

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the operationalization of the research variables, context and sample by adopting the revised D&M IS Success Model (Delone & McLean, 2002) explained in the earlier chapter. Also outlined is the development of hypotheses, sampling design, data collection procedure and data analysis technique used in the study.

Recognizing the complexity to measure IT success by quantifying the returns for each IT investment decision, this study thus to measures the relationship between system quality, information quality, service quality and user satisfaction. User satisfaction typically focuses on the successful interaction between the IS itself and its users. This is related to sum of one's feelings or attitudes a variety of factors affecting that situation. System quality typically focuses on the processing itself, measuring its performance in terms of productivity, throughput and resource utilization. On the other hand, information quality focuses on measures involving the IS output, typically the reports produced. Meanwhile service quality focuses on service consistency, reliability, timeliness, empathy, assurance, and accuracy or adequacy.

3.2 Research Framework

The primary research model used for this study is the revised D&M IS Success model (DeLone & McLean, 2002). It is a causal model that depicts the different dimensions affecting user satisfaction, and from thereon the net impact of IS success on individuals, workgroups, organizations and society as a whole. The secondary model is the Expectation Confirmation Theory (ECT) which is used as the approach in the data analysis section. Data from the survey results is analyzed to gauge the level of importance placed upon each of the twenty eight measures related to the identified IS attributes. Subsequently, the same data set is analyzed to identify the actual performance of the same twenty eight measures. The main objectives then would be to identify the key IS attributes perceived to be most important amongst the Pahang State Education Department end-users and whether the current performance is up to their expectations. In summary the research model can be visualized as follows:

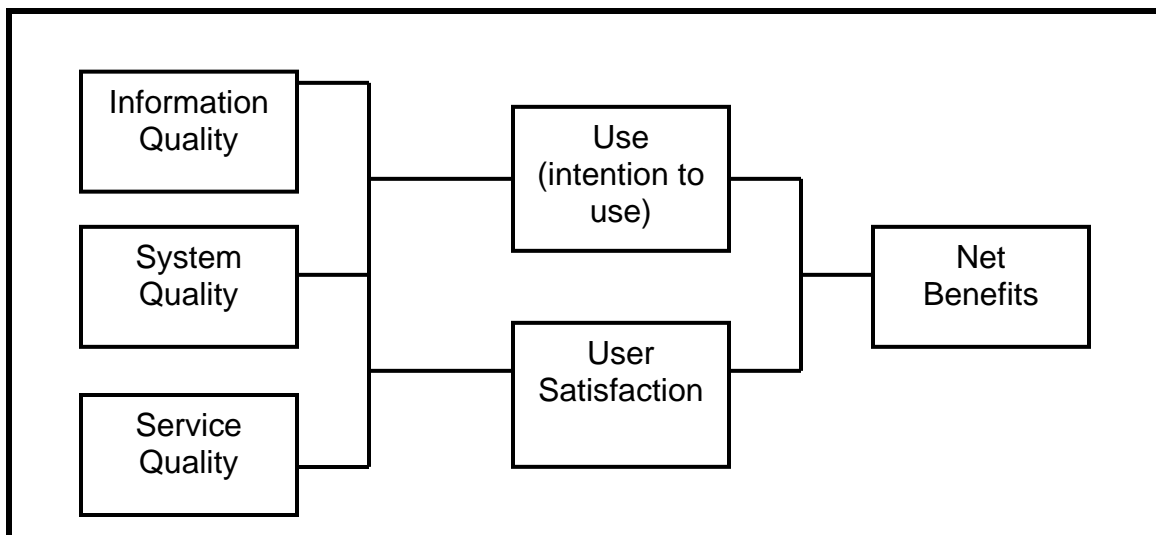


Figure 3.1

Research model (DeLone and McLean, 2002)

This study adopted the DeLone and McLean (2002) upstream model of information systems success. Two measures from the DeLone and McLean upstream model are excluded: use and net benefits. Firstly, the usage variable is omitted on account that the measurement of usage in the past has raised various complexities. Although perceived usefulness has been used in previous studies to replace use where this variable has shown to influence user satisfaction, this study has dropped the perceived usefulness variable. Information quality and system quality variables have been shown to refer to object-based beliefs where usefulness and ease of use were referred to as behavioral beliefs. On the other hand, system satisfaction was referred to as object-based attitude. Thus, based on Wixom and Todd (2005), mixing object-based beliefs and behavioral beliefs appears to potentially lead to a conceptual flaw in the information systems success model. Hence the decision to drop the perceived usefulness construct. Secondly, the net benefits are dropped as the study was confined to only internal end-users' perspective. Thus the theoretical framework is, as below:

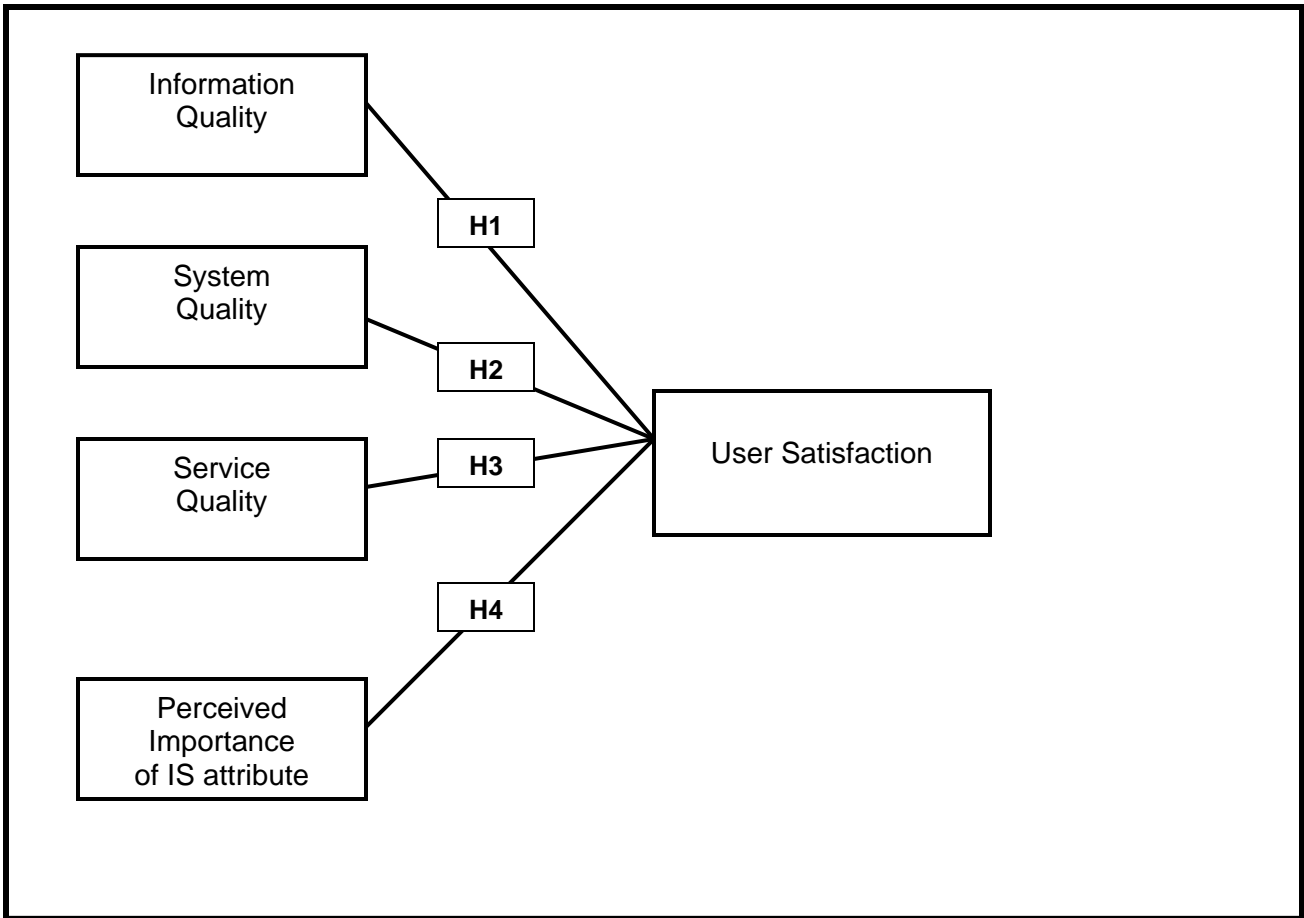


Figure 3.2
Theoretical framework (adapted from D&M, 2002)

3.3 Hypotheses Development

3.3.1 User Satisfaction

User satisfaction (US) is often used as a surrogate measure of information system effectiveness. User satisfaction typically focuses on the successful interaction between the IS itself and its users. This is related to sum of one's feelings or attitudes a variety of factors affecting that situation. Doll and Torkzadeh (1988) defined satisfaction as the "affective attitude towards a specific computer application by someone who interacts with the application directly". This definition was more specific to the application in use and dealt directly with its attributes which impacted the users' satisfaction level. Ives et al (1983) focused on the IS ability to meet the end-users' needs which is defined as "the extent to which the users believe the information system available to them meets their requirement". Bailey and Pearson (1983), on the other hand, adopted a more general definition borrowing from the psychological definition and covered areas including staff and service, information product, vendor support and user involvement.

Seddon and Kiew (1996), Fan and Fang (2006), tested the D&M model and found substantial support for the relationship among system quality, information quality and user satisfaction. Ozkan (2006) highlighted that quality is contingent and resides in the user's perception of the product. This suggested that success

in understanding the end-user's satisfaction of IS s closely related to understand the definition of quality.

3.3.2 Information Quality

Information quality is concerned with such issues as timeliness, accuracy, relevance and format of information generated by an information system. Information is power and when it falls in the wrong hands, an organization's competitive advantage can be severely compromised. Similarly, users are becoming increasingly concern with information integrity. This is defined as the condition in which information or programs are preserved for their intended purpose; including the accuracy and completeness of information systems and the data maintained within those systems.

If the information presented is deemed inaccurate, misleading or biased, users will not be inclined to use the system. Therefore, high confidence level in the information presented is important. If confidence level is particularly low, users will find themselves spending more time to justify or verify the information, instead of applying the insights gathered for decision-making. This simply means ensuring that the data presented is "fit for use", that it meets the underlying objectives (Tayi & Ballou, 1998). Additionally, data quality can be measured by its accuracy, completeness, consistency and timeliness (Ballou & Pazer, 1985).

Findings from previous research indicated that information quality is positively related to user satisfaction when regarding PDA solutions and general information systems (Ellingsen, 2002; Delone, 1992; Delone, 2003; Almutairi, 2005; Rai, 2002). Jung (2007) also found that there is a correlation between information quality and user satisfaction. Therefore, it is hypothesized that user satisfaction is correlated with information quality hence the first hypothesis is:

H1: There is a significant relationship between information quality and user satisfaction.

3.3.3 System Quality

System quality in the internet environment is concerned with usability, availability, reliability, adaptability and response time. According to Rolden & Leal (2003), system quality refers to the desired characteristics of the IS itself, which produces the information and it is related to the quality of IS output. Delone (2003) and Aasheim (2007), among others, highlighted that system quality is recognized by technical features regarding the network and the IT equipment itself. Therefore, some of the fundamental facets of the system quality found in the previous research addressed features like reliability, response time, and accuracy, ease of integration, flexibility and functionality as fundamental of system quality (Hu,2003). Roldan Leal (2003) found that, system quality of the

executive IS exerted a significant positive influence on end-user satisfaction. Since system quality has a significant effect on end-user satisfaction, it is therefore hypothesized that:

H2: There is a significant relationship between system quality and user satisfaction.

3.3.4 Service Quality

Users want more than just a machine; rather they seek a system that satisfies their personal computing needs. They seek support, proactive intervention and creative solutions to everyday problems which can be solved by technology. Accordingly, the IS staff should recognize their role beyond a service provider or problem solver. The IS staff should work closely with the users, understand their exact roles and task objectives and develop an appreciation for the business process.

The IS department's ability to supply installation assistance, product knowledge, software training and support, and online help is a factor that will have an impact on the relationship between IS and users. Superior technical competency exhibited by the IS staff can help increase users' confidence level and the perception that solutions rendered are of the highest quality.

In addition, user-friendliness of the support rendered by the IS staff is also important in determining service quality. This factor reflects the ability of the IS staff to exhibit empathy and subsequently develop solutions that solve end-user problems. It is not surprising to see sometimes, where empathy is lacking, the relationship between the IS staff and the end-users can border along the lines of abusive.

The relationship of service quality and end user satisfaction has attracted considerable interest from researchers in the field of IS (Delone, 2003; Luarn, 2005; Hsu, 2002; Hussein, 2005; Kim, 2005) and has long been recognized as playing a crucial for both the successful use of the firm's IS and company performance, which strengthens company survival in today's competitive market. They found that there is a positive correlation between service quality and user satisfaction concerning information systems (Delone, 2003; Luarn, 2005; Kim, 2005). Chung & Dauw (2009) also found that service quality has the most influence on user satisfaction in Health Information Systems (HIS) quality. It is then hypothesized that:

H3: There is a significant relationship between service quality and user satisfaction.

3.3.5 Perceived importance of IS effectiveness and the actual performance of IS

Martilla and James (1977) was first introduced the framework to assist in understanding customer satisfaction as a function of both expectations concerning the significant attributes (“importance”) and judgments about their performance (“performance”). Past research has also concluded that the IP analysis is appropriate for use in the IS context, applicable in various industries and within different IT infrastructure settings (DeLone and Niederman, 2002, Kophamel and Richardson, 2001).

Like most models dealing with expectancy theories, IS researchers apply them to help understand the link between users’ attitude and behaviour. In this case, the expectancy theory aims studies the strength of a tendency to act in a certain way, depending on the strength of the expectation that the act will be followed by a given outcome, and on the attractiveness of that outcome to the individual (Robbins, 2003). Additionally, research has shown that people seek consistency among their attitudes and between their attitudes and behaviour (Elliot and Devine, 1994). When an inconsistency occurs, the individual will strive to align his attitude and behaviour, to the extent that he alters his attitude or behaviour, or develop a rationalization for the discrepancy. Applying this in the field of IS research, a user will develop certain expectations on the IT products or services used. In the event that his expectations are met or even exceeded, he will alter his attitude to expect more from the IT system and subsequently, increase his

usage level. In fact this reasoning was used by several IS researchers to predict decisions to use computers (Hill, Smith and Mann, 1987, and Goodhue, 1988). It is then hypothesized that:

H4: There is a significant relationship between the perceived importance of IS effectiveness and the actual performance of IS (surrogate for end-user satisfaction).

3.3.6 Demographic factors and end-user satisfaction

Certain user characteristics have been found to affect end-user satisfaction, deduced by the level of systems usage observed amongst different user groups. Harrison and Rainer (1996) indicated that there is a relationship between user satisfaction and age.

Job designation can affect end-user satisfaction since different roles and seniority level imposes different responsibilities upon the user. For instance, in an ERP implementation information and process requirements generally significantly benefit managers (Holsapple & Sena, 2003, 2005), thus, it is reasonable to expect that ERP satisfaction may be higher for managers than for others.

In terms of duration of employment, this study aims to see if newer employees are relatively easier to please compared to those who have stayed with the

organization for much longer. Therefore this study will examines the association between the end user demographic factors and the actual performance of IS (surrogate for end-user satisfaction).

3.4 Research Method and Design

Taking into consideration the factors specified in Chapter 2 earlier, a research framework for this study is developed based on the DeLone & McLean IS Success model originally developed by DeLone & McLean (2002) .

This study used questionnaire survey as the primary form of calling responses from end-users of information systems available in Pahang State Education Department. Survey approach was chosen because it provides quick, inexpensive, efficient and accurate means of assessing information about the population. Other research designs were not adopted because, first, manipulation of variables was not required as such experiment method was not appropriate. Second, there were not many studies have been done related to the research area particularly in public sector, thus, secondary data approach alone was not sufficient. Third, observation approach was not viable as there are many things that cannot be observed. Attitudes, opinions, motivations and other intangible states of mind of people cannot be recorded by observation.

3.4.1 Questionnaire Design

The survey instrument was three-page questionnaire attached as *Appendix 2*. The survey was outlined in the form of a questionnaire which contained two identical sets of IS attributes. In the first set, they are required to evaluate the actual performance of the same attributes. In the second set, the respondent is asked to evaluate the degree of importance placed upon each attribute. A five-point Likert scale was utilized to quantify their responses. The questionnaire included a demographic section to capture details pertaining to the respondents' background and employment experience.

The questionnaire consisted of three sections. Part A was designed to measure the actual performance of the same attributes. A 5-point Likert scale ranging from 1 (Very Poor) to 5 (Excellent) were used. For each statement, respondents were required to indicate their level of agreement to the statements. The statements measured constructs that were deemed relevant in measuring IS Performance. Amongst the construct measured were 'system quality', 'information quality', and 'service quality'.

In Part B, the respondent is asked to evaluate the degree of importance placed upon each attribute. When developing the questions for section A & B, the basic approach developed by Seddon & Kiew (1996) and Sherman (1997) were

adopted. Some questions were modified to suit the research context and local conditions particularly in public sector.

Part C was designed to obtain the demographic information of the respondents. The demographic variables measured were gender, age, working experience, highest level of education, job position, education background and year of employment in company. The variables were measured using a close-ended multiple choice format.

A pilot test of the questionnaire was performed to assess the validity and reliability of the questions to about 10 employees of Faculty of Business and Accountancy of the University of Malaya who had access to IT facilities and services. Feedback was then obtained as to the ambiguity and content validity of the questions used in this study. Changes were then made based on the feedback from the pilot test and final version of the questionnaire was then developed. The questionnaire was produced in two languages: English and Malay. The original English version of the questionnaire was translated into the Malay language, the national language of Malaysia, using the back-to-back translation method.

3.4.2 Sampling Procedure and Data Collection Method

A convenience sampling method was employed for the study. The sample was confined to employees at Pahang State Education Department (PSED) head quarters located in Bandar Indera Mahkota Kuantan Pahang. The questionnaires were distributed to employees who had access to its IT facilities and system within 10 sectors and units in PSED. All employees were involved in this study from lower level management and higher level management. They were asked about their experience and knowledge of using the systems in PSED.

In order to provide an adequate level of confidence in the study, a sample size of 300 was targeted. 417 questionnaires were distributed with the hope of obtaining at least 300 usable responses for analysis. The survey was conducted over a two week period in July 2009 using self-administered drop-off method. This method was chosen because it was less expensive in terms of manpower as well as time needed.

3.5 Data Analysis Techniques

The survey data was analyzed using SPSS (version 16). Firstly, descriptive statistics was employed to analyze the questionnaire data and help summarize the obtained findings. Frequency percentages and graphs were used to obtain summary statistics of respondents specifically their gender, age, number of years in employment and job designation. Secondly, reliability analysis was carried out to examine the reliability of the questions used, to ensure that they were significant to the data analyzed. The model used was based on Cronbach Coefficient alpha. Thirdly, regression analysis was carried out to test whether the mean of the dependent variable differs between the independent variables. Additionally, Pearson correlation analysis was used to describe the strength and direction of the factors extracted and to test the hypotheses. Fourthly, factor analysis is used to analyze qualitative observations and resolves them into distinct patterns of occurrence in accordance with the research objectives.

3.5.1 Descriptive Statistics

This study utilizes descriptive statistics to analyze the questionnaire data and help summarize the obtained findings. Frequency percentages and graphs were used to obtain summary statistics of respondents specifically their gender, age, number of years in employment and job designation.

3.5.2 Reliability Analysis

Reliability analysis was carried out to examine the reliability of the questions used, to ensure that they were significant to the data analyzed. The model used was based on Cronbach Coefficient alpha. The acceptable Coefficient alpha according to Smith and Kendall (1969) should be equal to or greater than 0.5.

3.5.3 Regression analysis

This test enables detecting significant differences between the treatments as a whole. This test was carried out to see if there are differences between the means at our chosen probability level. Additionally, Pearson correlation was used to test the coefficient correlation of two factors simultaneously. Multiple regression via a stepwise technique was conducted to test the amount of variance that can be explained by the factors and also to test if the factor is a good indicator for predictability.

3.5.4 Factor Analysis

Factor analysis is a multi-variate, data reduction technique. It is typically used to summarize a large number of variables with a small number of factors. In this study, factor analysis is used to analyze qualitative observations and resolves them into distinct patterns of occurrence in accordance with the research objectives.

In conclusion, this chapter explains the measures used to test the hypothesis developed from the literature review, describes the convenience sampling approach, explains the data collection process and elaborates on the techniques used for data analysis in SPSS version 16. All this provides a logical basis for the next chapter which deals extensively with the research findings.

3.5.5 Importance-Performance Analysis

From the survey data compiled, performance and importance means are calculated for each element and plotted, usually with performance along the x-axis and importance along the y-axis. The point coordinates for each item determine their placements on the grid. The two-dimensional grid results in a four quadrant matrix as shown in Figure 3.5.

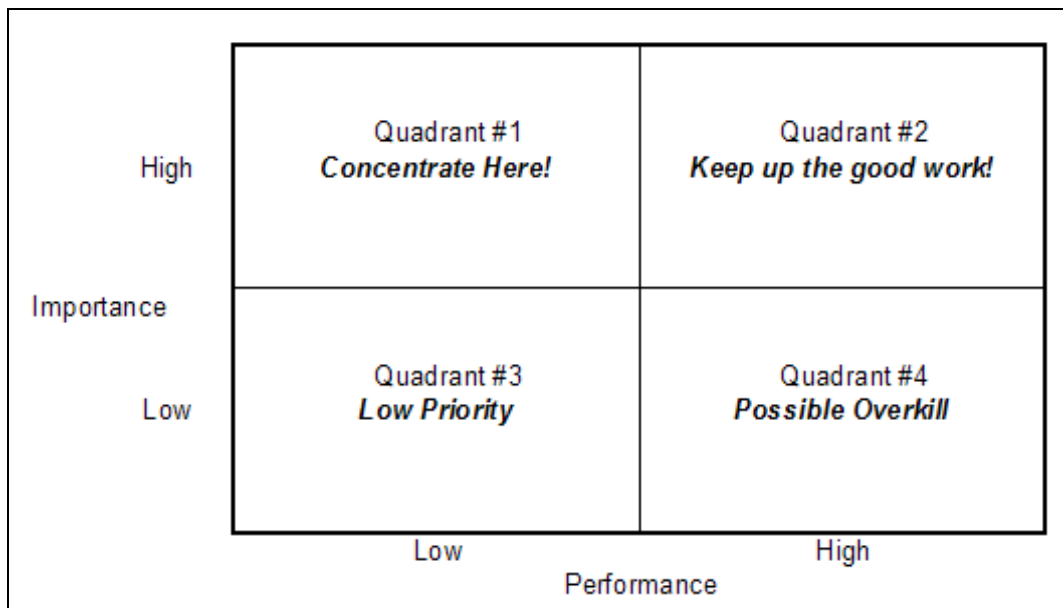


Figure 3.5

Importance-Performance Map (Martilla and James, 1977)

Items located in quadrant #1 (High Importance/Low Performance) is labeled “Concentrate Here”, indicating challenges which require urgent corrective action and thus should be given top priority. Items which fall in quadrant #2 (High Importance/High Performance) show existing strengths and should be maintained as is. For items which fall in quadrant #3 (Low Importance/Low Performance), if they do not pose a threat or potential points of failure, they may be considered for discontinuation of resources/effort. Thus this quadrant is labeled “Low Priority”. Items in quadrant #4 (Low Importance/High Performance) suggest insignificant strengths and the possibility that the resources invested here are better off diverted elsewhere.

Past studies have extended the IP Map to include an upward sloping, 45-degree line to highlight regions of differing priorities. It also known as the iso-rating or iso-priority line, where importance equals performance. This line also represents the optimal deployment of resources to meet the stated expectations as indicated by performance measures (Skok et al, 2001).

The literature describing the application of the IP analysis has demonstrated its usefulness and versatility, having been used to evaluate customer service and marketing strategy (Matrilla and James, 1977), operations strategy (Slack, 1994) and IS/IT operations (Skok, 2001). It has also been utilized in various environments, for instance in the automotive and banking industries. In IT/IS

studies, the IP analysis was employed to study the motivations behind e-business strategies among small businesses (Magal and Levenburg, 2005) and end user support (Shaw, DeLone and Niederman, 2001). In addition, finding from previous research indicated that end-users were satisfied with the company's IS performance (Ainin & Hisham, 2008).