RESEARCH REPORT

EVALUATING COMPANY'S PERFORMANCE USING MULTIPLE DISCRIMINANT ANALYSIS: A STUDY ON *SHARIAH* COMPLIANCE COMPANIES

CODE: PPPP(Y)/2006

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SUMBANGAN

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DECLARATION

We hereby declare the work in this research project is our own except for quotations and summaries which have been duly acknowledged.

Date: 17 July 2008

Signature:

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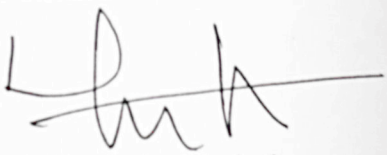

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Suhaila Abdul Hamid

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بسم الله الرحمن الرحيم

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Nuradli Ridzwan Shah Mohd Dali
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ABSTRACT

The global business environment is really demanding the investors to be prepared with the emerging and dynamic markets. Measuring company's performance is important for management, shareholders, government, customers, suppliers and other stakeholders that have importance or linkage with the wealth distribution directly or indirectly. To evaluate company's performance, we need tools that can be used to measure the performance and one of most popular tools is the financial ratio analysis. This paper will explore the use of alpha Jensen technique to classify the *shariah* compliance companies in the Main Board of Bursa Malaysia into two categories i.e. performing and non performing. Then the result would be used with the companies 20 financial ratios to identify the model that could discriminate the performing and non performing companies using multiple discriminant analysis. The study found that only shareholders fund/ share ratio is significantly contributing to the discriminant function.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

In this new era, most of the investor's are demanding nearly perfect information to analyze the companies' performance to make sure their investment can generate income and increase their satisfaction in the business market. Measuring companies' performance is importance especially to the management, shareholders, government, customers, suppliers, and other stakeholders that have interest to the company directly or indirectly.

Most of the practitioners, fund managers, owners, stockholders, personnel, customers, suppliers, competitors, regulatory agency, practitioner and academicians are using financial ratio to evaluate company's performance. The financial ratio is a useful by product of financial statements and provides standardized measures of a firm's profitability and riskiness. It also could be used to forecast the future success of companies, and the researchers' main interest is to develop models exploiting this ratio.

The information available in financial statements is normally prepared by the management and audited by the audit firm of the company. These financial statements are prepared yearly, quarterly and semi-annually. Sometimes the relationships between financial ratios are inversely related. This could make the decision-making in company's performance is a cumbersome processes. In analyzing performance using financial ratios from financial statement, there are two issues arise in differences in accounting standards and practices and how these differences may vary the comparisons across companies. The second relates to accounting for acquisitions and how this can affect both acquisition method and price.

The objective of this research is to introduce an alternative model using multivariate analysis, Multiple Discriminant Analysis (MDA). Selected *Shariah* companies' performance in Bursa Malaysia will be evaluated and segregated into two clusters or groups. The best financial ratios will be chosen as the discriminator to separate between performing and under-performed companies.

As at May 2007 there were 876 *Shariah*-compliant securities as determined by the *Shariah* Advisory Council (SAC) of the Securities Commission (SC). This represented 86% of the total listed securities or 64% of the market capitalisation on Bursa Malaysia. Companies seeking to list can request for a pre-IPO screening by the SAC to determine whether their securities are *Shariah* compliant (Bursa Malaysia).

Bursa Malaysia on 22 January 2007 added FTSE Bursa Malaysia Emas *Shariah* Index to its series of FTSE Bursa Malaysia indices. This new Index is subjected to the same international indexing features such as free float and liquidity. Therefore, the investors are now able to have a clearer picture of the quality of *Shariah* investments and track them more effectively on Bursa Malaysia. The current Kuala Lumpur *Shariah* Index (KLSI) will be phased out later in 2007 (Bursa Malaysia).

Since there are about 86% of the companies in the Bursa Malaysia are *Shariah* compliant, therefore it is justifiable to conduct a research specifically for the *Shariah* compliant companies. Furthermore, it could be used as an indicator or a tool for Muslim investors in general to identify the ratios that discriminate between performing and non performing *Shariah* companies.

1.1 Problem Statement

The number of *Shariah* compliance companies is growing. Some of the companies perform while others do not perform. However, since the *shariah* compliance industry are still in infant stage, there are lacking of research in determining the factors that discriminate between the performing and non-performing *shariah* compliance companies in Malaysia. The rapid growth of the *shariah* compliance companies, motivate us to provide a simple model to be used in discriminating and ranking the *shariah* compliance companies in bursa Malaysia.

1.2 Research Objectives

1. To identify the ratios that could discriminate the performing and under-performing companies.
2. To rank the *shariah* compliance companies in 2005.

1.3 Statement of Hypothesis

H_0: No average vector difference between group 1 and group 2

H_1: There is average vector difference between group 1 and group 2

1.4 Research Significance

This is an exploratory research in Malaysia using the multivariate analysis. The research will be useful in determining the performing and non-performing companies by using two methods i.e. regression and ratio analysis. The findings could be used by potential investors and the stock market players in identifying the underperforming companies and detecting the early warning signals of non-performing ones.

1.5 Scope and Limitation

The limitation of this research is the availability of data. The data of the companies are not publicly available and there are also problems with missing data. Our research scope is limited to samples of *shariah* compliance companies in Bursa Malaysia of the main board only and therefore should not be generalized for the overall performance companies in Bursa Malaysia. Therefore investors should be more meticulous if they want to invest in the stock market using our findings.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Albanis and Batchelor (1999) stated that nonlinear methods yield improvements in classification over the linear model, which are statistically significant, but translate to only small increases in financial returns. They explored the potential for identifying outperforming shares using nonlinear statistical classification methods comparing Linear Discriminant Analysis with a Probabilistic Neural Network, a Vector Quantization procedure, a Recursive Partitioning, and a Rule Induction Algorithm. The inputs are 38 accounting ratios for around 700 companies with shares traded on the London Stock Exchange in the years 1991-97.

Givoly and Hayn (2002) said that there is a rising conservatism by the United States (US). companies in the past few decades. Using a constant sample of almost 900 companies, the study examined several measures of accounting conservatism, including the level and rate of accumulation over time of negative non operating accruals, the differential timeliness of incorporating good news versus bad news in reported earnings, the skew ness and variability of the earnings distribution relative to the cash flows distribution, and changes in the market-to-book ratio. The increased conservatism has contributed to a persistent and prevalent decline in reported profitability, an increase in the incidence of losses, and an increase in the dispersion of earnings. Increased conservatism affects financial ratios and Price Earnings (P/E) multiples. Therefore, financial ratio use in determining the performance of the company can be manipulated.

Discriminant Analysis (DA) is a statistical tool that can predict the group membership of a newly sampled observation (Sueyoshi and Hwang, 2004). Sueyoshi and Kirihara (1998, 1999) have recently proposed a new type of nonparametric DA approach that provides a set of weights of a linear discriminant function, consequently yielding an evaluation score for the determination of group membership. The nonparametric DA is referred to as "Data Envelopment Analysis-Discriminant Analysis (DEA-DA)," because it maintains its

discriminant capabilities by incorporating the nonparametric feature of DEA into DA. In this study, a use of two statistical tests is proposed for DEA-DA and its discriminant capability is compared with DEA from a perspective of financial analysis.

A Study by Turetken (2004), aims to predict the financial performance of publicly traded Turkish firms using their available financial data. Financial performance is measured by a firm's inclusion in an index of top performers, where the inclusion of firms is based on the value and sales volume of their stocks. Two alternative techniques, multiple discriminant analysis and neural networks, are used for this prediction problem, and their prediction accuracy is compared.

Research made in determining the analyst's financial forecast accuracy and information transparency by Chiang (2005), used multiple regression analysis for the independent variable to predict dependent variable. The result showed that the relationship direction between corporate transparency and the Earning per share (EPS) forecast bias was negative as expected, which indicated that when the company disclose more information, the forecast bias will become lower and forecast accuracy will be higher.

The discriminant analysis in the study by Keasey and Watson (1986) is used to examine empirically whether current cost accounting (CCA) information may be useful for predicting the performance of small companies. A matched sample of failed and non-failed firms is chosen and historic cost accounts are adjusted in line with the requirements of Statement of Standard Accounting Practices (SSAP) 16. The companies are all single-plant independently owned firms in the Northeast of England; all the failed firms had ceased to trade during 1974-1980.

The theory of investment (Scott, 1977) states that financial reports objectives are to give information to help investor, creditors, and others financial reports user to assess amount, time, uncertainty acceptance from cash dividends and interest for the future. In other word, the financial reports will assist investors in gathering information about risk and return from investment activities.

Ball and Brown (1968) tested about the contents of profit information in share prices and found that financial ratios can be useful to predict bankruptcy (Altman, 1968; Sinkey, 1975), to predict return (Ou and Penman, 1989), and to predict revenue growth (Penman, 1992).

Company that is showing a sign of having financial problems could be identified early using company's financial performance. Beaver (1966) did a study about a brittle of the company five years before that company really failed. Altman (1968) also did the same study like Beaver in order to identify the success and failure of banks.

There are many professionals using multiple discriminant analysis in their study such as Altman (2000), who uses MDA and ZETA models to evaluate unique characteristics of business failures in order to specify and quantify the variables which are effective indicators and predictors of corporate distress of firms not traded publicly, to non-manufacturing entities, and also refer to a new bond-rating equivalent model for emerging markets corporate bonds.

It is also quantifiable characteristics of potential bankrupts but also the utility of a much-maligned technique of financial analysis: ratio analysis and updates the predictive tests on defaults and bankruptcies through the year 1999. The sample of 66 companies is selected on the basis of net income (deficit) reports in the years 1958 and 1961, with 33 from each year. Over 65% of these firms had suffered two or three years of negative profits in the previous three years. The firms are selected regardless of their asset size, with the only two criteria being that they were manufacturing firms which suffered losses in the year 1958 or 1961. The companies are then evaluated by the discriminant model to determine their bankruptcy potential.

Altman (2000) mentioned that the MDA technique has the advantage of considering an entire profile of characteristics common to the relevant firms and another advantage of MDA in dealing with classification problems is the potential of analyzing the entire variable profile of the object simultaneously rather than sequentially examining its individual characteristics

Most recent research on the use of discriminant analysis on evaluating company performance in Malaysia is by Muhammad Rubini Kertapati and Nuradli Ridzwan Shah Mohd Dali (2004). This research is using 11 ratios as independent variable to determine the performance

of finance company in financial industry in Malaysia. According to this research paper, the researcher is unable to conduct the model validation due to the sample size.

An expansion to the earlier research of Nuradli et al (2007) has analyzed the Shariah compliance companies in the industrial industry and found out that there are three ratios that discriminate between the performing and non performing companies. The ratios are Current Asset Turnover, Fixed assets Turnover and Shareholders Fund/Share (Nuradli et al 2007). The authors decided to use the logistic regression to find out any differences on the ratios that discriminate the performing and the non-performing Shariah companies.

2.1 Conclusion

Based on the literature review, previous studies have been using various method and techniques in determining the performance and non performance companies. However, this study would be following Altman (2000), which uses the financial ratios as the dependent variables. In contrast to Altman (2000), the study does not group the ratios to bankrupt companies, instead it groups the companies into performing and non-performing.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

In identifying the ratios that could discriminate the performing and non-performing *shariah* compliance companies, there are several processes that should be employed. This chapter will explain on how we segregate the performing and non performing *shariah* compliance companies and how to discriminate these two groups of companies and to rank the companies from the highest to the lowest. Various techniques will be combined in this study such as alpha Jensen and multiple discriminant analysis.

3.1 Data Selection

For this research, the sample size would be from all the *Shariah* compliance counters, (covering all the sectors) listed in the Main Board, Bursa Malaysia. Month end stock price starting from January 2000 until December 2005 were collected for the Alpha Jensen performance technique. In addition, the 2005 ratios for every company were collected in determining the ratios that segregate the performing and non performing *shariah* compliance companies. The research data will be focusing on the period of year 2000 to year 2005.

3.2 Multiple Discriminant Analysis

The discriminant analysis is used in situations when a predictive model of group membership based on observed data - characteristics, attitudes, and demographic data would like to be established. It is an a *priori* technique in that the groups are defined beforehand (the opposite of cluster analysis where we use the methodology to form the groups).

The analysis produces a linear equation that can be used to explain which variables best discriminates between two or more groups, and consequently, builds a predictive model that can be used for future classification.

The discriminant analysis covers a differentiation of variate, linear combination of two (or more) independent variable that will be used to distinguish group categories. It can be achieved by defining the weight for every variable to maximize relatively inter group variance relative to within group variance. The linear combination for the discrimination function needs to be differentiating in a form:

$Zi = W1X1 + W2X2 + W3X3 + ...WnXn$

Where:

Z : Discriminant score for company i

Wn : Discriminant weight for variable-n

Xn : Independent variable

The next step is to test the hypothesis whether the groups mean from a set of independent variables, for two (or more) groups different or the same. In order to differentiate between these two groups, we will use discriminant function to find the discriminant score for each individual company in analysis.

Then, individual company score in one group will be averaged to get the group mean. We call the group mean, CENTROID. If we observe two groups, then we will have two Centroids. The centroids show the important location for a group. The comparison between centroids will show how far the separation among those groups could be observed.

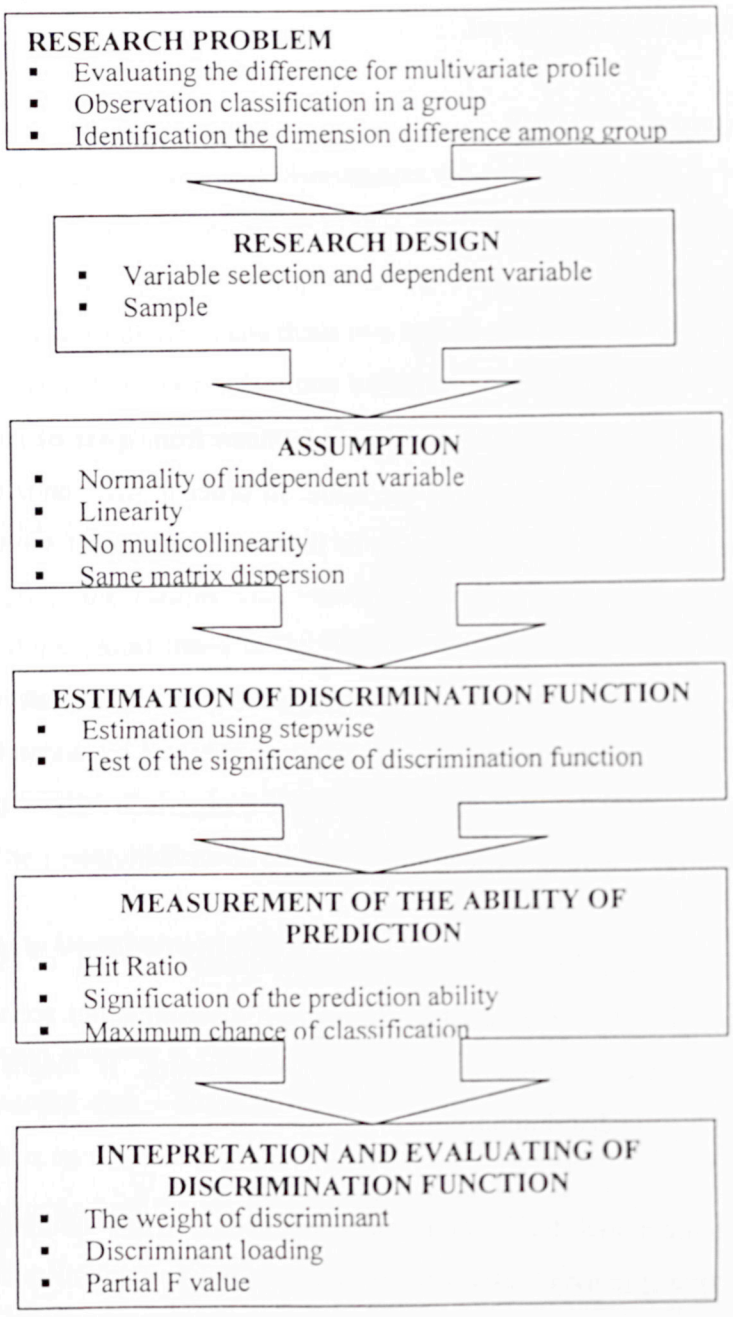
The significance test for discriminant function is generalization result of a distance measurement among centroids. It is measured by comparing discrimination score between two (or more) groups. If the distribution has small overlapping, it means that the discrimination function is a good discriminator.

The next step is to assess the model itself. The primary tool here is Wilks' Lambda test. The Wilks' Lambda test examines the hypothesis that the means of the functions listed are equal across groups, Wilks' lambda being the proportion of the total variance in the discriminant scores not explained by differences among the groups. A significance value less than 0.05 indicate that the group means differ, and therefore the function is a significant discriminator. This is clearly the case in this study and one can conclude that the function is a valid discriminator.

3.2.1 Stages of Multiple Discriminant Analysis

The discrimination analysis will follow six steps as in the figure below:

Table 3.1: The Process of Discriminant Analysis



Source: Rubini et al (2004)

3.3 Jensen Alpha

Jensen's alpha is used to evaluate historical performance of a portfolio. This method measures the difference between realized return and expected return for a period of time. The measurement of Jensen's alpha coefficient is differentiated from the estimation parameters of Capital Asset Pricing Model (CAPM), from finding the alpha and beta coefficient of a stock. The procedure to estimate beta is to regress between individual return (R_i) and market return (R_m):

$R_i = \alpha + \beta R_m$

Where:

α : Intercept

β : Slope of regression = Covariance (Rj, Rm)/σ_m^2

Slope of this regression shows the beta value, which is the risk of that stock.

Capital Assets Pricing Model (CAPM) equation:

$R_i = R_f + \beta(R_m - R_f)$

Intercept from the regression can be used to measure performance of that stock at that time. Then the CAPM model in equation (4.2) can be modified to equation (4.3):

$R_i = R_f(1 - \beta) + \beta R_m$

From equation (4.3) is similar with regression form from equation (4.1); it will be shown that $R_f(1 - \beta)$ from the CAPM model is similar to α and β withβ. The comparison between α and $R_f(1 - \beta)$ can be used to measure the performance of stocks at that time. So, if:

$\alpha > R_f(1 - \beta)$ it means that during the estimation period, the performance of the stocks is good (Performing).

$\alpha = R_f(1 - \beta)$. It means that during the estimation period the performance is as the same as it is expected.

$\alpha < R_f(1- \beta)$. It means that during the estimation period the performance of the stocks is poor (under performing).

The difference between α and R_f $(1-\beta)$ is called Jensen's alpha. The measurement is used to see whether the stocks are performing or under- performing.

3.4 Variables and Measurement

Financial ratio is used to measure the individual company's performances. The ratios that will be used as independent variable are shown below:

Table 3.2: The Independent Variables

Variables	Description	Variables	Description
Q1	Current Ratio	Q11	Total Asset Turnover / Day
Q2	Acid Test Ratio	Q12	Net Profit Margin
Q3	Cash/ Share (RM)	Q13	Shareholders' Fund / Share (RM)
Q4	Cash Ratio	Q14	Revenue / Share (RM)
Q5	Debt / Equity	Q15	Interest Cover (RM)
Q6	Inventory Turnover	Q16	Price / Book Value (x)
Q7	Debt Turnover / Day	Q17	Earnings Growth
Q8	Credit Turnover / Day	Q18	Return on Shareholders (%)
Q9	Current Asset Turnover / Day	Q19	Turnover Growth
Q10	Fixed Asset Turnover / Day	Q20	Price Performance

Table 3.3: Types of Ratio

Variables	Types of Ratio
Q1, Q2, Q3, Q4, Q5	Solvency
Q6, Q7, Q8, Q9, Q10, Q11	Management Evaluation
Q12, Q13, Q14, Q15	Profitability Ratio
Q16, Q17, Q18, Q19, Q20	Performance

The dependent variable is a categorical variable that consists of 1 and 2. If the company is in under performing group it will be categorized into 2. On the other hand, the company will be categorized into 1 if it performs. This categorical procedure follows the Jensen's alpha method.

The individual return, R_i, measured by monthly data from January 2000 until December 2005 is calculated using this formula:

$R_{it} = (P_{it}-P_{it-1}+Dividend_{it})/P_{it-1}$

Where :

P_{it} : Monthly price in period $_t$.

P_{it-1} : Monthly price in period $_{t-1}$.

$Dividend_t$: Dividend at period $_t$.

The market return, R_m, is measured by BURSA MALAYSIA monthly index. The formula is:

$R_{mt} = (KLSE_{mt}-KLSE_{mt-1})/KLSE_{mt-1}$

Where

$KLSE_{mt}$: KLSE index at period$_t$

$KLSE_{mt-1}$: KLSE index at period$_{t-1}$

The risk free rate, R_f, is measured by Cagamas monthly. Then, the study applies regression on the market return to individual return to get α and β. If the Jensen's alpha is lesser than Rf (1-β) we categorize it into under performing and if Jensen's alpha is greater than Rf (1-β), we categorize it into performing.

3.5 Conclusion

In this research, the study used two combined techniques which are the alpha Jensen and multiple discriminant techniques. The study used the alpha Jensen technique in order to categorize the companies into performing and non performing companies. Then it used the multiple discriminant analysis in order to find out the ratio that discriminate the performing and non-performing companies. Lastly it used the Z Score to rank the *shariah* compliance companies from the highest to the lowest.

CHAPTER FOUR

RESEARCH FINDINGS

4.0 Introduction

This chapter is divided into four sections which are the descriptive analysis, Alpha Jensen performance measurement, discriminator of the performing and non-performing *shariah* compliance companies using multiple discriminant analysis and the companies ranking using the Z score.

4.1 Descriptive Analysis

The descriptive analysis for the twenty ratios is listed below. The ratios are segregated according to ratio categories such as solvency, management evaluation, profitability and performance. The categorization is based on the Path Finder Education operated by Airgate Technology Sdn Bhd.

Table 4.1: Descriptive Statistics on the *Shariah* Compliance Companies Ratios

	N	Minimum	Maximum	Mean	Std. Deviation
Solvency					
Current Ratio(x)	201	.27	252.74	4.0674	18.0584
Acid Test Ratio(x)	201	.15	252.74	3.5194	18.0341
Cash/Share (RM)	200	.00	4.47	.4143	.6013
Cash Ratio(x)	200	.00	186.93	1.9963	13.4179
Debt/Equity(x)	177	.00	23.26	.8115	1.9140
Management Evaluation					
Inventory Turnover(x)	186	1.62	803.85	21.7413	66.6924
Debt Turnover/Day(day)	197	4.10	564.86	117.4945	99.7712
Credit Turnover/Day(day)	195	1.10	328.86	75.1644	55.3045
Current Asset Turnover(x)	201	.16	81.67	2.1436	5.7486
Fixed Asset Turnover(x)	201	.15	130.93	5.0109	12.7554
Total Asset Turnover(x)	200	.03	3.89	.8026	.5994
Profitability					
Net Profit Margin (%)	201	-308.30	124.23	2.6453	33.3121
Shareholders Fund/Share(RM)	201	.03	10.62	1.7472	1.3133
Revenue/Share(RM)	201	.02	32.32	3.1774	4.8846
Interest Cover(x)	195	-824.93	1134.53	31.8694	147.8624
Performance					
Price/Book Value(x)	201	.04	109.00	2.1678	7.7505
Earnings Growth (%)	184	-453.37	436.11	19.1626	117.4277

Return on Shareholders (%)	201	-397.78	62.03	2.3674	36.4845
Turnover Growth (%)	197	-91.72	601.11	16.4228	61.4713
Price Performance	199	-87.32	894.35	30.4311	98.8070

4.1.1 Solvency Ratios

In the solvency ratio, there are 5 ratios such as the current ratio, quick ratio, cash/share, cash ratio and debt to equity ratio. The current and quick ratio for the overall industry which explains the liquidity of the companies is above than 1.This indicates that the overall liquidity of the companies is good. In addition, the cash/share and cash ratios are good which show that the companies could meet their short term obligations when it comes due. Meanwhile the debt to equity ratio indicates that the *shariah* compliance companies in Malaysia are debt concentrated.

4.1.2 Management Evaluation Ratios

The overall inventory turnover is about less than once a week. The overall debt turnover is about 4 months which is considered as reasonable when compared to the banking facilities period. Meanwhile Credit turnover is above than 60 days but is lower than 90 days. The efficiency ratios for current asset and fixed assets turnover are considered efficient as compared to total assets turnover which is below than one. Overall the industry management ratios are satisfactory.

4.1.3 Profitability ratios

The profitability ratios for the *shariah* compliance companies are a bit low because there are companies which are having problems in their Net Profit Margin (NPM) and there are also companies which have more than 100% NPM. Overall the profitability ratios are satisfactory with the mean of 1.7472 for shareholders fund / share, 3.1774 for revenue / share and 31.8694 for interest cover.

4.1.4 Performance ratio

The overall companies' performance is satisfactory because the earning growth is about 20% which is higher nation growth. For the price / book value, the average is 2.1678 times more than the book value. The average of return on shareholders is 2.3674 % is considered fair to shareholders. For the turnover growth, the average for companies is 16.42% and this is good for the companies in generating sales.

4.2 Alpha Jensen Performance Measurement

The study measures Jensen's Alpha using regression model (CAPM) to estimate beta coefficient and alpha coefficient. The result is as below. The performing companies are categorized as 1, while the non performing companies are categorized as 2.

Companies	Category	Companies	Category	Companies	Category
PROTON	1	YEE LEE	1	GENERAL	2
SHELL	1	MMC	1	JOHN MAS	2
TELEKOM	1	MBM	1	PERSTIMA	1
ORIENTAL	1	ESSO	1	ROHAS	1
CEMENT I	1	NESTLE	1	ALUMINIU	1
UMW	1	FACB IND	1	EP MANUF	1
KECK SEN	1	LOH&LOH	1	NIKKO	1
THE NEW	1	HAP SENG	1	MELEWAR	2
MISC	1	NEW HOON	1	YUNG KON	1
UAC	1	KFC	1	QSR BRAN	1
C & C BI	1	LATITUDE	1	THONG GU	2
MSIAN OX	1	SUIWAH C	1	YE CHIU	1
MALAKOFF	1	IJM CORP	1	HO HUP	2
MEASAT	1	OCB	1	MINTYE	1
MALAYSIA	1	RAMATEX	1	STAR PUB	1
PK RESOU	1	SUBUR	1	MITRAJAY	1
LAFARGE	2	KPJ	1	MALAYSIA	1
TENAGA N	1	YEO HIAP	1	IPMUDA	1
PPB	1	LINGUI D	1	EASTERN	2
TRANSMIL	1	NAM FATT	2	TONG HER	1
TRADEWIN	1	DNP H	2	ANALABS	2
THE STOR	1	PCCS GRO	1	INTEGRAT	2
NCB	1	TRIUMPHA	2	LEONG HU	1
PERAK CO	1	MTD CAPI	1	YTL	2
HUME IND	1	KENMARK	1	ANCOM	1
PETRONAS	1	DUTCH LA	1	SURIA CA	2
YTL	1	WTK	1	SAPURA	2
TASEK	1	WHITE HO	1	MUDA H	2
AEON	1	NANYANG	1	FIAMMA	2
M3NERGY	1	TIONG NA	1	DAIBOCHI	2
SIME DAR	1	PADIBERA	2	TEXCHEM	1
JAYA TIA	1	COSWAY	2	MSIAN AE	1
PHARMANI	1	UPA CORP	2	KONSORTI	1
DELLOYD	1	YLI	1	IREKA	1
METROD	1	AJIYA	1	EVERMAST	2
GOH BAN	2	V.S IND	1	I BHD	1
SOUTHERN	1	CHEMICAL	1	SCIENTEX	1
ROAD	1	SEG INTE	1	INTI	2
CHOO BEE	1	MIECO CH	1	MWE	2
APM AUTO	1	WCT	1	SITT TAT	1
TA ANN	1	HIROTAKO	1	AMWAY	1

SCOMI MA	2	PDZ HOLD	2	MALAYSIA	2
EKSONS C	1	ANN JOO	2	UEM	2
MEGA FIR	2	INDUSTRI	2	MALAYSIA	1
SAFEGUAR	1	LION C	2	JOHAN	2
INTEGRAX	1	DKSH	1	ECOFIRST	2
MINHO	2	CHIN WEL	2	GOLDEN P	1
KUMP EUR	2	KUMP FIM	2	MP TECH	2
LINEAR C	1	ATIS	2	SIME ENG	2
SRII BHD	2	MTD	1	WIJAYA	1
TEKALA	2	PRESTAR	2	SAPURACR	2
PNE PCB	1	BINTAI	1	SINORA I	2
JAKS	1	MAGNI-TE	2	HUBLINE	1
SEAL INC	2	OILCORP	2	SIN HENG	2
NARRA IN	1	AMALGAMA	1	PUTERA C	1
KEN HOLD	2	LEADER U	1	TENGGARA	2
PANTAI H	1	DOLOMITE	2	DIALOG	2
HEXZA	1	NYLEX	1	TIME ENG	1
KOSSAN R	2	PADINI H	2	NAIM IND	2
KHEE SAN	2	SUPERMAX	2	KIA LIM	1
GOPENG	2	MUHIBBAH	2	FA PENIN	2
NATIONWI	1	KUB	2	MARCO	2
SPK SENT	2	TALIWORK	1	FCW	1
HALIM	2	FABER	2	MOL.COM	1
OYL IND	1	GEORGE K	1	MERGE EN	1
TSH	2	LB ALUMI	1	PAN M'SI	2
SANBUMI	2	OPUS	2	POLECON	2

From the alpha Jensen performance measurement technique, the study has identified 128 *shariah* compliance companies are performing while 73 companies are non-performing. The non-performing companies consist of approximately 36.3% percent from the total sample.

4.3 Ratio that significantly Discriminate the Performing and Non-performing Companies

Table 4.2 Estimation of Discriminant Function

Box's M		34.243
F	Approx.	33.986
	df1	1
	df2	42895.977
	Sig.	.000

The function tests null hypothesis of equal population covariance matrices.

The Box M result is used to test that whether the population covariance are homogeneous. The above result do not reject the alternate hypothesis therefore the population covariance are not equal. Thus, it violates the assumption of discriminant analysis. However, since the discriminant analysis is a robust analysis, the violation could be ignored.

From the output analysis using stepwise method, the variables that discriminate between the performing and non performing *shariah* compliance companies differ for consumer industry. The summary of all the canonical discriminant functions is as below:-

Table 4.3: Summary of Canonical Discriminant Function

Stepwise Statistic

Eigenvalue	% of variance	Canonical Correlation	Wilks' Lamda	Chi-Square	Significant
0.179	100	0.390	0.848	22.503	0.000

From the table 4.3 it depicts that the discriminant function has a Wilk's Lamda value below than 1. Lamda has a value between 0 and 1, which indicate 0 as major difference and the value of 1 means no difference. The Lamda values showed that the function has an ability to distinguish between two groups. The ability is tested with Chi Square test. The result showed both groups can be discriminated significantly (the significant value is less than 0.001)

The other information that can be pooled is canonical correlation for the shariah compliance companies is 0.390. The square of this value represents the variability of the dependent variables. This could be explained by the variability of independent variables using optimal weighted from discriminant function. The average of square of all the canonical is about 0.1521. It is means that about 15.21% of the variability of dependent variable can be explained with this discriminant function. The low value of canonical correlation is resulted from the exclusion of the other 19 ratios which are not significant in discriminating the performing and non-performing *shariah* compliance companies.

The objective of discriminant analysis is to get the linear combination in classifying the dependent variable according to the numerical independent variable. The criterion of classification is according to Wilk's Lamda statistics. From the variable chosen for each industry, we can analyze the discriminant to group 1 (Jensen's alpha >0) and 2 (Jensen's alpha < 0).

The result is as follows:

H_0: No average vector difference between group 1 and group 2

H_1: There is average vector difference between group 1 and group 2

The Wilk's Lamda test or Chi Square for consumer industry shown above is significant so we could reject H_0

Table 4.4: Canonical Discriminant Function Coefficient

	Function
	1
Shareholders Fund/Share (Q13)	0.7680
(Constant)	-1.448

Unstandardized coefficients

The discriminant function is:

Z = -1.448+ 0.7680 Shareholders Fund/Share (Q13)

Table 4.5: Value of Function at Centroid of Each Group

Shariah Compliance Companies	Category		No. of Sample In Group 1	No. of Sample In Group 2	*Zcu*
	1	2			
Main Board	0.305	-0.5799	91	48	-0.0005769

Table 4.5 shows the value of Function at centroid for each group. For centroid data we can calculate the cut off that is to divide the discriminant score between group 1 and group 2.

$$Zcu = \frac{N_1 Z_1 + N_2 Z_2}{N_1 + N_2}$$

N= number of samples
Z_1=Value of Centroid for group 1
Z_2=Value of Centroid for group 2

4.4.1 Ranking of the *Shariah* Compliance Companies.

Different industry may have different cut off point. If the *shariah* companies with the Z score are higher than the cut off point for each industry as in the table 4.4 will be ranked as the highest. Highest Z score would be the highest ranking. If the Z score is lower than the cut off point for each industry, it will be rank lowest as the number of Z score increases.

By ranking the companies according to the discriminant score, we could see which *shariah* company is performing and under performing as shown in the table below.

Table 4.6: Company ranking based on Z Score (Based on Shareholders Fund/Share (NTA))

No	Company	2005 Ranking	No	Company	2005 Ranking
1	PROTON	6.70816	7	KECK SEN	1.79296
2	SHELL	3.4672	8	THE NEW	1.78528
3	TELEKOM	2.88352	9	MISC	1.70848
4	ORIENTAL	2.72992	10	UAC	1.50112
5	CEMENT I	2.1232	11	C & C BI	1.49344
6	UMW	1.90048	12	MSIAN OX	1.49344

13	MALAKOFF	1.49344
14	MEASAT	1.48576
15	MALAYSIA	1.46272
16	PK RESOU	1.43968
17	LAFARGE	1.41664
18	TENAGA N	1.40128
19	PPB	1.28608
20	TRANSMIL	1.25536
21	TRADEWIN	1.22464
22	THE STOR	1.17856
23	NCB	1.17088
24	PERAK CO	1.17088
25	HUME IND	1.15552
26	PETRONAS	1.14784
27	YTL	1.1248
28	TASEK	1.048
29	AEON	1.01728
30	M3NERGY	1.0096
31	SIME DAR	0.98656
32	JAYA TIA	0.92512
33	PHARMANI	0.83296
34	DELLOYD	0.71776
35	METROD	0.71776
36	GOH BAN	0.664
37	SOUTHERN	0.61024
38	ROAD	0.5488
39	CHOO BEE	0.53344
40	APM AUTO	0.46432
41	TA ANN	0.46432
42	YEE LEE	0.45664
43	MMC	0.44128
44	MBM	0.41824
45	ESSO	0.40288
46	NESTLE	0.31072
47	FACB IND	0.31072
48	LOH&LOH	0.27232
49	HAP SENG	0.26464
50	NEW HOON	0.25696
51	KFC	0.24928
52	LATITUDE	0.22624
53	SUIWAH C	0.22624
54	IJM CORP	0.2032
55	OCB	0.1648
56	RAMATEX	0.14944
57	SUBUR	0.14944
58	KPJ	0.14176
59	YEO HIAP	0.1264
60	LINGUI D	0.08032
61	NAM FATT	0.08032
62	DNP H	0.05728
63	PCCS GRO	0.00352
64	TRIUMPHA	0.00352
65	MTD CAPI	-0.01184
66	KENMARK	-0.01952
67	DUTCH LA	-0.0272
68	WTK	-0.0272
69	WHITE HO	-0.05792
70	NANYANG	-0.08096
71	TIONG NA	-0.08096
72	PADIBERA	-0.08864
73	COSWAY	-0.11168
74	UPA CORP	-0.11168
75	YLI	-0.11168
76	AJIYA	-0.11936
77	V.S IND	-0.13472
78	CHEMICAL	-0.1424
79	SEG INTE	-0.1424
80	MIECO CH	-0.15776
81	WCT	-0.16544
82	HIROTAKO	-0.20384
83	GENERAL	-0.2192
84	JOHN MAS	-0.22688
85	PERSTIMA	-0.22688
86	ROHAS	-0.22688
87	ALUMINIU	-0.23456
88	EP MANUF	-0.24224
89	NIKKO	-0.24992
90	MELEWAR	-0.2576
91	YUNG KON	-0.26528
92	QSR BRAN	-0.26528
93	THONG GU	-0.27296
94	YE CHIU	-0.27296
95	HO HUP	-0.27296
96	MINTYE	-0.28832
97	STAR PUB	-0.28832
98	MITRAJAY	-0.296
99	MALAYSIA	-0.296
100	IPMUDA	-0.30368
101	EASTERN	-0.31136
102	TONG HER	-0.31904
103	ANALABS	-0.34208
104	INTEGRAT	-0.34208

105	LEONG HU	-0.34976
106	YTL	-0.34976
107	ANCOM	-0.36512
108	SURIA CA	-0.38048
109	SAPURA	-0.38816
110	MUDA H	-0.40352
111	FIAMMA	-0.41888
112	DAIBOCHI	-0.42656
113	TEXCHEM	-0.42656
114	MSIAN AE	-0.43424
115	KONSORTI	-0.4496
116	IREKA	-0.45728
117	EVERMAST	-0.488
118	I BHD	-0.49568
119	SCIENTEX	-0.51104
120	INTI	-0.51104
121	MWE	-0.51872
122	SITT TAT	-0.51872
123	AMWAY	-0.51872
124	SCOMI MA	-0.51872
125	EKSONS C	-0.53408
126	MEGA FIR	-0.53408
127	SAFEGUAR	-0.53408
128	INTEGRAX	-0.54176
129	MINHO	-0.54944
130	KUMP EUR	-0.54944
131	LINEAR C	-0.55712
132	SRII BHD	-0.55712
133	TEKALA	-0.58016
134	PNE PCB	-0.59552
135	JAKS	-0.59552
136	SEAL INC	-0.6032
137	NARRA IN	-0.61856
138	KEN HOLD	-0.63392
139	PANTAI H	-0.65696
140	HEXZA	-0.68
141	KOSSAN R	-0.68768
142	KHEE SAN	-0.69536
143	GOPENG	-0.69536
144	NATIONWI	-0.69536
145	SPK SENT	-0.70304
146	HALIM	-0.70304
147	OYL IND	-0.71072
148	TSH	-0.71072
149	SANBUMI	-0.7184
150	PDZ HOLD	-0.73376
151	ANN JOO	-0.74144
152	INDUSTRI	-0.74912
153	LION C	-0.74912
154	DKSH	-0.7568
155	CHIN WEL	-0.77216
156	KUMP FIM	-0.77984
157	ATIS	-0.7952
158	MTD	-0.7952
159	PRESTAR	-0.81824
160	BINTAI	-0.81824
161	MAGNI-TE	-0.8336
162	OILCORP	-0.8336
163	AMALGAMA	-0.84128
164	LEADER U	-0.84128
165	DOLOMITE	-0.84896
166	NYLEX	-0.84896
167	PADINI H	-0.85664
168	SUPERMAX	-0.85664
169	MUHIBBAH	-0.872
170	KUB	-0.88736
171	TALIWORK	-0.88736
172	FABER	-0.92576
173	GEORGE K	-0.97184
174	LB ALUMI	-0.9872
175	OPUS	-1.01024
176	MALAYSIA	-1.01792
177	UEM	-1.0256
178	MALAYSIA	-1.04096
179	JOHAN	-1.04096
180	ECOFIRST	-1.04864
181	GOLDEN P	-1.064
182	MP TECH	-1.07168
183	SIME ENG	-1.08704
184	WIJAYA	-1.13312
185	SAPURACR	-1.17152
186	SINORA I	-1.20224
187	HUBLINE	-1.20224
188	SIN HENG	-1.20992
189	PUTERA C	-1.23296
190	TENGGARA	-1.24832
191	DIALOG	-1.28672
192	TIME ENG	-1.2944
193	NAIM IND	-1.30208
194	KIA LIM	-1.3328
195	FA PENIN	-1.36352
196	MARCO	-1.36352

197	FCW	-1.3712	200	AN M'SI	-1.39424
198	MOL.COM	-1.3712	201	POLECON	-1.42496
199	MERGE EN	-1.37888			

From the result, we found out that Proton has the highest ranking score of 6.708 and followed by Shell which has the score of 3.46. This indicates that from our analysis, Proton is the most performing *shariah* companies in the year of 2005.

CHAPTER FIVE

CONCLUSIONS

5.0 Introduction

This chapter presents the conclusions and recommendation of the study. This study aims to identify the ratios that could discriminate the performing and under-performing companies and to rank the *shariah* compliance companies in 2005 in attempting to meet the research objective. We collected data from the 201 *shariah* companies listed on the Bursa Malaysia's Main Board. We employed alpha Jensen and multiple discriminate analyses for the research. Monthly share price data were collected from pathfinder education to determine the alpha Jensen. Likewise, relevant ratios were also collected from the pathfinder education. There were 20 ratios used for this study.

5.1 Summary of the Findings

Out of the 20 ratios that are being evaluated only one ratio is significant in discriminating between the performing and non-performing *shariah* compliance companies in the Bursa Malaysia. The ratio is shareholder fund/ share or Net Tangible Asset (NTA). This finding shows that the usage of the traditional companies valuation in determining the performance of *shariah* compliance companies do still valid even though there are many new vigorous high technical valuation method being introduced in the market. These findings are similar with Altman (2000) which states that negative profit is significant in determining bankruptcy. Our research is similar because NTA is found significant to the discriminator of the performing and non-performing companies.

5.2 Implications of the Study

This study could be duplicated and expanded using comprehensive data involving the non *shariah* compliance companies or overall counter in Bursa Malaysia. The companies listed in Bursa Malaysia also could be ranked annually based on the performance using the method employed in this research.

5.3 Conclusion and recommendations.

As the global market is inevitable and impossible to be avoided, one must be prepared for competition from the borderless world. International companies will compete with the domestic companies in a level playing field. Therefore, in the inflows of many companies from all around the world, it is vital for investors to evaluate and select the optimal investment portfolio.

In accordance to the demand for globalization, the objective of this paper is to introduce a simple model using multivariate analysis. The unique of this approach is the multivariate analysis, which does not depend on one variable. Another aspect that should be considered is the model accuracy. The accuracy for this model is about 66.7% so we could conclude that the financial ratios that discriminate between the *shariah* compliance companies is shareholders fund/ share Finally the research findings could become an indicator for investors to discriminate the performing and non performing companies but the level of confidence is at 66.7% only. However the classification of the performing and the non performing companies could vary depending on the methodology used.

As the global market is inevitable and impossible to be avoided, one must be prepared for competition from the borderless world. International companies will compete with the domestic companies in a level playing field. Therefore, in the inflows of many companies from all around the world, it is vital for investors to evaluate and select the optimal investment portfolio.

In accordance to the demand for globalization, the objective of this paper is to introduce an alternative model using multivariate analysis. The unique of this approach is the multivariate analysis, which does not depend on one variable. Another aspect that should be considered is the model accuracy. The accuracy for this model is about 66.26% so we could conclude that the financial ratios that discriminate between the shariah compliance companies for the industrial sector is sales / fixed assets. Finally the research findings could become an indicator for investors to discriminate the performing and non performing companies but the level of confidence is at 66.26% only. However the classification of the performing and the non performing companies could vary depending on the methodology used.

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Factors Influencing the Performance of Shariah Compliance Companies[7]

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Abstract

The global business environment is really demanding the investors to be prepared with the emerging and dynamic markets. Measuring company's performance is important for management, shareholders, government, customers, suppliers and other stakeholders that have importance or linkage with the wealth distribution directly or indirectly. To evaluate company's performance, we need tools that can be used to measure the performance and one of most popular tools is the financial ratio analysis. This paper will explore the use of multiple discriminant analysis using samples from the various sector listed in Bursa Malaysia, especially the shariah compliance counters. The result using multiple discriminant analysis would identify the ratios that could identify or discriminate between the non-performing and performing companies.

Keywords: Multiple Discriminant Analysis (MDA), CAPM, Company's Performance, Multivariate Analysis

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1. Introduction

In this new era, most of the investors are demanding nearly perfect information to analyze the companies' performance to make sure their investment can generate income and increase their satisfaction in the business market. Measuring companies' performance is importance especially to the management, shareholders, government, customers, suppliers, and other stakeholders that have interest to the company directly or indirectly.

Most of the practitioners, fund managers, owners, stockholders, personnel, customers, suppliers, competitors, regulatory agency, practitioner and academicians are using financial ratio to evaluate company's performance. The financial ratio is a useful byproduct of financial statements and provides standardized measures of a firm's profitability and riskiness. It also used to forecast the future success of companies, while the researcher's main interest is to develop models exploiting this ratio.

The information available is normally prepared by the management and audited by the audit firm of the company. This financial statement is prepared yearly, quarterly and semi-annually. Sometimes the relationships between financial ratios are inversely related. This could make the decision-making in company's performance is a cumbersome processes. In analyzing performance using financial ration from financial statement, there are two issues arise in differences in accounting standards and practices and how these differences may vary the comparisons across companies. The second relates to accounting for acquisitions and how this can affect both acquisition method and price.

The objective of this paper is to introduce an alternative model using multivariate analysis, Multiple Discriminant Analysis (MDA). We are going to evaluate companies' performance in Malaysia and to segregate them into two clusters or groups. The best financial ratios will be chosen to separate between performing and under-performed into two different groups.

2.0 Objectives of Research

11. To analyze data collected by using multiple regression for identifying the performing and non-performing companies and using Multiple Discriminant Analysis for discriminating the ratios.
12. To identify the ratios that could discriminate the performing and under-performing companies.
13. To validate the model with the Practice Note 4 and Practice Note 17 companies with the performing companies.

2.1 Significance of the Research

This is an exploratory research in Malaysia using the multi-variate analysis. The research will be useful in determining the performing and non-performing companies by using two methods i.e. regression and ratio analysis. The findings could be used by potential investors and the stock market players in identifying the underperforming companies and detecting the early warning signals of non-performing.

3. Literature Review

George T. Albanis and Roy A. Batchelor (1999) stated that nonlinear methods yield improvements in classification over the linear model, which are statistically significant, but translate to only small increases in financial returns. They explores the potential for identifying outperforming shares using nonlinear statistical classification methods comparing Linear Discriminant Analysis with a Probabilistic Neural Network, a Vector Quantization procedure, a Recursive Partitioning, and a Rule Induction Algorithm. The inputs are 38 accounting ratios for around 700 companies with shares traded on the London Stock Exchange in the years 1991-97.

Dan Givoly and Carla Hayn (2002) said that there is a rising conservatism in the conservatism by U.S. companies in the past few decades. Using a constant sample of almost 900 companies, examined several measures of accounting conservatism, including

the level and rate of accumulation over time of negative non operating accruals, the differential timeliness of incorporating good news versus bad news in reported earnings, the skew ness and variability of the earnings distribution relative to the cash flows distribution, and changes in the market-to-book ratio. The increased conservatism has contributed to a persistent and prevalent decline in reported profitability, an increase in the incidence of losses, and an increase in the dispersion of earnings. Increased conservatism affects financial ratios and P/E multiples. Therefore, financial ratio use in determining the performance of the company can be manipulated.

Discriminant Analysis (DA) is a statistical tool that can predict the group membership of a newly sampled observation (Toshiyuki Sueyoshi and Shiuh-San Hwang, 2004). Sueyoshi and Kirihara (1998,1999) have recently proposed a new type of nonparametric DA approach that provides a set of weights of a linear discriminant function, consequently yielding an evaluation score for the determination of group membership. The nonparametric DA is referred to as "Data Envelopment Analysis-Discriminant Analysis (DEA-DA)," because it maintains its discriminant capabilities by incorporating the nonparametric feature of DEA into DA. In this study, a use of two statistical tests is proposed for DEA-DA and its discriminant capability is compared with DEA from a perspective of financial analysis.

Study by Ozgur Turetken aims to predict the financial performance of publicly traded Turkish firms using their available financial data. Financial performance is measured by a firm's inclusion in an index of top performers, where the inclusion of firms is based on the value and sales volume of their stocks. Two alternative techniques, multiple discriminant analysis and neural networks, are used for this prediction problem, and their prediction accuracy is compared.

Research made in determining the analyst's financial forecast accuracy and information transparency by Hsiang-tsai Chiang, he used multiple regression analysis for the independent variable to predict dependent variable. The result shown that the relationship direction between corporate transparency EPS forecast bias was negative as expected, which indicated that when the company disclose more information, the forecast bias will become lower and forecast accuracy will be higher.

Discriminant analysis in this study by Kevin Keasey and Robert Watson (1986) is used to examine empirically whether current cost accounting (CCA) information may be useful for predicting the performance of small companies. A matched sample of failed and non-failed firms is chosen and historic cost accounts are adjusted in line with the requirements of Statement of Standard Accounting Practices (SSAP) 16. The companies are all single-plant independently owned firms in the Northeast of England; all the failed firms had ceased to trade during 1974-1980.

Theory of investment (Scott, 1977) states that financial reports objectives are to give information to help investor, creditors, and others financial reports user to assess amount, time, uncertainty acceptance from cash dividends and interest for the future. In other word the financial reports will assist investors in gathering information about risk and return from investment activities.

Ball and Brown (1968) tested about the contents of profit information in share prices and found that financial ratios can be useful to predict bankruptcy (Altman, 1968; Sinkey, 1975; Dambolera and Khoury, 1980; Thomson, 1990), to predict return (O'Conner, 1973; Ou and Penman, 1989), and to predict revenue growth (Freeman et al, 1982; Ou, 1990; Penman, 1992).

Company that is showing a sign of having financial could be identified early using company's financial performance. Beaver (1966) did a study about a brittle of the company five years before that company really failed. Altman (1968) also did the same like Beaver in order to identify the success and failure of banks.

There are many professionals using multiple discriminant analysis in their study such as E. Altman (2000), who use MDA and ZETA models to evaluate unique characteristics of business failures in order to specify and quantify the variables which are effective indicators and predictors of corporate distress of firms not traded publicly, to non-manufacturing entities, and also refer to a new bond-rating equivalent model for emerging markets corporate bonds.

It is also quantifiable characteristics of potential bankrupts but also the utility of a much-maligned technique of financial analysis: ratio analysis and updates the predictive tests on defaults and bankruptcies through the year 1999. The sample of 66 companies is selected on the basis of net income (deficit) reports in the years 1958 and 1961, with 33

from each year. Over 65% of these firms had suffered two or three years of negative profits in the previous three years. The firms are selected regardless of their asset size, with the only two criteria being that they were manufacturing firms which suffered losses in the year 1958 or 1961. The companies are then evaluated by the discriminant model to determine their bankruptcy potential.

Altman (2000) mentioned that the MDA technique has the advantage of considering an entire profile of characteristics common to the relevant firms and another advantage of MDA in dealing with classification problems is the potential of analyzing the entire variable profile of the object simultaneously rather than sequentially examining its individual characteristics

Most recent research on the use of discriminant analysis on evaluating company performance in Malaysia is by Muhammad Rubini Kertapati and Nuradli Ridzwan Shah Bin Mohd Dali (2004). This research is using 11 ratios as independent variable to determine the performance of finance company in financial industry in Malaysia. According to this research paper, the researcher is unable to conduct the model validation due to the sample size.

Due to lack of study of the performances of Malaysian Market using Multiple Discriminant Analysis, we have to do a further research so that there is an information and technique available to Malaysian market by using a good model.

14. Research Methodology

4.1 Multiple Discriminant Analysis

Discriminant Analysis is used in situations where you want to build a predictive model of group membership based on observed data - characteristics, attitudes, and demographic data. It is an a *priori* technique in that the groups are defined beforehand (the opposite of cluster analysis where we use the methodology to form the groups).

The analysis produces a linear equation that can be used to explain which variables best discriminates between two or more groups, and consequently, builds a predictive model that can be used for future classification.

Discriminant analysis covers a differentiation of variate, linear combination of two (or more) independent variable that will be used to distinguish group categories. It can be achieved by defining the weight for every variable to maximize relatively inter group variance relative to within group variance. The linear combination for the discrimination function needs to be differentiating in a form:

$Zi = W1X1 + W2X2 + W3X3 + ...WnXn$

Where:

Z : Discriminant score for company i

Wn : Discriminant weight for variable-n

Xn : Independent variable

The next step is to test the hypothesis whether the groups mean from a set of independent variables, for two (or more) groups different or the same? To differentiate between these two groups, we will use discriminant function to find the discriminant score for each individual company in analysis.

Then, individual company score in one group will be averaged to get the group mean. We call the group mean, CENTROID. If we observe two groups, than we will have two Centroids. The centroids show the important location for a group. The comparison between centroids will show how far the separation among those groups could be observed.

The significance test for discriminant function is generalization result of a distance measurement among centroids. It measure with comparing discrimination score between two (or more) groups. If the distribution has small overlapping, it means that the discrimination function is a good discriminator.

The next step is to assess the model itself. The primary tool here is Wilks' Lambda test. The Wilks' Lambda test tests the hypothesis that the means of the functions listed are equal across groups, Wilks' lambda being the proportion of the total variance in the discriminant scores not explained by differences among the groups. A significance value less than 0.05 indicate that the group means differ, and therefore the function is a significant discriminator. This is clearly the case in this study and one can conclude that the function is a valid discriminator.

The hypotheses of this study are as follows:

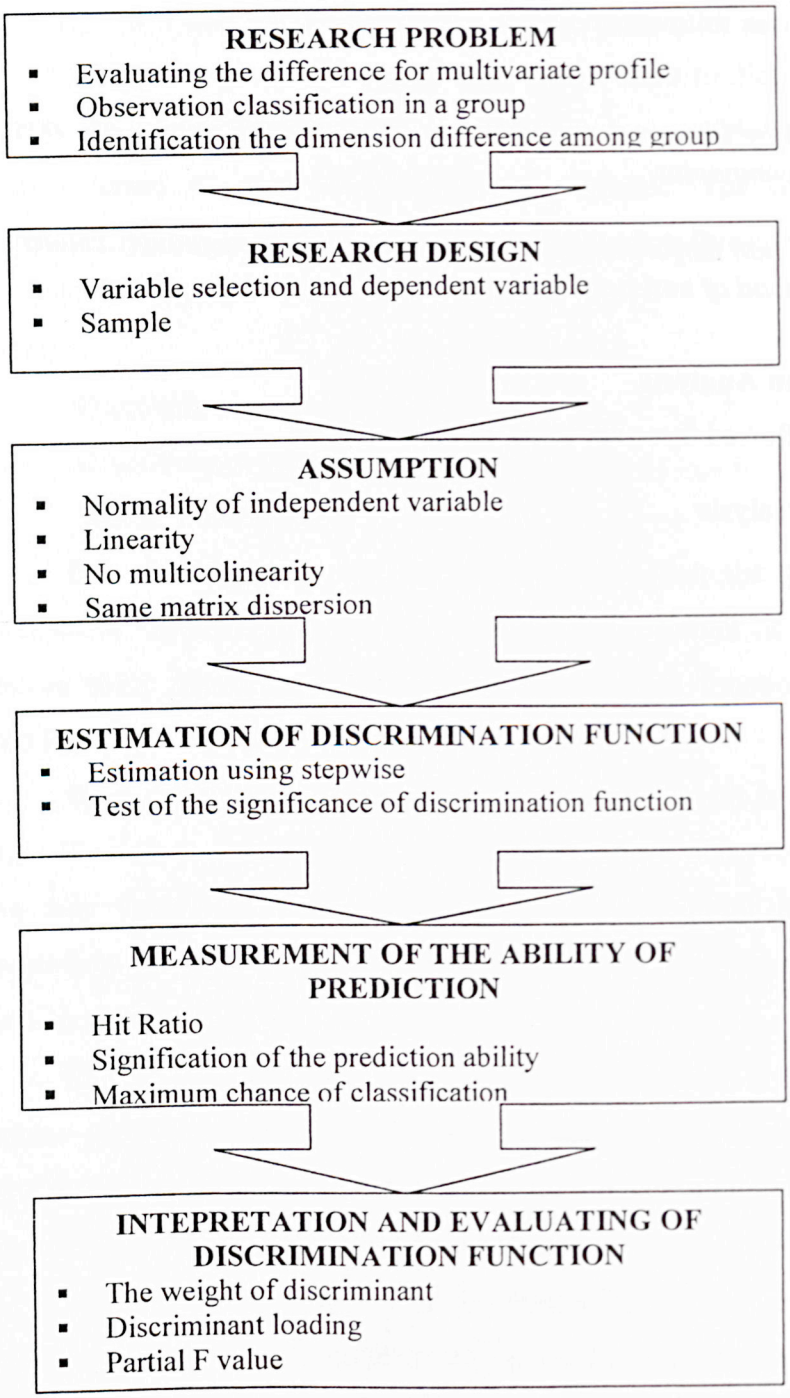
Hypothesis 1. *The ratios used by Altman do not differ in improving the power of non performing companies.*

Hypothesis 2. *For a sample of non performing companies, firm size is negatively related to the likelihood of non-performance.*

4.1.1 Stage of Discrimination Analysis

The discrimination analysis followed these six steps, in figure below:

The Process of Discriminate Analysis



Rubini (2004)

4.2 Jensen's Alpha

Jensen's alpha is used to evaluate historical performance of a portfolio. These method measures the difference between realized return and expected return for a period of time.

The measurement of Jensen's alpha coefficient is differentiated from the estimation parameters of Capital Asset Pricing Model (CAPM), from finding the alpha and beta coefficient of a stock. The procedure to estimate beta is to regress between individual return (R_i) and market return (R_m):

$R_i = \alpha + \beta R_m$

Where:

α : Intercept

β : Slope of regression = Covariance (Rj, Rm)/σ_m^2

Slope of this regression shows the beta value, which is the risk of that stock.

Capital Assets Pricing Model (CAPM) equation:

$R_i = R_f + \beta(R_m - R_f)$

Intercept from the regression can be used to measure performance of that stock at that time.

Then the CAPM model in equation (4.2) can be modified to equation (4.3):

$R_i = R_f(1- \beta) + \beta R_m$

From equation (4.3) is similar with regression form from equation (4.1); it will be shown that R_f (1- β) from the CAPM model is similar to α and β withβ. The comparison between α and R_f (1- β) can be used to measure the performance of stocks at that time. So, if:

$\alpha > R_f(1- \beta)$ it means that during the estimation period, the performance of the stocks is good (Performing).

$\alpha = R_f(1- \beta)$. It means that during the estimation period the performance is as the same as it is expected.

$\alpha < R_f(1- \beta)$. It means that during the estimation period the performance of the stocks is poor (under performing).

The difference between α and $R_f(1-\beta)$ is called Jensen's alpha. The measurement is used to see whether the stocks are performing or under- performing.

4.3 Variables and Measurement

Financial ratio is used to measure the individual company's performances. The ratio that going to be used as independent variable shown as below:

The Independent Variables

Variables	Description	Variables	Description
Q1	Current Assets/Current Liabilities	Q7	Profit Margin
Q2	(Current Assets-Inventory)/Current Liabilities	Q8	Total Assets Turnover
Q3	Working Capital/Total Assets	Q9	Account Receivables Turnover
Q4	Return on Equity	Q10	Sales/Fixed Asset
Q5	Return on Asset	Q11	Debt to Equity Ratio
Q6	Operating Profit Margin		

Variables	Types of Ratio
Q1, Q2, Q3	Liquidity
Q4, Q5, Q6, Q7	Profitability
Q8, Q9, Q10	Efficiency
Q11	Solvency

The dependent variable is a categorical variable that consists of 1 and 2. If the company has a under performing it will be categorized into 2. On the other hand, the company will

be categorized into 1 if it has a performing. This categorical procedure follows the Jensen's alpha method.

The individual return, R_i, measured by monthly data from January 2000 until December 2003 using this formula:

$R_{it} = (P_{it}-P_{it-1}+Dividend_{it})/P_{it-1}$

Where :

P_{it} : Monthly price in period $_t$.

P_{it-1} : Monthly price in period $_{t-1}$.

$Dividend_t$: Dividend at period $_t$.

The market return, R_m, is measured by BURSA MALAYSIA monthly index. The formula is:

$R_{mt} = (KLSE_{mt}-KLSE_{mt-1})/KLSE_{mt-1}$

Where

$KLSE_{mt}$: KLSE index at $period_t$

$KLSE_{mt-1}$: KLSE index at $period_{t-1}$

The risk free rate, R_f, is measured by Cagamas monthly. Then we regress the market return to individual return to get α and β. If the Jensen's alpha is negative, we categorize it into under performing and if Jensen's alpha is positive, we categorize it into performing.

SPSS 12.0 is used to estimate the regression function and discrimination function.

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