CHAPTER 4

RESEARCH METHODOLOGY

In this chapter, the research methodology used in the assessment of the development and performance of the Islamic unit trust in Malaysia is presented. It includes the sources of data needed for the study, the fund selection techniques as well as the data analysis techniques.

4.1 SOURCES OF DATA

The data that are needed for this study and their sources are as follows:

1. Summary of statistics
   a) The summary of statistics of the unit trust industry in Malaysia
      Source: Securities Commission Annual Reports and SC's Trust Funds and Investment Management Department
   b) The summary of statistics of the Islamic unit trust sector in Malaysia
      Source: SC's Islamic Capital Market Unit

2. Islamic Unit Trust Funds
   a) Monthly closing price (refer to the net asset value of the fund on the last trading day of the month which was published in the newspaper on the following day as a manager's buying price)
Source: newspapers; New Straits Times and The Star

b) Dividend and bonus unit records of the Islamic funds

Source: Islamic Fund Management Companies' Master Prospectus and Annual Reports

3. RHB Islamic Index

Monthly closing figures of the index (refer to the last trading day of the month)

Source: RHB Unit Trust Management Bhd.

4. Yield to Maturity of 3-months Treasury Bills of Bank Negara Malaysia (in percentage)

Source: Monthly Statistical Bulletin of Bank Negara Malaysia

4.2 SAMPLING: FUND SELECTION TECHNIQUES

Since the number of Islamic funds is relatively small, especially those with sufficient historical performance records, this analysis will try to include as many funds as possible and they will be evaluated right from their inception in the market until now. Thus, this study covers a nine and a half year period from January 1993, when the first Islamic unit trust fund was officially launched in the market, to June 2002. This period is sufficiently long to cover the various bulls and bear market in the Malaysian capital market and would therefore provide better insight into the performance of the Islamic unit trust funds.
The funds which will be included in this study must be approved as Islamic funds in line with the shariah guidelines as prescribed by the Securities Commission and have at least four years of historical performance record. Other Islamic unit trust funds which were newly launched and did not have sufficient amount of monthly data to be analysed as required in this study is excluded from the sample.

Hence, based on the conditions stated above, a total of 13 Islamic unit trust funds from 13 management companies were selected. This is shown in Table 4.1 below.

Table 4.1: List of Islamic Unit Trust Funds in the Study

<table>
<thead>
<tr>
<th>No</th>
<th>Fund Identification (ID)</th>
<th>Management Company</th>
<th>Name Of Fund</th>
<th>Date Launched</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ASMDAA</td>
<td>MARA Bumputra Fund</td>
<td>Dana Al-Aman</td>
<td>April 9, 1968</td>
</tr>
<tr>
<td>2</td>
<td>AUTFAB</td>
<td>Asia Unit Trust</td>
<td>Amanah Bakti</td>
<td>May 14, 1971</td>
</tr>
<tr>
<td>3</td>
<td>AMTI</td>
<td>AMMB Investment Services Bhd</td>
<td>Tabung Irtikal Arab-Malaysian</td>
<td>January 12, 1993</td>
</tr>
<tr>
<td>4</td>
<td>ASBITP</td>
<td>BIMB Unit Trust Management</td>
<td>ASBI - Tabung Pertama</td>
<td>June 20, 1994</td>
</tr>
<tr>
<td>5</td>
<td>ASDI</td>
<td>PTB Unit Trust Bhd</td>
<td>Amanah Saham Darul Iman</td>
<td>October 31, 1994</td>
</tr>
<tr>
<td>6</td>
<td>ASK</td>
<td>Amanah Saham Kedah</td>
<td>Amanah Saham Kedah</td>
<td>February 27, 1995</td>
</tr>
<tr>
<td>7</td>
<td>LDP</td>
<td>Commerce Trust Bhd</td>
<td>Lifetime Dana Putra</td>
<td>July 15, 1995</td>
</tr>
<tr>
<td>8</td>
<td>AIF</td>
<td>Abrar Unit Trust Management Bhd</td>
<td>Abrar Investment Fund</td>
<td>March 12, 1996</td>
</tr>
<tr>
<td>9</td>
<td>RHBM</td>
<td>RHB Unit Trust Management</td>
<td>Mudharabah Fund</td>
<td>May 9, 1996</td>
</tr>
<tr>
<td>10</td>
<td>PIF</td>
<td>Public Mutual Funds</td>
<td>Public Irtikal Fund</td>
<td>May, 1997</td>
</tr>
<tr>
<td>11</td>
<td>PDA</td>
<td>Pacific Mutual Fund</td>
<td>Pacific Dana Aman</td>
<td>April, 1998</td>
</tr>
<tr>
<td>12</td>
<td>ASNITA</td>
<td>Metrowengsa Unit Trust Management Berhad</td>
<td>Amanah Saham Wanita</td>
<td>May, 1998</td>
</tr>
<tr>
<td>13</td>
<td>BHLBDAI</td>
<td>BHLB Pacific Trust</td>
<td>BHLB Dana Al-Ihsan</td>
<td>May, 1998</td>
</tr>
</tbody>
</table>

Notes:
* Relaunched as an Islamic unit trust fund on May 19, 1997 - formerly known as Tabung Kumpulan Modal Bumputra Yang Pertama.
** Relaunched as an Islamic unit trust fund on June 25, 1994 - formerly known as Malaysia Security Fund.
Source: SC’s Islamic Capital Market Unit.
It is also appropriate to note here the limitations that embedded this study. The major constraints faced are the availability of readily accessible data of Islamic unit trust funds in Malaysia in terms of its quantity as well as quality especially in the early phases of its establishment. Hence, this study will use some of the data made available from previous research in the area. For that, I thank Kemal Rizadi (1999) for his work in making such data available.

Due to the fact that Islamic unit trust funds in Malaysia are still new and most of them do not have a long period of records, thus the analysis of the funds does not have a common base year since January 1993. Therefore, each Islamic unit trust fund, which was launched after 1993, is evaluated from each of their respective launch dates all the way up to June 2002. In other words, the performance of a fund is evaluated from its respective inception.

4.3 DATA ANALYSIS

The assessment of the Islamic unit trust schemes in this study will consist of two types of analysis. the first is a descriptive analysis of the growth and development of the Islamic unit trust sector for the past decade of operation and secondly, a risk-adjusted performance analysis of the Islamic unit trust funds.

4.3.1 GROWTH ANALYSIS
The growth and development of the Islamic unit trust sector vis-à-vis the overall unit trust industry for the past decade will be analysed based on a trend analysis for period from 1994 to June 2002. For this purpose, the growth of the Islamic unit trust sector will be compared to that of the industry using several selected indicators of the industry. These indicators include:

i. Total number of management companies

ii. Total number of funds approved

iii. Total size of fund approved

iv. Total units in circulation

v. Number of accounts

vi. Total net asset value (NAV)

vii. Percentage of total NAV to KLSE market capitalisation

4.3.2 RISK-ADJUSTED PERFORMANCE ANALYSIS

The investment performance of securities has always been the centre of emphasis of any investors and fund managers. However, the traditional method of performance measurement is based only on the rate of returns to the investment or portfolio. The rate of return is usually expressed on percentage of return to total amount of investment or on a per dollar basis. Hence, if Fund A has a greater rate of return than Fund B, then it is said that Fund A's performance is superior to Fund B.

However, such assessment had omitted another crucial element in investment performance measurement which has a significant bearing on the expected rate of
return namely the risk associated with the investment or portfolio. In Modern Portfolio Theory, it is suggested that there is a consistent trade off between risk and returns. Thus, the theory suggests that a more risky investment would demand a higher required rate of return compared to a less risky investment, and vice versa.

Fund A manager may obtain higher returns than Fund B manager because of investing in more risky securities. However, it may happen that Fund A in actual fact has earned less than the expected rate of returns with respect to the level of risk it bore. On the other hand, Fund B which is more risk-adverse in nature may have achieved an expected returns correspond to the level of risk it bore. In this case, Fund B performed better than Fund A. Hence, any analysis of investment performance must incorporate both elements of risk and return, or performance with risk adjustment.

The performance of the Islamic unit trust funds adjusted with risk will be assessed using indices based on the methods suggested in Capital Asset Pricing Model (CAPM). These indices are the Sharpe Index, Treynor Index and Jensen Alpha Index. Prior to computing the measurement of performance, we need to obtain certain essential values, which are relevant to the funds. These include the rate of returns of the funds, market portfolio and risk free asset as well as standard deviation and beta coefficient of the funds. Besides, we need to set a proxy to act as a comparison for the performance of the funds.

a. Assumptions
As the methodology of this study is based on the method suggested in Capital Asset Pricing Model (CAPM), several basic assumptions of the CAPM also have been made as follows:

1. All investors have full access to all information. As a result all investors have homogeneous expectations about risk and the returns characteristics of securities and portfolios;
2. Investors make decisions on the basis of the risk and returns characteristics of securities and portfolios;
3. Investors have identical time horizons;
4. The market is perfect;
5. A risk-free asset exists and investors can borrow and lend unlimited sums of money at the risk-free rate of interest.

b. Proxy of the Measurement

To measure the performance of the Islamic unit trust funds, we need certain index to act as a proxy for comparison. In our study, the fund performance is at best compared with the market portfolio performance in term of the associated risk and the expected returns.

Conventionally, the Composite Index (CI), which comprises 100 counters and the Emas Index, which comprises all the main board counters in the Kuala Lumpur Stock Exchange (KLSE), are assumed to be the best barometer of the overall stock market performance of the KLSE. While Composite Index has long been the main
barometer of the market performance, Emas index was only devised and launched in 17 October 1991 as the overall counters benchmark. Besides that, sectoral indices are also available to track movements of similar type of counters of the same business activity.

However, since we are evaluating the performance of Islamically managed funds, we are interested in the index or market portfolio benchmark that specially attributed to those counters in KLSE which operation and business activity are certified as in compliance with Islamic principles. As discussed in the previous chapter, in Malaysia, we have two indices that act as a benchmark for market portfolio of the syanah approved securities or halal stocks. The first index is the KLSE Syanah Index introduced by KLSE in early 1999.

The other index namely the RHB Islamic Index was launched by stock broking firm Rashid Hussain Bhd. in May, 1996. This value-weighted index used 1992 as the base year. It provides the avenue for institutions especially Islamic unit trust funds that invest according to Islamic principles track performance more accurately. Since we are evaluating the performance of Islamic unit trust funds from 1993, the RHB Islamic Index is the most appropriate barometer to be used in this study as the proxy for the market portfolio.

In addition to that, we also need an index to be a proxy to show the degree of excess returns associated with excess risk within a certain fund. As we know, in the conventional theory of investment, investors want to invest in unit trust funds or stock
market, which contains risk because they want to gain excess returns which bear extra risk. Otherwise they might prefer to invest in some form of risk-free assets to gain some minimal interest without bearing any risk. In this case, the closest approximation to the rate of returns of risk-free asset is the 90-day Treasury Bills of Bank Negara Malaysia.

However, interest is strictly prohibited in Islam. In addition to that, in line with fiqh maxims in Islamic syariah, there is no such thing as a risk free return. Nevertheless, starting 1983 the Malaysian government had introduced certificates that are in line with the syariah, namely the Malaysian Government Investment Certificate (GIC). It was introduced under the concept of Al-Qardhul Hasan (interest-free loan given mainly for welfare purposes). The purchases of these certificates are considered as a benevolent loan to the government for national growth and development. Since non-interest bearing loan is given mainly for welfare purposes, the provider of funds will not receive any promised returns on its investment except its principal amount at maturity. However, the borrower being the government has always provided returns to the investors as a gift (Al-Hibah), as a token of appreciation. The rate of return is absolutely at the discretion of the government.

Thus, the Government Investment Certificate (CIC) rate of gift is the more appropriate rate to be used as the proxy here for the measurement of Islamic unit trust funds. However, it must be also noted that the Government Investment Act 1983 under which the GICs are issued, provides only GICs with maturities of one year or more to be issued. On top of that, the problems of readily accessible data on the relevant figures were also prevalent.
In the recent development, the issuance of GICs will use the concept of bay' al-inna' to replace the al-Qard al-Hasan. This transformation of contract used in the issuance of such certificates is to facilitate the transactions of the certificates by financial players in the secondary Islamic money market in Malaysia. Soon, with this transformation and the increasing transactions of such certificates in the secondary market, the rate of return on GICs will be made available and readily accessible.

But for the purpose of this study, due to the limitation of the rates of GICs mentioned above, the yield-to-maturity of the 3-months Treasury-bills of Bank Negara Malaysia will be used here as the proxy for the risk less rate of return.

c. Rate of returns

Monthly returns, adjusted for dividends and bonuses distributed to unit holders were computed for the nine and a half year period from January 1993 to June 2002. To serve as a benchmark, the RHB Islamic index was used as the proxy for the market portfolio of the Islamic unit trust funds.

The rates of returns of the funds and the market portfolio which are essential for the performance measurement are calculated as follows:

* Islamic Unit Trust Funds
\[ r_{i,s} = \frac{P_{i,s} + D_{i,s} - P_{i,s-1}}{P_{i,s-1}} \]  

(4.1)

where

\( r_{i,s} \) - monthly returns of the fund \( j \) during month \( t \)

\( P_{i,s} \) - net asset value of the fund at the end of month \( t \) measured by the manager’s buying price

\( D_{i,s} \) - dividend or bonus per unit paid by the fund during month \( t \) (assumes that dividends are reinvested at month end)

\* Market portfolio

\[ r_{m,s} = \frac{I_s - I_{s-1}}{I_{s-1}} \]  

(4.2)

where

\( r_{m,s} \) - monthly returns of the market portfolio \( m \) (RHB Islamic Index) during month \( t \)

\( I_s \) - level of the RHB Islamic Index at the end of month \( t \)

Sharpe and Cooper (1972) suggested that beta value would not change significantly if dividend yield of the market portfolio were excluded. Therefore in this case, estimated dividends received by the market portfolio are omitted.

As specified earlier in the previous section, the Capital Asset Pricing Model (CAPM) assumes that all investors have horizon periods of identical length. This implies that all trading in the market takes place only at the beginning and end of this horizon
period. This is not realistic as trading in the market takes place almost continuously and investors therefore have different and overlapping horizon periods. Jensen (1969) showed that the CAPM holds for any arbitrary length of time as long as the returns are expressed in terms of the proper compounding interval. This horizon interval is infinitesimally small, that is instantaneous and that the natural logarithm form of the returns provides a very good approximation of reality. The equations (4.3), (4.4) and (4.5) shown below for calculating the rates of return for the sample of 13 Islamic unit trust funds are based on this continuously compounded method as adopted by Michael Jensen (1968):

\[ R_{t,t} = \log e \left( \frac{P_{t,t} + D_{t,t}}{P_{t,t-1}} \right) \]  \hspace{1cm} (4.3)

\[ R_{r,t} = \log e \left( \frac{I_t}{I_{t-1}} \right) \]  \hspace{1cm} (4.4)

\[ R_{f,t} = \log e (1 + r_{f,t}) \]  \hspace{1cm} (4.5)

where

\( R_{t,t} \) - monthly continuously compounded rate of return of the \( j \)th Islamic unit trust during the month \( t \)

\( P_{t,t} \) - NAV per unit for Islamic unit trust \( j \) at the end of month \( t \)

\( D_{t,t} \) - dividend per unit paid by Islamic unit trust \( j \) during month \( t \)

\( R_{m,t} \) - estimated monthly continuously compounded rate of return on the market portfolio \( m \) for month \( t \)

\( I_t \) - level of RHB Islamic Index at the end of month \( t \)
$R_{jt}$ - monthly continuously compounded yield-to-maturity of 3-month Treasury bills for month t

$r_{jt}$ - the yield-to-maturity of 3-month Treasury bills for month t

d. **Measurement of Risk**

Two measures of risk are used for the analysis in this study, namely the *standard deviation* of the historical returns of the studied funds and the *beta coefficient* of the funds’ returns vis-à-vis the market portfolio. In other words, we are measuring the dispersion of the funds’ returns. The more disperse the returns, the more risky is the fund and *vice versa*, less dispersion implies lesser risk.

i. **Standard deviation of returns**

The first measure is the standard deviation of historical returns. It is a measure of the total risk of a portfolio or fund, both the systematic and unsystematic risk. The standard deviation $\sigma_j$ is the positive square root of the variance. The formula is as follows:

\[
\sigma_j = \left\{ \frac{\sum_{t=1}^{N} (R_{jt} - \bar{R}_j)^2}{N-1} \right\}^{0.5}
\]

(4.6)

$\sigma_j$ - standard deviation

$R_{jt}$ - rate of returns of the fund during month t

$\bar{R}_j$ - mean of the rate of returns for the fund j
$N$ - number of observations

ii. Beta Coefficient

The second measure of risk is the beta coefficient, $\beta$ of the Islamic unit trusts, which is based on the CAPM developed independently by Sharpe (1964) and Lintner (1965). Beta is a measure of systematic risk. It measures the sensitivity or the volatility of a stock or fund relative to the market movement. The beta for the overall market portfolio is always equal to 1. A stock with a value of beta greater than 1 means a stock or portfolio is more volatile than the overall market portfolio and therefore it is considered more risky than the market portfolio. On the other hand, stocks or funds with beta of less than 1 are considered to be less risky than the market portfolio. In this study, we are going to find out the beta value or volatility of the studied funds' movement against the market proxied by the RHB Islamic Index.

According to CAPM, under the equilibrium market condition, the risk premium (beta) for any stock or fund is related to the risk premium of the market portfolio in the following formula:

$$R_{j,t} = \alpha_j + \beta_j R_{m,t} + e_{j,t}$$  \hspace{1cm} (4.7)

where

$R_{j,t}$ - monthly returns of the fund $j$ in month $t$

$\alpha_j$ - regression intercept

$\beta_j$ - measure of the systematic risk or commonly known as beta coefficient

$R_{m,t}$ - monthly returns of market portfolio $m$ in month $t$
\( e_{i,j} \) - regression random error term of Islamic Unit Trust, \( j \) in month, \( t \)

The beta coefficient of the fund is obtained by regressing the monthly returns of the fund on the monthly returns of the market portfolio represented by the RHB Islamic Index.

e. Investment Performance Indices

After obtaining the rates of returns, the values of standard deviation, beta coefficient and other relevant values of the respective funds, we calculate, evaluate and rank the performance of the funds by using the Sharpe Index, Treynor Index and Jensen Alpha index.

i. Sharpe Index (SI)

The Sharpe Index was introduced by Sharpe (1966) who calculated a reward-to-variability index for 34 mutual funds for the period from 1954 to 1963 and compared the values with that obtained from the Dow Jones Industrial Average (DJIA). This index can be calculated as:

\[
SI = \text{Risk Premium/Total Risk}
\]

\[
SI = \frac{\bar{R}_j - \bar{R}_f}{\sigma_j}
\]  \hspace{1cm} (4.8)

where

\( \bar{R}_j \) - average returns of the fund over the evaluation period.
\( \bar{R}_f \) - average risk-free rate over the evaluation period estimated from the yield-to-maturity of 3-month Treasury bills

\( \sigma_f \) - standard deviation of returns of the fund.

This index measures the risk premium of the fund relative to the total risk (measured by standard deviation) in the portfolio. In other words, it measures the ratio of the returns to the associated risk. But it must be made clear that in the Sharpe Index, the returns refer to the excess returns earned by a fund, that is, the difference between the actual returns of the fund and the rate of returns of the risk-free asset (YTM of the 3-month Treasury bills).

However, Miller and Gehr (1978) found that the traditional Sharpe Index was biased. Subsequently, Jobson and Korkie (1981) overcame this problem by introducing the Adjusted Sharpe index (ASI). It is given by the following equation:

\[
ASI = SI \left( \frac{N}{N + 0.75} \right)
\]  

\( ASI \) - Adjusted Sharpe Index

\( SI \) - traditional Sharpe Index

\( N \) - number of return intervals in the evaluation period

The greater the Adjusted Sharpe Index for the fund, the better the performance of the fund and vice versa. Besides, we also measure the Adjusted Sharpe Index for the market portfolio. Hence, by comparing the Adjusted Sharpe Index for the fund with the
Adjusted Sharpe Index for the market portfolio, it will indicate whether the fund has over performed or under performed the market.

ii. **Treynor Index (TI)**

Treynor (1965) developed another reward-to-volatility index as a variation of the Sharpe Index but served the same purpose. The difference between Sharpe Index and Treynor Index is that Treynor defined returns just as a return and not excess return. Secondly, Sharpe assumed the risk as total risk but Treynor assumed that all the unsystematic risk has been eliminated and only systematic risk remained. So the Treynor index is measured by beta coefficient of the funds and not measured by standard deviation of the returns, which is applied in the Sharpe Index.

The calculation of the Treynor Index is given below:

\[
TI = \frac{\bar{R}_j - \bar{R}_f}{\beta_j}
\]

where

\(\beta_j\) - beta coefficient of the fund

As in the case of the Adjusted Sharpe Index, a greater Treynor Index of a fund shows a better performance of that fund and vice versa. Likewise, the comparison of the Treynor Index for the fund with the Treynor Index for the market portfolio will indicate whether the fund has over performed or underperformed the market.
iii. **Jensen Alpha Index**

Jensen Alpha Index is used to measure the rate of the excess returns achieved by the funds. The formula is given below.

\[ R_{j,t} - R_{f,t} = A_j + \beta_j \left( R_{m,t} - R_{f,t} \right) + u_{j,t} \]  \hspace{1cm} (4.11)

where

- \( A_j \) - Jensen's Alpha of the fund obtained from the regression intercept
- \( \beta_j \) - regression slope coefficient
- \( R_{f,t} \) - risk-free rate estimated from YTM of the 3-month Treasury bills
- \( u_{j,t} \) - residual risk premium for \( j^{th} \) Islamic unit trust Fund at time \( t \) which is unexplained by the regression, \( E(u_{j,t}) = 0 \)

A positive alpha value indicates that the fund has achieved higher returns than the market portfolio (with the same degree of riskiness) and vice versa.

However, the traditional Jensen Alpha Index does not allow for the comparison of performance of the funds with different levels of systematic risk. To adjust for the systematic risk, the *Adjusted Jensen Alpha Index (AJA)* is computed. It is given by

\[ \text{Adjusted Jensen Alpha} = \frac{A_j}{\beta_j} \]  \hspace{1cm} (4.12)

f. **Objectives of Unit Trust Funds**
Normally a unit trust fund will state its objectives in its advertisement or prospectus to provide potential investors with qualitative guide in selecting a fund. These objectives will indicate the risk and returns that can be expected from the fund. Coates (1978) classified qualitatively the funds into six types according to their stated objectives. While based on empirical findings, McDonald (1974) related the risk level (Beta) that should adhere by the types of funds. The definition of the fund objectives and their level of risk adhered are given below:

<table>
<thead>
<tr>
<th>Fund Objective</th>
<th>Definition</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Fund</td>
<td>Provides a liberal a current income from investment as possible</td>
<td>0.55</td>
</tr>
<tr>
<td>Balanced Fund</td>
<td>Minimise risk and at the same time retain some possibilities for long term growth and current income</td>
<td>0.68</td>
</tr>
<tr>
<td>Income Growth fund</td>
<td>Slightly more emphasis on current income than on growth</td>
<td>0.86</td>
</tr>
<tr>
<td>Growth-Income</td>
<td>Fund emphasise growth more than current income</td>
<td>0.90</td>
</tr>
<tr>
<td>Growth Fund</td>
<td>View income as only a secondary or incidental objective</td>
<td>1.01</td>
</tr>
<tr>
<td>Maximum Capital Gain Fund</td>
<td>Pay low or no dividends and invest in risky stocks</td>
<td>1.22</td>
</tr>
</tbody>
</table>

Source: Coates (1978) and McDonald (1974)

However, local funds especially Islamic funds normally do not define their fund objectives specifically. Based on the information available, the funds in this study are classified into five categories, i.e., income fund, balanced fund, Income-growth fund, growth-income fund and Growth fund. In general terms, basically growth funds should achieve the highest returns (mean returns) through capital gain and adhere to higher risk level (higher Beta value). On the other hand, growth-income funds will emphasise on capital appreciation but at the same time try to provide income with above average risk level. Income-growth funds will provide investors with a source of income at lower risk level with a potential medium to long-term capital growth. Subsequently, balanced fund will try a balance between capital appreciation and current income with much lower
risk while the income fund provide regular current income with the lowest level of risk of all the groups.

The adherence of risk level (Beta) and the ranking of returns (mean returns) of these five types of funds empirically should be as given below:

i. **Beta value**: growth fund > growth-income fund > income-growth fund > balanced fund > income fund

ii. **Mean returns**: growth fund > growth-income fund > income-growth fund > balanced fund > income fund

By comparing the ranking of beta values and mean returns of the funds, one can determine if the fund managers adhere to their funds' stated objectives.

g. **Degree of Risk Diversification**

A good fund manager will always try to minimise the portfolio risk by diversifying into a large number of securities. The degree of risks diversification of a fund may be measured by the *Coefficient of Determination, R-square*, of the regression by regressing the return of the Islamic unit trust on the return of the market. A R-square value of zero indicates that there is no risk diversification and a R-square value of 1 indicates perfect risk diversification.
h. Consistency of Performance over Time

Sometimes certain fund managers manage to produce good results for a year or two merely based on chance. Over time, their performances are inconsistent. Only those superior fund managers are able to produce a consistent performance in the long run. To find out the consistency of performance of the fund, the Spearman Rank Correlation Coefficient \( R_s \) is calculated for each pair of years, i.e., July 1996/June 1997-July 1998; July 1997/June 1998-July 1999; July 1998/June 1999-July 1999/June 2000; July 1999/June 2000-July 2000/June 2001; and July 2000/June 2001-July 2001/June 2002. The test of significance of \( R_s \) is then carried out using the t statistic. The formulas are:

\[
R_s = \frac{1 - 6\sum d^2}{n(n^2 - 1)}
\]  

(4.13)

\[
t = \frac{R_s (n - 2)^{0.5}}{(1 - R_s^2)^{0.5}}
\]  

(4.14)

with \((n - 2)\) degrees of freedom

where

- \( d \) - difference between ranking of year 1 and year 2
- \( n \) - number of paired observations