CHAPTER 5

RECOMMENDATIONS AND CONCLUSIONS

5.1 Introduction

In this chapter, the outcomes of the research is summarized and conclusions drawn. The objectives are revisited briefly to show how they were fulfilled, this includes the theoretical framework, hypothesis testing and the uncovering of the relationships among the system quality, intention to use SIS, and user satisfaction. The research findings and recommendations are also presented.

5.2 Objectives Fulfilment

This research investigates the effect of SIS quality factors on user satisfaction directly and the mediating effect of intention to use on the system quality-user satisfaction relationship. The objectives and their fulfilments are presented in the following sections:

5.2.1 Objective 1

Defining the system quality factors for a Student Information System.

This research has reviewed previous studies in the literature to identify factors reflecting on SIS quality. The findings reveal that no commonly agreed or standard characteristics have been defined to evaluate SIS quality. In general, researchers reported a variety of factors based on their various fields of study (Musa et al. 2018; Zuama et al. 2017; Noh and Park 2017, Dreheeb et al. 2016; Ban, 2016; Mir and

Mehmood 2016; Montesdioca and Maçada 2015). These previous studies were presented and discussed in Section 2.4, and the results are summarized in Table 5.1 based on frequency of occurrence.

Table 5.1: Degree of Usage of Various Quality Factors in Previous Studies

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

To generalize the research findings, the most frequent factors in Table 5.1 were used to represent SIS quality. This process led to the selection of eight factors: usability, accessibility, functionality, flexibility, data quality, convenience, responsiveness, and timeliness, usability, responsiveness, accessibility, flexibility, functionality, data quality, timeliness, and convenience.) These factors are in agreement with those used in other studies to measure SIS quality. For example, Jalal and Al-Debei (2012) used usability, accessibility and flexibility. Nordaliela et al. (2013) used usability, responsiveness and flexibility. Kamran and Amjad (2016) used usability, data quality, timeliness, and convenience. Inoco and Hernandez (2017) used usability and accessibility.

To derive the overall effects of these eight factors on SIS system quality, the critical was analysed, and the quantitative analysis results revealed a significant positive correlation between the factors and the system quality of SIS. This indicates that, to a large extent, these factors can be used to characterize SIS quality.

5.2.2 Objective 2

Investigating the factors that influence the User satisfaction of SIS, and the related relationships highlighting the mediating effect of the intention to use factor on the system quality-user satisfaction relationship.

The research developed a hypothetical conceptual model for the relationships between system quality and user satisfaction while considering the mediating effect of the intention to use on this relation. The conceptual model assisted in developing the hypotheses and validating the relationships among the research variables. The research conceptual model was based on the theory presented by DeLone and McLean (2003) which provides the theoretical foundation for this research. Also, mediation analysis has been conducted inspired by the framework proposed by Baron and Kenny (1986), which was later used in the consumer researcher's toolkit. The conceptual model included the eight factors listed above (involving 48 items) identified by Objective 1 as independent variables. The intention was to use the mediator and user satisfaction as the dependent variables. As a result, four related relationships were developed and measured, these are summarized in the following subsections. Correlation analysis revealed strong correlations among all the variables of the conceptual model.

5.2.2.1 Influence of System Quality on User Satisfaction

The research investigated the effect of system quality on user satisfaction directly. Several tests were conducted, and ANOVA indicated a causal relationship between system quality and user satisfaction, with the regression coefficients (β) positive and moderate, see Table 4.11. The regression weights revealed that the relation between system quality and user satisfaction is significant, with CR equal to 4.469 and the P value 0.000, see Table 5.2. The regression analysis reveals that system quality is

correlated with user satisfaction in a positive and causal relationship. Moreover, it is found that the eight quality factors used represent and cover the whole system quality construct, with CR values found to be greater than 1.96 and P values less than 0.05; see Table 5.2.

Table 5.2: Testing of Various Factors Affecting System Quality

Hypothesis	CR	P value	Result
H1: There is a statistical relationship between system quality and user satisfaction of SIS	4.469	0.000	Supported
H1a: There is a statistical relationship between usability and the system quality of the SIS	5.288	0.000	Supported
H1b: There is a statistical relationship between functionality and the system quality of the SIS	3.922	0.000	Supported
H1c: There is a statistical relationship between flexibility and the system quality of the SIS	regression weight was fixed at 1.000	0.000	Supported
H1d: There is a statistical relationship between convenience and the system quality of the SIS	5.960	0.000	Supported
H1e: There is a statistical relationship between data quality and the system quality of the SIS	4.780	0.000	Supported
H1f: There is a statistical relationship between responsiveness and the system quality of the SIS	5.940	0.000	Supported
H1g: There is a statistical relationship between timeliness and the system quality of the SIS	6.311	0.000	Supported
H1h: There is a statistical relationship between accessibility and the system quality of the SIS	5.936	0.000	Supported

Table 5.2 shows that all the hypotheses achieved high CR values and very low P values, and, therefore, all the hypotheses are supported.

5.2.2.2 Influence of System Quality on Intention to Use

The research investigated the effect of system quality on the intention to use the SIS using several tests. The ANOVA test indicated a causal relationship between system quality and the intention to use; the regression coefficients (β) were positive and moderate, as shown in Table 4.19. The regression weights presented in Table 5.3 reveal that the relation between the system quality of the SIS and the intention to use the SIS is highly significant because the CR is greater than 2.58 and the P value is less than 0.01.

Table 5.3: Testing of Hypothesis that System Quality Affects Intention to Use

Hypothesis	CR	P value	Result
H3: There is a statistical relationship between system quality of SIS and intention to use SIS	5.241	0.000	Fail to reject

5.2.2.3 Influence of Intention to Use on User Satisfaction

The research investigated the effect of intention to use on user satisfaction via several tests. The ANOVA test indicates a causal relationship between the intention to use and user satisfaction, with the regression coefficients (β) positive and moderate, as reported in Table 4.15. The relation between intention to use a SIS and user satisfaction is also highly significant with the CR being greater than 2.58 and the P value being less than 0.01; see Table 5.4.

Table 5.4: Testing of Hypothesis that Intention to Use Affects User Satisfaction

Hypothesis	CR	P value	Result
H2: There is a statistical relationship between intention to use SIS and user satisfaction	3.826	0.000	Supported

The mediator affects the relationship between the independent variable (system quality) and the dependent variable (user satisfaction). The direct and causal effect (regression) of system quality on user satisfaction is decreased due to the partial mediation of intention to use the SIS. Both relationships: between system quality and intention to use, and between intention to use the SIS and user satisfaction are significant ($P \leq 0.01$.). A partial mediation relationship is found based on the indirect effect of the intention to use (mediator).

5.2.2.4 Influence of the mediating role of intention to use on the relationship between system quality and user satisfaction.

The research hypothesized a conceptual model for the relations between system quality and user satisfaction while considering the mediating effect of intention to use on this relation. The conceptual model assists in developing the hypotheses and validating the relationships among the research variables. The conceptual model includes eight factors (48 items) identified by Objective 1 as the independent variables. Using intention to use as the mediator, and user satisfaction as the dependent variable, analysis revealed strong correlations among all the variables.

5.2.3 Objective 3

Investigating the relationship between Islamic Features and Intention to use.

One of the WWW's significant properties is its capability of depicting distinctive identity features, such as Islamic features that attract users, while satisfying their information needs. Aliyu et al. (2013) reported that employing Islamic features in the content or the design of a website improved the usability of Islamic websites. Taking into account these views from the literature, the case study for this research was chosen

to be the USIM SIS, with the intention to uncover whether employing Islamic features in an SIS does affect Muslim user's intention to use.

The EFA and CFA results in Sections 4.6.3 and 4.7.2, respectively, show the significant influence of (1) system utility, (2) advantages, and the (3) employment of Islamic features on intention to use.

5.2.4 Objective 4

Development Model User Satisfaction of SIS Quality.

The hypothesized conceptual model was tested and evaluated to derive a measurement model, and then a SEM. A survey questionnaire was used to provide the research data. Before the testing and evaluation processes, the data collected by the questionnaire were tested for validity using the judgment of five experts in computer science. Also, the collected data were tested for reliability using a pilot study with 50 postgraduate students from the University Science Islam Malaysia. The research variables were found to be consistent and adequate for further statistical analysis. Then confirmatory factor analysis was utilized to evaluate the conceptual model, developing a measurement model, and then developing a structural equation model. AMOS was used for conducting the CFA using 275 samples which confirmed the reliability and normality of the data. The final measurement models of the quality factors, namely, the intention to use and the user satisfaction closely fitted the research data.

The measurement models were evaluated using several goodness of fit indices. The final structural equation model was developed using AMOS, as presented in Figure 5.1, and the goodness of fit values were within acceptable limits. Regression weights were used to test the hypothetical relations among the research variables. All the

regression estimates and correlations between the indicators and factors, between the factors and variables, and between the three variables (system quality, intention to use, and user satisfaction) were significant.

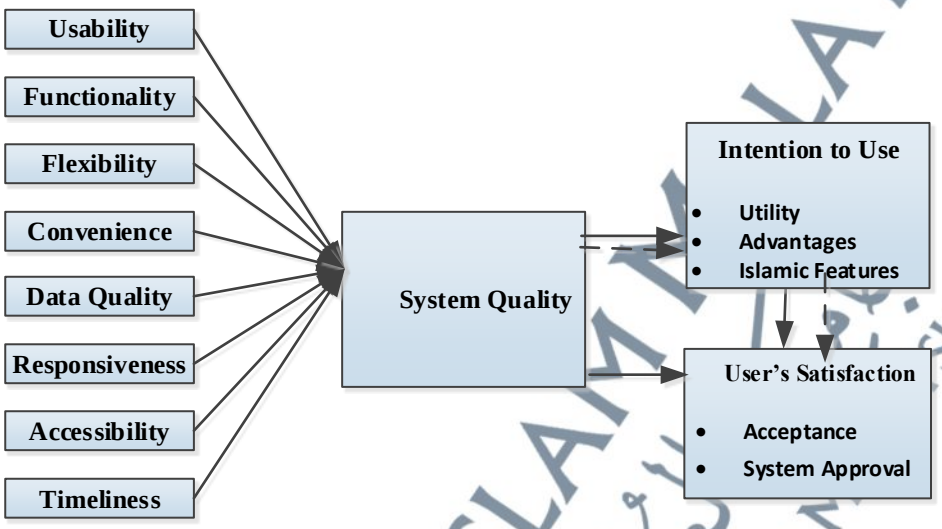

Figure 5.1: Model User Satisfaction of SIS Quality

The model in Figure 5.1 highlights the three main constructs, which are explained below:

- Firstly, the system quality factors were defined based on an extensive survey and review of the existing literature, as introduced in Section 2.4 and summarized in Section 5.2.1.
- Secondly, the user satisfaction factors were defined by exploratory factor analysis. The total number of extracted components with an eigenvalue greater than one equated to two factors. The first factor, called acceptance, included 7 items; the second factor, called system approval, included 6 items see Table 4.29.
- Thirdly, the intention to use factors were the result of reviewing the literature and examining the current case study.

5.2.4.1 Utility

The intention to use ISs is influenced by multiple individual utilities present on the system (Tsuma et al. 2015). Livari (2005) advised conducting more investigation on the IS utility effect to measure its influence on intention to use, he mentioned particularly the use-utility and user satisfaction relationship over time. Thus, this research addressed this issue with regard to the effect of the utility factor on the intention to use the SIS.

5.2.4.2 Advantage

DeLone and McLean (2003) stated that ISs can be a major advantage to the user and that may affect his/her intention to use it. Indeed, an IS can provide significant individual features that increase the overall value of the system to its users. Thus, the effect of net benefit is inspected within intention to use.

5.2.5 Objective 5

The Validation of the Developed Model User Satisfaction of SIS Quality.

The validation process included the participation of seven experts in information technology comprising academics and technical specialists. The experts were asked to validate the structural equation model developed as part of the research program, based on a questionnaire using a 5-point Likert scale. The questions were related to model applicability, usability, and satisfaction. The experts confirmed the model's usability, applicability, and usefulness in improving user satisfaction with an IS. The statements of the experts are given in the Appendix.

5.3 Research Contributions

This research is among the few experimental studies that have identified the quality relationships of SISs in the higher education domain, and studied the factors contributing to user satisfaction, and intention to use SISs in higher education institutions.

The following are the specific contribution of the research:

5.3.1 Theoretical Contributions

This research contributes to the literature by identifying the quality factors of an SIS in a higher education institute in Malaysia, and their relationship to user satisfaction. Moreover, the research contributes to the literature by identifying the mediating effect on relations between system quality factors and user satisfaction. It also contributes to the literature by investigating the Islamic principles embedded in the USIM SIS and their influence on the behaviour of its users.

5.3.2 Empirical Perspective

The research utilized a quantitative approach to collect and analyse the data obtained. This approach provided empirical results reflecting its ability to establish structural relations between the research variables based on a hypothesized conceptual model.

1. Quality Factors: Based on the literature, the research identified eight factors determining SIS quality in higher education. They were selected as the most common factors in previous research. These factors showed significant correlation with SIS quality and user satisfaction, which paves the way for other

researchers to investigate these effects in other universities to generalize the results.

2. Model: The conceptual model was developed based on the literature, the SEM was used to test the relations and hypotheses. The empirical results show acceptable goodness of fit to the structural equation model.
3. Relation: All the relations among the research variables were tested. The relations between SIS quality factors and user satisfaction were proved. The empirical results indicated a partial mediation effect of intention to use on the relationship between system quality and user satisfaction.

5.3.3 Practical Perspective

The research is significant for all stakeholders such as university, students, and system developers.

1. University: the research findings can assist Malaysian Universities in improving SISs while continuing to deliver quality services to students.
2. Education: The SIS is one of the main systems that supports the management and enables the growth of institutions by enhancing the decision making process related to students, lecturers, departments, faculties, and the curriculum.
3. Students: Implementing a high quality SIS can increase students' involvement and communication with the university and improve students' cooperation with their teachers. It can explain the gap in student performance and achievement.
4. System developers: The findings of the research can help system developers to enhance SIS design by including Islamic features to enhance student satisfaction.

5. Researchers: The research proposes a model that can guide future research and researchers to the most significant quality factors that influence SIS user satisfaction.

5.4 Future Work

In the future, the following projects could be carried out:

1. The model developed in this research program could be evaluated and validated in other universities and with the undergraduate population of USIM.
2. Develop a benchmark for SIS quality that evaluates user quality based on the list of criteria and functionalities.
3. An extended research program to study and compare the quality of SISs in Malaysia (and other countries) based on user satisfaction.
4. A comparative study of SISs in Islamic and non-Islamic universities in Malaysia to uncover the differences and scale of influence of Islamic features.

5.5 Research Summary

The IS success model most widely used is the D&M (2003) IS success model which states that system quality will have a positive effect on user satisfaction, see Woodham et al. (2017); Hussain et al. (2017); Filieri et al. (2017); Lin (2017); Efthymiou and Antoniou (2017); Kim et al. (2017); Radu et al. (2017); Hong et al. (2017); Berger et al. (2017); Carrasco et al. (2017); Yousuf and Wahab (2017); Laumer et al. (2017); Kiran and Diljit (2017); Balaji et al. (2017); Yang (2017); Noutsa et al. (2017); Ryu and Lee (2017); Cleverley et al. (2017) and Kilsdonk et al. (2017). Most studies that used the D&M IS success model (2003) studied ISs in other fields such as

banking, e-commerce, e-learning, e-government, and Cloud computing, which motivated this researcher to base his research on that model.

The researcher derived the critical ratio (CR) value and showed it indicated a statistically significant correlation between user's satisfaction and system quality. It was found that system quality has the CR value of 4.469 which is substantially greater than 1.96 and, thus, the hypothesis that the system quality variable has a significant positive effect on user satisfaction with the SIS was accepted.

Similarly, the correlation between SIS system quality and the intention to use SIS was significant with a CR of 5.241, and P-value less than 0.01. This result supports those of Yang et al. (2017) and Petter and McLean (2009) in indicating a positive and highly significant relationship between system analysis and the intention to use

There is a causal relationship between the intention to use and user satisfaction with the regression coefficients positive and moderate, the relation between intention to use the SIS and user satisfaction is also significant with the CR 3.826, and the P-value being less than 0.01. These results support those of Piper (2015).

The mediator affects the relationship between the independent variable (system quality) and the dependent variable (user satisfaction). The direct, causal effect (regression) of system quality on user satisfaction is decreased due to the partial mediation effect of intention to use. Both relationships between system quality and the intention to use the SIS, as well as the relationship between intention to use and user satisfaction are significant ($P \leq 0.01$). In general, a partial mediation relationship is found based on the indirect effect of the intention to use (mediator), so the results of this study support the finding of Ahmad et al.(2020) and Uddin et al. (2020), there is a

mediation of intention to use the impact of facilitating. Intention mediates the relationship between RL and WDB.

The measurement models were evaluated using several goodness of fit indices. The final structural equation model was developed using AMOS, as presented in Figure 5.1, and the values for goodness of fit are within the acceptable limits. The regression weights test was used to test the hypotheses concerning the research variables. All the regression estimates and correlations between the indicators and the factors, between the factors and the variables, and between the three variables (system quality, intention to use, and user satisfaction) were highly significant.

The key finding of the study are:

1. Develop a hypothetical conceptual model for the relations between system quality and user satisfaction while considering the mediating effect of the intention to use on this relation.
2. Selection of eight factors: accessibility, functionality, flexibility, data quality, convenience, responsiveness, and timeliness, each of which quantitative analysis confirmed as having a positive and significant correlation with the system quality of the SIS.
3. The results show that system quality is correlated with user satisfaction in a positive and causal relationship.
4. The results show that system quality of the SIS was correlated with intention to use the SIS in a positive and causal relationship.
5. The results show that intention to use was correlated with user satisfaction in a positive and causal relationship.

6. Based on the indirect effect of the intention to use, a partial mediation relationship was found (mediator).

5.6 Conclusions

This research investigated and studied the factors that determine and influence SIS quality. Based on the literature review, the research identified eight factors to represent the system quality.

1. The eight factors affecting system quality are: usability, functionality, flexibility, convenience, data quality, responsiveness, accessibility, and timeliness.
2. The research uncovered relationships among three main constructs: system quality, intention to use, and user satisfaction. The research also uncovered four important relationships.
3. The system quality significantly affects intention to use.
4. The system quality significantly affects user satisfaction.
5. The intention to use directly affects user satisfaction.
6. The system quality indirectly affects user satisfaction via the intention to use as mediator.

It is worth mentioning that all the initial hypotheses have been confirmed. Importantly, the mediation relationship is novel, and, to the researcher's knowledge, has not been previously discussed or presented in the literature. Further, the research has demonstrated that including Islamic features (which are compatible with Islamic rules) in the SIS of USIM significantly affect the intention to use.