CHAPTER THREE

RESEARCH METHODOLOGY

3.0. Introduction

The main purpose of this chapter is to present the methodology that has been used to obtain answers of research questions and objectives as well as to explain the research strategy and the research approach. Research Methodology is a science of performing research to solving research problems systematically. Wellington (2015: P 33) describes the methodology term as "*an activity or business of choosing, reflecting upon, evaluating and justifying the methods you use*". This research has adopted a deductive approach along with quantitative research strategy. This research has gone through three phases as shown in Figure 1.1 in Chapter one. This chapter also highlights the data analysis strategy and data resources of this research.

3.1. Research Strategy

The research strategy is a "general plan of how the research question(s) will be answered (Saunders & Lewis, 2000). Although there are several strategies that can be employed in research, there is no superior research strategy which is better than others. The most important question is whether it enables the researcher to answer the research questions and achieve the research objectives or not (Saunders & Lewis, 2000).

Creswell (2012) states that conducting educational research is more important than involving in the main stages of the research process. It also contains designing and writing in one of the two main methods: quantitative or qualitative research. It is regularly possible (and indeed common) to identify a research method as qualitative; as

quantitative; or as mixed methods (both qualitative and quantitative). Based on the research problem and the research questions that need to be answered, the researcher has to choose a proper method and to be familiar with how it will be helpful for the research.

3.1.1. Qualitative Research

The qualitative method involves using qualitative data, such as field notes, conversations and interviews (Myers, 1997). Qualitative data is not limited to words; it could be also an art or photographs. In a qualitative method, data collected is usually non-numerical format. Denzin and Lincoln (2011: P 3) state that in qualitative research, the researcher must "*Study things in their natural setting, attempting to make sense of, or interpret, phenomena in terms of the meaning people to bring to them*". One feature of the qualitative method is that respondents are free to answer in any way they like. They are not restrained to a pre-defined set of possible answers as on a survey (Harwell, 2011). A qualitative method is an excellent method to deal with a research problem which has unknown variables and need to be explored. On the other hand, a qualitative method generally takes a long time to gather and analyze the data. Thus, qualitative method is more costly.

3.1.2. Quantitative Research

Quantitative research method attempts to identify a research problem based on the need to explain why something is happening. According to Creswell and Clark (2007), Quantitative methods are frequently found in studies that test variables in quantitative instruments such as questionnaires, to test statistical hypotheses that correspond to research questions. In addition, some quantitative research problems require knowing the relation among variables as well as how one variable affects another or more than one variable might influence another variable (Creswell, 2012).

3.1.3. Use of Multi-Method Research

A mixed research method is a process for collecting, analyzing, and "integrating" both quantitative and qualitative methods in one study or in a multiphase series of studies to understand a research problem (Creswell & Clark, 2007). The main idea of mixed methods is to combine two types of methods to express a better understanding of a research problem than using one method. Mixed methods study, collect, analyze, the quantitative and qualitative data in a single study or in a multiphase series of studies (Creswell, 2012). Moreover, mixed methods assist each other methods' limitation and it offers the chance to research the largest selection of different points of view.

However , Saunders and Lewis (2000) asserts that what matters is not the label that is attached to a particular strategy, but whether it is appropriate for the research question(s) and objectives. In this respect, the current study used the qualitative strategy because, the qualitative strategy is generally associated with the deductive approach (Saunders & Lewis, 2000). This can be achieved by using the survey in where, the "data collected using a qualitative strategy to suggest possible reasons for particular relationship between variables and to produce models of these relationships" (Saunders & Lewis, 2000).Thus, , the qualitative strategy is the most suitable strategy for this study, which follows the deductive approach. To be clearer, Table 3.1 shows the objectives, questions, data collection approaches, analysis and output of the research.

TABLE 3.1: The Questions, Objectives, Method, Analysis and Finding of the Research

Research Questions	Objectives	Method	Analysis	Finding
Why cloud based e-learning users are concerns about the information privacy?	To identify the possible factors that cloud based e-learning users concern about.	Literature document Secondary sources (Desk study).	Content summative /categories.	Information Privacy issues in cloud computing.
How significant are these factors (Collection, Control, Awareness, Access, Storage, Retention, Destruction, Compliance, privacy Breaches and, Audit and Monitoring) in influencing information privacy of cloud based e-learning users?	To examine the factors that influence on information privacy of cloud based e-learning users.	Questionnaire survey (Field study).	EFA, CFA & SEM.	Information privacy framework of cloud based e-learning users.
How to validate the information privacy framework of cloud based e-learning users?	To develop and validate the information privacy framework of cloud based e-learning users.	Questionnaire survey (Field study).	Validation by expert.	A validated information privacy framework of cloud based e-learning users.

3.2. Research Approach and Process

The research approach is concerned with how the research project will engage the use of theory (Saunders & Lewis, 2000). Generally, there are two research approaches: the deductive approach (testing theory) and the inductive approach (building theory) (Saunders & Lewis, 2000). Creswell (2012) suggests several research approaches which may belong either to deductive approach, inductive approach or both inductive and deductive such as: experiment; survey; case study; action research; grounded theory; and ethnography.

In this respect, researchers choose the best fit of two different research approaches to their research aims. On the other hand, Bryman (2003) notes that there is no completely inductive or deductive approach; both inductive and deductive entail a little part from the other and they can be employed in research reasoning in a sequential manner (Cooper &

Schindler, 2003). However, the inductive approach may follow the deductive approach in a quantitative study (Bryman, 2003).

Given the above discussion, the deductive approach is adopted for the following reasons: first, the research hypotheses are derived from the proposed conceptual framework that illustrates the relationship between factors. Additionally, quantitative data is collected to test the research hypotheses and examine the identified outcomes. Accordingly, these steps, in fact, they fit only the deductive approach (Creswell & Clark, 2007; Saunders & Lewis, 2000). Second; the study depends on a sample to generalize the findings to the study population, which is consistent with the deductive approach (Saunders & Lewis, 2000). Thus, this research adopts the seven steps suggested by Sekaran and Bougie (2011) for deductive research approach. The following is an explanation of each step.

3.2.1. Observation

Observation is the first stage, in which one senses that certain changes occur, or that some new behaviors, attitudes, and feelings develop in one's environment. When the observed phenomena are seen to have potentially important consequences, one would proceed to the next step. Although, the observation is qualitative method, the initial review in collecting data is necessary and is used to obtain the better idea (Kawulich, 2005).

3.2.2. Preliminary Information Gathering

Preliminary information gathered involves seeking information in depth, of what is observed. This could be done by talking informally to people or to clients, or to other relevant sources, thereby gathering information on what happens and why. Once the researcher increases the level of awareness as to what happens, the person could then focus on the problem and the associated factors through further structure.

Additionally, by doing library research, or obtaining information through other sources, this information would give additional insights of possible factors that could be operating in the particular situation. The next step is to make sense of the factors that have been identified in the information-gathering stage by piecing them together in some meaningful fashion.

3.2.3. Theory Formulation

Theory formulation, the next step, is an attempt to integrate all the information in a logical manner. The factors responsible for the problem can be conceptualized and tested. The theoretical framework formulated is often guided by experience and intuition. In this step, the critical variables are examined as to their contribution or influence in explaining why the problem occurs and how it can be solved.

3.2.4. Hypothesizing

Hypothesizing is the next logical step after theory formulation. From the theorized network of associations among the variables, certain testable hypotheses or educated conjectures can be generated.

3.2.5. Scientific Data Collection

After the development of the hypotheses, data with respect to each variable in the hypotheses need to be obtained. In other words, scientific data collection is needed to test the hypotheses that are generated in the study.

3.2.6. Data Analysis

In the data analysis step, the data gathered are statistically analyzed to perceive if the hypotheses that are generated have been supported. Hypotheses could be

tested through appropriate statistical analysis. Analysis of both quantitative and qualitative data can be done to determine if certain conjectures are substantiated.

3.2.7. Deduction

The deduction is the process of arriving at conclusions by interpreting the meaning of the results of the data analysis. Based on these deductions, the researcher would make recommendations on how the research problem could be solved.

In this research, the observation step is based on several random interviews with e-learning staff of various Malaysian universities at the National University Carnival on E-Learning (NUCEL) 2014 held by Al-Madinah International University (MEDIU) at Shah Alam Convention Centre (SACC). The interview question is "Why your university does not adopt cloud computing in the e-learning system. Most of the answers are that they have concerns about information privacy and security issues in the cloud. In the second step, a systematic literature search is performed on information privacy concerns in cloud computing. The main academic databases are used to extract relevant literature following by meeting with Chief Information Technology Officer, ICT center, UPSI to gather information about the cloud based e-learning system in his university. For the theory formulation step, this research proposes a conceptual framework consisting of eleven constructs that illustrated the relationship between factors that influence in information privacy concerns of cloud based e-learning as explained in chapter two. Then, the research hypotheses are derived from the proposed conceptual framework which presents the step four. Step five involves a questionnaire survey to collect the main data of the research. To carry out this step, a questionnaire survey is distributed to the lecturers of computer and science department and the staff of center for information technology and communication of UPSI. Total 216 questionnaires are collected and coded using (SPSS) package in order to analyze. In step six, the research performs various procedures in order to analyze the data (descriptive statistics, preparation, and screening, assessment of normality and the reliability, exploratory factor analysis, confirmatory factor analysis and structural equation modeling). The result of

data analysis is presented in chapter four. The final step is involved in interpreting the meaning of the results of the data analysis. Also, the final research framework (Information Privacy Framework For Cloud Based E-Learning) and the research contribution are presented in chapter five and six. Table 3.2 presents the research methodology and seven steps research process and Figure 3.1 illustrates the overall research process.

TABLE 3.2: Research Methodology and Research Process

Phase	Research Process Step
Problem Identification Phase	Step 1: Observation Step 3: Preliminary Information Gathering Step 3: Theory Formulation
Data Collection and Analysis Phase.	Step 4: Hypothesizing Step 5: Scientific Data Collection Step 6: Data Analysis
Framework Development and Conclusion Phase.	Step 7: Deduction

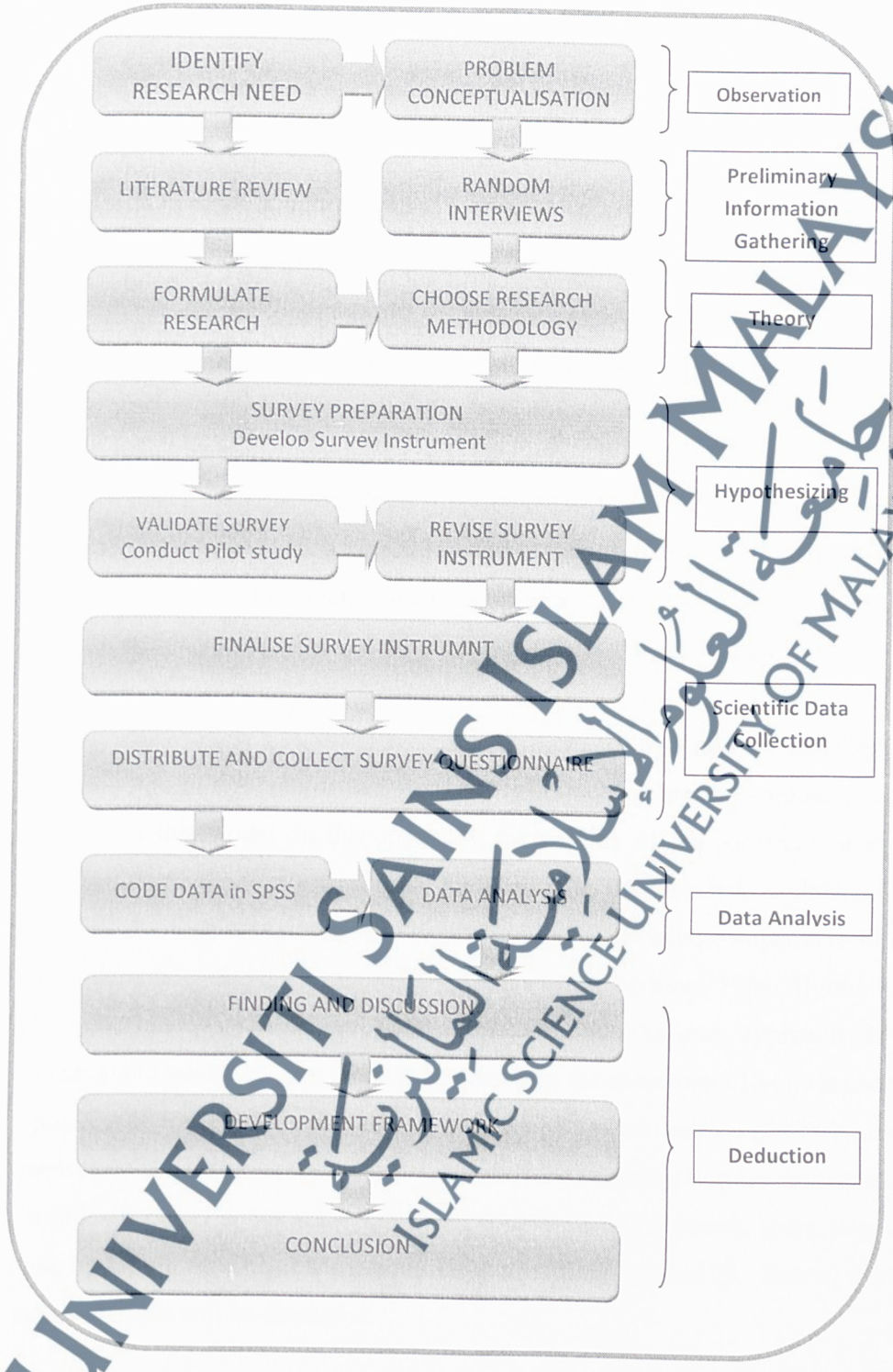

FIGURE 3.1: The overall research process

3.3. Data Analysis Strategy

After completing the data collection of the study, all the questions are coded, as well as the negative questions reverse coded using (SPSS) version 22.0. Descriptive statistics are conducted in order to provide respondents' details such as gender, education level, and occupation. The mean and the standard deviation are calculated to demonstrate the central tendency and dispersions of the variable. Followed by the preparation and screening of the data, in order to treat of missing data, outlier examination is conducted. Moreover, Skewness and Kurtosis are tested for normal data distribution. After that, the reliability test is applied to check the reliability of the instrument in the main survey by using Cronbach's coefficient alpha (α). However, descriptive statistics, preparation, and screening, assessment of normality and the reliability test are carried out by using statistical package for social sciences (SPSS) 22.0 version for Windows. Then, exploratory factor analysis (EFA) is used to clarify the measurement scale.

The study follow a two-step approach as suggested by Anderson and Gerbing (1988). The first step in this approach is to develop an acceptable measurement model before building on this model. In this approach, the validity of the constructs is examined by confirmatory factor analysis (CFA). CFA is used, because it is a theoretically-driven approach in which the factors need to be specified beforehand compared to EFA which is a data-driven (exploratory) approach (Anderson & Gerbing, 1988; Byrne, 1998; Hair, Black, Babin, Anderson, & Tatham, 2006). The second approach is examined measurement model and the relationship between the constructs. The measurement model represents constructs or latent (unobserved) variables and their set of observable variables (measures). The structural model is most useful in representing the interrelationships of variables between constructs (Hair et al., 2006). In this research, these steps have been done by using Analysis of Moment Structure (AMOS) version 23. Below, the features of each technique will be discussed.

3.3.1. Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) is a statistical approach for determining the correlation among the variables in a dataset. This type of analysis provides a factor structure by a grouping the variables based on strong correlations Hair et al. (2006). In general, an EFA prepares the variables to be used for cleaner structural equation modeling. In this research, exploratory factor analysis is used to group the dataset to factors based on strong correlations by determining the correlation among these factors. The study accesses the adequacy of the extraction the number of variables by using commonalities, eigenvalue, scree plot, KMO and Bartlett's test and, rotated component.

3.3.2. Confirmatory Factor Analysis (CFA)

The confirmatory factor analysis (CFA) is conducted after the exploratory factor analysis (EFA). Netemeyer, Bearden, and Sharma (2003)explain that confirmatory factor analysis (CFA) is a technique commonly used to confirm priori hypotheses of the relationship between a series of measurement items and their respective factors. Hair et al. (2006) assert that CFA is used to test whether the relationships on the theory-based are present in the data. CFA is applied to this study for several reasons. First, to ensure the relationships between the observed variables and the latent variables (unobserved variables). Second, to check the standardized factor loading values; the standardized factor loading values demonstrate the relationship between the items and the construct. It is generally agreed that the standardized factor loading values should be more than 0.60 in order to show a strong association.

3.3.3. The Structural Equation Modelling (SEM)

The Structural Equation Modelling (SEM) technique, also known as 'path analysis with latent variables' (Bagozzi, Yi, & Phillips, 1991), is employed to test the theoretical model. According to Bollen and Long (1993), SEM studies contribute to

theoretical developments in any field by employing this method to explain observed behavior. Nonetheless, SEM can simultaneously examine a series of relationships between dependent variables and independent variables, especially when a dependent variable in one relationship becomes an independent variable in another relationship (Hair et al., 2006). Additionally, SEM is superior to other multivariate techniques and useful for theory testing. It incorporates both observed and latent variables simultaneously, provides explicit estimates of measurement errors, and allows hypothesis testing for inferential purposes (Bagozzi et al., 1991; Byrne, 1998). However, according to Hair, Black, Babin, Anderson, and Tatham (2010), the structural equation model fosters the representation of the interrelationships of the variables between constructs. However, the model will be evaluated based on a selected number of goodness-of-fit indicators which are as follows:

- Goodness-of-Fit Indicators

The purpose of assessing goodness-of-fit indices is to test the fit of the hypothesized model against the sample data of the study. A variety of criteria has been suggested for evaluating the goodness-of-fit of any model that takes into account theoretical, statistical, and practical considerations (Byrne, 1998). Three main types of fit category to assess the model fit indices are included- the absolute fit indices, incremental fit indices, and parsimonious fit indices (Hair et al., 2006). Details of these fit measures and their recommended levels are presented in Table 3.3. Also, the literature supports for the respective fitness index are shown in Table 3.4.

TABLE 3.3: Details of Fit Measures

Name of Category	Name of Index	Level of Acceptance
Absolute fit	Chi-square	P-value > 0.05
	RMSEA	RMSEA> 0.08
	GFI	GFI> 0.90
Incremental fit	AGFI	AGFI> 0.90
	CFI	CFI> 0.90
	TLI	TLI> 0.90
	NFI	NFI> 0.90
Parsimonious fit	chi square/df	chi square/df< 3.0

Source: (Awang, 2011)

TABLE 3.4: Literature Supports for the Respective Fitness Index

Name of Category	Name of Index	Index Full Name	Literature
Absolute fit	Chi-square	Discrepancy Chi Square	(Wheaton, Muthen, Alwin, & Summers, 1977)
	RMSEA	Root Mean Square of Error Approximation	(Browne, Cudeck, Bollen, & Long, 1993)
	GFI	Goodness of Fit Index	(Joreskog & Sorbom, 1984)
Incremental fit	AGFI	Adjusted Goodness of Fit	(Tanaka & Huba, 1985)
	CFI	Comparative Fit Index	(Bentler, 1990)
	TLI	Tucker-Lewis Index	(Bentler & Bonett, 1980)
	NFI	Nonned Fit Index	Bollen (1989b) (Bollen, 1989)
Parsimonious fit	Chisq/df	Chi Square/ Degrees of Freedom	(Marsh & Hocevar, 1985)

Source:(Awang, 2011)

- Absolute Fit Indices

The absolute fit measurement is "*the degree to which the overall model (structural and measurement model) predicts the observed covariance or correlation matrix*" (Stamatis, 2002: P 160). The most important indices of absolute fit are identified as the Chi-square ($\chi 2$) statistic, the non-centrality parameter (NCP), the goodness-of-fit index (GFI), the root mean square error (RMR), the root mean square error of approximation (RMSEA) and the expected cross-validation index (ECVI).

- Incremental Fit Indices

Incremental fit indices calculate how fit the specified model is if it is compared to a baseline model (Hair et al., 2006).Usually, the baseline model is the null model. Adjusted goodnessof- fit index (AGFI), Tucker-Lewis index (TLI), normed-fit index and other incremental fit measurements such as relative-fit index (RFI), incremental-fit index (IFI), and the comparative-fit index (CFI) are the indicators for measuring the incremental-fit index. The value ranges from 0 to 1, in which 0 shows that

the specified model is no better than the null model. Whereas 1 shows that the specified model is a perfect fit.

- Parsimonious Fit Indices

The last fit, known as parsimonious fit, has been defined as, "*measurements (which) relate the goodness-of-fit of the model to the number of estimated coefficients required to achieve this level of fit and their basic objective is to diagnose whether model fit has been achieved by over-fitting the data with too many coefficients*" (Stamatis, 2002: P 164). This fit measure includes a parsimonious normed fit index (PNFI), parsimonious goodness-of-fit index (PGFI), normed chi-square and Akaike information criterion (AIC).

- Fit Indices Selection

It is crucial to choose the right goodness-of-fit indices in SEM because the empirical assessment of the specific model being tested is an essential facet of the theory development process (Anderson & Gerbing, 1988). The literature is unequivocal as to which represent a good estimation of fit (Diamantopoulos, 1999). There is no agreement among researchers which fitness indexes to use. Bollen and Long (1993) advice that the researcher should not rely on just one fit index to test the model fit. Kline (2011) suggests, at least, four indexes are the best indicator for a good fit. Holmes-Smith, Coote, and Cunningham (2006) recommend the use of at least one fitness index from each category of model fit.

- Bootstrapping

Bootstrapping is the re-sampling process on the existing dataset using the method of sampling with replacement. The main advantage of bootstrapping is that it allows the researcher to examine the parameter estimates stability and consequently report their values with a high degree of accuracy (Kline, 2011). The statistical procedure would compute the mean and standard deviation for every sample of size to create the new sampling distribution (Awang, 2011). Since the sample size is large (1000), the new sampling distribution would be closer to normal distribution. AMOS would analyze the Bootstrapping data and produce the confidence intervals as well as the significance for every parameter involved in the analysis. The researcher could compare the actual results with the bootstrapped results to confirm the analysis. If the results differ, the bootstrapped result will be acceptable (Awang, 2011).

3.4. Data Resources

The data resources of this study are categorized as secondary data resource and primary data resource.

3.4.1. Secondary Data Resource

The secondary data resource has been used. It includes a systematic search of previous studies, books, academic magazines databases, journals, government reports, web pages, books, and published articles regarding the research area. This data is necessary to achieve a better understanding of the study subject and what has already been done.

3.4.2. Primary Data Resource

With the purpose of analyzing quantitative data; the questionnaire is used as a key tool for the collection. The data is analyzed by inputting the data into Package for Social Sciences (SPSS) version 22.0 and Analysis of Moment Structure (AMOS) version 23.

3.5. Ethical Consideration

In the kind of research, where the aim is to study user perception, it is crucial to consider ethical issues before, throughout and after the data collection phase. (Zikmund, Babin, Carr, & Griffin, 2012). A lack of ethical consideration in such processes may lead to a lack of compliance and cooperation by respondents, which makes it difficult to collect the data (Sekaran & Bougie, 2011). Meeting ethical standards and gaining respondents' consent are the fundamental requirements for every study covering recognizable. The researcher should frankly explain the objective of the research. Furthermore, respondents should not be forced to take part in the survey (Sekaran & Bougie, 2011). In this context, Sekaran and Bougie (2011) recommendations about the research ethical obligations are adopted as below:

- The information obtained from the respondents is kept strictly confidential.
- The researcher does not falsify the nature of the study to respondents, and the purposes are clarified clearly.
- No one is forced to reply to the survey.
- There is absolutely no misrepresentation in reporting the data collected during the study.

In this research, participants are informed at the outset of the data collection form and that they have the choice of not answering any question that they feel inappropriate. Also,

they are ensured of confidentiality and that the data would be protected and used exclusively for the purpose of the identified research. They are also informed that the data would not be given to or used by any third party. An approval to conduct the data collection process is issued by the researcher's supervisors and the center of graduate students of USIM University. The collecting date letter is attached with all of the above considerations on the cover letter of the questionnaire.

3.6. Chapter Summary

This chapter discusses the methodology that has been used to obtain answers to the research questions as well as selecting an appropriate research strategy, use a quantitative research method and the research approach. The overall research process is captured in Figure 3.1. In the next section, the chapter classifies the study population and verifies the sample size which represents the population. Chapter four also discusses questionnaire development and the pilot study that is conducted to modify the item pool. In addition, chapter four presents the process of the data analysis and the results of the quantitative study.