International Journal of Home Science

ISSN: 2395-7476
IJHS 2015; 1(1): 09-13

www.homesciencejournal.com
Received: 3-03-2015
Accepted: 9-04-2015

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Discriminant analysis of internal and external financial options among small and medium scale enterprises in Abia state of Nigeria

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Abstract
The study was conducted to discriminate between Internal and External financial options among small and medium scale enterprises in Abia State of Nigeria. The specific objective of the study is to identify factors that distinguish among Internal and external financial options among the enterprises. Data for the study were collected with the use of questionnaires administered on 100 SMEs that were randomly selected across Ohafia, Umuahia and Aba geographical zones of the State. The data were analysed discriminant function model. The result of the discriminant function model reveals that firm size and value of movable asset contributed 75.83% and 10.10% respectively to the total product variable contribution of the discriminant Canonical score of the model. This implies that firm size is the highest factors that discriminate among internal and external financial options of SMEs. The group centroids were 1.51 and -1.09 for groups 1 and 2 respectively. It is recommended that SMEs intending to source external financial option, to adopt measures that will increase the firm size and value of movable assets. Such measures include forming financial cooperative societies through pooling of resources together. It is also recommended that SMEs should integrate vertically or horizontally so as to expand firm size.

Keywords: Discriminant, Internal, External, Financial and Abia State.

Introduction
There is no doubt that the choice of internal or external financial option plays critical role in the development of small and medium scale enterprises in Nigeria. The use of the appropriate financial option will enhance production and productivity and thus higher incomes and better standard of living of the people (Ijere 1998) [8]. This is true since small and medium scale enterprises (SMEs) act as catalysts in the socio-economic development of any country. Their positive impact on the economy has been given serious attention by policy makers all over the world because of their immense contribution to wealth creation, employment generation, improvement of technology, poverty alleviation and production of primary and secondary services for large scale enterprises (Zabri, 2012; Olabode *et al.*, 2013 and SMEDA, 2006) [19, 15, 18].

Brunto (2010) [5] described SMEs as the bedrock of industrialization and provide strong base for the development of local entrepreneurship. Available statistics show that they constitute more than 90% of Nigeria business enterprises by number and contribute significantly to the foreign exchange earnings, including export promotion in enhancing paradigm shift in domestic savings.

SMEs are by definition those cottage enterprises and industries with total capital base of not more than N200 million and staff strength of less than 300. They provide all sorts of products and services ranging from household products, industrial products, recreation and entertainment, healthcare, water disposal, professional services and so forth. In Nigeria, they also dominate the agricultural sector of the economy (Zabri, 2012 and Akinsulire, 2006) [19, 2].

According to Business-day (2014) [4], despite the potential tendencies of the subsector, SMEs have underperformed and contribute insignificant 1% to the country's Gross Domestic Product (GDP). Nto and Mbanasor (2010) [14] opined that SMEs have not made significant contribution to the growth and development of Nigerian economy and Abia State in particular despite the encouragement they receive from government through certain policies and programmes like establishment of Bank of Industry (BOI), small and medium equity investment scheme (SMEIS), Nigerian Export and Import Bank (NEXIM), Nigerian Agricultural Credit Guarantee

Scheme etc. Many of the businesses in the subsector are constrained by limited resources and inability to access fund from the external sources of finance (i.e. Debt and Equity) and rely on internal sources such as personal savings, gift from friends and relations. For instance, available data reveal that loans from external option like Commercial banks to SMEs as a percentage of total credits declined from 48.79% in 1992 to 0.15% in 2010. The reasons being that they have low business credibility, poor management and accounting structure, inability to present tangible collateral (which is a major requirement by formal financial institutions) as well as high risk of business failure inherent in the sector (Akinsulire, 2006, and Arosanyin, 2004) [2]. As a result of the above, Businessday (2014) [4] opined that about 39% of small scale firms and 37% of medium scale firms in Nigeria are financially constrained. The implication is that they are forced to close shop because of inability to access the required funds.

However, of all the highlighted challenges facing SMEs, Ijere (1998) [8] observed that inadequate finance is the most critical in the efficient performance of the subsector. Finance is required to energise and mobilize other factors of production. It is the power or key to unlock latent talents, abilities, visions and opportunities which in turn acts as the mover of economic growth of SMEs. Unfortunately, the issue of financial options available to SMEs in Abia State is not given the serious attention it deserves by researchers and policy makers. UNDP (2007) reported that lack of sufficient finance and access to credit are often reported as major impediment to the growth and development of SMEs in Nigeria, yet research has not focused on financial structure that can expand the economic horizon of SMEs.

The enterprises generally face difficulties in accessing external financing because of lack of collateral and low business credibility arising from poor management structure (Zabri, 2012) [19]. Nto and Mbanasor (2012) [13] opined that SMEs have access to only internal sources of finance which is often too meagre to avail the enterprise opportunity to exhibit their growth potentials. The external finance requires rigorous and more cumbersome procedure of acquisition. In view of the importance of finance and the difficulty experienced in accessing it by SMEs especially from external sources, it becomes necessary to investigate the financial options available to the subsector. Studies like Zabri (2012) [19], Olabode *et al.* (2013) [15], Akinsulire (2006) [2], Abiara and Arosanyi (2004) indicate that there is paucity and dearth of research on the mode of financing this subsector. A study conducted in this direction in Abia State, will enhance better understanding of the financial behavioural pattern of SMEs, thus x-raying the available choice that will improve their expected contribution to national growth and development.

However, Ghandi and Amissah (2014) [6] conducted theoretical literature review on financing options for small and medium enterprises (SMEs) in Nigeria, though the study provided some useful guide but it did not empirically determine the major characteristics of firm or manager that will enhance fund procurement among SMEs in Nigeria. Hence the need for a study that will bridge the gap by adopting parametric econometric tool to determine financial option among SMEs in Abia State, Nigeria.

Zabri (2012) [19] in a similar study investigated financing preferences and capital structure among Malaysian SMEs: Evidence from Enterprise's 50 Award winners, took steps to handle some statistical shortcomings of Ghandi and Amissah (2014) [6] by estimating manager and firm characteristics that determine financing preference and capital structure. However, the recommendation of the study cannot be used for policy formulation aimed at improving on mode financing the SMEs in Abia State and Nigeria in general given that Malaysia has its peculiar socioeconomic environment from Nigeria.

In another development, Abiara and Arosanyi (2014) [1] evaluated financing options among small scale enterprises in Ilorin, Nigeria. The study adopted modified multinomial logit regression to attain the objective. Result of the study revealed that small scale enterprises accessed the financing options at 63.9% in category one (< N100, 000) with odds of 1.77; less financing options at 22% in category two (N100, 000- N200, 000) with odds of 2.8 and least accessed at 14.1% in category two (> N200, 000) with odds of 0.16 for their start-up capital. A unit increase of any of these variables will improve the entrepreneur's finance. The study which adopted modified multinomial logit regression never applied procedure that will distinguish reliable personal or firm characteristics that will improve financial opportunity of the SMEs.

Following the shortcomings of the aforementioned previous studies, it becomes necessary to carry out a study of this nature that will distinguish variables that will improve internal and external financial options among SMEs in Abia State of Nigeria. The specific objective is to identify factors that distinguish among internal and external financial options of the enterprises.

Methodology

The study was conducted in Abia State of Nigeria. The State was selected because of numerous SMEs scattered in the three geopolitical zones of Ohafia, Umuahia and Aba. A total of 100 questionnaires were randomly administered to the SMEs. The distribution was 30 questionnaires to Ohafia and Umuahia zones while 40 were distributed in Aba Zone. The inequality is because SMEs are more in Aba zone (Nto *et al.*, 2012) [13].

The questionnaire which was pretested was structured in a way to capture data on sources of finance for the enterprises, farm size, number of employees, level of output, value of assets, location of business and general profile of the enterprises.

The objective was analysed using discriminant function model. The model which is multivariate in nature establishes group membership based on predictor variables.

The model is explicitly specified thus following Nto *et al.* (2014).

$Z= a+b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8$

Where:

Z= Discriminant score of the Canonical discriminant function for each group.

a= Constant

b= Discriminant Coefficient of the Independent Variables

X_1= Firm Size (N = Naira ie Currency of Nigeria)

X_2= No of employees

X_3= Output Level (N)

X_4= Age of the Firm (Years)

X_5= Value of Movable asset (N)

X_6= Location of Firm (1 = Urban, 0 = Rural)

X_7= Loan Obtained (N)

X_8= Amount of equity (N)

U = group membership

In line with Nto *et al.* (2014) and Mbanasor and Nto (2008) the procedure starts with categorization of the SMEs into two groups based on sources of Finance (e.g. Internal and External financial options).

Thus if total value of enterprise is less than N500, 000 then the firm can only depend on internal (i.e. Group 2) but if total value of enterprise is N500,000 and above, the business can be said to be classified as external which is group 1..

Results and Discussion

The process of discriminant analysis which predicts a group membership starts with examination of whether there exists significant differences between groups on each of the independent variables in group 1 and 2. Using the group statistics, as contained in table 1, it could be inferred that there were significant group differences between SMEs that used internal and external financial options, hence the need to proceed for further analysis.

Table 1: Group Statistics of the Respondents

Variables	Group1	Group 2	Group Mean
Firm Size X_1	831428.57 (445539.25)	282413.79 (124510.41)	549014.778
No. of Employee X_2	4.81 (1.44)	2.93 (1.73)	1.8785
Output Level X_3	90696.48 (35430.10	44982.76 (19529.11)	45707.7176
Age of Firm X_4	6.79 (4.25)	6.02 (4.63)	0.7685
Value of Movable Asset X_5	298285.71 (316787.48)	83344.83 (75628.31)	214940.886
Location of Firm X_6	.9524 (.21554)	.34 (.48)	0.6076
Loan Obtained X_7	136666.7 (196390.19)	4827.59 (14417.51)	131839.08
Amount of Equity X_8	686904.77 (439958.36)	253793.10 (116175.57)	433111.658

Source: Figure in Parenthesis is Standard Deviation calculated from field survey data 2014

For instance, a close examination of all the variables depicts large group mean between variables in each group as well as their corresponding standard deviation especially in the case of firm size, output level, value of movable asset, loan obtained and amount of equity. This suggests that the variables may be good discriminators given the wide variance. The group Statistics and mean difference among SMEs that depend on external financial option (group 1) and internal financial option (group 2) as presented in table 1 shows that group 1 members have more positive economic profile and background than those in group 2. The study therefore proceeded to test overall model fit and significance.

The result of the statistical test of significance of the model is presented in table 2. The table indicated an eigenvalue of 1.637. A low eigenvalue obtained is an indication of near linear dependence in the data obtained for the study. So there is no room to suspect problem of multi-collinearity in the discriminant model. This is an excellent result when compared with Nto *et al.* (2014) that got Eigen value of 3.116. However, Gujaratti and Sageatthi (2004) opined that when eigenvalue is less than 8, the result is considered as excellent.

Table 2: Statistical Test of Significance for the Discriminant Function Model

Test of Function	Result
Eigen Value	1.69
Wilks Lambda	0.372
Canonical Correlation	0.79
Chi-square	92.92
Degree of Freedom	8
Significance Level	0.000^{***}

Source: Calculated from Field survey data 2014

The high canonical correlation of 0.79 gives an insight to the index of overall model fit which is interpreted as being the proportion of variance explained. The canonical correlation also measures the association between the discriminant score and set of independent variables.

Table 2 also shows that wilks lambda which is the proportion of the total variance in the discriminant score not explained by the differences among groups to be 0.37. The low value of the test is desirable since only 37% of the variance was not explained by model. This implies that the discriminant function used in this study provided high significant amount of information required for determining ability to get external finance. The chi-square statistics of 92.92 corresponding to the Wilks lambda is statistically significant at 1% probability level at degree of freedom of 8. All these, point to the fact that there exists a relationship between the dependent variable (i.e. group membership) and the independent variables thereby confirming that the estimated function can be used to discriminate between those firms that can source funding from external and internal financial options as originally defined.

Having tested the performance of the discriminant function in identifying economic profile of the SMEs that clearly discriminate group membership of 1 and 2, the next stage was to estimate the parameter of each of the independent variables under observation.

According to Nto *et al.*, (2014) and Baldwin *et al.*, (1984) the significance of each estimated discriminant function lies on the magnitude of the linear weight (Parameters) associated with each variable. By implication, the weight of the variable provides an index of the importance of the predictor.

Table 3 indicates the parameter estimate of the variables and direction of the relationship.

Table 3: Standardized Canonical Discriminant Function Coefficient among SMEs

Variables	Discriminant Coefficient
Firm Size X_1	1.048
No. of employee X_2	0.104
Output Level X_3	0.472
Age of Firm X_4	-0.028
Value of Movable Asset X_5	-0.360
Location of Firm X_6	0.390
Loan Obtained X_7	-0.269
Amount of equity X_8	-0.113
Group 1 Centroid	1.511
Group 2 Centroid	-1.094

Source: Calculated from field survey data 2014

The set of economic characteristics involved in the study are firm size, number of employee, output level, age of firm, value of movable asset, location of firm, loan obtained and amount of equity. Of all the variables, firm size has the highest and positive discriminant coefficient of 1.048. Besides, variables like number of employees, output level and location of firm also made positive contribution in the model while the other variables had negative parameter. The positive signs obtained in variables like firm size, number of employees, output level and location of firm suggest that an SME chance of belonging to group 1 i.e. ability to access external funding improves as firm size, number of employees, level of output and location of improve. This is in line with apriori expectation as the variables assist in credit rating of an SME thus help to enhance confidence of lenders and other business financiers when their values are deemed high.

The estimated centroid for group 1 was found to be 1.511 while that of group 2 was -1.094. This implies that the higher the composite score of any SME the higher the probability that the firm will be classified into group 1 membership. Also, the lower the composites score of any of the firms, the higher the probability that firm will be classified into group 2 (Mbanaso and Nto 2008). Nto *et al.*, (2014) opined that cases with scores near to a centroid are predicted as belonging to that group.

In order to determine the variables that are most important through their product contributions to the total discriminant score, the percentage contribution of the significant variables to the total discriminant score is presented in table 4. The result shows only variables like firm size (75.83%), value of movable asset (10.10%), amount of equity (6.45%), loan obtained (4.67%) and output level (2.84%) made meaningful contribution to the total discriminant score.

Table 4: Contribution of Individual Variables to the Total Discriminant Score

Variables	Mean of 1	Mean of 2	Mean Difference	Discriminant Co-efficient	Product variable Contribution	% of Product Variable Contribution
X_1	831428.5714	282413.7931	549014.778	1.048	575363.487	75.83%
X_2	4.8095	2.9310	1.8785	0.104	0.195365	0
X_3	90690.4762	44982.7586	45707.7176	.472	21574.0427	2.84%
X_4	6.7857	6.0172	0.7685	-.028	0.021518	0
X_5	298285.7143	83344.8276	214940.886	-.360	77378.7193	10.1%
X_6	.9524	.3448	0.6076	.390	0.2387868	0
X_7	136666.6667	4827.5862	131839.08	-.269	35464.713	4.67%
X_8	686904.7619	253793.1034	433111.658	-.113	48941.617	6.45%
Total	-	-	-	-	-	100

Source: Calculated from Field Survey 2014

The largest contribution made by firm size and value of movable asset which is 75.83% and 10.10% respectively is expected as lenders consider paramount the capacity of SME to repay loan and interest in their credit rating which could be drawn from values of firm and movable assets. The credit information of SME is largely explained by size of the firm and value of movable asset in its possession. When value of movable asset is high, lender can easily confiscate it in event that the business owner finds it difficult to repay loan and interest. Mbanasor and Nto (2008) opined that banks evaluate credit worthiness potential of SME borrowers through firm size and value of assets.

In order to know how well the function used in the study performed, in classifying SMEs, the discriminant function evaluated for each of the SMEs classification procedure based on the initial group 1 and 2 cases. The result is presented in table 5 since the usefulness of discriminant function lies in its power to classify correctly, hence, the higher the rate is, the better the predictive power of the function (Nto *et al.*, 2010 and Nto and Mbanasor, 2013) [14] .

The estimated discriminant function used, classified the SMEs into two distinct groups: those who can source external finance like debt and equity from financial institutions and other investors and those that depend on only internal source of financial option such as personal savings and gift from friends/relations. This classification was based on U ≥ N500, 000 and U< N500, 000 for group 1 and 2 respectively.

The classification performance of the estimated discriminant function is shown in table 5. The table reveals that classification performance of the function was based on 100 sampled SMEs. Given that the power of the model depends on its capacity to classify correctly, then the higher the classification rate, the better the predictive power of the function.

Originally, in using the total value of asset, 42 SMEs were found to belong to group 1 and therefore could afford to access external financial options while 58 SMEs only depend on internal financial options so belong to group 2.

Table: 5 Classification Performance of the Estimated Discriminant Function

Actual Group	Number of Cases	Predicted Group Membership 1	2
Group 1	42	37 (88.1%)	5 (11.9%)
Group 2	58	7 (12.1%)	51 (87.9%)

Percentage of actual grouped cases correctly classified = 88.0%
Source: Field Survey Data, 2014

However, in application of the model, table 5 depicts that about 88.1% of original 42 SMEs were correctly classified as group 1 members while only 11.9% were erroneously classified into group 2. Also, 87.9% of 58 SMEs were correctly classified as group 2 while 12.1% were wrongly classified as belonging to group 1. By these correct classification result, those that are supposed to access external financial option would now be taken into consideration thus enhancing quantum of debt or equity that should go to the SMEs in the area. Nto *et al.*, (2014) [11] and Mbanasor and Nto (2008) [10] opined that this kind of misclassification error observed in the study constitute greatest risk in financial market administration because they have the tendency of misguiding policy formulation. The model exhibited high classification performance of 88% which is considered adequate especially when compared with 75% obtained by Bauer and Jodan (1971) [3], 74% recorded by Matiezo (1978) [9] and 75.6% observed by Onyenucheya (2005) [16].

Conclusion

The result of the discriminant model reveals that firm size made the highest contribution of 75% to the total discriminant score while value of movable assets came second with about 10%. This points to the fact that all policies of government to stabilize financial options of SMEs should centre on encouraging the scope of operation so as to increase firm size. The policy implication is that individual SMEs should form either vertical or horizontal integration with a view to enhance

the firm size and also increase the value of movable asset. The Central Bank of Nigeria SMEs fund should be granted more to those that formed financial cooperatives.

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