CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used in this study. This research uses method of quantitative approach. Description of method, research design, variables and factors affect security awareness model is summarized in Figure 4.

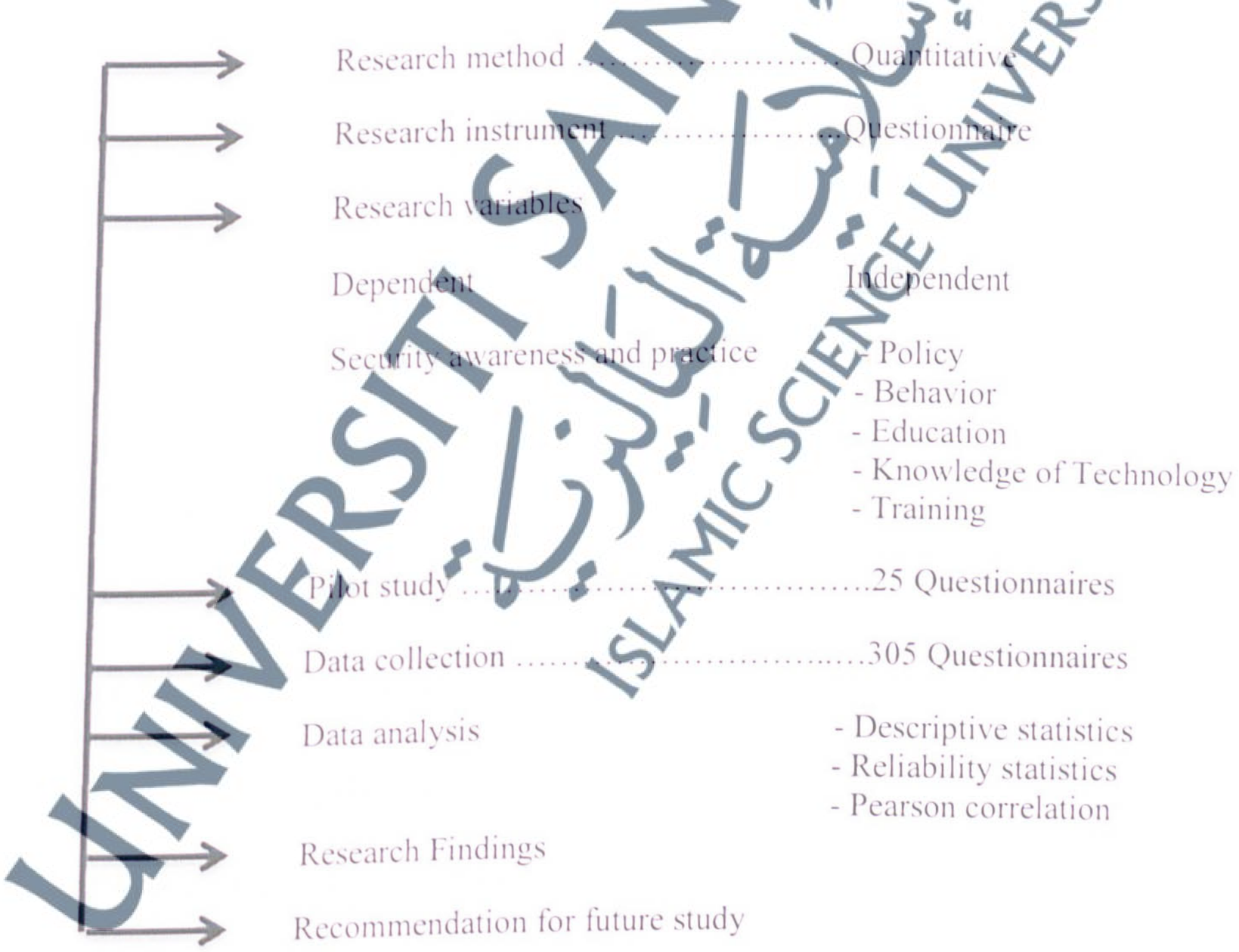

Figure 4: Description of Method and Variables

3.2 Research Method

In the research methods there is quantitative research or qualitative research. A qualitative research approach aims to develop explanation and understanding of the social and cultural phenomena by using several methods such as case study and action research. Qualitative data collection includes interviews, observations, questionnaires surveys and participant observations (Bernard, 2011; Zakaria, 2004).

In contrast, quantitative research seeks to explain phenomena through the collection of digital data which are analysed by means of statistics in order to determine the relationship between dependent variable and independent variables and to determine the cause and the result of interactions between variables. Quantitative data collection includes survey, questionnaires and experiment. Research in this approach likely depends on a deductive approach and oriented towards hypothesis testing (Zakaria, 2004; Newman, 1998).

According to Newman, (1998) quantitative approach researches are based on the exploration (discover what is there) and description (describe what has been found). Quantitative research aims to test hypotheses that are pre-determined in the study by using statistical methods to substantiate or refuse hypotheses, as well as, measuring the effect of the dependent variable on the independent variable. Therefore, the approach adopted in the present study is a quantitative approach to evaluate information security awareness and practices in both workplace and home for employees based on the conceptual framework.

According to (Aiman & Markham, 2004) a survey is an appropriate method to collect data from large population and could contribute to enhance confidence for generalizing of the results. Four types of questions are useful in answering the survey which is background questions, closed-end questions, open-ended questions and intensity questions. These types of questions aim to understand the thoughts, perceptions and behaviour of individuals.

The purpose of this study is to identify and describe the relationship between employee's security awareness and practice, dependent variable (DV) and the factors that affect security awareness and practice in both workplace and home, independent variables (IV), research questions and hypothesis are utilized to concentrate the investigation on the possible relationships between the variables and the strength or magnitude of these relations. In this study, five hypotheses are identified on the security awareness and factors that affect security awareness of employees in work place and home, from the literature review (section 2.4), five key factors that affect information security awareness were identified, that are policy, behaviour, training, knowledge of technology and education.

A questionnaire comprising three sections was designed. The survey used a three-point Likert scale with "1 = No, 2 = Not Sure and 3 = Yes". Section 1 obtained information related to the respondents. Section 2 is obtaining information related to security awareness and practices at both workplace and home. These questions show the level of information security awareness and practice as well to determine the differences between security awareness and practice in workplace and home. Section 3 obtained information related to factors that affect information security awareness

and practices both at workplace and home, these questions aim to find out the relation between the factors that are defined in the conceptual framework of information security awareness and employee's security awareness and practice at the workplace and home. Table 5 shows the source of questions.

Table 5: Source of Questionnaire

Section	Measurement Questions	Source
Section 1: Demographic	Questions 1-5	NA
Section 2: Security Awareness Security Practice	Questions 1,2,3,5 Q4 Questions 1-5	Ishak et al., (2014) Fakeh et al., (2012) Talib et al., (2012)
Section3: Factors affect security awareness in the workplace and home.	Policy: Questions 1-5	Fakeh et al., (2012)
	Behaviour: Questions 1-5	Fakeh et al., (2012)
	Training: Question 1 Question 2 Questions 3,4,5	Talib et al., (2012) Alnatheer, (2012) LR
	Knowledge of IT: Questions 1- 4	Fakeh et al., (2012)
	Education: Questions 1- 5	Fakeh et al., (2012)

3.2.1 Research Hypothesis

The comprehensive literature review of information security awareness and practice presented in Chapter 2 revealed five key factors which affect employee's security awareness and practice in both workplace and home. These factors are policy, behaviour, training, knowledge of technology and education, the consequence of this comprehensive review led to propose a conceptual framework to facilitate the

investigation of the hypotheses and research question for this study, see figure 3. However, the proposed conceptual framework needs to be more clear to identify which factor has a significant effect on security awareness and practice at the workplace, as well as, which factor has a significant effect on the security awareness and practice at home. In other words, there is a need to clarify the differences and similarities between the factors that affect security awareness and practice in workplace and home. Additional analysis is required to identify and describe the relationship between these factors and security awareness and practice of employees in both workplace and home, as well as, to evaluate the current security awareness and practice level of employees. The following hypotheses are proposed and tested to determine the relationship between the factors of security awareness and security practice:

Hypothesis 1:

H1a: Policy has a positive effect on security awareness and practice at workplace.

H1b: Policy has a positive effect on security awareness and practice at home.

Hypothesis 2:

H2a: Behaviour has a positive effect on security awareness and practice at workplace.

H2b: Behaviour has a positive effect on security awareness and practice at home.

Hypothesis 3:

H3a: Training has a positive effect on security awareness and practice at workplace.

H3b: Training has a positive effect on security awareness and practice at home.

Hypothesis 4:

H4a: Knowledge of Technology has a positive effect on security awareness and practice at workplace.

H4b: Knowledge of Technology has a positive effect on security awareness and practice at home.

Hypothesis 5:

H5a: Education has a positive effect on security awareness and practice at workplace.

H5b: Education has a positive effect on security awareness and practice at home.

3.3 Population

The population of this study was employees in Universiti Sains Islam Malaysia (USIM) both academic and administrative. The criteria for selection is that each participant should be an employee of USIM (i.e. permanent or contract), experience using a computer of both home and workplace, has an email account, and has access to the USIM email system. The choice of USIM is based on three reasons:

1. The population consists of both academic and administrative staff with different level of educations, ages and experiences, so an assortment of cultural will be available.
2. The emblems of this university is the piety, commitment and honesty, as most of the staff at this university are Muslims this ensures the credibility of the research data.
3. The population can be considered as a convenient of sampling for ensuring that portion of the population has background in information security due to the information security specialization in USIM.

3.3.1 Sampling Size

Based on the latest statistics on 16th Dec 2014, by the Human Resources Department of USIM, there are 1450 employees. According to (Kotrlik et al., 2001) sample size is one of the critical features of the study design that can affect identification of significant divergence, relationships or interactions. As such, the sample size of the present study was 305 respondents comprising both academic and administrative. This to ensure various levels of educational, knowledge, culture and experience are covered.

The size sample in this study provided enough data for analysing the effect of the independent variable on the depending variable. According to Field (2009) 10 to 15 respondents' per-variable is considered as a common rule for measuring correlation between variables. The sample size of this study was determined according to Sekaran (2006) sample size table, that classifies the suitable sample size of population, the sample has been chosen randomly from the employees of USIM as a whole. Table 6 classifies the number of employees based on their job roles.

Table 6: USIM Staff Classification

	Job role	Total Number
1	Academic staff	535
2	Non- academic	108
3	Administrative staff	177
4	Support staff	630
	The total number of staff	**1450**

3.4 Data Collection

This research applied quantitative data collection methods, the data collection has been conducted through a questionnaire, the questionnaire was adapted by reconfiguration the items in line with the purpose of the study from survey instrument that was used by (Ishak et al., 2014; Fakeh et al., 2012; Alnatheer, 2012; Talibe, 2012). Manual method was used for collecting data. The researcher visited the staffs in their office and manually distributed the questionnaires to participants. Around 350 questionnaires were distributed to USIM staff, both academic and administrative, distribution of the questionnaires took two weeks in Feb 2015, distribution procedure was random, and the location of USIM building assisted the researcher in collecting back the questionnaires from the following:

- Chancellery
- Library
- Centre for Graduate School (PPS)
- Global Open Access Learning System (GOALS)
- Faculty of Qur'an and Sunnah (FPQS)
- Faculty of Economics and Muamalat (FEM)
- Faculty of Science & Technology (FST)
- Faculty of Major Languages Studies (FPBU)

A total of 305 questionnaires were considered appropriate for this research study, thereafter, the data collected were coded and uploaded into SPSS version (20).

Data screening and cleaning procedures for errors or outliers were conducted, a total of 285 questionnaires were usable. According to Fowler (2009) a response of 200 or more usable participants was considered acceptable and captures the same statistical percentages as a sample size of 300. The questionnaire consists of three different structured sections, (section 1) demographic data was descriptively analysed, (section 2) security awareness and practice, (section 3) the factors affect security awareness and practices in workplace and home, were analysed using reliability, descriptive statistics, Pearson Correlation and Linear Regression.

3.5 Data Analysis

Data analysis requires classifying and tabulation of the data collected to address the problem of the study to make meaningful inferences from the study (Yin, 2003). Therefore, collected data from USIM staff were analysed by Statistical Package for the Social Sciences SPSS version (20) covering the reliability, descriptive analysis Pearson Correlation and Linear Regression analysis respectively. Descriptive analysis was used to describe the key lineaments of the collected data from questionnaires including number of respondents, number per gender, their job role and their education level by presenting summary with percentage and frequencies. Statistics of reliability was used to obtain Coefficient Cronbach alpha. In general, reliabilities less than 0.60 are considered to be poor, those with above 0.60 ranges are acceptable, and those over 0.80 are good (Cortina, 1993). Finally, correlation analysis was used to identify the relationship between independent variables and dependent variable. Summarization of the analysis shows below:

- Descriptive statistics presents the primary features of data in the current research study and provides a summarization about the sample with illustration graphs which are discerned from inferential statistics.
- Cronbach alpha was used to Measure the reliability and internal consistency of the survey items. Cronbach alpha reliability and validity test was conducted at 0.70 as the minimum accepted level.
- Pearson Correlation was used to test the hypotheses to measure the degree of relationships between the variables and the significant level of the variables was used in this research study. The perfect correlation of 1 or -1 indicates that the value of one variable can be determined exactly by knowing the value of other variable. Besides, the correlation value 0 indicates no relationship between the specified two variables.
- Regression is described as a method that is used for the examination of the relationship between one continuous dependent variable and several independent variables. There are many methods that are generally used in Linear Regression including standard regression, hierarchical or sequential and stepwise regression. In the standard Linear Regression, the entire independent variables are entered into the equation at the same time and are thought to have the same importance (Gerber & Finn, 2005).

3.6 Pilot Test

A pilot test was conducted to define suitability of the questionnaire for the current study. Pilot study could be done to identify the suitable tool of analysis and to determine if the instrument that is used in data collection is effective and reliable (Yin,

2003). The source of primary data collection in the pilot study was an online questionnaire by using the Google form. The questionnaire was distributed to 25 participants by using a call for volunteer through email. The target respondents were both those who in computing area and non-computing area, as to ensure the questions will be understood by different backgrounds. The main target of pilot test was to improve the quality of the questionnaire and determine the shortcomings in the questionnaire that will be improved before targeting with large scale.

3.7 Summary

This study utilized quantitative approach to assess the information security awareness and practice among the employees in USIM for both workplace and home, as well as, to determine the relationship between security awareness and practice and factors that affect security awareness and practice of employees both in workplace and home. This chapter discussed the method that was used to collect data and analysis. A survey instrument was used in this study to collect data from USIM employees. To ensure the validation of survey instrument, a pilot study was conducted on 25 respondents from USIM employees. Then, a full research was conducted where the questionnaire was distributed to 305 employees from USIM, but only 285 are usable. The next chapter presents results for both pilot study and actual data collection, with data showing the answerability of stated hypothesis.