Applicability Of Standard Magnitude Variance In Determination Of Financial Progress Of Business Organizations

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Abstract: This study on applicability of standard magnitude variance analysis in determination of financial progress of selected business organizations in Calabar, Nigeria, was carried out to establish the nature and usage of standard magnitude variance as a statistical model developed to solve the problem of tied rank during selection of similar investment opportunities and also to determine progress in any given business data. Both primary and secondary data were used for the study. The data collected were analyzed using standard magnitude variance model, analysis of variance and chi-square test. The findings had shown that: In measuring the financial progress of selected business organizations in Calabar, Nigeria through the use of standard magnitude variance, there would be significant difference in determination of profit, production and sales than using any other measurement, standard magnitude variance analysis significantly determined the financial progress of business organizations as compared to any other method, and the perception of the operators of business organizations in Calabar, Nigeria on the use of standard magnitude variance in measuring their financial progress would be significantly different from their perception in using other traditional methods. The study recommended that: business operators should make effort to apply standard magnitude variance in determination of financial progress and stability of the businesses, rather than rigidly adhering to financial ratios as a traditional method of assessing financial performance of business. Finally, the implication and contributions of this work is that it would help the Accountants to render their advisory function much more objectively through the application of the model developed in this study.

Keywords: Standard Magnitude Variance; Financial progress; Business Organizations; Progress Index; Financial Performance

1. INTRODUCTION

With the growing size, need and ever-increasing competition in the Nigerian business environment, problems of business enterprises are becoming complex and the business operators are left with no option than using more and more statistics in their decision-making. Moreover, management has become a specialized job and a manager is called upon to plan, organize, supervise and control the operations of the business firm. Since very little personal contact or sometimes no contact at all, is possible with customers, and the business environment is filled with uncontrollable business variables such as income level, inflation rate, tax rate, etc., the modern business firm faces a much greater degree of uncertainty concerning future operations than before. Also, most of production these days is in anticipation of demand and, therefore, unless a very careful study of the market is made, the firm may not be able to make profits. Thus, a businessman who has to deal in an atmosphere of uncertainty can no longer adopt the method of trial and error in taking decisions. If he is to be successful in his decision-making, he must be able to deal systematically with the uncertainty itself by careful evaluation and application of statistical methods when considering his business activities. Business indeed runs on estimates and probabilities. The higher the degree of accuracy of a businessman’s estimates, the greater is the success attending on his business. In recent years it has become increasingly evident that statistics and statistical methods have provided the businessman with one of his most valuable tools for decision-making. Standard magnitude variance (STAMAVAR) is a statistical model developed to solve the problem of tied ranks in business data. The progress index, which is otherwise known as the STAMAVAR, was developed with the primary purpose of determining the response pattern of subjects on test items of unequal scales such as essay test where there is no absolute zero in the response values. But it was later found useful in other areas such as study of stability, irregularity amongst others in the business environment (Akpan, 2001). Moreover, organizational behavior is an important business variable, therefore, any effective tool for studying organizational behavior attempts at accommodating these variables, thus the use of statistical analytical tool in business management. Efforts made at capturing these various variables into experimental condition have yielded various statistical methodological approaches, each with its symbolic advantages and inherent shortcomings. The list of Common analytical tools in management sciences research is not exhaustive but for the purpose of this research, one would be permitted to mention here a few of them, which include, correlation, variance analysis, standard deviation, Chi-Square test, progress index, time series analysis, etc., and the latest amongst them being progress index (Akpan, 2001). Each of these methods mentioned above, has its own functions but the best and most effective is that of progress index. The reason is that the measure is potentially important in the sense that the deviation between the expected or envisaged result and the actual result is taken into consideration during manipulation of data, whereas the provision is glaringly lacking in the Z and the T scores. STAMAVAR is endowed with more effective standardization and manipulation of business data. It takes into consideration every element of output or scores as the case may be, and is highly standardized by taking the square root (Akpan, 2001). Furthermore, introducing business organizations in Nigeria and the attendant problems and prospects associated with managing their resources is not out of place at this point of reviewing the background of the study. As earlier mentioned business is a hard competitive struggle and has become worse in Nigerian business environment for the business organization. In recent times, many businesses which had good prospects at the beginning, have close their doors. And these failed businesses included those whose losses are withstood quietly by the firm’s owners, or, if profits are earned, the profit margins are inadequate (Ajojugo, 1980). The mortality rate among the newer, enterprises is high, particularly during the first year of operation; but the odds
for survival improve as the firm grows older. Why do these businesses die? In the opinion of the creditors and others who had dealt with the demise, ineffective management is cited as the underlying cause of the business failures, as recorded by the Nigerian business analysts of recent time. Unsuccessful business owners do not see themselves in the same way that others do, and they rarely attribute their failures to personal defects. The basic difficulty in business organization is bad management, and few business owners will admit that they are bad managers. They generally attribute their failures to other reasons, such as poor location, excessive competition, difficulties relating to receivables and inventory, and, for whatever reason, inadequate sales. No matter how large or small initial capital may have been, incompetent management has not only exhausted it but incurred debts beyond ability to pay (Udoka, Akpan, Ojong & Bassey, 2003). To the failing Nigerian entrepreneurs, the most obvious reason is lack of capital, regardless of how inefficiently they have managed what capital they had. It is poor management which subsequently results in poor determination of financial progress that is the root of most of the operating problems of business organizations in Nigeria. Poor management in failed or failing firm is evidenced by conditions such as: inventory imbalance, overextension of credit, excessive overhead and operating costs, cash flow difficulties, competitive weakness, poor revenue forecast etc. (Nwachukwu, 1989). Nevertheless, to know why some businesses fail is to know why others succeed. Business success and business failure are two sides of the same coin, in essence, a business organization succeeds in direct proportion to its highly motivated owner’s possession of certain essential talents of modern business operation. These include alertness to change, ability to adjust or to create change oneself, ability to attract and hold competent workers, with respect to operating details, and a knowledge of customers and their needs (market). That, there is need for knowledge of the market and the customer is obvious. Planning which results in prediction is an absolute must, if having the right goods at the right place at the right time and price’ is accepted goal of business (Effiong, 2004). Also, in a situation where the different business options yielded the same positive results, that is, the same value in terms of envisaged returns, the progress index would be of a great assistance in standardizing the result in order to bring out the best amongst them, even though they may have the same positive value.

2. Objectives of the study
The study is aimed at achieving the following Objectives:
1) To determine the applicability of the standard magnitude variance analysis in determination of financial progress of selected business organizations in Calabar, Nigeria.
2) To examine how STAMAVAR model could be used to break tied rank during selection and also determine the probability of selectivity amongst business organizations in Calabar, Nigeria.
3) To determine if there would be any difference in the perception of the operators of business organizations in Calabar, Nigeria on the use of standard magnitude variance in measuring their progress and their perception in using other traditional methods?

3. Research questions
1) To what extent can the standard magnitude variance analysis be applied in determination of financial progress of selected business organizations in Calabar, Nigeria?
2) Can STAMAVAR model be used to disentangle tied rank during selection and also determine the probability of selectivity amongst business organizations in Calabar, Nigeria?
3) Would there be any difference in the perception of the operators of business organizations in Calabar, Nigeria on the use of standard magnitude variance in measuring their progress and their perception in using other traditional methods?

4. Research hypotheses
The following stated in the null form are the research working hypotheses:
1) Standard magnitude variance analysis could not be significantly applied in determination of financial progress of selected business organizations in Calabar, Nigeria.
2) STAMAVAR model could be significantly used to disentangle tied rank during selection and also determine the probability of selectivity amongst business organizations in Calabar, Nigeria.
3) The perception of the operators of business organizations in Calabar, Nigeria on the use of standard magnitude variance in measuring their progress would not be significantly different from their perception in using other traditional methods.

5. Theoretical framework
Most accounting text books have for many years illustrated the use of two basic ratios that can be used for assessing or determining the financial progress of a business. These are the current ratio and the quick ratio (Okaro, 2004). The quick ratio though intuitively appealing is not considered too good a predictor for financial progress as its deduction comes too late for action to be taken. Similarly, most accountants recognize that current ratio is often unsafe to use, particularly when interpreting the account of manufacturing companies with considerable amounts of work-in-progress. The literature is overstocked with other sophisticated early warning models of traditional predictors (Millichamp, 1988). Of all the models, the Z-score technique seems to have gained very wide prominence and acceptance before the introduction of standard magnitude variance (progress index).

5.1 Altman’s Theory
The originality for the development of the Z-score technique is credited to Altman of USA in 1968 (Okaro, 2004). It is a system that works on the principle of the "whole being worth more than the sum of the parts. A number of appropriately chosen financial ratios derived from a company’s financial statements are weighted and added to provide an overall index, the z-score. This measures a company’s solvency simply and unambiguously. If the z-score lies at risk region, the enterprise has the financial characteristics of previous
failure and this heralds a more than 50/50 chance of financial distress and not progress. For example, a review of the variant of z-score model developed by Taffier of UK showed that less than 43 percent of H4 quoted companies selected as being at risk (Z < 0) as the end of 1976 subsequently gone into bankruptcy by 1982. A further 29 percent “are still at risk at that point. In effect, fewer than three in 10” such companies appeared to have recovered permanently (Okaro, 2004). One obvious weakness of the z-score model is purely analytical approach adopted in the models. Views have been expressed to the effect that the surest prediction involves a combination of techniques which in the final analysis may be reduced to a subjective judgment based on what is commonly known as “gut feel”.

6. The Ratio Adjustment Process And The Contribution Of Firm-Specific Factors

Prior research (Lev, 1969) examining the process of ratio adjustment has indicated that firms adjust their financial ratios to industry norms. In measuring the rate of ratio adjustment, Lee & Wu (1988) indicate that the adjustment lag can be decomposed into two components. Lambda (ë), which measures the speed of adjustment to the target, and delta (ää), which measures the speed of expectation adjustment. This theory development first describes and explain these two components of the ratio adjustment process. Subsequently, a discussion of the firm-specific factors and the anticipated relationship of each of these factors to ê and ä are carried out. The partial adjustment adaptive expectation (PAAE) model is used in this theory to re-examine the ratio adjustment process and to assess the contribution of firm-specific factors to the rate of adjustment to the target (ë) and to the rate of expectation adjustment (ää). Only the aspects of the model pertinent to theory development are discussed here. The PAAE model is combination of two separate and distinct models: the partial adjustment (PA) model and the adaptive expectation (AE) model. In order to describe and explain the basic components for measuring ratio adjustment (ê and ä), it is essential to have an understanding of these two models and their theoretical underpinnings. Therefore, a brief description of each follows:

6.1 Components Of The Pae Model

According to Lev (1969) and Lev & Sunder (1979), the partial adjustment model can be expressed as:

\[(Y_t - Y_{t+1}) = \lambda(Y_t - Y_{t+1}), \quad o - \dot{e} \]

where

- \(Y_t\) = a firm’s financial ratio in period t
- \(Y_{t+1}\) = a firm’s financial ratio in period t-1
- \(Y_t^*\) = the target level of a particular ratio

and

- \(\dot{e}\) = the speed of adjustment coefficient

Equation (1) states that the current level of a financial ratio, y, will move only partially from its previous position, y, - 1, to the desired target level, y*. The amount of adjustment between the two time periods, t and t -1 is equal to \(\lambda(Y_t^* - Y_{t-1}),\) where the fraction 6 measures the speed of adjustment. The size of ê reflects the limitations to the periodic adjustment of y caused by technological and institutional constraints. For equation (2), let (2) \(y_{t}^* = x_i,\) where \(x_i\) is the industry norm (mean/median) of a particular financial ratio at time t or t-1, which determines the target. Behavioral equation (1) therefore postulates that when a firm observes a deviation between its financial ratio and the industry target, it will adjust its ratio in the next period so that this observed deviation will be at least partially eliminated. The speed of adjustment to the target is indicated by the size of the adjustment coefficient (ê); the closer ê is to 1, the faster the periodic adjustment. Nerlove (1958) rationalized the extent of partial adjustment in terms of two conflicting requirements: (a) the cost of adjustment, and (b) the cost of being out of equilibrium. The former often results from the technological, institutional, and psychological inertia and the increasing cost of rapid change. The cost of adjustment reflects the degree of difficulty in a quick adjustment of the financial ratio to a predetermined target. Some ratios (e.g., the current ratio) involve short-term items and are under the direct control of management. Consequently, they can be adjusted in the short run more easily and at less cost than other ratios. The cost of being out of equilibrium reflects the importance to the firm of the conformity of a ratio with a target. If, for example, lenders insist on maintenance of a 2:1 current ratio, then the cost of a firm not conforming to this standard will be higher interest rates or debt renegotiation costs. Consequently, the speed of adjustment (ê) of a ratio to a target level will depend on the relative significance of these two cost items. While ratios involving current items tend to be less costly to adjust and therefore adjust more rapidly, ratios involving long-term items (e.g., equity and long-term debt) and variables which are not under the complete control of management (e.g., sales) tend to be more difficult to adjust and thus, adjust more slowly. Accordingly, the Current ratio, cash position, inventory/sales, and receivables inventory ratios would generally tend to be adjusted more quickly (have higher values) since these ratios involve current items that are typically less costly to adjust in a given time period. The traditional emphasis on the importance of the current ratios to lenders increases the cost of being out of equilibrium for these ratios, thus, causing management to adjust them more rapidly. The out-of-equilibrium cost argument could account for higher values for debt/total equity, current ratio, and net income/total assets ratios, since debt covenant often use these accounting numbers to place restrictions on manager's choices of accounting procedure (Adeniyi, 2004)

7. Materials and method

Population, sample size and sampling procedure

The survey research design was adopted for the study. The population of the study which comprises of two hundred and forty eight (248) business organizations which are operating in the Calabar Metropolis were classified into ten classes from these classes, samples of one hundred (100) business outfits, ten (10) from each class, were randomly drawn from the ten (10) classes. These samples were considered adequate and representative enough of the parent population to which inference and generalization was ultimately made. Judgmental Sampling procedure was adopted in order to determine the number which effectively represented each category of business organizations. The names of the business outfits in the Calabar Metropolis were written on pieces of paper according to the serial
number assigned to them, and from this, the final selection of one hundred outfits, ten from each category, was made.

7.1 Instrumentation
The instrumentation that was used in this study for data collection was well developed questionnaire. The Questionnaire was administered by hand to the respondents, who now, completed the questionnaire by filling in or ticking the right answers. The questionnaire was divided into four sections and the coding schedule was adopted in section C based on 6 – point Likert scale and had the following response options: Very Strongly Agree (VSA), Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD) and Very Strongly Disagree (VSD). Other sections, A, B, and D, required either ticking or supplying the needed answers.

7.2 Validity and reliability of the instrument
The actual validation of a questionnaire utilized the same principle and procedures as the validation of any instrument of tests and measurements. At the most elementary level, it is necessary for the questionnaire to have face validity (Osuala, 1993). This means that each question must be related to the topic under study, there must be an adequate coverage of the overall topic, the questions must be clear and unambiguous, and so on. A more adequate validation, however, required checking the responses, which the questionnaire elicits against an external criterion as stated earlier on. For example, factual questions about age and educational background of the respondent were checked against the records. Also, a signature of the respondents was required to inhibit dishonesty and frankness in response to sensitive questions and thus ensuring validity. However, since validation is an aspect of questionnaire development, much care was taken to formulate questions that would ensure valid answers for the study.

7.3 Model specification
The specification of the model is based on economic theory and on any available information relating to the Phenomena being studied (Koutsoyiannis, 2001 & Anyanwu, 1993). Thus, the specification of the model presuppose: knowledge of economic theory as well as familiarity with the particular phenomenon being studied. The model that was used in this research is the standard magnitude variance (STAMAVAR) model, which was used to test for independence of the variable.

PRODEX = \[ \sum_{i=1}^{n} \sum_{j=1}^{k} \theta_{ij} \]

And

\[ \theta_{ij} = \sqrt{\frac{\sum(x_i - \alpha_i)^2}{\sum(A_j - \sum a_{ij})^2}} \times \frac{(x_i - \alpha_i)^2}{\sum(A_j - \sum a_{ij})^2} \]

Where \( x_i \) = Maximum expected value
\( \alpha_i \) = Observed value
\( \sum A_j \) sales
\( \sum \alpha_i \) = Total maximum expected value along row cells (all variables; profit, production
\( \sum \alpha_i \) = Total observed value along row cells (all variables; profit production and sales)
\( \sum A_j \) = Total maximum expected value along column (all organizations)

\[ \sum \alpha_i = \text{Total observed value along column (all organizations)} \]

| TABLE 1 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| s / n | Progress index | Year 1 (profit $000.00) | Year 2 (profit $000.00) | Year 3 (profit $000.00) | Year 4 (profit $000.00) | Total Profit ($000.00) |
| 1. | 0.0011645 | 35 | 60 | 80 | 20 | 200 |
| 2. | 0.0161383 | 35 | 20 | 80 | 60 | 200 |
| 3. | 0.0284059 | 30 | 20 | 80 | 70 | 200 |
| 4. | 0.0249687 | 25 | 40 | 80 | 55 | 200 |
| 5. | 0.0038476 | 45 | 50 | 60 | 45 | 200 |
| 6. | 0.0215794 | 25 | 30 | 60 | 65 | 200 |
| 7. | 0.0398620 | 30 | 25 | 45 | 100 | 200 |
| 8. | 0.0085439 | 75 | 35 | 55 | 35 | 200 |
| 9. | 0.009356154 | 29 | 36 | 20 | 115 | 200 |
| 10. | 0.0510636 | 28 | 35 | 96 | 101 | 200 |
| 11. | 0.00796142 | 30 | 55 | 80 | 35 | 200 |
| 12. | 0.00356175 | 25 | 50 | 85 | 40 | 200 |
| 13. | 0.08830229 | 23 | 24 | 36 | 117 | 200 |
| 14. | 0.04376863 | 20 | 50 | 90 | 40 | 200 |
| 15. | 0.03596229 | 17 | 45 | 80 | 58 | 200 |
| 16. | 0.01395682 | 28 | 60 | 45 | 67 | 200 |
| 17. | 0.0359100 | 20 | 56 | 84 | 40 | 200 |
| 18. | 0.01869854 | 18 | 42 | 60 | 80 | 200 |
| 19. | 558 | 733 | 1411 | 1188 | 2000 |

* Most progressive and qualified for selection for best performance.

Source: Field survey and researchers' computation, 2019.

8. Progress Index for breaking tied rank
To disentangle tied-ranks in business performance appraisal is very important and also common in modern in business analysis and evaluation. For example, as shown in table 1 above, 18 different business organizations had the same total profits in four different year of operation. And in order to break these tied-ranks, and then determine which amongst them had the best performance, and of course, is most progressive, standard magnitude variance ratio analysis (progress index) was most useful, as we can see in the table presented above (Table 1). Although they all had the same total profit for the four years, the one with the higher progress index was selected for best performance and as most progressive.

8.1 PROGRESS INDEX FOR SELECTION OF FIRMS FOR INVESTMENT OPPORTUNITY
In most competitive business assessments where the business variables (profit, production, sales, etc.) are arranged in ascending order of importance or descending order as the case may be, each business firm is expected to show maximum performance in the core business variables and followed in that order: for example, in business progress determination, that requires profit and sales level as basis for selection, if a firm has achieved 80 percent profit level, 70 percent in sales, and say 50 in production, then in selection, this firm would be considered to have performed better than a firm which has achieved say a level of 50 percent in profit, 70 percent in sales and 60 percent production.
8.2 Test of hypotheses and interpretation of results

ANOVA test on null hypothesis one

Ho: In measuring the financial progress of selected business organizations in Calabar, Nigeria through the use of standard magnitude variance, there would be no significant difference in determination of profit, production and sales than using any other measurement.

1. Ho: μ1 = μ2 = μ3 = μ4
2. Ho: μ1 ≠ μ2 ≠ μ3 ≠ μ4
3. Significant level = 0.05
4. Critical Region: Fc > F0.05. 3. 396 = F0.05 4.00 = 3.60
5. Decision Rule: Reject Ho; if Fc ≥ F1
Accept Ho; if Fc < F1

\[ SST = \sum \frac{(x_i - \bar{x})^2}{n} = (0.016308)^2 + (13.8)^2 + (275.7)^2 + \ldots + (15)^2 - \frac{(17097.8)^2}{400} \]
\[ = 2,778,667.46 - 730493.19 = 2048174.27 \]
\[ SSB = \sum \frac{(x_i - \bar{x})^2}{N} = \frac{399.02}{100} + \frac{507285.29}{100} + \frac{14333796}{100} + \frac{7764429.56}{100} + \frac{(17097.8)^2}{396} \]
\[ = 3.0902 + 50728.529 + 143337.96 + 785254.55 - 730493.19 = 979324.16 - 730493.19 = 248830.96 \]
\[ = 1799343.31 \]

Degrees of freedom between (dfB) = k – 1 = 4 – 1 = 3
Degree of freedom within (dfw) = N – k = 400 – 4 = 396
Total degrees of freedom (dfT) = N – 1 = 400 – 1 = 399

Mean sum square between = MSB = \[\frac{SSB}{dfw} = \frac{248830.96}{3} = 82943.65\]
Mean sum square within MSW = \[\frac{SSW}{dfw} = \frac{1799343.3}{396} = 4543.80\]
F – statistics = \[\frac{MSB}{MSW} = \frac{82943.65}{4543.80} = 18.25\]

Table 2: Analysis of variability amongst measures of financial progress

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean square</th>
<th>Computed F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>248830.96</td>
<td>3</td>
<td>82943.65</td>
<td>* 18.25</td>
</tr>
<tr>
<td>Within groups</td>
<td>1799343.31</td>
<td>396</td>
<td>4543.80</td>
<td></td>
</tr>
<tr>
<td>(error)</td>
<td>2048174.27</td>
<td>399</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Not significant at 0.05 level F3, 396 = 3.0

Source: Researchers’ computation, 2019

Decision

From table 4.29, Fc > Ft, i.e.18>3. Hence, we reject the null hypothesis and accept the alternative hypothesis. We reject that the perception of the operators of business organizations in Calabar, Nigeria through the use of standard magnitude variance, there would be no significant difference in determination of profit, production and sales than using any other measurement. From this evidence, we may infer that the populations from which the samples were drawn do differ.

8.3 Chi-Square test on null hypothesis two

1. Ho: STAMAVAR does not significantly determine the financial progress/success of business organizations as compared to any other method.
2. H1: STAMAVAR significantly determines the financial progress/success of business organizations as compared to any other method.
3. Significant level = 0.05
4. Critical Region/Decision Rule: Accept the null (Ho) if the calculated \(x^2\) lies within the acceptance region i.e. if the calculated \(x^2 < x^2_{n-1}\), otherwise, reject (Ho).

The observed values are as obtained from question 11 of the research questionnaires administered to 100 business operators to seek their opinions on the use of STAMAVAR model as a statistical technique to determine the financial progress of business organization. The business operators were allowed the options of six different opinions, ranging from Very strongly agree (VSA), Strongly agree (SA), Agree (A), Disagree (D), Strongly disagree (SD) to Very Strongly Disagree (VSD). Each of the expected values = \(\frac{100}{6} = 16.67\)

Table 3: \(X^2\) Computation for test of null hypothesis two

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observed (o)</th>
<th>Expected (E)</th>
<th>(o – E)</th>
<th>(o – E)^2</th>
<th>(o – E)^2/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSA</td>
<td>11</td>
<td>16.67</td>
<td>-5.67</td>
<td>32.1489</td>
<td>1.9285</td>
</tr>
<tr>
<td>SA</td>
<td>13</td>
<td>16.67</td>
<td>-3.67</td>
<td>13.4898</td>
<td>0.8080</td>
</tr>
<tr>
<td>A</td>
<td>29</td>
<td>16.67</td>
<td>22.33</td>
<td>498.629</td>
<td>29.91</td>
</tr>
<tr>
<td>D</td>
<td>12</td>
<td>16.67</td>
<td>-4.67</td>
<td>21.809</td>
<td>1.308</td>
</tr>
<tr>
<td>SD</td>
<td>12</td>
<td>16.67</td>
<td>-4.67</td>
<td>21.809</td>
<td>1.308</td>
</tr>
<tr>
<td>VSD</td>
<td>13</td>
<td>16.67</td>
<td>-3.67</td>
<td>13.4698</td>
<td>0.8080</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>16.67</td>
<td></td>
<td>36.071</td>
<td>0.080</td>
</tr>
</tbody>
</table>

Source: Researchers’ computation, 2019

The \(X^2\) table with \(n-1 = 6-1 = 5\) degrees of freedom at 5% level of significance gives \(X^2_{0.05} = 11.07\). Our calculated \(X^2\) value lies within the rejection region since \(X^2_c < X^2_{n-1}\). Hence, we reject Ho and conclude that STAMAVAR model significantly determines the financial progress/success of business organizations as compared to any other method.

8.4 Anova test on null hypothesis three

Ho: The perception of the operators of business organizations in Calabar Metropolis on the use of Standard magnitude variance in measuring their financial progress would not be significantly different from their perception n using other traditional methods.

1. Ho: μ1 = μ2 = μ3 = μ4 = μ5 = μ6
2. H1: μ1 ≠ μ2 ≠ μ3 ≠ μ4 ≠ μ5 ≠ μ6
3. Significant level = 0.05
4. Critical region: Fc > F0.05; 4,496 = F0.05; 4, 8 = 2.60
5. Decision Rule: Reject Ho; if Fc ≥ Ft

\[ SS_f = (\sum (x_i - \bar{x})^2 - \frac{(\sum x)^2}{N}) \]
\[ = (0.48)^2 + (0.22)^2 + (0.86)^2 + \ldots + (0.0210615)^2 - \frac{(583.60)^2}{300} \]
\[ = 2250.15 - 681.18 = 1568.97 \]
SSb = \left( \frac{\sum X_i^2}{N_1} + \frac{\sum X_i^2}{N_2} + \frac{\sum X_i^2}{N_3} + \frac{\sum X_i^2}{N_4} + \frac{\sum X_i^2}{N_5} \right) - \left( \frac{165.8^2}{100} + \frac{74.95^2}{100} + \frac{17.58^2}{100} + \frac{262.37^2}{100} \right) - \left( \frac{583.6^2}{500} \right)

= 274.80 + 56.18 + 40.27 + 3.09 + 688.38 - 681.18

= 1062.72 - 681.18 = 381.54

SSW = SSb - SSb = 1568.97 - 381.54 = 1187.43.

Degrees of freedom between (dfb) = K - 1 = 5 - 1 = 4

Degrees of freedom within (dfw) = N - K = 500 - 5 = 495

Total Degrees of freedom (df) = N - 1 = 500 - 1 = 499

N = N_1 + N_2 + N_3 + N_4 + N_5 + N_6 = 100 + 100 + 100 + 100 + 100 + 100 = 500

Mean Sum Squares between = MSB = \frac{SSW}{dfb} = \frac{381.54}{4} = -95.39

Mean Sum Squares within = MSW = \frac{SSW}{dfw} = \frac{1187.43}{495} = 2.40

F - Statistics = \frac{MSB}{MSW} = \frac{-95.39}{2.40} = 39.75

Table 4:

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Sum of squares</th>
<th>Degrees of freedom</th>
<th>Mean square</th>
<th>Computed F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>381.54</td>
<td>4</td>
<td>95.39</td>
<td></td>
</tr>
<tr>
<td>Within Groups (Errors)</td>
<td>1187.43</td>
<td>495</td>
<td>2.40</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1568.97</td>
<td>499</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Not significant at 0.05 level F_0.05 = 2.60

Source: Researchers’ computation, 2019

Decision

From table 4 the F_c > F_t, i.e, 39.75 > 2.60. Hence, we reject the null hypothesis and accept the alternative hypothesis. We reject that the perception of the operators of business organizations in Calabar, Nigeria through the use of standard magnitude variance, there would be no significance difference in determination of profit, production and sales than using any other measurement. From this evidence, we may infer that the populations from which the samples were drawn do differ.

8.5 Results and discussion of empirical findings

It has been observed through this study that Some of the selected business organizations, over the years, have not been able to withstand the problems of liquidity very favourably, compared to others within the industrial sector, due probably to lack of Standard application of financial measures (traditional financial ratios) and statistical parameters in the assessment of financial performance of these business organizations. Although accounting ratios have been useful tools in financial analysis, that is, they have been used traditionally in financial analysis as yardsticks for evaluating the financial position and performance of the firms; they have limitations in application, interpretation and usage. As such, for a financial analyst to make qualitative judgement about a firm’s financial position, such judgement should be based not only on financial ratios, but rather, with some modern statistical parameters, which are developed to facilitate modern business decision making. Business analysts should be able to evolve both past and present data for the prediction of future financial performance of the business organization by use of appropriate statistical techniques. A cursory look at the financial ratios of business organizations which were studied has shown a great lot of inconsistency due to lack of compliance by the entrepreneurs to the standard they should observe for each of the ratios analyzed. For instance, the liquidity or acid test ratio, which measures the ability of the firm to meet its short term obligations, has not been kept to the required standard of at least 1, by almost all the firms surveyed in the study. Some of the firms even have a higher ratio, and this also contribute to the liquidity problem of these firms, because of the surplus cash, which they cannot employ effectively and efficiently, thus, leading to their lack of progress. Also, examination of the leverage ratios, has revealed that all the firms are facing the problem of poor capital structure, and the same is also revealed about the turnover and profitability ratios of these firms, which by implication means inadequate sales, high operating expenses and high cost of goods produced and sold, which eventually reduced profit, and of course, hinder progress/success of these businesses.

8.6 Attitude of business operators

Some of the businessmen studied have shown a high degree of willingness to improve their business, earn more money and expand. Some of the questions, which the investigator asked, include the type of financial aids or assistance, which they need from government, and whether they or their employees have received adequate motivation to work hard for improved performance. As found in the study about the distribution of business by employees motivation, 55 percent said yes to the question asked on employees motivation for better performance, while the remaining said No. Meaning tat some of the businessmen, in fact, majority of them recognized the fact that motivation and training can ensure improved performance thus leading to growth and financial progress of the business. Also examining the issue about the distribution of business in need of government assistance, 68 percent of the industrialists really desired government financial aids to enhance the growth of their businesses. In almost all the ten categories of business organizations industries listed for the study, because of the changing tastes, new demands and the shifting market. The pattern of production is constantly changing the new enterprises and springing up, while older ones are restructuring and expanding. The printers, for instance, are buying new types of machines to cope with the increasing printing needs. The carpenters are buying new lathes, new furniture making equipment and employing more skilled workers in order to meet the growing needs for better and more durable furniture. Side by side with such expansion is the increasing demand for working and fixed capital by the businessmen, and, therefore, their willingness to meet the minimum operational criteria set by the banks. The desire of the entrepreneurs to exploit new and profitable markets before, or in competition with, others and to learn new and more advanced production techniques for the successful exploitation of
such markets, even in the rural areas, is in sharp contrast of the usually tradition-bound nature of their immediate neighbors. Their attitudes, apart from contributing to the changing structure of the metropolis and to economic growth generally, further encourages the mobility of the young school leavers away from the government service to the industrial sector either in the rural or in the urban areas. Majority of the entrepreneurs are willing to abandon traditional activities and undertake risks involved in new enterprises. They possess considerable adaptability to changing conditions and circumstances. Some of them have been rescued from stagnation or decline by timely shifts into new lines of production, while others have made themselves less dependent on the ups and downs of the market by carrying on two or three different businesses at the same time (Udo, Ojong, Udoka, Akpan & Bassey, 2003). In a way it is however, the great majority of the entrepreneurs shift to rather closely related lines of activity so as to solve problems caused by market shifts, growing competition or shortages. It is their own elementary mechanics of horizontal and vertical integration which greatly enhance their financial progress or success. And in most cases skills and experience acquired in the established activity have been brought to bear in the new industry. And finally, since there is considerable underemployment, caused by the seasonality in the demand for most of their products diversification has permitted to greater utilization of labour and, possibly, of equipment in order to achieve financial progress (Eghosu & Osagie, 1978).

8.7 The obstacles to the rapid growth or financial progress of business
Factors which constitute the main obstacles to the business organization may be categorized as managerial, technical, commercial and financial. The management problems arise from the one sided ability of the manager owner of the enterprise, the problem of finding the right successor to him after his retirement or death, and the shortage or absence of staff-officer capable of advising him on management policies. His limited education and training and nature of his function and location further deny him access to modern management techniques (Udo, Ojong, Udoka, Akpan & Bassey, 2003). The technical problems arise from his limited access to modern production equipment, and his low technical know-how, which are as a result of his limited education and training, the limited extent of the market in which he is operating and his inaccessibility to further source of finance outside his own savings or ploughing back (Nwachukwu, 1989). The commercial problems consist of the limited possibilities of market expansion and the absence of a steady and guaranteed market. The financial problems derive from his own limited capital, his limited possibility to loan funds, the liquidity of his operating capital and the indebtedness of his customers to him (Nwachukwu, 1989). The limitations of managerial ability along with limited technical and commercial possibilities, make the risk of lending money to business organizations very high, in turn, the shortage of business capital further aggravates the technical, commercial and managerial problems. Almost 99 percent of the business operations who responded to the questionnaire mentioned financial inadequacies as their main problem. But it is obvious that financial support to those business organizations can never be the sole Solution to their problems. In a rapidly changing economy, the businessman is as much in need of business information and advice as he is of financial support. Unless the enterprise is economically sound, it cannot obtain financial support, just as unless it is guaranteed continued financial support for its worthwhile Project it cannot remain economically sound. The manual problem, though major, can actually be reduced. Through the trade associations for business, government and government - subsidized commercial information can be made an available to business Organizations. In addition, banks and various other external advisers can help as much as possible to fill the gap in the management function and contribute to the quality of the decisions made, and the production techniques adopted by these business organizations and these business organizations and these will certainly ensure the financial growth or progress of the business.

9. Summary
This study was concerned with the empirical determination of the applicability of standard magnitude variance ratio analysis in determination of financial progress of selected business organizations in Calabar, Nigeria. It was aimed at examining how standard magnitude variance model could be used to differentiate increase in profitability and growth of business in Calabar, Nigeria. Lack of financial Progress, profitability and financial stability is a thing of worry amongst the operators of business organizations and therefore, called for a change from the old and traditional methods of assessing financial performance of a business to a more modern and scientific methods of assessment. It therefore became necessary for the study to develop a model, which could be used to determine progress, stability and selectivity for better investment in the business organizations. A closed ended questionnaire was developed and validated for this study, alongside with 17 item questions on the required business variables for the study. These instruments were administered to 100 randomly selected business organizations, which were classified into ten categories, and which are operating within the Calabar, Nigeria. The responses obtained from the instruments were edited, qualified and analyzed. Specifically, financial ratios were derived and STAMAVAR model otherwise known as progress index was used in analyzing financial progress and probability of selectivity amongst business organizations. The measures of stability solvency investment decision and other variables considered in the study here analyzed using, chi-square and analysis of variance, depending upon the nature of the hypothesis formulated. Each hypothesis “as then tested for significance at 0.05 level of significance with different degrees of freedom relative to the statistical techniques employed. From the result, the null hypotheses were all rejected.

9.1 Conclusion
Based on the findings of this study, it was concluded that profit, production, and sales are core business variables, which significantly influence financial progress (growth) or retrogression of any business organization. And that, in assessing the financial performance; profitability and stability, through the use of standard magnitude variance,
there would be a significant difference in determination of profit; production and sales than using any other measurement. It was concluded that progress index (STAMAVAR model) as well as other statistical techniques could significantly be used to determine the financial success of a business, as compared to any other method. It was further concluded that the perception of the operators of business organizations in Calabar, Nigeria on the use of standard magnitude variance in measuring their financial progress would be significantly different from their perception in using other traditional methods.

9.2 Recommendations
In view of the sensitivity with which Progress index otherwise known as the standard magnitude variance ratio analysis (STAMAVAR) has shown in determining the financial progress or retrogression and the probability of selectivity of the most progressive firms amongst the different categories of businesses in Calabar, Nigeria, in this study, and the relative influence of each of the core business variables on the financial progress of businesses. Also, considering the problems and roles of business Organizations in the promotion of economic growth and development in Cross River State, the following were recommended for business entrepreneurs, government agencies and industrialists’ association

1. Since progress index is significant in the detection or determination of progress and stability in business, entrepreneurs should make effort to apply it, rather than rigidly adhering to financial ratios as a traditional method of assessing financial performance of business.

2. Areas of production there the roles of our modern firms still remain complementary should be viewed with serious concern, as no firm will progress without producing at maximum level in order to avoid Stock out and consequent loss of Profit. Government and its agencies should give adequate incentives to bring out inventions from there. Sufficient funds should be allocated to research for the discovery of Local raw materials.

More sufficient research should be done to facilitate the local sourcing of raw materials. Investment opportunities are under-utilized in certain areas due to lack of raw materials. Research will certainly discover new areas, and this will ensure growth and development of the business organizations in Cross River State.

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