CHAPTER 3

RESEARCH METHODOLOGY

This Chapter highlights the methodological issues and the selection of research method. Hypothesis development, measure selection, sampling design, data collection and data analysis techniques are discussed next.

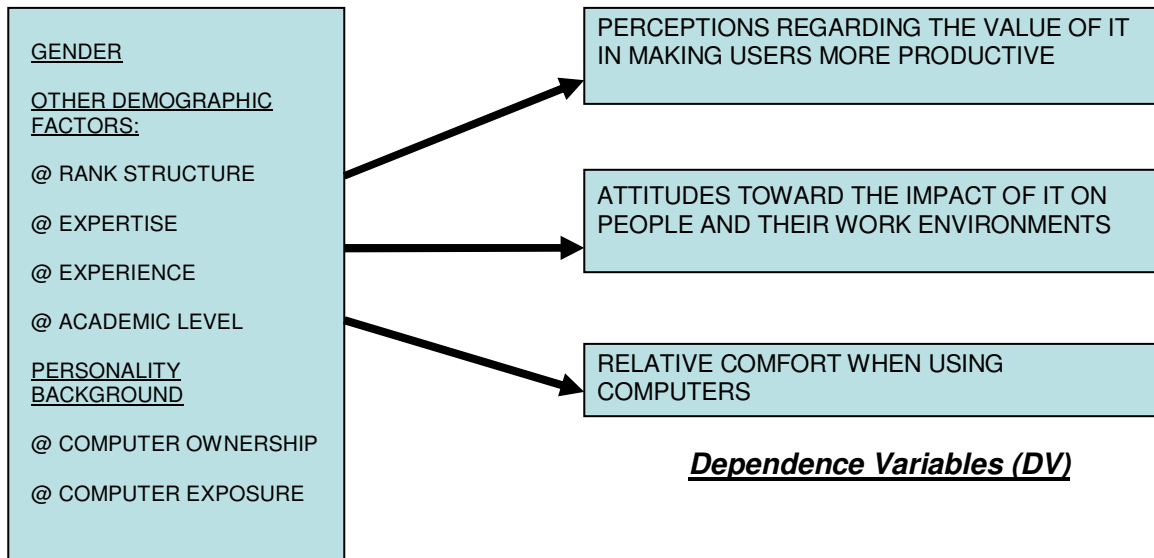## 3.1   Methodological Issues and a Framework for Selecting Methodologies

A research method essentially is a way of collecting and analyzing empirical evidence and such method have traditionally been classified as either being experimental or non experimental (Hill, 1993). Non experimental research methods include the survey, the case study, and interview and participant observation. Sekaran (2006) states that research methodology as an organized, systematic, critical, scientific enquiry or investigation into specific problem, undertaken with the objective of finding answers or solutions. Zikmund (2003) defines research as the systematic and objective process of gathering, recording and analyzing data for aid in making business decisions. One type of research i.e. basic or pure research is intended to expand the limits of knowledge or to verify the acceptability of given theory. On the other hand, applied research is conducted when a decision must be made about specific real life problem.

3.2   Hypotheses Development

The main objective of this research is to conduct descriptive study to determine current status of the gender perspective of attitudes and beliefs on IT in Malaysian Army. This study was referred to largely studies by Sormunen, Ray, & Thomas (1999) and Havelka (2003).

In the study of *Men's and Women's Attitudes toward Computer Technology: a Comparison*, Sormunen, Ray, & Thomas (1999) used nine selected statements to comprise an inventory (See **Figure 3.1** as per **Appendix A**) to answer the research question of the study. The items contained positive and negative statements about the value of technology, the impact of technology on people, and participant comfort levels with technology. In this study, the author had developed the instrument to measure attitudes related to the three research question by adopting Sormunen, Ray & Thomas (1999) inventory and another thirteen potential items statement which were adopted from Christensen & Knezek (1998) and Wong Su Lan (2002). To broaden the study, the author had included other demographic factors and personality background to compare and answer one of the research questions. **Figure 3.2** is Research Framework for this study.

Figure 3.2: Research Framework

GENDER OTHER DEMOGRAPHIC FACTORS: @ RANK STRUCTURE @ EXPERTISE @ EXPERIENCE @ ACADEMIC LEVEL PERSONALITY BACKGROUND @ COMPUTER OWNERSHIP @ COMPUTER EXPOSURE

PERCEPTIONS REGARDING THE VALUE OF IT IN MAKING USERS MORE PRODUCTIVE

ATTITUDES TOWARD THE IMPACT OF IT ON PEOPLE AND THEIR WORK ENVIRONMENTS

RELATIVE COMFORT WHEN USING COMPUTERS

Dependence Variables (DV)

Independence Variables (IV)

3.2.1 Dependent Variable

Sekaran (2006) explains that dependent variable is the variable of primary interest to the researcher. The researcher's goal is to understand and describe the dependent variable, or to explain its variability, or predict it. Through the analysis of the dependent variable, it is possible to find answer or solutions to the problem. He further explains that it is possible to have more than one dependent variable in a study. For example, there is always a tussle between quality and volume of output, low-cost production and customer satisfaction, and so on.

This study examined three research questions as used by Sormunen, Ray & Thomas, (1999) to compare the attitudes of men and women about (1) the value

of technology making users more productive, (2) the impact of technology on people and their working environment, and (3) the relative comfort of men and women when using computer. The study used an attitude inventory constructed to identify attitudes associated with gender issues reflected in the literature. In this research, the author had identified three items (statements) as dependent variables as follows:

- *Perceptions regarding the value of IT in making users more productive.*

- *Attitudes toward the impact of IT on people and their work environments.*

- *Relative comfort level when using computers.*

3.2.2 Independent Variable

Sekaran (2006) explains that an independent variable is one that influences the dependent variable in either a positive or negative way. That is, when the independent variable is present, the dependent variable is also presents, and with each unit of increase in the independent variable, there is an increase or decrease in the dependent variable. In this descriptive study, the independent variable will be gender i.e. men and women. To widen the study, the author included other demographic factor such as rank structure, expertise, experience

and academic level; personality background such as computer ownership and attended computer course before joining service as an independent variable.

3.2.3 Hypotheses Testing

According to Sekaran (2006), a hypothesis can be defined as a logically conjectured relationship between two or more variable expressed in the form of a testable statement. Based on the research framework, the author had developed the hypotheses for this study as follow:

- **Hypothesis 1A (H1A)**: *There is significant difference in the perception between males and females regarding the value of IT in making users more productive.*

- *The null Hypothesis (**H10**) of **H1A** is "There is no difference in the perception between males and females signalers regarding the value of IT in making users more productive.*

- **Hypothesis 2A (H2A)**: *There is significant difference in the attitudes between males and females signaler toward the impact of IT on people and their work environments.*

- *The null Hypothesis (**H20**) of **H2A** is "There is no difference in the attitudes between males and females signaler toward the impact of IT on people and their work environments".*

- ***Hypothesis 3A (H3A)**: There is significant difference between males and females signaler comfort in using computers.*

- *The Null Hypothesis (**H30**) of **H3A** is "There is no difference between males and females signaler comfort in using computers".*

- ***Hypothesis 4A (H4A)**: Other demographic factors significantly influence the perception regarding the value of IT in making users more productive.*

- *The Null Hypothesis (**H40**) of **H4A** is "Other demographic factors have no influence on the perception regarding the value of IT in making users more productive".*

- ***Hypothesis 5A (H5A)**: Other demographic factors significantly influence the attitudes toward the impact of IT on people and their work environments.*

- *The Null Hypothesis (**H5₀**) of **H5_A** is other demographic factors have no influence on the attitudes toward the impact of IT on people and their work environments.*

- ***Hypothesis 6_A (H6_A)**: Other demographic factors significantly influence comfort in using computers.*

- *The Null Hypothesis (**H6₀**) of **H6_A** is "Other demographic factors have no influence toward comfort in using computers".*

- ***Hypothesis 7_A (H7_A)**: Respondent IT backgrounds significantly influence the perception regarding the value of IT in making users more productive.*

- *The Null Hypothesis (**H7₀**) of **H7_A** is "Respondent IT backgrounds has no influences on the perception regarding the value of IT in making users more productive".*

- ***Hypothesis 8_A (H8_A)**: Respondent IT backgrounds significantly influences the attitudes toward the impact of IT on people and their work environments.*

- *The Null Hypothesis (**H8₀**) of **H8ₐ** is "Respondent IT backgrounds have no influences on the attitudes toward the impact of IT on people and their work environments".*

- ***Hypothesis 9ₐ (H9ₐ)**: Respondent IT backgrounds significantly influence comfort in using computers.*

- *The Null Hypothesis (**H9₀**) of **H9ₐ** is "Respondent IT backgrounds has no influence toward comfort in using computers".*

3.3   Selection of Measure

Measurement of the variables in the theoretical framework is an integral part of research and an important aspect of research resign. Unless the variables are measured in some way, we will not be able to test our hypotheses and find answer to complex research issues. According to Sekaran (2006), when we get into the realm of people's subjective feeling, attitudes, and perceptions, the measurement of these factors or variables become difficult. This is one of the aspects of organizational behavior and management research that adds to the complexity of research studies.

3.3.1 Rating Scale and Ranking Scale

In this research, various categories rating scale has been used to elicit responses with regard to the object, event, or person studied. In Section A of the questionnaire form, the dichotomous scale and category scale is used to identify respondent demographic and personality background response. Section B used Likert Scale to examine respondent how strongly subjects agree or disagree with statements on a 5-point scale on their perception and attitude toward IT. The responses over a number of items tapping a particular concept or variable are then summated for every respondent. This is an interval scale and the differences in the responses between any two points on the scale remain the same. Section C consists of ten selected item statements regarding the characteristic and importance of IT adopted from Havelka (2003). Force choice ranking scale is applied to enable respondents to rank items relative to another, from the most important (1) to least important (10) regarding their opinion and perception aboot the usage of IT.

3.3.2 Reliability and Validity Issues

Reliability concerns the extent of agreement between two or more measures of a trait through similar methods (Smith et al., 1989). Cronbach alpha is a measure of the degree of consistency with a test. Cronbach reliability coefficient alpha indicates the degree to which variance is present in scale (Cronbach, 1970).

Cronbach alpha varies between 0 and 1 inclusive, with higher numbers indication greater reliability (Bagozzi 1994). The internal consistency of the measures for each construct is assessed by (1) a test for unidimensionaly using a common factors model with varimax rotation and eigenvalue>1 cut-off, and (2) a standard-used Cronbach reliability statistic (Bagozzi 1980). Bagozzi (1994) said that for exploratory research, one generally desires values for Cronbach alpha greater than about 0.60, although values greater than 0.70 are preferred. The scale which produced a Cronbach's alpha of 0.75 is considered an acceptable level of reliability for this type of research (Edwards and Kilpatrick, 1974). However, Youngman (1979) explained that it is an estimate and generally only offers a lower bound for the true value. Youngman (1979) added that even though high values are desirable Cronbach asserts that internal consistency need not be perfect for a test to be interpretable. Reliability alone is not a sufficient guide to test content (Youngman, 1979), even though it is part of validity in the sense that it establishes an upper bound to validity (Bagozzi, 1994). Therefore, it is possible to construct a perfectly reliable test which has no validity, which in the end has no research value.

One of the factors that affect the internal consistency estimate of test is the number of items. If all items are measures of the same trait or ability, simply increasing the test length will improve the reliability (Kaplan, 1987). Validity can be defined as the agreement between a test score or measure and the quality it is believed to measure (Kaplan, 1987). He highlighted that the most commonly

discussed dimension of validity are: content, criterion and construct. In describing the difference of each, Kaplan said, "Content validity describes the extent to which test items represent a conceptual domain, which is largely a logical process that does not require statistical analysis. Correlation analysis is most often used to assess criterion and construct validity."

3.4 Data Collection

3.4.1 Types and Sources of Data

Identifying and collecting data is very critical to the success of the study. If biases, ambiguities or other types of error may flaw the data being collected. In this study, the author used both primary and secondary data for both objectives. Subsequent sub-sections will briefly explain both types of data.

3.4.1.1 Secondary Data

Sekaran (2006) explain that a secondary data research normally aim at collecting descriptive information to support decision making. Amongst the sources for secondary data are encyclopedias, textbooks, magazine, newspaper articles, statistical bulletins and reports of earlier researcher. In this particular study, the authors' main sources are from various publications, annual report produce by Army Training Command, Army Human Resources Department, and Signal

Directorate Department. Those materials are in the form hardcopy. In addition, the researchers also use online database, for instance Emerald, ProQuest provided in the University Malaya electronic library to search for relevant information for this study.

3.4.1.2   Primary Data

Sekaran (2006) explains that primary data refer to information obtained firsthand by researcher on the variables of interest for the specific purpose of the study. Some examples of sources of primary data are individuals, focus groups, panels of respondents specifically set up by the researcher and from whom opinions may be sought on specific issues from time to time, or some unobtrusive sources such as a trash can. The internet could also serve as a primary data source when questionnaires are administered over it.

3.4.2 The Preferred Method

The author had selected structured questionnaire technique as the instrument for primary data collection. Questionnaires are used because it is an efficient data collection mechanism and it provides what is required. The advantages of using the instrument are:

- Less expensive and time consuming.

- Do not require as much skill to administer the questionnaire as compared to conducting interviews.

- Able to collect all completed responses within a short period.

- Doubts regarding any questionnaires could be clarified immediately.

A set of questionnaire which consists of 3 parts was used (**See Appendix B**). The questionnaire which is 4 pages long is designed for respondents that have been identified as all other ranks from the Malaysian Army RSC personnel. In addition the instrument was developed in the Malay Language, seemed most appropriate, as it is the national language. The use of Malay Language made it possible for participants to fully understand the entire instrument. Since most of Malaysian Army personnel are bilingual in their everyday usage but most tend to be more proficient in the Malay Language, the national language of the country.

3.4.3 Questionnaire Design

The questionnaires are designed in 3 sections:
- **Section A** consists of personal data and demographic profiles of respondents such as gender, work place, appointment, trade, experience, academic qualification, computer experience and ethnicity.

- **Section B** consists of 22 questionnaires using Likert Scale focusing on *how respondent feel about IT*. Previous literature study has guided the author to design the questionnaire for Section B in this survey. As discussed earlier, this study examined three factors as used by Sormunen, Ray, & Thomas (1999) that compared the attitudes of gender about (a) their perception regarding the value of technology making users more productive, (b) their attitude toward the impact of technology on people and their working environment, and (c) the relative comfort of men and women when using computer. The **Table 3.3** as per **Appendix C** show that outline in detail the measurement of questionnaire, variables and sources. The twenty two items in this section contained positive and negative types of statements. Item 2, 4, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18 and 22 are negative coded to evaluate the negative feel of respondent toward IT. The other statement will evaluate the positive feel amongst the respondent. The study expects some variation of opinion from the respondent in these two statements.

- **Section C** consists of ten selected item statements regarding the important of IT adopted from Havelka (2003) previous study (See **Figure 3.4** as per **Appendix D**). The ten selected statements using force choice ranking scale to enables respondents to rank items relative to another,

from the most important (1) to least important (10) regarding their opinion and perception above the usage of IT.

3.5 Sampling Design

3.5.1 Sample Survey

The aim of this research is to contribute to a better understanding of the current status of males and females of RSC personnel in the Malaysian Army and their attitudes and beliefs toward IT. The sample population of this survey will be Malaysian Army RSC signalers.

3.5.2 Sampling

Sekaran (2006) stressed that the reason for using a sample, rather than collecting data from the entire population, are self-evident. In research investigation involving several hundreds and even thousands of elements, it would be practically impossible to collect data from, or test, or examine every elements. Even if it were possible, it would be prohibitive in terms of time, cost, and other human resources. Study of a sample rather than the entire population is also sometimes likely to produce more reliable results.

3.5.3 Sampling Technique

In this research, the **Stratified Random Sampling** design technique is used to collect sample because it is the most efficient manner and a good choice when differentiated information is needed particularly when the target population for this research has been identified as the Malaysian Army RSC personnel.

3.5.4 Determining the Sample Size

Sekaran (2006) argued the fact that the sample size of any descriptive research is governed by the extent of precision and confidence desired. However, in research, the theoretical framework has several variables of interest, and question arises how one should come up with a sample size when all the factors are taken into account. Krejcie and Morgan (1970) greatly simplified size decision by providing a table that ensures a good decision model. Since the strength of Malaysian Army RSC other ranks personnel are around 6,500 people, by using the Krejcie and Morgan (1970) decision model table, the author need at least 350 sample size to establish the representatives of sample for generalisability of this study.

In determining sampling decision, the author also considered both the sampling design and the sample size. Sekaran (2006) mentioned that too large a sample size, however (say over 500) could also become a problem inasmuch as we

would be prone to committing Type II errors. In other word, with too large a sample size, even weak relationships (say a correlation of .10 between two variables) might reach significance level, and we would be inclined to believe that these significant relationships found in the sample are indeed true of the population, when in reality they may not be. In deciding sample size to be taken for this study, the author also considered Roscoe (1975) who proposed the following rules of thumb for determining sample size:

- Sample sizes larger than 30 and less than 500 are appropriate for most research.

- Where sizes are to be broken into sub samples; (male/females, juniors/seniors, etc.), a minimum sample size of 30 for each category is necessary.

- In multivariate research (including multiple regression analyses), the sample size should be several times (preferably 10 times or more) as large as the number of variables in the study.

- For simple experimental research with tight experimental controls (matched pair, etc.), successful research is possible with sample as small as 10 to 20 in size.

3.5.5 Sampling Process

A questionnaire pilot test was self-administrated by the author at Terendak Camp, Malacca on 7 and 8 May 2009. The author managed to obtained 77 samples from the participants of 3 Royal Signal Corp Regiment (23), 10 Squadron Royal Signal Corp Para (28) and 91 Royal Signal Regiment (26). Results obtained have been tested to confirm the validity and reliability of the questionnaires; the author also acquired the feed back from the respondent regarding clarity of the questionnaire. The pilot test involved limited number of participants as it was the researcher's intention to improve the instrument before it was tested against the bigger sample. Major revision of the instrument was undertaken as a result of the pretest.

The actual survey was conducted over a one-week period from 15 to 19 June 2009 using self-administered drop-off method and through the assistance of Administrative Officer (AO) from various RSC units. The AO was the liaison persons as well as the coordinator to administer the survey. The completed questionnaire was returned to researcher for further analysis. The research is confined to all RSR signalers in the Malaysian Army. The respondents who underwent the survey came from different units and particularly those who were attending courses at IKED. The questionnaire was evenly distributed to get maximum feedback. Distribution of questionnaires is as follows:

(1)	IKED	-	200.
(2)	91 RSR	-	100.
(3)	95 RSR	-	50.
(4)	71 RSR	-	50.
(5)	93 RSR	-	50.
(6)	11 RSR	-	50.
(7)	72 RSR	-	50.
(8)	10 Sqn RSR	-	50.
(9)	4 Sqn RSR	-	50.
(10)	3 RSR	-	50.

3.6   Data Analysis Techniques

3.6.1 Objectives of Data Analysis

Sekaran (2006) stated that data analysis have three objectives: getting a feel for the data, testing the goodness of data, and testing the hypotheses developed for the research. The feel for the data will give preliminary ideas of how good the scales are, how well the coding and entering of data have been done and so on. The questionnaire for this study was analyzed by conducting a pre-test and subsequently it was vetted through pre-analytical processes which include data editing, data coding, error checking and data keying. Statistical Package for Social Science (SPSS) Version 16.0 was extensively used to analyze the data.

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3.6.2 Feel for the Data

The feel for the data can be acquired by using SPSS by checking the central tendency and the dispersion. The mean, the range, the standard deviation, and the variance in data will give the author a good idea of how the respondents have reacted to the items in the questionnaire and how good the items and measures are. It is prudent to obtain (1) the frequency distributions for the demographic variables, (2) the mean, standard deviation, range, and variance on the other dependent and independent variables, and (3) an Intercorrelation matrix of the variables, irrespective of whether or not the hypotheses are directly related to these analyses.

3.6.3 Testing Goodness of Data

The reliability of a measure is established by testing for both consistency and stability. Consistency indicates how well the items measuring a concept hang together as a set. In this study, Cronbach's alpha was used to test the reliability of questionnaire as a set for three dependent variables. Factor analysis was administered to ensure that the groupings of the factor are consistent with Barned & Vidgen (2002) and if they are not consistent; is there any new factor present? These new factors will then be tested using reliability tests.

3.6.4 Hypotheses Testing

Once the data are ready for analysis, the author is ready to test the hypotheses already developed for the study. In this study, the t-test and ANOVA is used to indicate the perceived differences are significantly different among gender, other demographic factors and respondent IT background.

3.7 Conclusion

These chapters have covered the research methodology including research framework, hypotheses development, and selection of measure, data collection, sampling design and data analysis techniques. The study's' results and finding based on the methodology covered will be discussed in the following chapter.