Assessing the Nature of Risk Management Implementation in Manufacturing Small Medium Enterprises in Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The survival of manufacturing small and medium enterprises depends on its capability to anticipate and prepare for setbacks, challenges and risks, rather than waiting for it to happen. Thus the purpose of this study was to investigate the nature of risk management implementation in manufacturing small and medium enterprises in Nigeria. A survey methodology was applied during this investigation. And the results revealed that as the owner/manager entrepreneurial experience grows, risk management experience is gained. Thereby leading to a better risk perception, where a more sophisticated risk management approach is implemented that ensures its survival during political or economic crises.

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1. INTRODUCTION

There is the risk of all activity that we take part in, it is found everywhere and spreads through every issue of life [1]. In the global business environment, unexpected situations create severe loss exposures [2]. In a typical small and medium enterprise environment, where access to capital is limited a sudden change of events could likely lead to operational activities being interrupted, financial loss and even bankruptcy [3]. It is therefore important to have in place effective measures to counter such events.

The practice of risk management in small and medium enterprises (hereinafter SMEs), especially small firms is usually determined by the attitude to risk and the beliefs of the owners [4]. There is an informal approach to the implementation of risk management procedures, decisions are made in relation to the status of their business as a unit while ignoring techniques to manage risk [5]. These decisions are linked irrevocably as the strategic decision made by owner-managers reflecting the management of risk they face [6].

Despite having performed some form of risk identification and evaluation, SMEs owners may simply ignore a particular risk [7,8].

According to Turpin [9], four out of ten SMEs have no official risk management strategy and this is due to the problem in communication and delegation of risk management competencies to employees. Despite the fact that business that fully adopts and implement a risk management strategy is more likely to survive and grow.

Most empirical research and literature has been focused on larger firms and little is known about risk management applications within SMEs [3]. But according to Henschel [4], the little research done summarized that risk management in SMEs is amorphous, complicated and solely in the hands of the owner who may or may not implement risk management procedures depending on their risk perception, therefore the purpose of this study is to investigate the nature of risk management implementation in manufacturing small and medium enterprises in Nigeria.

Table 1. Definition of SMEs in Nigeria

S/N	Size category	Employment	Assets (=N= Million) (excl. land and buildings)
1	Microenterprises	Less than 10	Less than 5
2	Small enterprises	10 to 49	5 to less than 50
3	Medium enterprises	50 to 199	50 to less than 500

Table 2. SMEs contribution to national GDP, 2014 (Smedan, 2014)

Activity	Sector	Micro	Small	Medium
Agriculture	86.53	6.53	3.95	97.01
Mining and quarrying	0.28	0.39	3.60	4.27
Manufacturing	14.28	21.27	19.98	55.53
Water supply, sewage, waste management and remediation	25.44	6.63	2.51	34.57
Construction	0.52	2.02	7.68	10.22
Trade	36.34	14.39	8.68	59.41
Accommodation and food services	4.23	27.98	13.68	45.90
Transportation and storage	50.73	5.60	12.03	68.36
Information and communication	0.00	2.38	9.57	11.95
Arts, entertainment and recreation	47.35	28.20	22.26	97.82
Finance and insurance	1.05	1.39	3.69	6.13
Real estate	31.00	13.25	11.29	55.55
Profession, scientific and technical services	13.25	2.08	5.28	20.61
Administrative & support services	8.55	15.20	65.76	89.51
Education	2.09	14.69	24.48	41.26
Human health and social services	18.24	20.06	20.96	59.25
Other services	80.76	17.01	2.23	100.00

1.1 Small and Medium Enterprise (SME) in Nigeria

In Nigeria, the National Bureau of Statistics describes a small and medium enterprise as a separate and distinct entity including cooperative enterprises and non-governmental organizations managed by one owner or more including its branches or subsidiaries. Table 1 illustrates this description.

Manufacturing SMEs play an essential function in global economies by creating employment and thus reducing poverty. This is further supported by the economic report by the Small and Medium Enterprises Development Agency of Nigeria [10] and National Bureau of Statistics (NBS) for 2014, stating SMEs contribution to Gross Domestic Product in Nigeria in nominal terms stood at 55.55%, as seen in Table 2.

2. METHODOLOGY

Information from the primary data source was collected using a survey questionnaire, which according to Leedy [11], and Douglas C. Montegomery and Runger [12], is a common instrument for obtaining data beyond the physical reach of the researcher. A survey offers a reliable and cost-effective solution for obtaining data related to the current state of risk management practice by SMEs. The target population is represented by owner/managers of manufacturing SMEs. Information about the target population was obtained from the Small and Medium Enterprise Development Agency of Nigeria, with a sample size of sixty eight participants responding out of 80 participants from various enterprises.

2.1 Data Analysis and Evaluation

Data obtained from respondents were coded according to a predetermined coding scheme and entered into the Microsoft Excel. This coded data was then imported into the statistical package for social science (spss), software program for statistical analysis.

The following inferential statistics was performed on the data:

Factor analysis: used to analyze inter-relationship between a numbers of variables and to explain these variables in terms of their common underlying factors (See Appendix A).

This is a useful tool as it helps in identifying underlying factors, variable relationships and screening of variables. It was chosen as a statistical approach to analyze and compare various variables and their common aspect. It is calculated using the following model equation below:

$$Yn = \alpha n1F1 + \alpha n2F2 + \alpha n3F3 + \ldots \alpha nxFx$$

Where

Y = variable with known data
α = A constant
F = Function of some unknown variable

Evaluations are made based on results arranged in patterns of relationships where a number of variables are related to the same function.

Anova (Analysis of Variance): used to determine if there is a significant difference between two or more means (See Appendix B). This statistical approach was chosen to determine whether a variable has a significant different means within a subset of scales identified by a second variable. It is calculated using the following equations:

$$F = \frac{MST}{MSE} \tag{1}$$

Where

F = ANOVAs coefficient
MST = Mean sum of squares
MSE = Mean sum of error

$$\text{Where MST} = \frac{SST}{P-1} \tag{2}$$

$$\text{SST} = \sum_n (x - X)2 \tag{2.1}$$

Where

SST = Sum of squares
P = Total number of population, n = Total number of samples

and

$$MSE = \frac{SSE}{N-P} \tag{3}$$

$$\text{SSE} = \sum (n - 1)S^2 \tag{3.1}$$

Where

SSE = Sum of squares
S = Standard deviation
N = Total number of observations

By evaluating the statistical significance, the null hypothesis is rejected if there is no difference between means, thus accepting the alternative hypothesis.

3. RESULTS

The aim of factor analysis is to investigate whether a number of variables of interest are linearly related to a smaller number of unobservable factors. It also shows the underlying constructs of the survey questionnaire.

An exploratory factor analysis was carried out to determine the factor structure responsible for co-variation in the data analysis.

In order to determine the appropriate number of factors to extract, the Kaiser criterion (eigenvalue >1) and the "elbow" criterion were applied using the scree plot as shown in figure.

Results including the rotated component matrix are shown in Table 3 and appendix A. the principal factorial analysis was used, followed by a verimax (orthogonal) rotation. The scree plot suggested eleven meaningful factors also confirmed with a parallel analysis (Monte Carlo eigenvalue simulation).

A variable is said to load on a given factor if the factor load is 0.40 or greater, and less than 0.40 on other factors. Using this criterion, a total of twenty seven variables loaded on various given factors.

Five variables were found to load on the first factor and were subsequently labelled "Impact of risk on SME operations". One variable loaded on the second factor was labelled "SME business activity". Three variables loaded on the third factor was subsequently labelled "SME business environment". One variable loaded on the fourth factor was labelled "Managerial experience in current firm". Two variables loaded on the fifth factor were subsequently labelled "Entrepreneurial experience and risk perception in small business management". Four variables loaded on the sixth factor were labelled "Importance of implementing risk management procedures".

Two variables loaded on the seventh factor were labelled "Risk associated with company structure". Four variables loaded on the eighth factor was subsequently labelled "Risk barriers to projects/products and investments". One variable loaded on the ninth factor was labelled "Company structure". Two variables loaded on the tenth factor were labelled "Risk management knowledge and decision making". Two variables loaded on the eleventh factor were subsequently labelled "Governance and legislative framework barriers".

One way ANOVA was used for to analyse the factors that owner/manager entrepreneurial experience affects perception to business risk. Question seventeen was identified as the independent variable and question twenty six as the dependent variable.
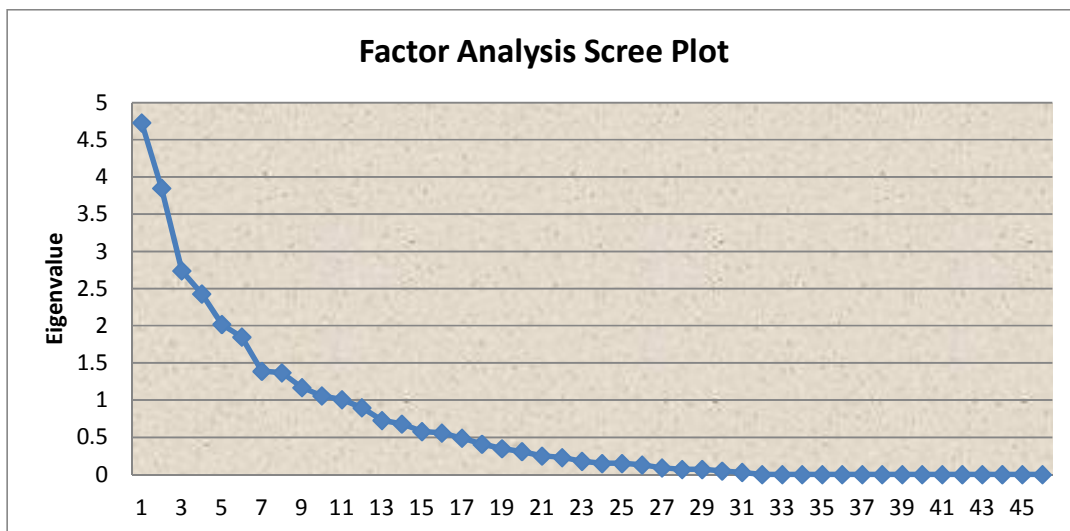

Fig. 1. Scree plot

Table 3. Factor analysis: Verimax rotation, loadings>0.4 shown

Item	Factors										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Q30_5	0.64										
Q30_6	0.58										
Q30_8	0.72										
Q30_9	0.51										
Q30_10	0.55										
Q22_1		1.62									
Q23_3			0.73								
Q23_5			0.58								
Q24_2			0.53								
Q16				0.58							
Q17					0.52						
Q26					1.26						
Q30_3						0.71					
Q21_3						0.40					
Q21_2						0.48					
Q21_4						0.63					
Q18							0.43				
Q13							0.91				
Q22_2								0.52			
Q23_4								0.41			
Q29								0.49			
Q30_1								0.48			
Q12									0.96		
Q27										0.65	
Q28										0.73	
Q21_6											0.52
Q21_7											0.57

From the analysis, it was observed that the significance level is 0.07 which is below 0.05, therefore there is a statistically significant difference in perception to business risk as a result of entrepreneurial experience gained. This is further supported by many researchers [4,1].

4. DISCUSSION

As identified from the results, the process for the implementation of risk management is the responsibility of the owner of the owner/ manager. Resulting in risk management not being formal and widely implemented. The final decisions on identified risk are assessed by the owner manager, who strongly depends on entrepreneurial experience accrued over the years. Should the owner/manager be absent or a vacuum for a long period of time, it will present a serious issue since risk management is not widely implemented.

In-cooperated companies have in place, procedures and plans for risk identification and risk management implementation, this is as a result of the need to fulfil legal requirements and government regulations.

With regards to company size, through the number of employees, the increase in the number of employees decreases the amount of responsibility for risk identification and management from the owner/manager. Units are created with the sole purpose of identifying and managing risk, with employees trained to gain more knowledge about risk management procedures.

A genuine risk management plan is not possible without an appropriate strategy. The identification and assessment of risk and the understanding of the dynamic business environment is the key to operating success. This helps SMEs in the assessment of risk and implementing methodologies to cushion the impact of risk on their business. Such approach will lead to a simplified risk management through an extended responsibility among other employees.

5. CONCLUSION

The interpretation of the analyzed data offered the validity in relation to the main purpose of this study. From the findings, the following can be drawn from the survey questionnaire research:

Company structure plays an essential role in the formation, implementation and management of risk. With sophisticated legal forms comes sophisticated risk management approach, thus responsibilities are delegated to more experienced personnel.

Various SMEs have a structured program and plans in place to combat the impact of risk in their daily business activities. This enables them to identify critical activities prone to risk thus ensuring the survival of the business during difficult times.

The One-way Analysis of Variance (ANOVA) provided empirical support that as the owner/manager entrepreneurial experience grows, risk management experience is gained. Thereby leading to a better risk perception, thus leading to a more sophisticated risk management approach that ensures company survival during political or economic crises.

The survey also revealed that manufacturing SMEs in Nigeria do not have a formal risk management strategy, this is due to the attitude to risk and the beliefs of the owner/managers. This informal approach becomes problematic when there is a project, product or investment decisions involved.

Economic related factors such as labour uncertainty and union strikes, electricity outages, foreign exchange fluctuation currently experienced, the current hike in raw material prices etc plays an important influence on risk management decisions making and long term planning by SMEs.

The attitude and beliefs of owner/managers play an important role on how risk is handled therefore with proper training and development the current planning system of SMEs will be enhanced with the owner/manager's knowledge and perception of risk and risk management activities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Appendix A

FACTOR
/VARIABLES= Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21_1 Q21_2 Q21_3 Q21_4 Q21_5 Q21_6 Q21_7 Q22_1 Q22_2 Q22_3 Q23_1
Q23_2 Q23_3 Q23_4 Q23_5 Q24_1 Q24_2 Q24_3 Q25 Q26 Q27 Q28 Q29 Q30_1 Q30_2 Q30_3 Q30_4 Q30_5 Q30_6 Q30_7 Q30_8 Q30_9 Q30_10
Q30_11
      /CRITERIA = MINEIGEN (1) ITERATE (25)
      /EXTRACTION =PAF
      /METHOD = COVARIANCE
      /PLOT = EIGEN
      /PRINT = INITIAL EXTRACTION ROTATION
      /CRITERIA = ITERATE (25)
    /ROTATION = VARIMAX.

Rotated factor matrix

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
What legal form is your company?	.01	.02	.16	.06	-.23	.00	-.13	.09	.12	.22	.01
Is the general manager one of the owners?	-.01	.02	-.10	.00	.01	-.02	-.07	.03	-.19	-.28	-.01
Is the general manager a majority shareholder?	-.01	-.01	.00	.02	-.07	-.05	-.11	-.04	-.07	-.39	.08
What is the percentage of shares held by the general manager?	.01	.00	.28	.15	.07	-.05	.07	-.05	-.28	.95	.16
How many shareholders does the company have?	.00	-.03	-.32	-.14	-.07	-.03	.14	-.11	.93	-.16	-.23
Is the company family owned and managed?	-.04	.03	.17	.04	.02	.03	-.27	.05	.18	-.25	-.19
Would you consider yourself to be an entrepreneur?	.03	.00	-.46	-.14	.14	-.08	-.14	.03	.09	.01	.16
What is the number of years as owner/manager of current firm?	.08	-.03	.43	.12	-.20	.01	.15	.13	-.04	.25	.15
What is the number of years of entrepreneurial experience in small business management?	.11	.03	.56	.08	.12	-.12	.00	-.11	.15	.13	.02
What is the age of owner/manager?	.06	-.01	.18	.24	-.01	-.06	-.11	.06	.45	.18	.19
Do you believe that your own judgment based on your experience plays an important role in your decision-making?	-.03	.03	.10	.39	.15	-.04	-.11	.00	-.09	-.01	-.08
Would you consider yourself to be a risk-taker in business?	-.06	.02	-.02	.14	.11	.01	-.09	.20	-.13	-.11	.04
How would you rate these risks in your business? (External risks, which may affect your organization such as changes in the environment in which you operate)	-.02	.00	.10	-.04	.20	1.17	.16	-.09	-.14	.12	.23
How would you rate these risks in your business? (Setting organizational objective and ensuring you set the right ones and then meet them)	-.04	.06	.21	.17	.00	-.04	.45	.20	-.15	.18	.07

How would you rate these risks in your business? (Operational risks, which arise from the services you deliver or the activities you carry out)	-.03	-.02	.00	-.21	.30	-.05	.42	.18	.10	.05	.03
How would you rate these risks in your business? (Financial risk facing the organization in terms of internal systems planning, funding etc)	.01	.02	.03	.04	-.11	.04	.57	.06	-.07	.16	.15
How would you rate these risks in your business? (Risk associated with the employment, management and retention of staff)	-.02	.03	.28	-.02	.05	.04	-.17	-.16	.11	-.02	.03
How would you rate these risks in your business? (Risk associated with legislative framework within which your organization operates)	.02	.10	.10	.18	.43	.02	-.02	-.24	-.18	-.24	-.02
How would you rate these risks in your business? (Governance- reviewing the risks, which are part of the management of the organization)	-.01	2.64	.17	.05	.16	.00	.14	-.08	-.08	-.08	-.04
My business tends to be involved in business/projects/products that are: Low risk with a normal/expected rate of return	.04	-.01	-.18	1.35	.03	-.08	.31	-.11	.04	.27	-.01
My business tends to be involved in business/projects/products that are: Medium risk with a sometimes higher than expected rate of return	.02	.00	-.08	.12	-.05	.06	.04	.03	.13	.03	.52
My business tends to be involved in business/projects/products that are: High risk with a high rate of return	.00	.01	-.11	-.09	.32	-.06	-.08	-.03	-.07	.10	.28
The business environment in which my business operates is: Safe with little threat to my firm's survival and well being	-.01	.01	-.16	-.38	-.21	-.06	-.04	-.06	.01	.00	-.10
The business environment in which my business operates is: Moderately risky where achieving business goals may sometimes be affected	-.03	-.01	-.11	.14	-.02	.08	-.08	.18	.04	.09	-.02
The business environment in which my business operates is: High risk where one false move can result in severe loss	.01	.02	.04	.00	.64	-.02	.15	-.01	-.02	.03	-.13
The business environment in which my business operates is: Full of investment and marketing opportunities	-.06	.04	-.05	-.21	.04	.02	.02	.09	-.06	.06	.35
The business environment in which my business operates is: Stressful, hostile and hard to survive in	.03	.04	.13	.09	.58	.10	.06	-.08	-.16	.11	-.14
My business: Can control and manage the business environment to its advantage	.01	.02	.08	-.12	-.29	-.05	.07	-.05	-.05	.06	.03
My business: Has little or no control over business environment in which it operates	-.01	.02	-.06	.07	.51	.02	-.11	.01	.03	.02	.14
My business: Has some control over the business environment	-.03	-.01	.06	-.09	-.16	-.05	-.06	.02	.24	.04	.09
Do you use have a FORMAL risk management strategy and/or processes and procedures (Risk Identification, Risk Assessment, Risk Mitigation, Risk Monitoring with regard to e.g. production, supply chain, finance, safety etc) in your company?	.00	-.02	.04	.02	-.09	.02	.04	.04	-.02	.19	.15
How would you PRIMARILY define risk in your business environment?	3.72	-.01	.32	-.03	.08	-.04	-.02	-.10	.05	.17	-.03
Do you believe that risk in the business is well managed?	.03	-.02	-.07	-.05	-.17	-.02	.03	1.08	.09	.01	.03

Do you believe that you have the resources (e.g. information, knowledge, technology) you need to make good business decisions regarding risk?	.00	-.02	-.02	-.25	.04	-.17	.10	.36	-.08	.04	.11
Please indicate the impact the following risks have on your business.(Unable to forecast (due to demand variation and no feedback from customers))	.01	.01	-.14	.35	.31	.09	.25	-.11	-.06	-.19	.36
Please indicate the impact the following risks have on your business(Raw material price volatility)	.05	.03	.07	-.06	.02	.05	.24	-.11	.08	.06	-.07
Please indicate the impact the following risks have on your business (Accounts not being settled)	-.06	-.01	.06	.06	-.01	.10	.68	-.05	.01	-.03	-.13
Please indicate the impact the following risks have on your business (Defective parts (from suppliers))	.04	-.01	.21	-.05	.04	-.07	.28	-.09	.00	.05	.18
Please indicate the impact the following risks have on your business (Variability in finished goods produced)	.01	-.02	.52	-.02	-.13	-.05	.28	-.15	-.27	.01	.14
Please indicate the impact the following risks have on your business (Variability in raw materials from suppliers)	-.01	.01	.57	-.32	.10	-.07	.12	.06	-.26	-.11	-.08
Please indicate the impact the following risks have on your business (Inventory control (too high or too low))	.01	-.01	.58	.11	-.04	.07	-.03	.06	.12	.13	.00
Please indicate the impact the following risks have on your business (Manual processes (e.g. stocktaking))	.02	.03	.76	.06	-.11	.02	.24	-.23	.08	-.05	-.12
Please indicate the impact the following risks have on your business (Poor supplier service (late deliveries, quality))	.02	-.01	.39	-.33	.14	.18	.18	-.01	-.09	-.01	.00
Please indicate the impact the following risks have on your business (Other natural disasters (Floods/Heavy Rains,)	-.02	.03	.49	-.09	.05	.01	-.08	.07	-.06	.18	.08
Please indicate the impact the following risks have on your business (Out sourcing certain activities)	-.02	-.03	.09	-.10	.19	.04	.08	.01	-.16	.03	.19

Appendix B

ONEWAY /VARIABLES= Q26 BY Q17
/STATISTICS=DESCRIPTIVES HOMOGENEITY.

Descriptives

		N	Mean	Std. Deviation	STD. Error	95% Confidence interval for mean		Minimum	Maximum
						Lower bound	Upper bound		
How would you primarily define risk in your business environment?	0 - 4 years	4	1.50	.58	.29	.58	2.42	1	2
	5 - 10 years	4	2.50	1.29	.65	.45	4.55	1	4
	11 - 15 years	7	2.14	.90	.34	1.31	2.97	1	4
	15 years and above	31	3.10	1.40	.25	2.58	3.61	1	6
	Total	46	2.76	1.35	.20	2.36	3.16	1	6

Test of homogeneity of variances

	Levene statistic	Df1	Df2	Sig.
How would you primarily define risk in your business environment?	3.13	3	42	.04

Anova

Test of homogeneity of variances

	Levene statistic	Df1	Df2	Sig.
How would you primarily define risk in your business environment?	3.13	3	42	.04