value and quantity. As rice cultivation is fully dependent on the vagaries of monsoon, the degree of risk and uncertainty in its production is considerable. The reliance on a single unirrigated crop completely ruins the cultivators in the event of a crop failure resulting from uneven distribution of rainfall. In fact this region has been frequented by famines in quick succession during the past few years. On the whole, the uncertainties in agricultural production arise due to the following reasons.

- (1) Complete specialisation and absence of diversification in agriculture.
- (2) Too much dependence on rainfall for its successful production. Failure of monsoon results in drought and crop failures. Uplands are most susceptible to crop failure in case of uneven distribution of rainfall.
- (3) Occurrence of floods in deltaic regions of the coastal districts.
- (4) Intensification of maladies in absence of a stable enterprise in the farm plan.

Object and Scope

In areas susceptible to frequent floods the cultivators are expected to take some precautionary measures against risk and uncertainty compared to that of areas where agriculture is more stable due to introduction of canal irrigation. The above hypothesis was tested in a study made in Jagatsinghpur Tahasil of Cuttack district where both the conditions are available. There is canal irrigated tract introducing greater stability in agricultural production on one hand and a tract where frequency of the occurrence of flood is great on the other.

Methodology

The total villages, numbering 366, of Jagatsinghpur Tahasil were stratified into villages with stable agriculture brought about by provision of canal irrigation and the villages where risk and uncertainty in agriculture are greater as a result of the absence of such irrigation and frequent occurrence of flood—their number

being 338 and 28 respectively. One village from each group was selected at random with probability proportional to the cultivating population with replacement. The holdings were classified into five size-groups in acres, viz., 0-2, 2-4, 4-6, 6-8 and 8-above. From each of the village and from each of the size-group two holdings were selected for the purpose of the above study. The relevant data collected by survey method relates to the year 1961-62. The crop conditions were normal in both the sample villages during the year.

Background of the Sample Villages

There is significantly greater proportion of the area devoted to pasture, cultivable waste, fallows, groves, etc., in the flooded village relative to the irrigated village. While paddy (*kharif*) and potato (*rabi*) have got relatively greater importance in the irrigated village, the extensive *rabi* pulses like black and horse grams dominate in the flooded village. The silt deposited by the flood works as natural manure resulting in very high yields of these two *rabi* crops. The flooded village is completely cut off from other neighbouring villages during rains as it is surrounded by rivers. This situation also adds to the difficulty of mobility of labour to and from this village. In winters also the condition is not improved since the boats that provide mode of transport to the villagers are used for fishing purposes. The position with regard to transport and communication is better in the irrigated village.

Frequency Distribution of Risk and Uncertainty

The nature of risk and uncertainty in agricultural production faced by this part of the region has been cited earlier. So far as the area under investigation is concerned, Table I will show the frequency of occurrence of the various types of uncertainties for the last ten years.

TABLE I—FREQUENCY DISTRIBUTION OF VARIOUS TYPES OF UNCERTAINTIES DURING THE LAST 10 YEARS

Nature of Uncertainty	Irrigated village	Flooded village
Major flood	—	2
Minor flood	3	12
Major drought	—	1
Minor drought	1	3

It is crystal clear from the above table that the frequency of uncertainties is much greater in case of the flooded village than the irrigated one. The devastation brought about by the major flood is of such magnitude that there is great loss of property, i.e., loss of houses, cattle and others including the complete loss of all *kharif* crops. The minor flood, as observed from Table I, comes about very frequently in the flooded village so much so that it has occurred more than once in four years during the last ten years. This almost destroys a very large proportion of *kharif* crops, viz., rice and lowers its yield.

However, it is conclusive that flood occurs in much greater frequency in flooded village than in the irrigated village. Similarly, drought brings about greater crop failure in the former village than in the latter where canal irrigation has been provided for.

Besides, widespread crop diseases, cattle diseases and pest attacks are other forms of risks and uncertainties which assume great importance in this region. But none of them has been very widespread and virulent in the two sample villages for the last few years.

Differences in the Levels of Agricultural Production

A consideration for drawing comparison between the per acre yield of the important crop, *i.e.*, rice between the two categories of villages is of some significance in the context of the present study. This will speak why the cultivators of the flooded village have to explore other avenues for augmenting their farm business income which is inadequate and uncertain.

TABLE II—VARIATION IN THE PER ACRE YIELD OF RICE IN THE DIFFERENT SIZE-GROUP OF HOLDINGS IN THE TWO SAMPLE VILLAGES

Size-groups (acres)							(in maunds per acre)	
							Irrigated village	Flooded village
0—2	..	..	..	..	..	..	18.00	14.25
2—4	..	..	..	..	..	..	17.00	12.75
4—6	..	..	..	..	..	..	17.00	9.75
6—8	..	..	..	..	..	..	17.25	12.53
8—above	..	..	..	..	..	..	16.25	15.03
All farms (average)	..	..	..	..	..	..	17.10	12.56

The difference in yield rate between the two sample villages is mainly brought about by an assured supply of water on the one hand and the consequences of flood on the other. The yield rate in the flooded village is particularly depressed due to crop failures in a large proportion of the cultivated land. While its dispersion between holdings is small in irrigated village, it is very large in the flooded village. The latter is ascribed to the difference in the proportion of cultivated land of the different size-group of holdings that is subjected to flood. The analysis of variance shows that while the inter-village differences in the per acre yield is significant at 1 per cent level of probability, the inter-holding differences in this regard and the interaction between villages and holdings are non-significant. Of course the variation in per acre yield between years within the flooded village is of greater significance than its variation between size-group of holdings. Though no statistics is available to prove that wide swings in the yield rate between years exist as this will reveal the degree to which uncertainty in agricultural production prevails, but circumstantial evidences show that in relatively bad years there is a

wide fall in the average yield of rice. This introduces an element of risk and uncertainty in agricultural production.

Farm Business Income from Crop Husbandry

The foregoing discussion is made with regard to rice yield rate alone. The discussion in the following sections pertains to the total farm business income from the crop husbandry alone. Table III presents the same.

TABLE III—VARIATION IN THE FARM BUSINESS INCOME PER ACRE AND PER FARM BETWEEN THE TWO SAMPLE VILLAGES AND DIFFERENT SIZE-GROUPS

(in Rs.)

Size-groups (acres)	Per Farm		Per Acre	
	Irrigated village	Flooded village	Irrigated village	Flooded village
0—2	291.57	206.92	222.57	215.54
2—4	650.56	502.71	209.13	190.42
4—6	934.91	636.39	210.09	126.77
6—8	1,510.39	562.73	200.58	88.76
8—above	2,161.84	1,317.26	191.31	69.14
All farms (average)	1,109.85	645.20	206.76	138.13

It is evident from Table III that a very wide difference exists in the levels of farm business income per farm and per acre between the irrigated and flooded village. The 'F' test shows that the farm business income per farm and per acre between the villages is significant at 1 per cent level of probability. Therefore, there is every reason to believe that the farm business income from crop husbandry per farm and per acre in the irrigated village is greater than that of the flooded village. Besides, inter-holding differences are also significant at the same level of probability.

Precautions to Meet Uncertainty

The difference in the yield rate of rice between the irrigated and flooded village is not only highly significant but the yield rate in the latter as per the circumstantial evidence is subject to wide fluctuations between years. Therefore, to level off the income between years the cultivators take to the following uncertainty measures.

1. *Diversification of cropping* :—The cultivators of the flooded village give greater importance to *rabi* crops, particularly pulses, viz., black gram and horse gram. A very high per acre yield is obtained as the flood leaves a fertile silt during rains. There is, thus, a greater importance to *rabi* crops. In irrigated area also *rabi* crops play an important part.

2. *Selection of more stable supplementary enterprises* :—As the total farm business income derived by the cultivators of the flooded village from crop husbandry is quite uncertain and too inadequate to eke out a living, the cultivators try to augment their slender earnings by the inclusion of a number of other enterprises like dairy, poultry, horticulture, fishery, forestry, etc. These are all supplementary farm enterprises. An assessment of their relative importance in the two categories of villages can be made from the income obtained from such endeavours from Table IV.

TABLE IV—DISTRIBUTION OF FARM BUSINESS INCOME PER FARM FROM SUPPLEMENTARY ENTERPRISES BETWEEN SIZE-GROUPS OF THE TWO SAMPLE VILLAGES

Size-groups (acres)	(in Rs. per farm)	
	Irrigated village	Flooded village
0—2	340.60	332.04
2—4	217.23	532.32
4—6	361.27	438.67
6—8	469.51	1,015.43
8—above	468.89	1,206.94
All farms (average)	371.50	705.68

The above table clearly suggests that there exists a great difference in the levels of farm business income per farm from supplementary enterprise between the villages. These sources together provide about double the income in the flooded village relative to the irrigated village. The test of significance shows that inter-village and inter-holding differences together with the interaction between the two factors are highly significant. Thus, there is every reason to believe that the farm business income from supplementary enterprises in the flooded village is much greater relative to that in the irrigated village. Further, the presence of interaction between the factors is indicative of a differential behaviour of the supplementary farm business income in the same size-group of holdings of the two categories of villages. It can, therefore, be reasonably asserted that a greater supplementary farm business income is derived in all the holding-size of the flooded village than its counterpart in the irrigated village. The exceedingly poor income from crop husbandry in the flooded village with a greater degree of risk and uncertainty induces the cultivators to derive greater income from other stable and supplementary enterprises.

Relative Importance of Different Enterprises in the Two Sample Villages

This section of the analysis has been devoted to bring to light the differences between the two sample villages with regard to the farm business income from individual supplementary enterprises so as to find out the degree of reliance attached to different enterprises by the cultivators of both the villages.

TABLE V—DISTRIBUTION OF SUPPLEMENTARY FARM BUSINESS INCOME BETWEEN DIFFERENT ENTERPRISES IN THE TWO SAMPLE VILLAGES AND THEIR PERCENTAGE TO TOTAL

Villages	(in Rs. per farm)			
	Irrigated		Flooded	
	Income	Per cent to total	Income	Per cent to total
Dairy	298.10	16.05	680.40	19.28
Fishery	338.40	18.22	1,522.50	43.15
Forestry	706.50	38.03	804.50	22.80
Poultry	98.00	5.28	279.00	7.91
Horticulture	125.00	6.73	117.00	3.32
Rent from leased out land	221.50	15.69	125.00	3.54

There is a greater scope for expanding business in dairy and fishery in the flooded village, because the village has relatively more of grazing land, waste land, etc., as has been indicated earlier and it is also surrounded by rivers on all sides. Relatively greater importance is attached to dairy as the income from this source is stable and the cost of maintenance of dairy cows in the flooded village is cheap due to availability of sufficient pasture as also due to greater supply of black and horse grams. Poultry in the flooded village has proved to be one of the most profitable among all the supplementary enterprises. The difference in the caste-composition is responsible for greater degree of reliance on this enterprise in the flooded village.

Conclusion

Thus, it is conclusive that the flooded village is more susceptible to risk and uncertainty to agricultural production. The effect of such hazards is well reflected in the slender farm earnings of the cultivators of this village compared to that in the irrigated village where a stable farming is ensured through irrigational facilities. However, the cultivators of the flooded village in their attempt to withstand such risk and uncertainty in agricultural production and income take resort to certain precautionary measures such as diversification of cropping and introduction of stable supplementary farm enterprises.