

## **Chapter 3**

### **Research Methodology**

This chapter outlined the design and methodology used in this research. Questionnaire survey was used in this research. The use of a questionnaire eased the identification of the information useful to the planning and control activities.

#### **3.1 Research design**

A questionnaire was developed to measure user satisfaction. In this case, user satisfaction had been identified as the dependent variable for information system's success. The questionnaire design consisted of 27 items whereby 26 items were identified as independent variables and an additional item was used to rank the respondent's satisfaction of the information systems. The independent variables had been modified from Pearson and Alloway(1983). A composite instrument had been designed to meet the general need for assessing IS effectiveness. Both the composite-scale dimensional and single scale dimensional were also used in this research. A sample questionnaire is attached in Appendix V.

The questionnaire used a five-point "Likert scale" which was labeled from "very poor"(1) to "Excellent"(5). The middle scale (3) indicated "neutral" which was defined as "neither good nor poor" or equally good or poor for the system. The respondents were required to rank the attributes for the systems provided in their organization.

### **3.2 Data Collection**

Since primary data was required for this research, the data were gathered individually from various companies. A list of companies was obtained from the "Malaysian Manufacturers and Exporters", 1997 FMM Directory. The target population only include companies in Petaling Jaya and Shah Alam area.

Initial contacts were made by telephone to all the companies. However, only eight companies were willing to participate in this survey. The companies requested to be anonymous. The questionnaires were distributed to the companies that were interested to participate in this survey. One person was in charge with the distribution and collection of the questionnaires. The completed questionnaires were then collected personally from the respective companies.

A total of 20 to 40 questionnaires were distributed to each company. However only an average of 20 people from each organization responded.

### **3.3 Data Editing**

Questionnaires that were collected had to be edited and filtered before any analysis could be done on it. Editing was carried out to ensure completeness, consistency, and reliability of data. Missing data, outliers(extreme cases), and violation of statistical assumptions were investigated and corrected before applying statistical procedures.

Missing data is a serious problem for any research effort. Corrective measures must be taken if a large percentage of cases are found missing. In this study, no deletion of cases or estimation of missing value was necessary.

### 3.4 Data Analysis

The 'Statistical package of Social Science' (SPSS) program was used for analysis. The study used the mean score of each company's respondents to carry out the analysis.

$$\text{Mean} = \frac{\sum_{n=1}^{26} Q_n}{n}$$

Where, mean = mean score of the company  
Q<sub>n</sub> = score for question 1 to 27 except Q25  
n = number of question, in this study is 26

The mean score summarizes the central tendency of frequency distributions. However, it is also important to identify the tendency for observations to depart from the central tendency. In addition, the study used standard deviation method to calculate a measure of variability that will give a quantitative index of the dispersion of the distribution.

$$\text{S.D.} = \sqrt{\frac{\sum_{n=1}^{26} (Q_i - \bar{Q})^2}{n-1}}$$

Where, S.D. = standard deviation of the company  
Q<sub>i</sub> = score for question 1 to 27 except Q25  
 $\bar{Q}$  = mean score for the company  
n = number of question, in this study is 26

The data in this study was divided into four main categories:

#### a) Respondents profile

The tools used to analyze this data were frequency distribution, cross-tabulation and Chi-square. Frequency distribution used to organize a set of data by summarizing the number of times a particular value of variable occurred. In this

study, the number of respondents for various companies; the age, education and position/designation were summarized. Cross-tabulation was used in this study to analyze the respondents characteristics by age, education and position. In addition, Chi-square test was used to test for significance in the analysis of frequency distribution.

The frequency calculation was used to analyze the respondents demographic profile, such as the distribution of their age, position and education. Cross tabulation together with Chi-square was used to determine if there was any relationship among the different groups in respect of age, education, and position/designation, to the level of user satisfaction. For the purpose of this research, the significance level was set at the confidence level of 0.05.

b) Validity of the data

A questionnaire's validity is the extent to which the questionnaires actually captures the concepts it purports to measure. In order to gain a better understanding of the perception scores, a factor analysis was performed. The factor analysis allows examination of the underlying structure of the measure and was used to construct validity.

*Factor Analysis*

Factor analysis is a way of reducing data by finding a small number of underlying dimensions that explain a large number of items. There are many ways of doing factor analysis and related procedures. This study uses the most commonly approach, that is, the rotation approach. Rotation approach attempts to put the factors in a simpler position with respect to the original variables, which aids in the interpretation of factors. Rotation places the factors into positions that only the variables which are distinctly related to a factors will be associated. This study uses VARIMAX rotation to extract the factors. VARIMAX rotation tries to find clusters of items that go together and that can be differentiated from other cluster. The study sets to extract factor that has eigenvalue greater than unity. The eigenvalue is the sum of squared factor loading for each factor. An aid to knowing where to stop is to use the scree plot. This plot shows the eigenvalue of

each component number. A scree plot comes from geology where you look at the side of a steep hill and avoid the rubble that slides down to the bottom edge of hill.

In this study, there were a total of 26 input variables that had to be extracted. The first extracted factor typically accounts for the largest part of the total variance. VARIMAX converged in a maximum of 20 iterations to extract the factors that has eigenvalue greater than unity. The total user information satisfaction score was determined by the mean scores of the 26 scales. These mean scores also determine as a comparison among the factors and users' perception for the companies.

c) Reliability analysis

The reliability test was conducted to test the internal reliability of the data. Reliability refers to the degree whereby the measures are free from errors and therefore able to yield consistent result. Coefficient of reliability (Alpha) was used to assess the reliability. Alpha value ranges from 0 to 1.0 whereby 0 is considered as perfectly unreliable and 1.0 as perfectly reliable.

d) Effectiveness measures.

Effectiveness measures were used to examine how IS rank in respect of the expectation of the systems and the composite of the attributes. The composite instrument was designed to meet the general need for assessing IS effectiveness, to reflect the perception that certain issues such as database technology, steering committees and strategic planning must be addressed in today's information system arena. The coefficient of determination calculated by squaring the correlation coefficient (R square) was performed to analyze the relationship of Q25(single scale question) and was correlated to the overall measurement. The correlation coefficient measures the strength of the linear association between two variables. An adjusted R-squared, which take the size of the sample into effect, was used in this study.

### **3.5 Problems Encountered in this Research**

The main problem encountered was to get a sufficient number of companies to participate in this survey. Some companies did not want to participate due to their information system investment which was still in the infancy stage. This also meant that there was still a lot of room for expansion for the information system in its effort to improve efficiency in an organization.

Another problem faced was that, some respondents have difficulty interpreting the questionnaire which was presented in English.

This survey only utilized convenience sampling due to the constraints of time, budget and man-power ability.