Chapter 3

RESEARCH METHODOLOGY

This chapter outlines the methodology used in the study. An overview of the methodology is first given. The chapter then discusses in some detail the sampling and data collection procedures, the selection of the measurement scales and the statistical techniques used to analyse the data collected.

3.1 AN OVERVIEW

The study is an ex post facto design. Primary data were collected by means of questionnaires administered either by the researcher himself or by the managing directors of engineering consulting firms. Data were collected only from consulting engineers working in the Klang Valley.

The survey questionnaire consisted of two parts from which variables were extracted for statistical analysis. These variables were the Seven Habits and demographic data. The measurement scales used in the study were adopted from the Personal Leadership Application Workbook issued by the Covey Leadership Center.

Once the data had been collected, the statistical package for the Social Sciences (SPSS) programme was used to analyze and summarize the data. Tests were first carried out to assess the reliability of each habit scale as well as the combined habits scale. Multiple regressions were then conducted to determine the relationship between each of the habits, as well as the combined habits, and the demographic data. The habits were considered the dependent variables, while the demographic data were considered the independent variables. Finally, crosstabulation, anova and the t-test were used to gather additional information.

3.2 SAMPLING AND DATA COLLECTION PROCEDURES

The sampling frame comprised consulting engineers who were employed by engineering consulting firms located in the Klang Valley which were registered either with the ACEM or the BEM. Steps were taken to avoid double counting as some consulting firms were registered both with the ACEM and the BEM.

Primary data were collected by means of the following procedure:-

i) the managing directors of the engineering consulting firms selected from the sampling frame were first approached and then requested to distribute the questionnaires to the consulting engineers employed by them; and

ii) the consulting engineers employed by these firms were asked to return the completed questionnaires either to the managing directors (from whom the

questionnaires were then collected) or to the researcher via the mail by a specified date.

3.3 MEASUREMENT SCALES

The constructs measured in the study were the Seven Habits. The measurement scales for the constructs were adopted from a preset questionnaire obtained from the Covey Leadership Center. The questionnaire itself consisted of two parts, as follows.

Part I of the questionnaire comprised the measurement scale of the Seven Habits. The Seven Habits were extracted from the Personal Leadership Application Workbook used by Covey (1989) in his study on the practice of the Seven Habits. The original questionnaire consisted of 27 items, of which only 21 were found to be relevant to this study. The 21 items could be divided into 7 parts, each consisting of 3 items. Each part constitutes a habit The respondents were asked to select a response scale that best reflected how well they performed in each item. The response scale ranged from "1" for "Very Poor" to "6" for "Outstanding". The score for each habit was then totalled and compared with the preset index shown below.

Score for each habit	Category
3	Very Poor
6	Poor
9	Fair
12	Good
15	Very Good
18	Outstanding

Part II of the questionnaire comprised the measurement scale of personal data as well as the data on the firm concerned. Demographic data were used as independent variables to test interdependency as well as the relationship between the demographic variables and the practice of each of the habits.

3.4 DATA ANALYSIS PROCEDURE

The data collected were analysed according to the procedure described below.

3.4.1 Editing, Coding and Data Entry

Editing, coding and data entry were carried out prior to analysing the data. The purpose was to ensure that all codes were complete, consistent, legitimate and free from error.

3.4.2 Summary Statistics

The "frequency" subprogram was used to examine the data entered and to identify any coded values wrongly keyed in. Such values were considered as 'missing values' and were excluded from the statistical analyses. The "frequency" subprogram was also used to provide an overview of the respondents' demographic backgrounds.

3.4.3 Reliability Test

All the items on the habits were subjected to a reliability test. The reliability test was first conducted on all the items in each habit; then, all the items in the first part of the questionnaire were tested for overall reliabililty.

Reliability is the degree to which measures are free from error and therefore yield consistent results. It is a necessary but not a sufficient condition for the validity of a scale. Unreliable measures reduce the correlation between the items. The coefficient of reliability (alpha) is used to asses the reliability of a measure. This value ranges from 0 to 1.0, with 1.0 being a measure of perfect reliability and 0 being perfectly unreliable.

The method used in the study to test reliability was the 'internal consistency' method using Cronbach's Coefficient Alpha. Internal consistency measures assess the

homogeneity of a set of items where Cronbach's Coefficient Alpha determines the mean reliability coefficient for all possible ways of splitting a set of items in half.

As this study is essentially exploratory in nature, a minimum alpha value of 0.5 was adopted. This is based on Nunnally's guideline on the necessary value of alpha of a scale for exploratory research. A minimum alpha value of 0.8 is required if it is for basic research (Davis and Cosenza 1988).

The validity of the questionnaire is not known. It is assumed to be valid as it has been used elsewhere by the Covey Leadership Centre when conducting research.

3.4.4 Multiple Regression Analysis

Multiple regression analysis was conducted on each of the habits as well as all the habits combined (Total Habits) to determine the relationship between them and the demographic variables.

Multiple regression analysis is a general statistical technique used to analyse the relationship between a single dependent variable and several independent variables. (Hair, Anderson, Tatham and Black 1992). Multiple regression analysis helps answer the following questions:-

i) Can a linear composite of the independent variables that compactly expresses the relationship between a dependent variable and the set of predictors be found?;

ii) If so, how strong is the relationship between the values of the dependent variables and the values of the linear composite?;

iii) Is the overall relationship statistically significant?; and

iv) Which predictors are most important in accounting for variations in the dependent variable?

In this study, only stepwise regression was used as it could help build the 'best' regression model. Here, the independent variables entered the regression equation one at a time. The purpose is to find the smallest subset of independent variables that will account for most of the variations in the dependent variable. Care was taken to avoid multicollinearity. For example, in this study, the variable "Number of Years Working" was found to be highly related to the variable "Age" and therefore was excluded out from the regression analysis.

Essentially, this study investigates which demographic variables (independent variables) significantly influence each of the habits as well as the combined habits of the respondents

3.4.5 Crosstabulation

Crosstabulation was carried out to assess whether there was any significant relationship between the practice of the habits and the demographic variables of the respondents.

Crosstabulation is a technique which organises data by groups, categories or classes and thus facilitates comparisons between different groups. It is a joint frequency distribution of observations on two or more sets of variables.

The calculation of percentages helps the researcher understand the nature of the relationship by making relative comparisons. Percentages are always computed across the dependent variables.

Chi-square analysis was used to determine whether the observed association between the variables was statistically significant, i.e. whether the variables were dependent or independent of each other.

The null hypothesis used was H_0 : $\Pi_1 = \Pi_2 = \ldots\ldots \Pi_n$ (variables were independent)

as oppose to the alternative hypothesis where H_1 : $\Pi_1 = \Pi_2 = \ldots \Pi_n$ (variables were dependent).

An alpha value of 0.05 was chosen. This was the probability of making a Type 1 error i.e. the probability of rejecting the null hypothesis when the null hypothesis is true. The confidence level was therefore 0.95. The significance value (also referred to as a P-value) calculated from the sample was then compared to the alpha value. If the significance value was less than alpha (=0.05), the null hypothesis (H_o) would be rejected and the conclusion would be that the variables were related (and vice versa).

3.4.6 Comparative Analysis

Two statistical techniques were used in this study - the t-test and anova.

The test is a technique used to test the hypothesis that the mean scores on some interval or ratio scaled variables significantly differ for two independent samples or groups. It is used when the number of observations (sample size) in either group is small (less than 30) and the population standard deviation is unknown. To use the t-test, assumptions were made that the two samples were drawn from normal distributions and that the variances in the two populations are equal (homocedasticity).

The one-way analysis of variance (anova) is used to compare the means of two or more groups of population. The independent variable must be categorical (nominal or ordinal) and the dependent variable must be interval or ratio. The F-test is used to determine if there is more variability in the scores of one sample than in the scores of another sample. If the observed statistics (F value) is greater than the test value at

0.05 level of significance the conclusion is that there is a significant difference in the means of sample groups.

In this study, anova was used to assess the effect of the demographic variables on the practice of effective habits. The T-test was used only as a check for the results of anova as the t-test is suitable only where the number of observations is less than 30.