



RISK MANAGEMENT STRATEGIES OF MICRO, SMALL AND MEDIUM AGRIBUSINESS ENTERPRISES IN NORTH-WEST, NIGERIA

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ABSTRACT

The study identifies the common risk management strategies (RMS) used by micro, small and medium scale enterprises (MSMAEs) in North-west, Nigeria. A sample of 334 MSMAEs were selected using multi-stage sampling procedure. Data were collected in 2020 with the use of structured questionnaire. Both descriptive statistics and principal component analysis (PCA) were employed to describe and analyse risk management strategies of MSMAEs. The result revealed that there were three categories of RMS namely, investment, budgeting and marketing. The investment RMS were the most used strategies with a mean score ($\bar{X}$) of 3.73 and a standard deviation (S^2) of 2.85. This is followed by the marketing RMS with a mean score of 2.98 and a standard deviation of 2.08, irrespective of the business status. The least important RMS were the budgeting RMS with a mean score of 1.91 and a standard deviation of 1.52. The PCA results also revealed that RMS factor under micro agribusinesses had the highest and smallest correlation in terms of maintaining accurate and up-to-date financial record (0.93) and savings (0.66), respectively. Similarly, under the small agribusinesses, RMS factor had the highest and smallest correlation with timing or type of sales modification (0.95) and Borrowing (0.54). Furthermore, in medium agribusinesses, RMS factor had the highest and smallest correlation with timing of sale of output (0.92) and keeping of business record (0.68). In conclusion, MSMAEs managed their risk through investment, budgeting and marketing strategies. It was recommended that regular capacity building especially in the area of record keeping, maintaining accurate and up-to-date financial record, budgeting cash flow and outflows and conducting basic financial analysis couple with effective marketing management system should be given priority in risk management strategies in the sector.

Keywords: Agribusiness enterprises, Micro- small-medium, Principal component, Risk management strategies, Saving.

INTRODUCTION

Micro, Small and Medium Scale Enterprises (MSMEs) play a significant role in the economic development of Nigeria including agriculture and are known to be the main engine of economic growth thus, a key factor in promoting private sector development and partnership. MSMEs are generally responsible for the availability of goods and services, credits and stimulating entrepreneurial spirit. The sector creates employment and a high standard of living, provides competition and satisfies the needs of society and other firms (Tom, 2016). Investors



in agribusiness enterprises face the danger of what they expect (*ante*) may not be realized. For instance, each time an investor borrows money for investment in micro, small or medium agribusiness enterprises, there is the possibility that, return on investment could be less than cost of borrowed fund. This is obvious especially in this era of global climate change where an investor cannot predict with certainty the degree of fluctuation in prices of input and output (Sekumade and Ogunro, 2013). Moreover, empirical information on risk management strategies with specific emphasis on micro, small and medium agribusiness enterprises that covers North West Nigeria is limited. Therefore, the study identifies the common Risk Management Strategies (RMS) used by micro, small and medium scale enterprises in North West, Nigeria.

Berry-Stolzle and Xu (2016) asserted that the mainstream view in the risk management literature to date is that risk management creates value through its impact on a firm's cash flows. Some Studies (Asogwa *et al.*, 2014; and Chavas and Shi, 2015). Berry-Stolzle and Xu (2016) shows that risk management can reduce a firm's tax liability, transaction costs of bankruptcy, regulatory costs and mitigate the underinvestment problem in financially constrained firms, thus leading to higher profits. Ondiek and Muathe (2017) used multiple linear regression models to test the significance of the influence of the independent variables on the dependent variable risk management strategies and performance of small agribusiness firms in Kiambu County. The study indicated that financial risk management strategy, operational risk management strategy, human resource risk management strategy, regulatory risk management strategy and disaster risk management strategy affected organizational performance. Results indicated that keeping previous record enables to forecast future risks, financial distress affects performance, keeping informed of various risks reduces the risk of poor performance and that having contingent measures to reduce financial risks improves agribusiness performance.

According to a study conducted by Sekumade and Ogunro (2013) on risk management analysis among agribusiness enterprises investment in Ondo State of Nigeria, using W-statistics and validated with Pearson criterion (χ^2). The result of the study indicates a W-statistics of 0.79 and was verified by Pearson criterion which gave χ^2 calculated value of 4.81 which is lower than table value of 11.07 at 5% significant level. This revealed that risk sources affecting agribusiness investment were financial, marketing, currency and production in that order. The study also found, diversification, integration, forward contracting, and insurance, among others as common risk reducing strategies. Similarly, Nto *et al.* (2011) analysed risk among agribusiness enterprises investment in Abia State of Nigeria, identified diversification, integration, forward contracting, and insurance, among others as risk reducing strategies.

Conceptual Framework and Estimation Technique

In order to discuss risk management issues in agribusiness, it is of paramount important to define the concept 'risk.' Thus, for the purpose of this study, risk can be defined as the uncertainty faced by agribusiness enterprises that affect their business fortune. Clearly, risk is often associated with adversity and loss by the firm (agribusiness entrepreneur), and also with

its survival as a business. Risk is uncertainty that affects an individual's welfare, and is often associated with misfortune and loss (Ashok and Sergio, 2005; and Oladimeji *et al.*, 2019). Risk situation is complicated by the fact that micro, small and medium scale agribusiness entrepreneurs operate in an environment with weak markets. There exist some policies that were designed to manage risk in the country. These include risk sharing institutions such as national insurance and credit schemes that help in reducing the burden of risk to society. However, the enterprises have little or no access to sufficient support by these institutions. Thus, risk remains a potential hindrance to the growth of micro, small and medium scale agribusiness enterprises in Nigeria (Bank of Industries [BOI], 2017).

Risk management can be defined as an organized approach to identify possible or probable financial harm and take steps to minimize the financial impact to acceptable levels (Vaughan, 2016). Risk Management is a process through which risks can be measured, exploited, governed, financed and monitored from all sources by business organizations operating in any sector of the economy with a view to increasing the value of shareholders or owners. The enterprise risk management views risks as opportunity exemplified in the overall business strategy of an enterprise which must be identified, measured, responded to, prevented and monitored (Kehinde *et al.*, 2017). Conceptually, Risk Management Strategies (RMS) can be categorized based on three components: investment, budgeting and marketing (Figure 1).



Figure 1: *Typical management strategies*



Furthermore, each of the components comprises risk factors. Agribusiness entrepreneurs choose and combine strategies based on their goals, attitudes towards risk and their personal and financial situations.

MATERIALS AND METHODS

The Study Area

The study was conducted in the North-Western zone of Nigeria. The zone comprises of Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara States. The zone has a projected population of 54,090,075 people in 2021 at a growth rate of 3.2 % per annum. The zone is characterized by a tropical climate with temperature varying at different times. High temperature is normally recorded between the months of April and September with the daily minimum and maximum temperatures of 14° and 39° Celsius, respectively. The zone is characterized by two distinct seasons; the rainy and dry seasons. The rainy season lasts for about six months from May to October with average rainfall of between 400 mm to 1300 mm and the dry season lasts for about seven months from October to April. Agriculture is considered as the major economic activity of the zone with over 80% of the population found in the rural areas and predominantly engaged in farming and animal husbandry. Also, trade and commerce are undertaken on micro, small and medium scale, especially in agricultural and other consumer goods (Bivan, 2018).

Sampling Techniques

A multi-stage sampling procedure was adopted for the purpose of this study. The first stage involved selection of three out of seven States of Northwest Nigeria using random sampling technique. These are Kano, Kaduna and Katsina States. The second stage involved purposive selection of all agribusiness firms from the three States. Thereafter, stratified sampling technique was used to group the sampling unit based on agribusiness membership status (sole proprietor, cooperative and partnership). In the next stage, 100% of the registered agribusiness enterprises were selected from each stratum. Finally, Snowball sampling technique was also employed to identify sampling unit of 181 who were not registered with any of the ministry and agency in the States. This was achieved using lists of the micro, small and medium scale enterprises owners obtained from the institutions to serve as referrer to them. The registered MSMEs sample size is 334. The total sample size was therefore 515 (Table 1).

Table 1: Sampling Frame and Size Selection Plan of the Study

Form of organization	Kaduna	Kano	Katsina	Pooled
Sole proprietorship	107	123	81	311
Cooperative	29	36	46	111
Partnership	27	25	41	93
Total	163	184	168	515



Method of Data Collection

Data were collected using primary and secondary sources. This was achieved with the aid of well-structured questionnaire.

Analytical Tools

The procedure undertaken to determine the factors of RMS associated with MSMAEs using PCA was carried out in three main stages namely, initial checks (preliminary analysis), main analysis and post analysis (Figure 2). The preliminary analysis focused on assessing the quality of the sample size and the correlation matrix between pairs of indicators of risks. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy by Kaiser (1974) in particular was used to determine the quality of the sample size. According to the Kaiser (1974), the sample is said to be unacceptable if KMO ranges from 0.00 to 0.49, miserable if it ranges from 0.50 to 0.59, mediocre if it ranges from 0.60 to 0.69, middling if it ranges from 0.7 to 0.79, meritorious if it ranges from 0.80 to 0.89 and marvellous if it ranges from 0.90 to 1. The observed sample for this study was subdivided into three subsamples based on the scale of the agribusiness: micro, small and medium agribusinesses. Therefore, the assessment of the adequacy of the subsamples, as a preliminary analysis, was first carried out.

Furthermore, the quality of the correlation matrix (*R*-matrix) was considered in ensuring that reasonable patterns in the dataset would be uncovered. Field (2009) suggested that, for a good factor analysis in general, the pairwise correlations should not be too low neither too high. In other words, only indicators with sufficient correlation among themselves were retained. This is because a good PCA requires that the *R*-matrix should neither be a singular nor an identity matrix (Field, 2018). The *R*-matrix was then scanned through and indicators of risks for which the correlation coefficients were less than 0.2 were identified and eliminated. As a rule of thumb, the hypothesis that the *R*-matrix is not singular is rejected if its determinant is greater than 0.00001 while the hypothesis that the *R*-matrix is an identity matrix is rejected when the Bartlett's test of sphericity is statistically significant (Field, 2009; 2018).

The main analysis was interested in extracting the principal components from the dataset which was achieved in 3 steps. Let *X* the matrix of the indicators of risks associated with MSMAEs be expressed as:

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} = \begin{bmatrix} x_{11i} & x_{12i} & \cdots & x_{1ni} \\ x_{2i} & x_{22i} & \cdots & x_{2ni} \\ \vdots & \vdots & \vdots & \vdots \\ x_{ni} & x_{n2i} & \cdots & x_{nni} \end{bmatrix} \quad \dots(1)$$

where;

$x_1, x_2, x_3, \dots$, and x_n are row vectors of the indicators of risks. The first step was to estimate the covariance matrix of all pairs of indicators of risks. Let (x_{ni}, x_{li}) be a pair of indicators of risks associated with MSMAEs, $\bar{x}_n$ and $\bar{x}_l$ be the sample mean of x_{ni} and x_{li} , respectively. The covariance matrix of the indicators of risks was then defined as:

$$M = \begin{bmatrix} \text{cov}(x_1, x_1) & \text{cov}(x_1, x_2) & \cdots & \text{cov}(x_1, x_n) \\ \text{cov}(x_2, x_1) & \text{cov}(x_2, x_2) & \cdots & \text{cov}(x_2, x_n) \\ \vdots & \vdots & \ddots & \vdots \\ \text{cov}(x_n, x_1) & \text{cov}(x_n, x_2) & \cdots & \text{cov}(x_n, x_n) \end{bmatrix} \quad \dots(2)$$

where;

N = sample size, i = an observed agribusiness enterprise, n and l are initials representing specific indicators of risks:

$$\text{cov}(x_n, x_l) = \frac{1}{N} \sum_{n=1}^N (x_{ni} - \bar{x}_n)(x_{li} - \bar{x}_l), \bar{x}_n = \frac{1}{N} \sum_{i=1}^N x_{ni} \quad \dots(3)$$

$$\bar{x}_l = \frac{1}{N} \sum_{i=1}^N x_{li} \quad \dots(4)$$

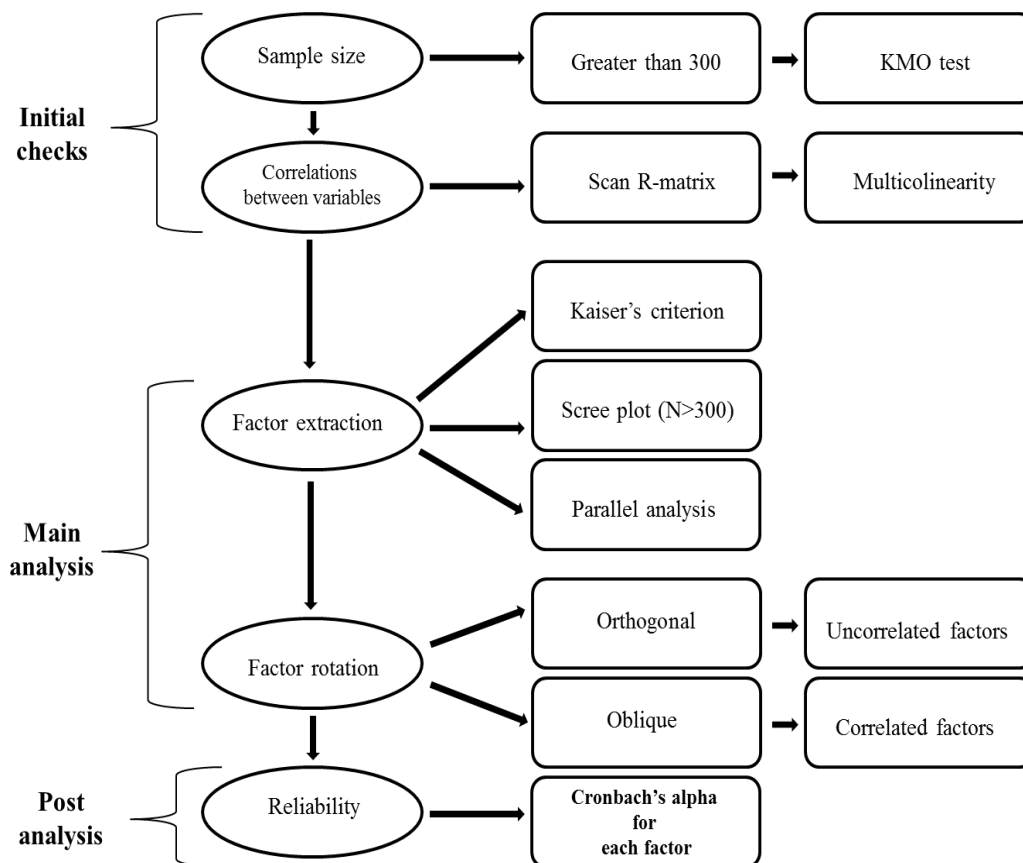


Figure 2: Flowchart of principal component analysis of risk management strategies in micro, small, and small scale agribusiness enterprises.

Source: Adapted from field (2018)

Note that the covariance between an indicator of risk and itself is equivalent to its variance. The second step was to calculate the eigenvalues and the normalized eigenvectors of

the covariance matrix M . The eigenvalues were determined by solving the following equation for λ :

$$\det(M - \lambda I) = 0 \quad \dots(5)$$

where;

$\det$ = Determinant; $\lambda = \lambda_1, \lambda_2, \dots, \lambda_t$ represents a set of solutions such that $\lambda_1 > \lambda_2 > \dots > \lambda_n$; I is an $n \times n$ identity matrix while M is the $k \times k$ covariance matrix in equation 2. For each eigenvalue there is an eigenvector which was determined by solving equation 6:

$$(M - \lambda' I) U_n = 0 \quad \dots(6)$$

where;

M is covariance matrix; λ' is the transpose of λ ; U_n is an eigenvector of a given eigenvalue; that is, $U_1, U_2, U_3, \dots$, and U_n is the eigenvector of $\lambda_1, \lambda_2, \lambda_3, \dots$, and λ_n , respectively. The normalized eigenvectors were then derived by dividing the eigenvectors by their lengths. Mathematically, the normalized eigenvectors determined as:

$$\Omega_n = \frac{U_n}{\|U_n\|} = \frac{U_n}{\sqrt{u_1 + u_2 + \dots + u_t}} \quad \dots(7)$$

where;

$u_1, u_2, u_3, \dots$, and u_n are the elements of U_n ; Ω_n is the normalized eigenvector of the eigenvector U_n such that $\Omega_1, \Omega_2, \Omega_3, \dots$, and Ω_n is the normalized eigenvector of $U_1, U_2, U_3, \dots$, and U_n , respectively. Let Y_i be a vector of principal components (PC) obtained as a linear combination of a matrix of X_i risk indicators (scores/instruments/items/ factors), θ_k be a vector of parameters (loadings) and u_{ni} be a vector of homoscedastic error terms. Given that PCA can be viewed as a regression analysis through the origin, the 17-factor sample regression function (SRF) for an observation was given as:

$$y_{ni} = \theta_1 x_{1ni} + \theta_2 x_{2ni} + \theta_3 x_{3ni} + \dots + \theta_{18} x_{17ni} + u_{ni} \quad \dots(8)$$

Equation 8 can be written more compactly as $Y_{ni} = X\theta + u_i$ and in a matrix form as:

$$\begin{bmatrix} y_{1i} \\ y_{2i} \\ \cdot \\ \cdot \\ y_{17i} \end{bmatrix} = \begin{bmatrix} \theta_1 \\ \theta_2 \\ \cdot \\ \cdot \\ \theta_{17} \end{bmatrix} + \begin{bmatrix} u_{1i} \\ u_{2i} \\ \cdot \\ \cdot \\ u_{17i} \end{bmatrix} \quad \dots(9)$$



where;

$i = 1, \dots, 515$; $n = 1, \dots, 18$; $y_{1i}, y_{2i}, \dots, y_{17i}$ is the first, second up to the 18th PC, respectively; x_1 = enterprise diversification (1 = yes, 0 = no), x_2 = integration of contract (1 = yes, 0 = no), x_3 = company insurance registration (1 = yes, 0 = no), x_4 = forward contracting (1 = yes, 0 = no), x_5 = foreign exchange hedging (1 = yes, 0 = no), x_6 = sharing leases (cost of rent) (1 = yes, 0 = no), x_7 = borrowing (1 = yes, 0 = no), x_8 = joining co-operative (1 = yes, 0 = no), x_9 = savings (1 = yes, 0 = no), x_{10} = keep business record (1 = yes, 0 = no), x_{11} = maintaining accurate and up-to-date financial record (1 = yes, 0 = no), x_{12} = budgeting cash inflow and outflows (1 = yes, 0 = no), x_{13} = conducting basic financial analysis (1 = yes, 0 = no), x_{14} = timing or type of sales modification (1 = yes, 0 = no), x_{15} = timing of purchase of inputs (1 = yes, 0 = no), x_{16} = timing of sale of output (1 = yes, 0 = no), x_{17} = placement where and from whom the purchases are made (1 = yes, 0 = no) and x_{18} = placement where and from whom the sales are made (1 = yes, 0 = no). Before the estimation of the parameters of the model in equation 7 or equation 8, the indicators of risks in the X-matrix were screened in order to eliminate those with particularly very low or high pairwise correlations.

RESULTS AND DISCUSSION

Table 2 presents a summary of the risk management strategies (RMS) used by micro, small and medium agribusiness in Northwest Nigeria. Descriptively, there were three categories of RMS namely, investment, budgeting and marketing RMS. The investment RMS were the most used strategies with a mean score of $\bar{X} = 3.73$ and a standard deviation of $S^2 = 2.85$ followed by the marketing RMS with a mean score of $\bar{X} = 2.98$ and a standard deviation of $S^2 = 2.08$, irrespective of the business status. The least important RMS were the budgeting RMS with a mean score of $\bar{X} = 1.91$ and a standard deviation of $S^2 = 1.52$. The observed difference in standard deviations revealed that while investment and budgeting RMS were the most and least adopted by businessmen/women respectively, the variability in the use of the investment and budgeting RMS was the most and least important, respectively.

Also, in Table 2 Items 8 (borrowing) and 9 (savings) had the highest contributions in terms of investment RMS with an average score of $\bar{X} = 0.68$ and $\bar{X} = 0.89$, respectively. In terms of budgeting RMS, items 10 (keep business record) and 11 (maintaining accurate and up-to-date financial record) had the highest contributions with a mean score of $\bar{X} = 0.6$ and $\bar{X} = 0.47$, respectively. Finally, items 15 (timing of purchase of inputs) and 17 (placement where and from whom to purchases are made) had the largest contribution to marketing RMS with a mean score of $\bar{X} = 0.63$ and $\bar{X} = 0.64$, respectively.



Table 2: Summary of Items Used as Indicators of Risk Management Strategies in Micro, Small and Medium Agribusinesses

Item	Description of item (1 = Yes, 0 = No)	Micro (n ₁ = 190)	Small (n ₂ = 256)	Medium (n ₃ = 69)	Pooled (n = 515)	F-test	χ^2 -test
Item1	Enterprise diversification	0.70 (0.46)	0.28 (0.45)	0.20 (0.41)	0.43 (0.49)	57.43***	94.36***
Item2	Integration of contract	0.53 (0.50)	0.16 (0.37)	0.12 (0.32)	0.29 (0.46)	49.30***	83.16***
Item3	Company insurance registration	0.38 (0.49)	0.13 (0.33)	na	0.20 (0.40)	36.20***	63.80***
Item4	Forward contracting	0.46 (0.50)	0.23 (0.42)	0.07 (0.26)	0.29 (0.46)	26.43***	48.19***
Item5	Sharing leases (Cost of rent)	0.47 (0.50)	0.18 (0.38)	0.13 (0.34)	0.28 (0.45)	29.95***	53.94***
Item6	Joining co-operative	0.58 (0.50)	0.42 (0.49)	0.22 (0.42)	0.45 (0.50)	15.07***	28.63***
Item7	Foreign exchange hedging	0.42 (0.50)	0.12 (0.33)	Na	0.22 (0.41)	47.03***	79.93***
Item8	Borrowing	0.74 (0.44)	0.68 (0.47)	0.48 (0.50)	0.68 (0.47)	8.00***	15.59***
Item9	Savings	0.93 (0.26)	0.9 (0.30)	0.77 (0.43)	0.89 (0.31)	6.81***	13.34***
Total 2	Investment risk management strategies	5.21 (3.11)	3.10 (0.40)	2.00 (1.49)	3.73 (2.85)	53.72***	113.50***
Item10	Keep business record	0.62 (0.49)	0.63 (0.48)	0.43 (0.50)	0.60 (0.49)	4.55**	8.99**
Item11	Maintaining accurate and up-to-date financial record	0.5 (0.50)	0.48 (0.50)	0.30 (0.46)	0.47 (0.50)	4.28**	8.48**
Item12	Budgeting cash inflow and outflows	0.64 (0.48)	0.32 (0.47)	0.36 (0.48)	0.44 (0.50)	26.91***	48.98***

Note: ***<0.01, **<0.05; *F-test* tests for the difference in business risk management strategies across business status while χ^2 -test tests for the association between business risk management strategies and business status; values outside and inside brackets are means ($\bar{X}$) and standard deviation (S^2), respectively; na = not available.

Source: Survey data (2019)

From Table 2, evidence of a statistically significant ($P < 0.01$) relationship by means of chi-squared tests was found between RMS and business status. Also, there was a statistically significant ($P < 0.01$) difference in RMS used across the three agribusinesses under study. For instance, micro agribusinesses had the highest investment RMS ($\bar{X} = 5.21$, $S^2 = 3.11$) followed by the small ($\bar{X} = 3.10$, $S^2 = 0.40$) and medium ($\bar{X} = 2.00$, $S^2 = 1.49$) agribusinesses. Overall, micro agribusiness had the highest level of RMS ($\bar{X} = 11.47$, $S^2 = 5.65$) while medium agribusiness had the smallest level of RMS ($\bar{X} = 5.45$, $S^2 = 4.14$).



Table 2: Summary of Items Used as Indicators of Risk Management Strategies in Micro, Small and Medium Agribusinesses **Cont'd.**

Item	Description of item (1 = Yes, 0 = No)	Micro (n ₁ = 190)	Small (n ₂ = 256)	Medium (n ₃ = 69)	Pooled (n = 515)	F-test	χ^2 -test
Item13	Conducting basic financial analysis	0.66 (0.48)	0.25 (0.44)	0.28 (0.45)	0.41 (0.49)	46.70***	79.44***
Total 2	Budgeting risk management strategies	2.42 (1.60)	1.68 (1.41)	1.38 (1.27)	1.91 (1.52)	19.23***	58.75***
Item14	Timing or type of sales modification	0.78 (0.41)	0.45 (0.50)	0.36 (0.48)	0.56 (0.50)	34.81***	61.65***
Item15	Timing of purchase of inputs	0.83 (0.38)	0.55 (0.50)	0.42 (0.50)	0.63 (0.48)	28.48***	51.56***
Item16	Timing of sale of output	0.75 (0.44)	0.54 (0.50)	0.45 (0.50)	0.61 (0.49)	14.31***	27.26***
Item17	Placement where and from whom the purchases are made	0.83 (0.38)	0.54 (0.50)	0.48 (0.50)	0.64 (0.48)	25.62***	46.85***
Item18	Placement where and from whom the sales are made	0.66 (0.47)	0.5 (0.50)	0.38 (0.49)	0.54 (0.50)	10.88***	20.99***
Total 3	Marketing risk management strategies	3.85 (1.64)	2.59 (2.14)	2.09 (2.13)	2.98 (2.08)	30.64***	65.90***
Total	Overall risk management strategies	11.47 (5.65)	7.37 (5.09)	5.45 (4.14)	8.63 (5.65)	49.05***	144.09***

Note: ***<0.01, **<0.05; *F-test* tests for the difference in business risk management strategies across business status while χ^2 -test tests for the association between business risk management strategies and business status; values outside and inside brackets are means ($\bar{X}$) and standard deviation (S^2), respectively; na = not available.

Source: Survey data (2019)

Table 3 shows the result of the principal component analysis (PCA) of the risk management strategies (RMS) by business status in Northwest Nigeria. The initial result of the PCA of RMS revealed that the correlation matrix between the items was singular (perfectly correlated) due to items 2, 3, 4, and 7. These items were therefore removed from the analysis and the PCA was rerun on the remaining items (Table 3). The determinant of the new correlation matrix between the items, $D = 0.001$, was less than 0.00001. The implication is that the correlation matrix between the items was not singular, thereby suitable for PCA (Field, 2018). The Bartlett sphericity test for micro, small and medium agribusinesses, $\chi^2 (91) = 1329.47$, $\chi^2 (78) = 1849.53$, and $\chi^2 (91) = 474.81$, respectively, was statistically significant, $P < 0.001$. The implication is that the correlation matrix was different from an identity matrix in which case the items would not correlate with each other, the items being suitable for PCA. The sample size of the micro, small and medium agribusinesses was adequate and good for PCA, all KMO being greater 0.8 (Field, 2009, 2018).

A single RMS factor was extracted as a measure of RMS for each of the agribusinesses, with that of micro agribusiness having an eigenvalue of 9.36 which explained 67 % of the variance in the items.



Table 3: Summary of Exploratory Factor analysis Results for the Risk Management Strategies in Micro, Small and Medium Agribusinesses

Item	Description of item (1 = Yes, 0 = No)	Micro			Small			Medium		
		FL	Uniq	Com	FL	Uniq	Com	FL	Uniq	Com
Item1	Enterprise diversification	0.75	0.44	0.56	0.67	0.56	0.44	0.36	0.87	0.13
Item5	Sharing leases (Cost of rent)	0.76	0.43	0.57	0.82	0.32	0.68	0.77	0.41	0.59
Item6	Joining co-operative	0.90	0.20	0.80	0.71	0.50	0.50	0.36	0.87	0.13
Item8	Borrowing	0.67	0.54	0.46	0.54	0.71	0.29	0.78	0.39	0.61
Item9	Savings	0.66	0.56	0.44	na	na	na	0.80	0.37	0.63
Item10	Keep business record	0.72	0.48	0.52	0.57	0.68	0.32	0.33	0.89	0.11
Item11	Maintaining accurate and up-to-date financial record	0.93	0.13	0.87	0.79	0.38	0.62	0.68	0.53	0.47
Item12	Budgeting cash inflow and outflows	0.89	0.21	0.79	0.78	0.39	0.61	0.77	0.40	0.60

Note: FL = Factor Loading; Uniq = Uniqueness; Com = Communality; Factor loadings over. 40 appear in bold; KMO = Kaiser–Meyer–Olkin measure of sampling adequacy; ***<0.01

Source: Survey data (2019)

The eigen value of RMS factor for small and medium agribusinesses was 8.32 and 7.8, respectively, which explained 64 and 56 % of the items' variance, respectively (Table 3). It can be seen from the factor loadings that RMS factor under micro agribusinesses had the highest and smallest correlation with item 11 (maintaining accurate and up-to-date financial record) and 9 (savings), respectively. Similarly, under the small agribusinesses, RMS factor had the highest and smallest correlation with items 14 (timing or type of sales modification) and 8 (borrowing). Finally, in medium agribusinesses, RMS factor had the highest and smallest correlation with items 16 (timing of sale of output) and 10 (keep business record).

It was also found (Table 3) that item 1 (enterprise diversification), 6 (Joining co-operative) and 10 (keep business record) were unrelated to the RMS factor under medium agribusinesses given that the factor loadings were less than 0.4 (Field, 2018). The mean of the RMS factor for micro, small and medium agribusiness was 0.97, 0.54 and 0.41, respectively. The implication is that micro agribusinesses had a highest level of RMS followed by the small and medium agribusinesses. The result agreed with earlier findings which were based on the descriptive analysis. However, the descriptive analysis tended to underestimate the level of RMS. For instance, based on the descriptive analysis, the RMS of micro agribusinesses was about 36 and 52 % higher than that of small and medium agribusinesses, respectively. In terms of PCA, the RMS of micro agribusinesses was about 44 and 58 % higher than that of small and medium agribusinesses, respectively. It was also found that the RMS for micro, small and medium agribusiness all had high reliabilities; all Cronbach's $\alpha > 0.86$.



Table 3: Summary of Exploratory Factor analysis Results for the Risk Management Strategies in Micro, Small and Medium Agribusinesses **Cont'd.**

		Micro			Small			Medium		
Item	Description of item (1 = Yes, 0 = No)	FL	Uniq	Com	FL	Uniq	Com	FL	Uniq	Com
Item13	Conducting basic financial analysis	0.87	0.24	0.76	0.87	0.25	0.75	0.84	0.30	0.70
Item14	Timing or type of sales modification	0.90	0.19	0.81	0.95	0.10	0.90	0.90	0.18	0.82
Item15	Timing of purchase of inputs	0.84	0.29	0.71	0.93	0.13	0.87	0.86	0.26	0.74
Item16	Timing of sale of output	0.75	0.43	0.57	0.92	0.15	0.85	0.92	0.15	0.85
Item17	Placement where and from whom to purchases are made	0.87	0.25	0.75	0.85	0.28	0.72	0.90	0.19	0.81
Item18	Placement where and from whom to sales are made	0.87	0.25	0.75	0.88	0.23	0.77	0.78	0.39	0.61
Model validation statistics										
Number of observation		190			256			69		
Determinants		0.001			0.001			0.001		
Bartlett's test χ^2 (91, 78, 91)		1329.47***			1849.53***			474.81***		
KMO		0.87			0.87			0.81		
Eigenvalues		9.36			8.32			7.80		
% of variance		67			64			56		
Cronbach's alpha		0.90			0.89			0.87		
Average risk management strategy score		0.97			0.54			0.41		

Note: FL = Factor Loading; Uniq = Uniqueness; Com = Communality; Factor loadings over. 40 appear in bold; KMO = Kaiser–Meyer–Olkin measure of sampling adequacy; ***<0.01

Source: Survey data (2019)

The analysis of the scree plot (Figure 2) showed that between 1 and 3 factors could have been retained based on the Kaiser criterion, but the approach was not warranted. For instance, not all the items' communalities for micro and medium agribusinesses were greater than 0.7, given that the sample size was less than 250 in these categories and the number of items was less than 30 (Field, 2009). For the small agribusiness, although the sample size and the average communality exceeded 250 and 0.6, respectively, the three factors extracted were not systematically different.

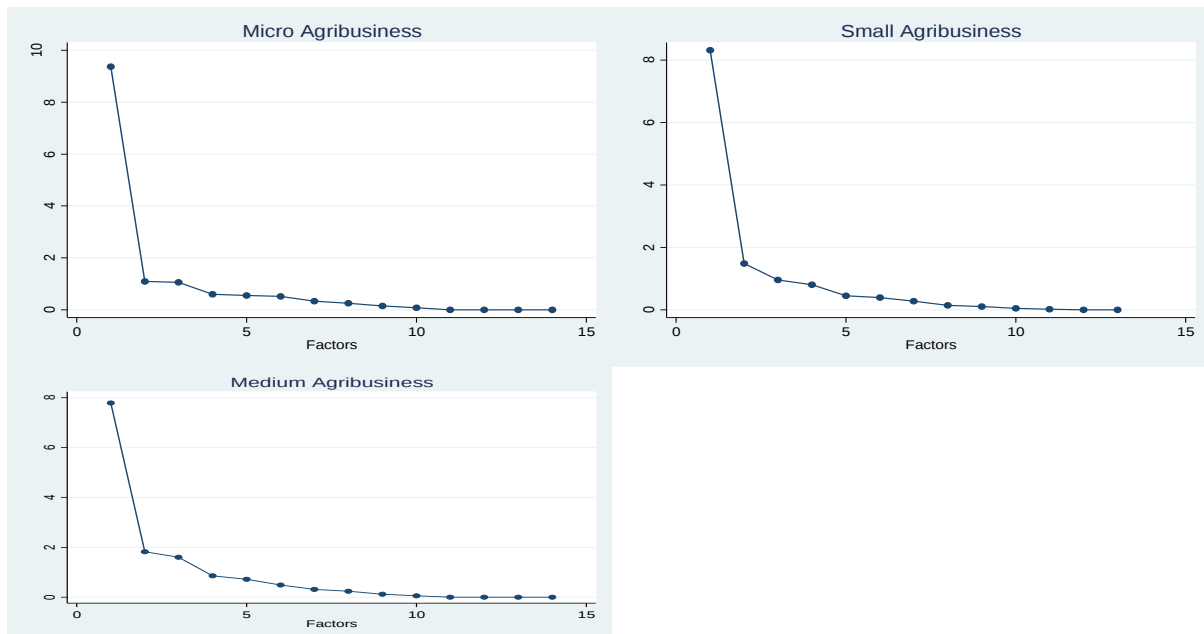


Figure 2: Scree plot of eigenvalues after principal component analysis of the components of the risk management strategies adopted by micro, small and medium agribusinesses

CONCLUSION AND RECOMMENDATIONS

It can be concluded that principal component analysis (PCA) was a useful means to reduce the list of factors considered for the assessment of RMS among micro, small and medium agribusinesses in Northwest Nigeria. In effect, RMS in micro, small and medium agribusinesses was explained by a unified factor which was termed as investment, budgeting and marketing strategies. A close attention by micro, small and medium agribusinesses on this factor could ensure reduction in cost of production as it regards the risks associated with the businesses they are involved in.

Based on the result of the finding, it can be concluded that micro, small and medium small enterprises manage their risk through investment, budgeting and marketing strategies. Although, the major risk reducing strategies of agribusiness enterprises were found to be investment and marketing risk management strategies (RMS). The study, therefore, recommended that capacity building should be regularly organized to train micro, small and medium agribusiness investors on business record keeping, maintaining accurate and up-to-date financial record, budgeting cash flow and outflows and conducting basic financial analysis. Also, micro, small and medium agribusiness enterprises are encouraged to operate effective marketing management system as it serves as a tool to their RMS. This will comprise the integrating function, which reflects the relationship between the developed strategies, the use of elements of marketing, operational implementation of programs in the areas and social corporate responsibility for the results of the work to the public.

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