CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Chapter 3 defines and elaborates research work methodology and design topologies used in carrying out the researches and achieving this analysis examination goals as well as testing the research hypothesis. In addition to that, this chapter highlights the research's philosophy executed, clarifies the focal research methods in addition the tools of collecting the required data.

Furthermore, this chapter describes the statistical' means and its relevant tools that are implemented for the analyses, the category of data collections, the factors which is employed to define the validity and reliability of the instruments identify the overall consistency of the constructs in the questionnaire.

3.2 Research Approach

'The research methodology is 'usually split into two main categories: quantitative' and qualitative, although in recent years a new approach has evolved, combining both quantitative and qualitative methodology' called a mixed methodology. (Creswell, 2009).

The quantitative method includes various calculations for the testing of variables relationships (Sekaran, 2003), this uses objective factors and statistical data analysis that are obtained from a pre-defined research site.

Quantitative research falls into either the experimental or non-experimental classification, according to Hoy and Adams(2015). .

Through experimental research, which is known to be the most reliable and effective way for testing all research methods, a scientist manipulates intervention in a non-experimental study to determine the cause and effect of the contrasting phenomenon. It comes to the attention that there is a negative endeavor that is designed to alter the comportment or states of the research's themes with the scholar evaluating present phenomenon by means of the way they got it (Sekaran, 2003). Significant types of non- experimental researches would be at least one than one of the type following classifications:

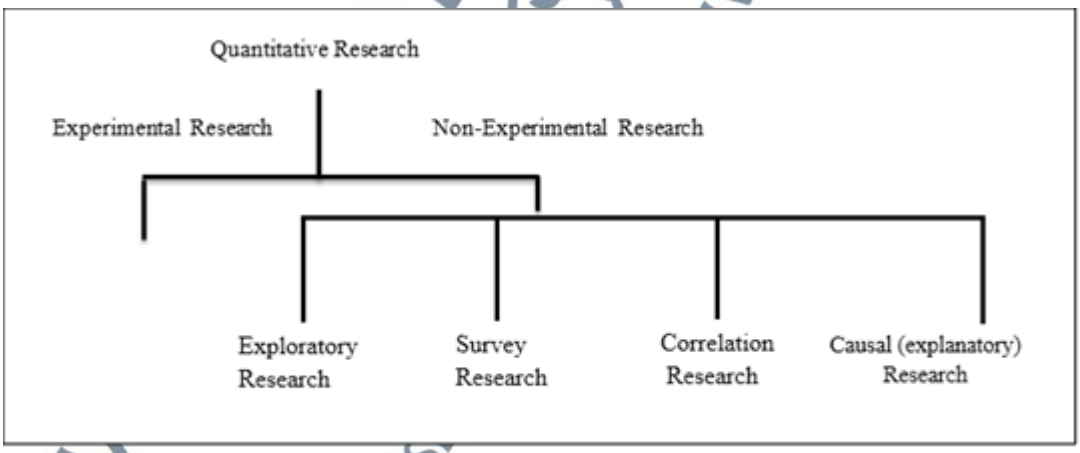


Figure 3.1: Type of Quantitative Researches

Exploratory research is conducted for a problem that has not been studied more obviously, priorities are set, operational definitions are developed and the final design

of the research is improved. Exploratory research helps to identify the best research design method of data collection and topic choice, final conclusions should be drawn only with extreme caution. Because of its essential nature, exploratory research almost always concludes that a perceived problem does not actually exist. Exploratory research often depends on techniques such as secondary research-such as the review of available literature and/or data, informal qualitative approaches such as discussions with consumers, employees, managers or competitors, formal qualitative research through in-depth interviews, focus groups, projective methods, case studies or pilot studies. The consequences of exploratory research aren't commonly helpful for Decision making management by their contribution; however, they could offer notable understanding's towards a specified situation. In spite of the notion that the aftereffects of qualitative studies would deliver few remarks in respects to the "why", "how" besides "when" anything materializes, they are unable to discover "how often" or "how many". This research will therefore not follow exploratory research to address research questions and explore the relationships between the study variables since exploratory research is not usually generalizable to the general population. (Shields et al. 2006).

Survey research is conducted to test the characteristics of different groups or their behavior towards a certain phenomenon, or their impressions of it. In comparison, correlation analysis is used to assess, as well as to examine the strengths and course of, the relationship between two or more variables in relation to the same group of people. (Ary et al., 2002).

Correlations research is a quantitative investigative technique in which you have at least enough quantitative variable derived from a similar collection of subjects, an analyst tries to determine whether there is a relationship (or correlation) between the

two factors (proximity between them, not a contrast between their methods). Throughout correlation analysis as well as the correlation coefficient, the intensity of the relationship (association) between two variables is expressed without specifying the direction of the relationship. In comparison to causal research, correlation research may explain whether two variables are correlated, but it cannot address why they are correlated or decide what variable causes the effect on the other. (Shields and Rangarjan 2013). Causal research is also referred to as explanatory research. The researcher investigates cause-and-effect relationships through causal research. In order to determine causality, it is necessary to observe the variance in the supposed to cause that induces the change in the other variable(s) and then calculate changes in the other variable (This type of research can sometimes be very complex and the researcher can never be absolutely confident that there are no other factors influencing the causal relationship, especially when dealing with the attitudes and motives of people. (Tumbel, 2016). The relationship (association) between cause and effect must be statistically significant Thus, in this type of research, exploratory factor analysis is very common. In other words, statistical analysis is the main tool for testing and measuring the relationship between cause and effect the goal of causal research is to test theories about surroundings besides rational outcomes acquaintances. The aim of causal research is to test hypotheses about relationships between cause and effect. If the objective is to establish which variable may cause a certain behavior if there is a cause-and-effect relationship between variables, causal research must be carried out (Babbie, 2007).

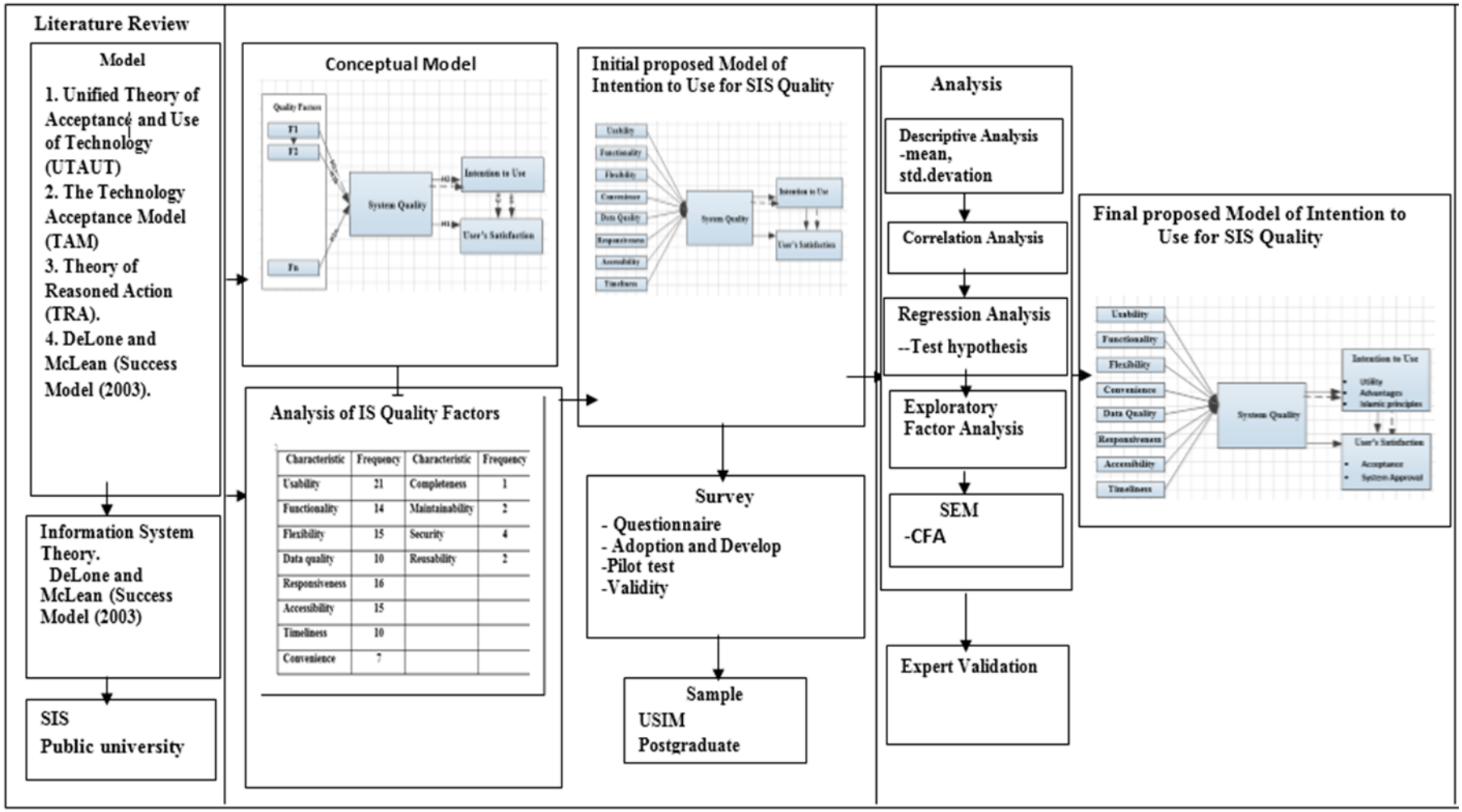
Therefore, this research used the causal and correlation research methodology to investigate the association, cause or effect of differences between certain variables and a group of people (study sample).

3.3 Research Design

The research design stimulates research ideas through finding discrepancies or contradictions in an information base, thus allowing the researcher to recognize or define research questions or hypotheses. The research design can help to narrow or concentrate a large research question and is useful for the collection of topics and the refining of topics. It may also help to develop conceptual or theoretical frameworks (Coughlan et al. 2007).

Moreover, literature reviews could be undertaken independently of a researches study (Polit and Beck 2006). Figure 3.2 shows the steps of the research stages as follows:

Shown the first step in figure 3.2 the previous studies that provide information on concepts and how to measure them, identify changes in knowledge to be studied and present theories used in research and how to benefit from them and the next step demonstrates the selection stage of the conceptual model based on previous studies. The other stage shows the factors of system quality that are chosen and then determined the initial research proposed model, and the next step shows the research tools used and the sample of the research after that comes the step of the analysis, where all kinds of analysis shown in the picture were carried out. The final step shows the model in its final form after the expert validation test of the model.



Characteristic	Frequency	Characteristic	Frequency
Usability	21	Completeness	1
Functionality	14	Maintainability	2
Flexibility	15	Security	4
Data quality	10	Reusability	2
Responsiveness	16		
Accessibility	15		
Timeliness	10		
Convenience	7		

Figure 3.2: The Research Design

3.4 Population

A research population is also referred to as an excellently-defined collection of individuals known to have similar characteristics. In general, all individuals within a given population have common, binding characteristics or attributes.

In other words, a study population is a group of people taken from the general population who share a common characteristic, such as age, gender, or a related condition. For various reasons, such as their reaction to certain variables of the phenomenon, this category can be studied. Sekaran (2000) defines the population as "the full set of people, actions or items that the investigator wants to examine".

This is a case study where the population of this research comprises 1172 represents postgraduate students in USIM in the 2016 academic year. The researcher selected postgraduate students because the scope of study relate to the system that specifically used by postgraduate students. also in this research used Data collection Method by purpose random sampling technique, the researcher cannot test every individual in the population because it is too costly and time-consuming. Along these lines, the researcher depends on sampling techniques.

3.5 Sample Size

The sampling technique is the method of taking a sample of the entire population that is representative of the population as a whole. The sample must be enough to conduct a statistical analysis (Cooper and Schindler 2008).

The size of the samples depends on the appropriate sampling design. The method of sample size, centered on the rationale of probability theory, is used to

determine how large a sample from a specific population should be, in order to provide the estimation with the necessary level of accuracy. (Channels, 1985, p.106).

There are three key aspects play an essential part in figuring out samples size alongside probability models (Channels, 1985; Hair et al. 2008):

- As the variability of the researched populace is excessive, greater sample's sizes are required.
- As the preferred degree of confidence increases, the bigger the sample size is required.
- As the level of precision preferred in estimating the population features increases, the larger sample size required.

The research used a methodology trailed by Krejcie and Morgan (1970). This is clearly shown in Table 3.1

Table 3.1: Krejcie and Morgan's Sample Size Determination Table

Population Size	Sample Size	Population Size	Sample Size	Population Size	Sample Size
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331

Table 3.1 continued

65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Source: Krejcie and Morgan (1970)

The determination of the required size S of a randomly selected sample from a given finite population of N cases would result in the sample proportion p being within ± 0.05 of the population proportion P with a confidence level of 95 percent (Krejcie and Morgan 1970). The populace of roughly 1172 is prearranged as roughly 287 participants, the researcher of the research has increased the number to 370 in order to collect valid questionnaires and collected questionnaires = 300, the valid questionnaires which are used in the analysis = 275. This is clearly can be seen in table 3.2.

Table 3.2: Samples Sizes of this research

The Population of the Study	Sample Size	Number of Questionnaires distributed	Number of Questionnaires recovered	Number of Questionnaires ready for Analysis	Recovery Rate	The Population of the Study
1172	287	370	300	275	97%	1172

3.6 Research Instruments

In this research, the design and formation of the questionnaires are the instruments for gathering primary data. A questionnaire is a research instrument consisting of a set of items for collecting information (primary data) from participants in the survey (James, 2005). The questionnaire sheet has been circulated to the study sample by hand. The researcher selected the locations of students at the university, such as the library, Student housing, PPS, and distributed the questionnaire to all postgraduate students in the university. This research applied Purposive Sampling Method where the target respondent directly toward the users of the SIS in USIM which is the postgraduate students. Then the researcher randomly select the respondents among 1172 represents postgraduate students in USIM in the 2016 academic year.This method of distribution is preferred in most of social studies and researches associated with behaviour of employees (James, 2005).

The Likert scale has a genuinely powerful indicator that has demonstrated to be solid over a wide assortment of forms, and the bigger issues concern, such issues as the item content of scales related to their construct validity. While such concerns are substantial, there is one part of Likert scale development which is at any rate of equivalent significance when the data is utilized as factors of the result. As recommended by Guyatt and Jaeschke (1990), this is the question of sensitivity to

measurement, and it is quite curious that this crucial parameter has been virtually ignored. The typical Likert scale offers 5-or7-choice points that are unlikely to exploit most people's discriminating capacity in terms of their perceived well-being on their own. A Likert scale of five points ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Researcher built up the questionnaires from the scratch after did the systematic review to identify the factors that contribute to the research model. From the identified factors, the constructs and items has been built up as shown in table 3.3.

The questionnaire was divided into two parts: the first contains information about the demographic profile, including age, study level, and SIS level of use. The second part refers to the research variables, the total number of questions in the questionnaire is 76, the questions have been divided as shown in Table 3.3 and the questionnaire can be found in Appendix (A).

Table 3.3: Items in Questionnaire

Factors	Items Number
System Quality	
Usability	6
Functionality	6
Convenience	6
Data quality	6
Responsiveness	6
Accessibility	6
Timeliness	6
Flexibility	6
User's Satisfaction	13
Intention to Use	15
Total	**76**

3.7 Pilot Study

Pilot studies can be defined as a little scale introductory pilot studies executed for the objective to evaluate times frame, feasibilities costs, charge or costs, adversative activities, besides influence size (statistical variability) attempting to take up beforehand an adequate samplings sizes besides enhancing the research designs prior to performance of a full-scale research project (Walters, 2019.).

Pilot experiments are often performed before large-scale quantitative research to prevent wasting time and money on an inadequately designed project a pilot study is typically performed on members of the population concerned, but not on those who are going to be part of the final sample. This is because if they have already been interested in research, it may affect the later conduct of research subject (Haralambo, 2000).

The research conducted a pilot study on a sample of 50 participants (Refer the Table 3.4). The random sample included University Science Islamic Malaysia (USIM) postgraduate students with fair experience using their universities ' SIS. The purpose of the pilot study on a limited scale is to assess the questionnaire and phrases as well as the consistency of questionnaire items. Internal consistency examines the inter-item correlations within an instrument and indicates how well the items fit together conceptually (Nunnally and Bernstein 1994; DeVon et al. 2007).

Additionally, conducting a pilot study will enhance the design of data collection instrument and save the time required in the actual study to collect the primary data. Many studies depend on pilot research to improve the data in the actual research and avoid errors in the design of the questionnaire, the phrases of items, and the misunderstanding of items.

The analysis in the pilot study includes a reliability test as described in table 3.4.

Table 3.4: Samples Sizes of Pilot Study

Number of Questionnaires distributed	Number of Questionnaires recovered	Number of Questionnaires ready for Analysis	Recovery Rate
50	37	37	89%

3.7.1 Validity Instrument

Validity denote to "the extent to which the empirical measure adequately reflects the real meaning of the concept under consideration" (Babbie, 1992, p.133). The validity of an instrument can be deduced from many perspectives, such as face and content, validity; concurrent or predictive validity; and construct validity (Kumar, 1996).

- Face validities refers to the judgment made of the instrument in respect of the logical linkage between the questions asked and the objectives of the research in question.
- Simultaneous validities refers to the degree to which one instrument compares with another when they are concurrently administered.
- Predictive validities, in contrast, refers to the extent to which an instrument can easily predict or forecast the outcome of a research.
- Construct validities, which is the most sophisticated method of testing the validity of all three, aims at ascertaining the contribution which each construct makes to the total variance observed in the phenomenon.

In the research, both the face validity and the construct validity tests were conducted. The face validity was established. Three experts in the field of specialization review the items on the questionnaire and assess the extent to which they reflected the meaning they are expected to measure. This process was followed by rewording some statements that were deemed not accurate. experts' notes were as follows:

1. In the intention, the items have some similar content and so they are somehow confusing.
2. Some items in the satisfaction concept, are similar namely items No.2 and .5
3. Some items of system quality need revision.
4. The items of the satisfaction are not enough and more questions need to be added to be fit.

Onstruct validity was established by means of factor analysis, in terms of which a number of constructs were established, based both on the eigenvalues and on the percentages of variance explained by each construct. The eigenvalues and the variance, which are explained by each, are presented in chapter four in terms of factor analysis.

3.7.2 Reliability Test for Instrument

Reliability coefficient is a measurement error associated with an exam grade (Neil, 2009). Commonly, unwavering quality coefficient alpha is a measure of inward consistencies in regards to the entire items embedded within the questionnaires; this coefficient shows items qualitative qualities of the survey are specifically correlated as well as associated besides steadiness towards each other.

Cronbach's alpha is proportional to the normal of the all-conceivable split-half measures also is the furthermost regularly utilized dependability measurement

statistic's to build up inside consistencies unwavering quality and reliabilities (Trochim 2001; DeVon et al. 2007).

The term reliabilities are utilized to examine the general consistency pertaining the questionnaires utilized in gathering the essential primary data derived from participants. Dependability coefficient is a proportion of the measure of estimation errors related with examination scores.

Regularly, coefficients of reliabilities are a proportion or estimates of inside consistency in regards to the entire items to be associated and correlated, showing how well things are related with each other in this research. Reliabilities coefficient alpha extents from 0.00 to 1.00 (This can be depicted in Table 3.5), the greater the magnitude, the extra solid the examination scores. Reliabilities transformation depends on the accompanying qualities:

Table 3.5: Reliability Cronbach's Alpha Classifications

Alpha values	Grade	Interpretation
0.90 and above	Excellent	Reliability of data at the highest level of the best standardized tests.
0.80 -0.90	Very good	Data is very good for the test
0.70 - 0.80	Good	Data is good for a test; in the range of most. There are probably a few items that could be improved
0.60 - 0.70	Low	This test should be supplemented by other factors to determine grades. There are probably some items that could be improved
0.50 - 0.60	Very low	Alpha value suggests a need to revise the test, unless it is quite short (ten or fewer items). The test must be supplemented by other factors for grading.
<0.5	Bad	Data is not consistent below Questionable reliability. This test should not contribute heavily to the course grade, and it needs revision

The data from pilot study has been analyzedyield the table structure SPSS indicates that the reliabilities coefficients Cronbach's Alpha of the entire total variables are equivalent to 0.95 (95%). In light of the above classifications of alpha qualities, it is discovered that the present reliabilities of gathered information related with the totals itemized items is utilized in the surveys are "Excellent", which is viewed as the degree of the finest standardized examinations in statistical methodologies as appeared in the table beneath.

The research then examines the reliabilities coefficients (coefficient's Cronbach's Alpha) of every variables clarified in the research as appeared in table 3.6.

Table 3.6: Reliabilities Cronbach's Alpha of Each the Variables

Variable's names	**Reliability's Coefficients (Cronbach's Alpha)**	**Reliability's levels**
System Quality	92.40 (92.40%)	Excellent
Intention to use SIS	0.88 (88.10%)	Very Good
User's Satisfaction	86.80 (86.80%)	Very Good
Overall reliability	0.95 (95%)	Excellent

It is clear that the reliabilities of items related with every part of variables is acceptable for statistical analyses. Therefore, further analysis could be conducted.

3.8 Data Analysis

The research used software names as Statistical Packages for Social Science (SPSS) versions 21 besides (AMOS) versions 22 to enable the Statistical studies away from the collected data. Statistics of SPSS is defined as product packages employed for measurable studies, the said products are employed for overview creating besides transferring (IBM SPSS Data Collections), data mining, text analytics, and collaboration and deployment, besides synchronized efforts and arrangement (batch and automated scoring services). Coding's of different independent variables and dependent variables were keyed in within. Subsequently, another graphics were created utilizing AMOS. Toolbars are utilized in AMOS to sketch the models that will be examined, as well as certain type of boxes utilized to show IV besides circles applied to demonstrate DV. The arrows are sketched to demonstrate social stream; IV are coordinated toward the DV. Subsequently t when the models are sketched utilizing toolbars, information document made utilizing SPSS is chosen in AMOS platform and statistical examinations are achieved by the software application programs of utilizing SPSS information files.

In order to construct models of search variables, the analysis in chapter four is conducted through Structural Equations Modeling (SEM), which is a familiar method used for testing the model fit because it gives the scholar of the research the possibility to examine the causal association between variables accurately. In addition to that, to examine the associations between variables accurately based on a data sample greater than 200, SEM is recommended and mostly used by scholar of the research's, refer to Kline (2005), Weston and Gore (2006).

Table 3.7: The Data Analysis Methods

Research Question	Research Objectives	Data Analysis
1. What are the quality factors for Student Information System?	To identify quality factors for student information system.	• Bivariate statistics • Mean, Std. deviation • Correlation Bivariate. • Exploratory Factor Analyses (EFA). • Confirmatory Factor Analysis (CFA) • SEM
2. What are the factors that influencing satisfaction?	To investigate the factors that influence the satisfaction of SIS based on: i. Investigate the influence of system quality on user satisfaction directly. ii. Investigate the influence of system quality on intention to use. iii. Investigate the influence of intention to use on user satisfaction. iv. Investigate the influence of system quality on user satisfaction while mediating the intention to use factor.	
3. What is the relationship between Islamic features and intention to use?	To investigate the relationship between Islamic features and intention to use.	
4. How can the structural Relations be established among the quality factors, intention to use, and user satisfaction?	To develop a model of intention to use for student information system quality by Structural Equation Modelling (SEM)	
5. How can the model of intention be validated to use for Student Information System quality?	To validate the model of intention to use for student information system quality.	by Expert Validation

3.8.1 Pearson Correlation Analysis

In the process of analysis of correlation, the research measures samplings correlations coefficient (r), all the supplementary explicitly the correlations of Pearson Product Moment coefficients. The matrix of correlation is important because it is used to check the degree of association between variables predefined in the theoretical framework. The correlations are not direction relationship or causal relationship like regression. They are measures of statically nature (communicated as a figure or number)

that portrays the physical capacity as well as type (positive/negative) of an association between at least two variables.

The process of correlations between variables, nonetheless, doesn't consequently imply that the adjustment in one variable is the reason for the adjustment in the estimations of other variables. Therefore, correlations analysis won't be used to predict the changes in the User's Satisfaction.

Correlations analysis is used in this research for the following two reasons:

1. Correlation enables the scholar of this research to examine typically happening variables that perhaps unscrupulous or illogical to examine tentatively. For instance, it is unprincipled to perform experiments on in the case of smoking could cause lung cancer.
2. Correlation enables the scholar of this research to plainly and effectively verify whether there is an association between variables regardless of the direction of the cause and effect of this relationship.

The process of correlations coefficient is a proportion of straight relationships between 2 types of variables. Estimations of the correlations coefficients are consistently between - 1 in addition +1. The correlation's coefficient between two variables can be certain or negative. The correlations coefficients of +1 shows in which 2 types of variables were superbly correlated in a positively straight relationship (i.e., more elevated phases of single variable are related with more elevated levels of the other). A connection coefficient of - 1 demonstrates that two variables are flawlessly related in a negative straight relationship (i.e., more elevated phases of single variable are related with lesser phases of another's), and a connection coefficient of 0 shows that

there is no direct connection between the two factors. The Political Science Department at Quinnipiac University published these helpful lists of the description and significance of Pearson's Correlation coefficients showing table 3.8. They noted that these are "crude estimates" for translating qualities of correlation's coefficient utilizing Pearson's correlation.

Table 3.8: Coefficients of Pearson's Correlation

r value	Interpretation
+.70 or higher	Very strong positive relationship
+.40 to +.69	Strong positive relationship
+.30 to +.39	Moderate positive relationship
+.20 to +.29	weak positive relationship
+.01 to +.19	No or negligible relationship
0	No relationship
-.01 to -.19	No or negligible relationship
-.20 to -.29	weak negative relationship
-.30 to -.39	Moderate negative relationship
-.40 to -.69	Strong negative relationship
-.70 or higher	Very strong negative relationship

Source: Mukaka, M. M. (2012).

For instance, a value of correlation of r = 0.9 recommends a very robust, optimistic connotation between two variables, although a value of correlation of r = -0.2 advise a feeble, negative connotation. Correlations close to zero advises not one linear associations between two continuous variables. Any correlation bigger than 0.30 is recognized.

3.8.2 Regression Analysis

Fundamentally, the testing's of hypothesis is the objectives to verify of the likelihood esteem (ρ) is equivalent of not exactly the noteworthiness level (Sig. = 0.05). It is additionally termed the test's size of or sizes of the basic district. The investigator assumes that the null hypothesis (H0) is valid in hypothesis testing and tests how often the result found will occur if this assumption were correct.

A theoretical concept is projected for the statistical associations between the two educational lists datasets, besides this is stood out as an alternative with an appreciated invalid hypothesis that recommends no association between two instructive assortments. The assessment is regarded truthfully enormous if the associations between the informative collections could become an impossible affirmation of the unacceptable hypothesis as indicated by a limit likelihood the hugeness level.

Settling on testing a theory is either to dismiss the invalid speculation for the other option or doesn't dismiss it. The choice guideline is to dismiss the invalid theory H0 if the monitored worth t as the basic locale, besides to acknowledge or "fail to reject" the speculation generally.

Theory testing's are utilized in this segment in realizing what results might swift an expulsion of the unacceptable theories for a pre-demonstrated degree of centrality. A Simple linear direct regression is utilized to quantify the causal connections between the interrelated develops of the applied system. The key thought in speculation testing is dismissing the invalid theory when the ρ-esteem is equivalent of not exactly the essentialness (α) level of (0.05). At the end of the day (ρ-esteem ≤ 0.05).

In statistics, simple linear regressions are an exceptionally valuable investigation to foresee the adjustment in the needy variables if the autonomous variables are changed. In scientific demonstrating and factual displaying, there are DV and IV. The modules examine in what way the previous rely upon the last mentioned. The DV addresses the outcomes whose assortment is being thought about. The self-ruling or IV variables address data resources or reasons, for example possible clarifications overdue assortment.

In basic direct regression models' testing's or clarify the impacts that the free factors have on the needy factors. Once in a while, IV might be combined for diverse motives, for ex, possible bewildering impact, deprived of a desire to examine related impact straightforwardly (Carlson, 2006). The objective in this examination is to locate the accompanying regressions equations in regards to straight lines between the Y, the dependent variable versus X, the independent variable.

$Y = \alpha + \beta X + \text{error}$

Basic direct regressions give a "best" fit for the information focuses. At this time the "best" will be comprehended as at all squares approaches: a line that limits the whole of squared residuals of the straight regressions model.

In the statistical writing, statistical theory testing's assumes a basic job. The typical line of thinking is as per the following (Lehmann, 2005):

- There is an underlying examination theory of which in all actuality obscure.
- The initial step is to express the significant invalid and elective speculations. This is significant, as misquoting the theories will sloppy the remainder of the procedure.

- The subsequent step or 2nd is to study the statistical expectations being established in regards to the samples in conducting the examination for instance, suppositions about the statistical freedom or about the type of the dispersions of the perceptions.

3.8.3 Exploratory Factor Analysis (EFA)

EFA is generally a descriptive or exploratory methodology before conducting the CFA. CFA is regularly utilized in later periods of scale improvement or develop approval after the hidden structure has been likely settled by earlier exact examinations utilizing EFA, just as on hypothetical grounds (Timothy, 2006).

There are two sorts of variables characterized in this research. In insights, idle factors contradicted to detectable factors, they are factors that are not straightforwardly monitored yet are fairly derived (roundabout) through a scientific model from different factors that are monitored (for example legitimately estimation like poll things). The research reclassified 3 idle variables (System Quality, Intention to Use, User's Satisfaction). Every one of these three variables includes a certain number of factors. EFA analysis is used in this research to lessen the quantity of monitored variables (itemized) related with each latent variable so as to diminish the understanding quality of monitored variables. EFA is conducted for this research to achieve the following:

1. Outline numerous monitored variables partaking comparable examples of reactions since they are altogether connected with one inert variables.
2. Grouping related things of every inactive variables into factors (measurements) as per their stacking pertaining that factor.

3. Eliminate monitored variables (items) within little clarification levels besides weak factor loading.
4. Minimizing multi collinearity between the monitored variables of each inert variable.
5. Improving data before conducting SEM analysis using AMOS software.

3.8.4 Confirmatory Factor Analysis (CFA)

Exploratory factor analysis (EFA) is a classical formal measurement model that is used when both observed and latent variables are assumed to be measured at the interval level. Characteristic of EFA is that the observed variables are first standardized (mean of zero and standard deviation of 1).

EFA is executed on the correlation matrix between the items. In EFA, a latent variable is called a factor and the associations between latent and observed variables are called factor loadings. Factor loadings are standardized regression weights. Since EFA is an exploratory technique, there is no expected distribution of loadings; hence, it is not possible to test statistically whether or not factor loadings are the same across cultural groups. However, congruence measures, such as Tucker's ϕ, have been developed to indicate whether the pattern of factor loadings across items on a factor is the same across cultural groups. Sufficient congruence for structural equivalence is usually taken to be found if Tucker's ϕ exceeds 0.95. Values below 0.90 are taken to indicate that one or more items show deviant factor loadings and thus show bias. Bootstrap procedures have been developed to test the identity of factor loadings in EFA.

EFA is used to investigate structural equivalence. However, since it works on standardized variables (mean of zero and standard deviation of 1), this model is not

suited to detect non-uniform and especially uniform item bias.

EFA is often used in the multidimensional situation where more than one latent variable is measured at the same time. Before evaluating congruence in this case, the factor structures should be rotated toward a target structure.

If the goal of the researcher is to interpret the correlations among variables as arising from a smaller set of latent variables/factors, EFA is the method of choice. The latter model recognizes that variables are measured with error and yield coefficients which are less biased.

Comparable to EFA, the motivation behind CFA is to recognize latent parameters that record for the variety and co-variation between a groups of indicators. In cooperation, EFA besides CFA were depending on the normal factor models (Timothy, 2006).

In comparison to EFA, the CFA model provides the researcher with the freedom to define the nature of relationships among the indicators ' measurement errors (unique variances). CFA is more parsimonious than EFA as it uses fewer factors. While both EFA and CFA distinguish common and unique variances, Since CFA generally requires a more parsimonious approach, CFA normally aims to replicate the relationships found between indicators with fewer parameter estimates than EFA, these relationships can be calculated if this definition is significantly justified and other identification criteria are met Consequently, due to the identified limitations of the EFA, the model of the factor must be specified on the assumption that the error of measurement is random. On the other hand, correlated measurement error can be modeled in a CFA solution. (Timothy, 2006).

The measurement model's evaluation is the first step before the final structural model is designed. The measurement model test is accomplished by Confirmatory Factor Analysis CFA.

CFA's objective is to verify that each independent variable (System Quality), moderator (Intention to use), and dependent variable (User Satisfaction) matches in a measurement model with its observed variable (items) the fitness of the data with the measurement model is essential prior to the construction of the structural model.

The SEM procedures ensure that the measurement model of each variable is consistent with the data collected in the survey.

The measurement model consists of a latent variable, which may be first order (including one factor) or second order variable (two or more factors). The measurement factor evaluation measures are as follows: Creating the measurement variables the estimation variable for every parameter from factors determined in EFA.

1. Constructing the measurement variable for each variable from factors specified in EFA.
2. Verifying the factor loading of indicators (measurement variables). The minimum value of factor loading is 0.3, and their impact on the overall fitness of the measurement model of each variable.
3. Comparing the Fit-Indices for structural equation modeling (CMIN/DF ،RMR, GFI, AGFI ،CFI ،NF ،PCFI ،PCLOSE ،RMSEA) beforehand and subsequently CFA.

CFA is often used as a precursor to SEM models defining structural relationships (regressions) between latent variables. SEM models can be divided into two main components: (1).The measurement model specifying the number of factors,

how the specific indicators respond to latent factors and the relationships between the indicator errors of the CFA system. (2) The structural model which describes how the various latent factors are directly or indirectly related to each other, no relationship, no spurious relationship. (Timothy, 2006).

In structural equation modeling, the fit indices decide whether, in general, the model is acceptable if the model is acceptable then researchers will determine whether there are important specific paths. Acceptable fit indexes do not mean strong Nevertheless, when the relationships between variables are small rather than large, high fit indices are often easier to obtain because the ability to identify inconsistencies from predictions is enhanced.

The chi-square value incorporates many of the match indices. Conceptually, in this context, the chi-square value represents the difference between the matrix of covariance observed and the matrix of covariance expected or model.

- Discrepancy functions, such as, the chi square examination, relative chi square, besides RMS.
- Tests that comparing the target model and the null model, for example, the GFI, CFI, NFI, TFI, and IFI .

Many scientists, such as Marsh et al. (1996), have recommended that individuals use a range of fit indices. For sure, Jaccard & Wan (1996) prescribe utilizing lists from various categories too and this procedure defeats the confinements of each record.

A researcher often uses model is regarded as acceptable if: utilize module is considered as satisfactory if:

- The Indexes of Normed Fit (NFI) surpasses 0.90 (Byrne, 1994) or .95 (Schumacker & Lomax, 2004).
- The Indexes of Goodness of Fit surpasses 0.90 (Byrne, 1994).
- The Indexes of Comparative Fit surpasses 0.93 (Byrne, 1994).
- RMS is under .08 (Browne & Cudeck, 1993) then preferably under .05 (Stieger, 1990). The upper confidence interval of the RMS should not exceed 0.08.

The relative chi-square ought to be under 2 or 3 (Kline, 1998; Ullman, 2001). These standards are simply rules. To delineate, in a field wherein past models create CFI estimations of 0.70 just, a CFI estimation of 085 speaks to advance and subsequently ought to be satisfactory (Bollen, 1989).

Each latent variable of the research variables associated with several factors was measured, from the second level to the standard model. (estimated variable based on data obtained through a questionnaire and then assessed to check their suitability with the standard model presumed to do this. It has been the use of factor analysis affirmative for each variable through the steps of structural equation modeling, taking into consideration that the quality of the model matching largely depends on the sample size and the number of variables in the model. It has been the utilization of factor examination positive for every factor through the means of basic condition displaying, contemplating that the nature of the model coordinating to a great extent relies upon the example sizes with the quantity of variable in the module (Hair et al. 2010).

As appeared in the investigation, the standard structures might be coordinated with the information for a few reasons, including that the residuals magnitudes (standard

errors) might be negative because of the way that stacking or loadings the magnitudes of the worldwide more prominent than one (Chen et al. 2001).

The scientists and scholars ascribed the presence of negative estimations of the residuals because of the variance in the context of the samples' answers about the justification for the remaining qualities in the exploration populace (Chen, 2001). In this way, it will be limited any negative an incentive for residuals and equivalent to zero or extremely little positive esteem and way to deal with zero (Chen et al., 2001; Kline, 2005).

Before continuing in CFA investigation and analysis for every variable, every variable must consist of 3-pointers as a base or within the minimal magnitude so as to diminish the proportion of the standard glitches measure. For the situation whereby there are under 3 items (monitored variable) stacked on one facto followed by the specific factors would be erased from the structure models.

3.8.5 Structural Equation Modeling (SEM)

The following stage is interpreting the outcomes as indicated by respondents' responses through a modelling technique the observed variables are the items of the questionnaire. In the subsequent subsections, the monitored type of variables are the factors of the required questionnaire. As found in the previous section, the outcomes from EFA indicate that every variable comprises an explicit number of components, and each factor consists of a specific number of observed variables (items), that is termed of the factor's indicators.

SEM with non-observable variables is a major research technique in today's management world. The establishment of the covariance-based SEM method can be

traced back to the development of Jöreskog's (1966-1979) and Wiley (1973) maximum likelihood covariance structure study.

SEM alludes to the various arrangements of irrelevant calculations, algorithms, measurable, statistical techniques that appropriate systems of develops to statistical methods. SEM includes confirmatory factor analysis, path analysis, squares path analysis. Utilizing of SEM is normally supported in the social sciences in light of its capacity to allocate out associations between unobserved constructs (latent variable) from noticeable variables.

SEM provides two main advantages in testing a theory (model):

1. Provide numerical estimates for each of the parameters (arrows) in the model to indicate the strength of the relationships.
2. Allows the researcher to diagnose which observed variables are good indicators of the latent variables (through Confirmatory Factor Analysis CFA).

The motivation behind utilizing SEM within the boundaries of this research work is to test the theoretical models besides its appropriateness and suitability with the monitored data gathered in the surveys and questionnaires.

SEM analysis encompasses the fundamental two major stages:

- Phase one. This phase includes testing measurement model of every variable through CFA.
- Phase two. Within this the phase, researcher constructs the final structural model and test its fitness with the observed data.

Table 3.9 fit records are utilized to quantify the model fit in SEM examination.

CMIN	Minimum value of the discrepancy between the model and the data. This is the same as the chi-square statistic in the "notes for model" section.
CMIN/DF	The chi-square divided by its degrees of freedom. Acceptable values are in the 3/1 or 2/1 range. Using this criterion, our earlier model (without the added path from PIQ to COMP) was also acceptable (CMIN/DF = 1.65). Is considered satisfactory when <3 in large samples (N > 200), < 2.5 in medium-sized samples (100 <N< 200), and <2 in small samples (N< 100).
GFI	The GFI (Goodness of Fit Index) is similar to the Baseline Comparisons described below, giving a statistic between 0 and 1, with 1 indicating perfect fit, and is used with maximum likelihood estimation for missing data.
AGFI	[Adjusted Goodness of Fit Index] takes into account the degrees of freedom available for testing the model (this statistic can have values below zero).
NFI	- Baseline Comparisons - NFI [Normed Fit Index] shows how far between the (terribly fitting) independence model and the perfectly fitting) saturated model the detaulf model is. In this case, it's 91% of the way to perfect fit.
RFI	[Relative Fit Index] is the NFI standardized based on the df of the models, with values close to 1 again indicating a very good fit.
CFI.	[Comparative Fit Index) is similar to GFI. It is usually between 0 and 1, but is not limited to that range.
RMSEA	RMSEA is a corrected statistic that gives a penalty for model complexity, calculated as the square root of FO divided by DF (RMSEA stands for "root mean squared error of approximation"). RMSEA values of .05 or less are good fit, <1 to >.05 are moderate, and .1 or greater are unacceptable. RMSEA = .00 indicates perfect fit.
PCLOSE	The "PCLOSE" statistic that goes with this result is the probability of a hypothesis test that the population RMSEA is no greater than 05 (so, this result to be nonsignificant (p > .05), because you do not want to prove that the RMSEA is significantly greater than .05). RMSEA value of < 0.8 as good model fit (Tong,
PCFI Chi-Square	[Parsimonious Comparative Fit Index is a df-adjusted modification of the CFI it is used as a "badness of fit" statistic in SEM Notes for Model" shows the chisquare statistic that tests for significant deviations between the model and the data. In this case, the p-value is significant, meaning that the model is not a good fit for the data.

Discussions in this section are based on formative factors which indicate that a latent variable is a measure that uses one or more of its causes. (Indicators or questionnaire items), which decide the importance of that build (e.g., Blalock, 1964; Edwards and Bagozzi 2000; Jarvis et al. 2003).

There is a major theoretical and empirical disparity between the reflective and the formative constructs the intelligent and developmental builds occurs a significant hypothetical and experimental distinction.

3.9 Summary

In this chapter, this research demonstrates the research methodology that will be used for analysis and collecting of data. The research design presented and illustrating the techniques for collecting the data, the theory and the model will be used for examining the relationship the variables of the research, and demonstrating the analysis methods that will be applied on the collected data. The design of this investigative research aims at producing subsequent hypotheses by investigating data sets in addition to observing probable associations between variables and stating by identifying the research problem and subsequently presenting the research questions. The above said research questions, as well as its related research objectives, are well-defined before revising relevant literatures. The section of (literature review) delivers info concerning what is previously acknowledged; and providing information about notions, in addition how the perceptions had been evaluated and assessed. It also identifies gaps in knowledge that will be studied. Finally conducting the quantitative analysis and at this stage the scholar of the research started collecting of data, allocating surveys/questionnaire's', besides scrutinizing principal data gathered from the questionnaire's 'participants.