RISK MANAGEMENT STRATEGIES IN COTTON PRODUCTION IN BUNGUDU AND TSAFE LOCAL GOVERNMENT AREAS OF ZAMFARA STATE, NIGERIA

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ABSTRACT

Cotton is an important cash crop in the study area. Unfortunately its production has experienced a sharp decline in the recent past. The decline has been attributed to several factors one of which is the risk encountered by farmers in its production. The aim of the study was to examine the type of risk encountered by the producers and the strategies they used to manage such risk. A sample of 120 respondents was selected for the study. Portfolio analysis of the main crop enterprises with cotton was also carried out. The main risk that the respondent said they encountered is that caused by natural hazard. Price fluctuation, labour shortage and changing government policies were other risks that threatened cotton production in the study area. The respondents used mostly informal rather than formal methods to manage risk. None of the crop enterprise combination with cotton satisfied the condition for optimum yield. It was therefore concluded that since farmers do not use the formal methods of coping with risk in cotton production, government should come to their aide either by providing some form of insurance or by encouraging cotton producers to establish cooperative or some form of social insurance organizations to cope with the menace of risk. It was also suggested that farmers may be better off if they grow cotton sole than in mixture.

Keywords: Risk perception; Risk management, Crop combinations

INTRODUCTION

Cotton production is an important agricultural activity in Nigeria, particularly in the northern states. Cotton provides the raw materials for textile industries for the production of goods such as fabrics and clothing. Besides, cotton production provides both direct and indirect employment opportunities for a large segment of the Nigerian labour force.

Unfortunately, cotton production in Nigeria has experienced a sharp decline in the recent past (Muhammad, 1999). For instance, Nigeria, which was a major exporter of cotton in the 1980s to the 1990s, is now a net importer (NAICPP, 1994). A lot of reasons have been adduced for this decline, and one of them is risk uncertainty involved in cotton production (Abbas, 2000).

Risk and uncertainty exist under imperfect knowledge situation. Uncertainty exists when the possibility of an action or the possibilities associated with each outcome are unknown. On the other hand risk situation occurs when all possible outcomeS of an action are not known but the probabilities associated with each outcome are known (Heady, 1952). Uncertainty exists when the possibility of an action or the probabilities associated with the outcome are unknown.

There are different forms and shapes of risk and uncertainty. Risk and uncertainty can be caused through changes in prices, weather and other environmental factors. This invariably results in the fluctuation of net farm income. The success of risk-prone enterpriseS depends on the ability of the entrepreneurs to identify the risk components and manage them effectively.

Through several years of experience farmers have adopted several measures to manage risk and uncertainty in agriculture. Risk management in agriculture is aimed at attaining a desired combination of risk and return from the farm enterprise. According to Anaman (1988) and Remi and Owolabi (1990), farmers have variety of strategies to enable them achieve an acceptable balance between expected farm return, and risk and uncertainty. So, whatever strategy is adopted, some trade-off between expected yield and exposure to risk and uncertainty will have to be made (Randy and Richard, 1999). Despite the subtle difference between risk and uncertainty, the two are used interchangeably in the text.

Cotton production is an important enterprise in Zamfara State because it is a major cash crop. The study aimed at identifying the risk involved and the risk management strategies adopted in cotton production by farmers in the study area. This is with a view to determining the optimum yield options available to farmers in order to enhance cotton production in the study area.

MATERIALS AND METHODS

The required information was collected through farm survey. The questionnaires were personally administered by the researchers.

The study was carried out in two local government areas (LGAs); Bungudu and Tsafe. Cotton is grown in almost all parts of the state, so the two local government areas were randomly selected. A preliminary survey was conducted in each of the selected LGAs to identify villages where cotton is grown in considerable quantity. Four villages in each of the two LGAs were selected from these identified villages. The villages selected in Tsafe Local Government Area were Tsafe, Yankuzo, Kurcheri and Yandoto while the villages selected in Bungudu LGA were Bela, Bungudu, Wazoji and Sabon Birni. In each of the selected villages 15 cotton farmers were selected giving a simple size of 120 respondents. The required information was collected from the respondents at the beginning of farm operations and after harvest.

Statistical tools such as variance and standard derivation were used for the Portfolio analysis to determine the optimum formation between cotton and other enterprises.

The portfolio analysis model is specified as follows:

$$\delta^2{}_T = \delta^2{}_A + \delta^2{}_B + 2\alpha \, \delta_A \, \delta_B$$

Where :

δ_T	= Total of combined variance of crop A and crop B.
δ_A	= Variance of yield for enterprise A.

δ_A = Variance of yield for enterprise B.

$2\alpha\,\delta_A\,\delta_B$ = Absolute covariance.

In the model the farmer is assumed to be rational under the following axioms:

1. For any given level of risk, a higher level of yield is preferred,
2. For any given level of yield, a lower level of risk is preferred, and
3. For any given combinations of risk and yield a combination with higher yield and lower risk is preferred (Markowitz, 1959).

Combining enterprise A and B will reduce income variability and maximize income if the following assumptions that form the theoretical basis for the portfolio model are satisfied:

1. If the value of α (i.e. the correlation coefficient) is negative,
2. The combined variance δ_A is less than δ_B and
3. The absolute value of the covariance $(2\alpha\,\delta_A\quad\delta_B)$ is greater than δ_B. If these conditions are all satisfied then enterprise combination would give optimum yield to the farmer.

RESULTS AND DISCUSSION

Risk Perception by the Respondents

The respondents were asked the nature of risk they encountered most in cotton production. About 68 percent of them said natural hazard variously referred to as *Fari, Soshiya, Agarehi* and *Kurzuna* in Hausa, while 27 percent mentioned economic factors, which they referred to poverty (Rashi) or low price (Fadiwar Kasuwa). The remaining 5 percent mentioned social factors referred to in Hausa as *Satar kada,(theft), Yandara (gamble)* and *Damfara (duping).*

Their responses indicated that they have a good perception of the risk they encountered in cotton production. The respondents were further asked what they consider as the sources of risk to their enterprises. The result is given in Table 1.

Disease and pest attack were the main source of risk to the respondent. The other major sources of risk were price fluctuation, labour shortage and changes in government policies in that order of importance. The situation can be so severe in some cases that the respondents had to abandon cotton production for other crops.

Table 1: Major sources of risk in cotton production by the farmers

Source	Number	Proportion (%)*
Disease and pest	105	87.5
Price fluctuation	87	72.5
Labour shortage	65	54.0
Changing government policies	50	41.5
Financial risk	40	33.0
Institutional problems	20	46.5
Technological change	18	15.0

Field study, 1999; * Percentages may not add up to 100% exactly because there were multiple responses.

Risk Management Strategies Employed by Respondents

Risk management strategies are specific plans designed to avert or reduce the severity of the incidence of risk. Both formal and informal strategies were used by he farmers. Table 2 shows the number of respondents that used the various types of strategies. Majority of the respondents used informal strategies while a few used the formal form. The formal strategies involved the transfer of risk to second or third party. This includes insurance, hedging, forward contract, market research, future reserve and so on. Informal strategies, on the other hand, involve diversification of production such as growing crops in mixture and the combination of crops with livestock enterprises. There was therefore a low patronage and acceptability of the formal strategies. Umar (1990) has attributed this tendency to lack of understanding of the principles of insurance. Randy and Richard (1999) had observed that universally, there is less participation of farmers in insurance programme. Abbas (2000) attributed the lack of patronage of the formal strategies to Islamic religion, which predominates in the study area. This may be because some of the basic operational principles of insurance go contrary to the Islamic business ethics. This school of thought has been supported by Ruxton (1940). According to Chijoke (2000), Islamic financial system discourages and prohibits transactions which involve extreme uncertainties, gambling and risk. The state may have to come in to provide a form of insurance to cotton producers or the farmers should be encouraged to form cooperatives or some form of social insurance scheme to help ameliorate the menace of risk in cotton production. The state can provide a form of subsidy or compensation in case of crop loss while cooperatives will serve as a means of mutual sharing of losses and gains.

Table 2: Type of risk management strategies used by the farmers

Source	Number	Proportion (%)*
Informal	89	74.0
Formal	16	13.5
Both	15	12.5

Field study, 1999

The informal strategy for managing risk mostly was crop combination and diversification of crop enterprises. All the respondents interviewed practiced crop enterprise diversification and also grow crops in mixture. Cotton was grown with other crops in mixture. The nature of crop enterprise combination with cotton was examined and the result is presented in Table 3. The table depicts that crops that would be harvested early were mostly combined with cotton. Such crops include maize, groundnut, millet and cowpea. An examination of the yield showed that there was no much variation in the yield of the various crop enterprise combinations with cotton. The variation in yield was more between cotton/groundnut combinations and less between rice/cotton combinations. Table 3 shows that the negative correlation coefficient condition for optimum yield of enterprise combination has been met only for cotton/millet and sorghum/cotton combination.

Portfolio Analysis of the Crop Combinations

The result of the portfolio analysis is shown in Table 4. The condition for $\delta_T < \delta_B$ has not been met for all the crop enterprises except sorghum/cotton combination. While the condition that $2\alpha \, \delta_A \, \delta_B > \delta_B$ was met by all the crop enterprise combinations except maize/cotton and rice/cotton combinations. So, none of the crop enterprise combinations

met all the optimum yield conditions. The result could be an indication that optimum yield is obtained from cotton when grown sole rather that in mixture. The result may be inconclusive because of the nature of data provided by the respondents. They do not keep records of their farm operations and so the information they provided was based on their recall ability.

Table 3: Major crop enterprises combination with cotton and their yield variation

Enterprise combination	Number of respondents	Standard deviation of yield	Covariance of yield	Correlation coefficient of yield
Maize/cotton	60 (50.0)*	1.103	0.0117	0.3132
Groundnut/cotton	45 (37.5)	1.397	0.1253	0.1505
Millet/cotton	40 (33.3)	1.386	0.8881	-0.0131
Cowpea/cotton	50 (41.7)	1.291	0.8511	0.0228
Rice/cotton	10 (8.3)	1.006	0.6595	-0.64287
Sorghum/cotton	15 (12.5)	1.1380	0.6827	0.69748

Field study, 1999; * The figures in bracket are percentages.

Table 4: Portfolio analysis of the yield of crop enterprises combination with cotton in the study area

Enterprise combination	δ^2_A	δ^2_B	$2\alpha\,\delta^2_A\,\delta^2_B$	δ_T
Maize/cotton	1.910	6.270	7.50	15.68
Groundnut/cotton	1.910	6.260	3.80	11.97
Millet/cotton	1.910	5.690	-0.28	7.32
Cowpea/cotton	1.910	1.722	0.15	3.79
Rice/cotton	1.910	1.527	11.58	15.01
Sorghum/cotton	1.910	4.346	-3.75	2.51

Field study, 1999

CONCLUSION

The study examined the nature of risk encountered by cotton farmers. It was fond that farmers mostly encountered risk caused by natural hazards. They mostly used informal methods of managing risk which may be because the formal method was contrary to Islamic business ethics. The portfolio analysis showed that no crop enterprise combination with cotton gave optimum yield. It was therefore concluded that, since the respondents are averse to using formal risk management methods government should come in and provide some form of insurance for crop failure. Alternatively, the respondents should be encouraged to form cooperatives or social insurance organization to help them combat risk in cotton production. It was also concluded that farmers might get higher yield if they grow cotton sole in the study area.

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