Classification of the Micro, Small, Medium and Large (MSMLE’s) enterprises in Belize, based on the Free Cash Flow (FCF).

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Abstract

The objective of this research was to classify the enterprises into Micro, Small, and Medium & Large (MSMLE’s) in Belize based on its Free Cash Flow (FCF). The data that was used came from 1500 enterprises distributed within the nine municipalities through the country of Belize. The method that was used to classify the enterprises based on the Free Cash Flow was the Discriminant Analysis method. The specific objectives of this research were to 1) Evaluate the accuracy level in the classification of the enterprises in Belize. 2) Determine correlation level, or association of the contributing indicators or Factors, in the classification process, 3) Estimate a Mathematical Equation for Enterprise classification into MSMLE’s for Belize. The study found that the Discriminant Analysis (DA) calculated four groups that can be classified as Micro, Small, Medium and Large Enterprises (MSMLE’s). Additionally, it confirmed an accuracy level of 98.8%. Furthermore the calculated Mathematical Equation for unstandardised values is as follows:

\[ D1 = -13.186 + 5.723EBT(X_1) - 0.258BT(X_2) + 0.013GST(X_3) + 6.954NOPAT(X_4) + 0.105EI(X_5). \]

Keywords: Free Cash Flow; Micro, Small, Medium and Large Enterprises (MSMLE’s); Taxes; Nopat; Belize; Discriminant Analysis

1. INTRODUCTION

The main objective of this study was to classify the firms into Micro, Small, Medium and Large Enterprise (MSMLE’s) within the Belizean economy. The study was concluded with the use of a Discriminant Analysis as an agglomeration procedure that determined the Discriminant Functions, Coefficients, and Association Level (%), as well as the accuracy level of the selected cases or enterprises into its appropriate groups. The study was based on the information of 1500 enterprises from the nine municipalities of the country. The sales and operational cost was then calculated to obtain the Earnings before Interest & Tax (EBIT).

Additionally, the General Sales Tax (GST) and the Business Tax (BT) were deducted from the Earnings before Interest & Tax (EBIT), which then resulted in the Net Operating Profit after Tax (NOPAT). Nopat was then used to subtract the reinvestment to get to the Free Cash Flow (FCF). Today’s modern business model, calls for the most competitive enterprise to apply the most efficient management instrument continuously in order to stay on top and to prevent other from be active or determined competitors.

For the country to continue its long journey towards Enterprise development, it is important to design strategic plans that will design research to answer entrepreneur questions. These questions will facilitate and lead us into new horizons, providing that the required resources of human capital, finance, time, equipment and infrastructure are available to provide the services to the market. These instruments will create innovative tools and strategies for business creation, development, monitoring, and evaluation for long term sustainability.

Finally, it is believed that businesses that are engaged in any aid see the significant economic benefit since this can be translated into economic savings that will minimize operational costs and boost or increase the Net Income from a financial perspective. The product of this research will be essential so that policy makers such as governmental agencies and foreign investors can design strategies that adhere to developmental needs that will benefit the country from an economic perspective.
2. LITERATURE REVIEW

Free Cash Flow (FCF) can be describe in financial terms as the monies that results from the subtraction of any reinvestment for the Net Operating profit after Tax (Nopat). Nopat as a financial term eliminates completely the influences of taxes since this can increase or decrease the performance of the Free Cash Flow. Meena&Pawan (2009) mentioned that the Discriminant Analysis (DA) can be classified as a technique that is been used when analyzing data that is been categorized on some criteria or dependent variable. For other authors, this technique is been view as a method to discriminate between two or more mutually exclusive and exhaustive groups on the basis of some explanatory variables.

Additionally, the Discriminant Analysis as a process to assess the capacity of the variables to predict the classification of firms or groups within cluster since the analysis also creates an equation which will minimize the possibility of misclassifying cases into their respective groups or categories. Finally, a predicated group membership will always perform to reconfirm the accuracy or association level of the cluster groups into membership groups. The Discriminant Analysis main purpose are to 1) To maximally separate the groups, 2 To determine the most parsimonious way to separate groups, and 3) To discard variables that are little related to group distinctions. However researchers are always interested in the relationship between groups of independent variable.

In today’s world of investment portfolio, the Free Cash Flow is a modern practical terminology used to indicate, classify or identify the liquidity of an enterprise, especially for turnover reasons. Therefore authors indicated that researcher would also like to know how many dimension are needed to express the relationship. By the use of this relationship, we can predict classification based on independent variable or assess how the independent variables separate the categories in the classification.

3. HYPOTHESIS

3.1 Null Hypothesis
1. There is no statistical significance in the effects caused by the financial indicators as well as the clusters.
2. The accuracy level that results from the Discriminant Analysis is equivalent to 95% or more.

4. OBJECTIVES

4.1 Specific Objectives
1. Evaluate the accuracy level in the classification of the enterprises in Belize.
2. Determine correlation level, or association of the contributing indicators or Factors, in the classification process
3. Estimate a Mathematical Equation for Enterprise classification into MSMLE’s for Belize.

5. METHODOLOGY

For this particular study a convenient stratified sample of 1500 enterprise were selected to participate in the process throughout the country of Belize, a number that is equivalent to an average of 15% of the population (10,233) of registered enterprises in the nine municipalities in the country. Information was taken from the enterprises that were registered during the last three fiscal years (April 1st, 2013 to Mach 31st 2016).

In order to obtain a very high confidential level degree, 95% was used and can be translated to the level of probabilistic success and 5% tolerance or failure as illustrates below:

\[ n = \frac{(Z^2 \times P \times (1 - P))}{e^2} \]

Where:
- \( Z \) = Abscissa of the normal curve (1.96)
- \( P \) = Proportion within the population
- \( e \) = Precision level or variability
- \( N \) = Number of enterprises

5.1 Discriminant Analysis as classification method

The Discriminate Analysis was used as the classification method considering that is useful in determining whether a set of variables is effective in predicting category membership. Additionally, its prediction equations is based on method that develops a multiple regression equation for each group, ignoring the discrete nature of these options let you specify where to store various row-wise statistics as observed in the table below.

6. Results and Discussion

6.1 Group Membership Application

Table No. 1 below, illustrates the summary of the classification process. The results indicated that 1500 data were processed, 0 data were missing or out of range, and 0 were at least was presenting as a discriminating variable.
The calculation of prior grouping was as calculated as art of the procedures as illustrated in Table No. 44 the analysis revealed the pre-classification of four groups according to the Free Cash Flow (FCF). Based on a probability of 0.25; 1391 cases were classified between the ranges of $1,569 to $7,689,154, 93 were classified between the ranges of $7,689,155 to $15,376,739, 3 were classified between the ranges of $15,376,740 to $23,064,325 and finally; 3 were classified between the ranges of $23,064,326 to $30,751,911 as expressed in the Table No. 2.

Table 1: Classification Processing Summary

| Cluster | Cases | %  |
|---------|-------|----|
| 1       | 3     | 0.2%|
| 2       | 8     | 0.5%|
| 3       | 1470  | 98.0%|
| 4       | 19    | 1.3%|
| Valid   | 1500  | 100%|

Table 2: Prior Probability for Groups.

| Free Cash Flow (FCF) Range | Prior | Cases Used in Analysis |
|----------------------------|-------|------------------------|
|                            |       | Unweighted | Weighted |
| 1569 TO 7689154            | 0.25  | 1391       | 1391     |
| 7689155 TO 15376739        | 0.25  | 93         | 93       |
| 15376740 TO 23064325       | 0.25  | 3          | 3        |
| 23064326 TO 30751911       | 0.25  | 3          | 3        |
| Total                      | 1     | 1490       | 1490     |

6.2 Verification of the accuracy of the clustering process

To ensure that the cluster procedure was completed appropriately, a canonical Discriminant analysis was performed on the four-cluster and the Six(6) variables. Three canonical Discriminant functions were significant in deferring among the clusters (p < 0.0005). Table 3: illustrates the Eigen values and Wilks’ Lambda results in the calculation.

The analysis revealed that the Discriminant functions had calculated Eigen values of 9.667, 0.674 and 0.053; with correlations of 0.95, 0.635 and 0.225 respectively. Such Eigen value can be classified as good, with a positive correlation nature for Function 1, 2 and 3; the classification of the correlation level is Very High for Function 1, moderate for Function 2 and Low for Function 3.

This correlation also indicates the high efficiency of the Discriminant in discrimination. Wilks’ Lambda calculated a value of 0.053 for the first functions; 0.567 for the second function and finally; and 0.949 for the third function (p< 0.0005) as shown below.

Table 3: Eigen values and Wilks’ Lambda

| Function | Eigenvalue | Variance | Cumulative % | Correlation | Function(s) | Lambda | square | df | Sig |
|----------|------------|----------|--------------|-------------|-------------|--------|--------|----|-----|
| 1        | 9.667      | 0.95     | 95.0         | .552        | 1 through 1 | .553   | 498.61 | 15 | 0.00|
| 2        | 0.674      | 0.05     | 95.5         | .555        | 2 through 2 | .567   | 842.51 | 8  | 0.00|
| 3        | 0.053      |          |              |             | 3           | .546   | 772.32 | 2  | 0.00|

a. First 2 canonical discriminant functions were used in the analysis.
Table No. 4 below illustrates the information concerning the correlation between each of the Discriminant variables and the Canonical Discriminant Function from a statistical standpoint. The highest correlation that resulted from the discriminating variables and the standardized Discriminant function was the Net Operating Profit after Tax (NOPAT) (X4) and the Earnings before Tax (EBT) (X₁) with values of 0.785 and 0.628 respectively for the first function.

With regards to the second function Business Tax (BT)(X₂) and General Sales Tax (GST)(X₃) contribution calculated the correlation of 0.764 and 0.680 respectively. For the last function (3) the Business Tax (BT)(X₂) contributed to a correlation of 0.590 compared to the Earnings before Tax (EBT)(X₁) that calculated 0.209. For a positive correlation this indicates the level of relationship that exists between discriminating variables and the standardized Discriminant function.

### Table 4: Structure Matrix

| VARIABLES / FUNCTIONS                     | 1       | 2       | 3       |
|-------------------------------------------|---------|---------|---------|
| Net Operating Profit after Tax Range (NOPAT)? | 0.785   | 0.015   | -0.992  |
| Enterprise estimated Earning before Tax range (EBT)?| 0.626   | 0.039   | 0.260   |
| Estimated Business Tax contribution Range?(BT)? | 0.125   | 0.764   | 0.540   |
| Enterprise estimated General Sales Tax range(GST)? | 0.395   | 0.588   | -0.099  |
| Enterprise estimated investment range in expansion | 0.243   | 0.345   | -0.474  |

*Correlation coefficients between discriminating variables and standardized canonical discriminant function.

Variables ordered by absolute size of correlation within function.

To evaluate the effect of the individual discrimination of the variables; calculation was performed on the Standardized Canonical Discriminant Function Coefficients and the group centroid for the Standardized Canonical Discriminant Function Coefficients as express in the tables consecutively.

### Table 5: Standardized Canonical Discriminant Function Coefficient

| VARIABLES / FUNCTIONS                     | 1       | 2       | 3       |
|-------------------------------------------|---------|---------|---------|
| Enterprise estimated Earning before Tax (EBT)? | 0.626   | -0.261  | 0.285   |
| Estimated Business Tax contribution Range? | -0.070  | 0.591   | 1.095   |
| Enterprise estimated General Sales Tax (GST)? | 0.003   | 0.538   | -1.020  |
| NOPAT RANGE                                | 0.766   | -0.334  | 0.253   |
| Enterprise estimated investment range in expansion | 0.243   | 0.345   | -0.474  |

According to the calculated Standardized Canonical Discriminant Function Coefficients the most statistically significant function is the First one (1) according to its Eigenvalue (9.667) and the calculated the Chi² value (4356.61). This indicates that the Discriminant Equation can be expressed for the standardize values as follows: 

$$D1 = 0.629\text{EBT}(X_1) - 0.070\text{BT}(X_2) + 0.003\text{GST} (X_3) + 0.768\text{NOPAT}(X4) + 0.041\text{EI}(X5)$$

### Table 6, Unstandardised Canonical Discriminant

| VARIABLES / FUNCTIONS                     | 1       | 2       | 3       |
|-------------------------------------------|---------|---------|---------|
| Enterprise estimated Earning before Tax (EBT)? | 5.723   | -2.376  | 2.591   |
| Estimated Business Tax contribution Range? | -0.253  | 2.110   | 4.029   |
| Enterprise estimated General Sales Tax (GST)? | 0.113   | 2.073   | -3.927  |
| NOPAT RANGE                                | 6.054   | -3.026  | 2.288   |
| Enterprise estimated investment range in expansion | 0.105   | 1.472   | -1.177  |
| (Constant)                                 | -31.166 | -2.511  | -7.594  |

Unstandardized coefficients
The Unstandardised Canonical Discriminant Function Coefficients was also calculated here. In line with the above statistical significance, function number one was also used according to its Eigenvalues (9.667) and the calculated Chi² value (4356.61). This measurement indicates that the Discriminant Equation can be expressed as the unstandardised values as follows:

\[ D1 = -13.186 + 5.723 EBT(X1) - 0.258 BT(X2) + 0.013 GST(X3) + 6.954 NOPAT(X4) + 0.105 EI(X5) \]

accuracy of the cases classified within and among the groups based on the Free Cash Flow (FCF) ranges of the dependent variable as shown in the Table No 7. It is also a representation of the proximity of the cases around the Group Centroid. Base on this calculation Hypothesis No. 2 is accepted, considering that the prediction of the clusters was higher than 95% as illustrated in the table below.

### Table 7; Classification Summary

| Classification Results | Predicted Group Membership |
|------------------------|----------------------------|
| Estimated Free Cash Flow (FCF) Range | 1569 TO 769154 | 769155 TO 1576739 | 1576740 TO 2384426 | 2384426 TO 3075101 |
| 1569 TO 769154 | 1374 | 17 | 0 | 0 | 1391 |
| 769155 TO 1576739 | 0 | 93 | 0 | 6 | 99 |
| 1576740 TO 2384426 | 0 | 1 | 0 | 3 | 3 |
| 2384426 TO 3075101 | 0 | 0 | 0 | 10 | 10 |
| Unassigned cases | 0 | 0 | 0 | 10 | 10 |

8. RECOMMENDATION

1. Base on the variables evaluated; it is important to classify the enterprises in the country base on financial indicators considering that it highlights Business Tax (BT)(X1), General Sales Tax (GST)(X3), and Net Operating Profit after Tax (NOPAT)(X4) and Free Cash Flow (FCF)(X5).

2. Use the calculated Mathematical Equation for unstandardised values for Enterprise classification as estimated.

3. All municipalities should formalize the informal business sector; by extending a specific license to Mobile Informal Micro Enterprise (MIME’s) that are doing street vending, which can be seen as an avenue to create illegal competition for business.

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