Model Development on Mediation Role of Intention to Use of Student Information System Quality

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Abstract—Students Information System (SIS) is considered as an important system in the management and development of higher education institutions. SIS have been widely studied focusing on factors that influences the intention to use and adopt, and the performance of information systems but limited in system quality. Since system quality is essential to encourage user to have the “intention to use” of SIS and bring toward the successful of SIS implementation, the study on influences factors of system quality is an important. This paper aims to identify the factors of system quality, investigate the relationship of intention to use between the system’s quality and user’s satisfaction of SIS. This quantitative study is based on purposive sampling method and uses questionnaire to collect randomly data from 275 postgraduate students in a selected university. Eight (8) relevant factors has been identified from the reviewing the literature. The result shows that intention to use has relationship between system’s quality and user’s satisfaction as output of SIS and affect the frequent users’ level of satisfaction. This study proposes a model of intention to use of SIS that recommend the developers of SIS to give special attention to the development process and focus on the dimensions of SIS quality to enhance the level of usage SIS and particularly influence on user’s satisfaction in educational institutions.

Keywords—Student Information System’s Quality, user’s Satisfaction, Intention to use

1. INTRODUCTION

A Student Information System (SIS) refers to a software application applied for managing student data in educational institutes. SIS provides capabilities for entering the database of the university and check student test results, discipline record, and other assessment scores associated with the student that enhance the communication between a university, lecturers and the management and teacher of the university (Inoco & Hernandez, 2017). SIS is used to build student schedules, track student attendance at the university and the most advantage of this system is managing many other student-related data needs and that enhance the management of the whole educational process in a university.

The literature showed that SISs have been widely studied around the world. Most of the studies focused on factors that influence the intention to use and adopt, and the performance of information systems (Carillo, 2010), but overlooked the technological factors, such as system quality. Mahmud et al. (2017) suggested that, globally, higher education institutions need to consider the essential quality factors that enhance users’ intent to use information systems. Based on the D&M IS success model (2003), it is found that quality factors as one of the three independent variables in the model has not been examined extensively particularly in the domain of SIS where the recent researchers are focusing in other dimension of quality factors (Jalal & Al-Debei, 2012; Nordaliela et al., 2013; Sherifi, 2015; Mir & Mehmood, 2016; Bayangan-Cosidon, 2016; Inoco & Hernandez, 2017; Gürkut
& Nat, 2018). These difficulties lead more than 50% of the users have faced some barriers in using SIS and do not want to use more the system and drive users to use traditional procedures to deal with their faculty.

Thus, this paper discusses on system’s quality factors as the main aspects of the success of SIS and the mediating role of intention to use between the system’s quality and user’s satisfaction. System’s quality is assumed as the independent aspect that affects user’s satisfaction. We applied Structural Equation Modeling (SEM) approach to determine the relationships between the factors and as evidence in favor of the propose model. This paper is organized as follows: Section 2 present a brief literature review, Section 3 the research methodology used, Section 4 the result and discussion of the study and finally Section 5 as the conclusion of the study.

2. LITERATURE REVIEW

The system quality embodies is a quality of the data processing though employing technology (Karwowski, Soares & Stanton, 2011). The quality of any information system is a critical matter for system developers as well as IS vendors. Today, system quality of SIS is the key to success of education institutions, the quality of SIS allows universities to keep up with and meet the quality levels, the user’s condition for quality and gain user’s satisfaction (Caplinskas & Gasperovic, 2005).

The attributes for quality of evaluation will be adopted recent articles in this field. In the field of information systems, there are several factors to a quality system, and each organization is going to have a unique information system. A comprehensive literature review by reviewing from various and related electronics databases is performed to identify the system quality factors. As a result, eight (8) factors were identified as the variables or factor of system quality and will be discussed above:

a. Usability (Doll & Torkzadeh, 1988; Sherry & Robert, 2005; McKinney et al., 2002; Holmes & Gardner, 2006; Gable et al., 2008; Karwowski, 2011; Nordaliela et al., 2013; Rochimah et al., 2015).

Usability includes a method for gauging information system as an interface. In the field of computer science and human-computer interaction, the usability refers to the smartness and transparency of the computer application and design. There is a difference between Usability and user experience and user satisfaction since usability takes into account the usefulness as well. One of the key features of system quality is usability which refers to learnability of the human-made and the ease of use.

b. Functionality (Liedtke & Schepperle, 2004; Caplinskas & Gasperovic, 2005; Robert and Ping, 2006)

Functionality is the degree that the designed product or system will fulfill to meet its meant purpose. Functionality refers to a range of essential qualities to represent the necessities of the future system. Functionality is considered as one of the most important features for the internal quality of information system. In general, the functionality of information systems and particularly SIS is considered very essential to ensure that students use the system frequently and gain their acceptance and satisfaction on the overall functionality of the system. Users facing complicated functionality may not use the system again due to complexity and difficulty in obtaining the output from the system.

c. Flexibility (Jarvenpaa et. al, 1998; Soh et. al., 2003; Whitten et. al., 2007; Nelson, 2010)

Flexibility is the ability of IS to respond to different requirements by users, where IS should be be flexible enough with various demands of users. IS must have the capacity to accommodate a particular extent of variation about the necessities of the business process and fulfill the demand of users. Insufficient flexibility can decrease the overall lifespan of the system in circumstances which avoids system changes so as to adapt changes in the business process.
d. **Data Quality** (DeLone & McLean, 2003; Wu & Wang, 2006; Liao, 2008; Miller (2010))

The term information quality or data quality refers to content's quality or capability of the system to connect with a user in a method to facilitate understanding. Data quality practically refers to the ability to utilize the provided information provided. Information content’ a key factor in application success and are among the first to put this aspect, and added that an application information system should act as a decision-support system to provide comprehensive information on product and transaction support.

e. **Responsiveness** (Larry, 2009; Taylor and Francis, 2010; Robert, 2013)

Responsiveness is defining as the particular capability of the system or functional part for completing assigned tasks through a given time. A fast response application is a proven system for dealing with the ever-mutable user's requirements and request, and valuable information system is one of the spines for having a successful program. The responsiveness' of SIS is among the most important factor that determines information system quality.

f. **Accessibility** (Poole, 2001; Kuzma, 2010; Lopes et al., 2010: Lourdes and Paloma, 2013)

Information systems should be easily accessible by users regardless of their experience with IS. Accessibility is found that companies can increase the number of possible customers or users to their online applications by making their web site more accessible. When designing accessible webpages and computer applications, professionals should consider the different ways that determined by various personal, technological and contextual factors in which individuals’ access web content.

g. **Timeliness** (Eppler, 2003; Bouzeghoub et al.2004; Prestipino, 2006; Aschoff et al.,2011)

Timeliness in information system refers to whether information requested by the user is up-to-date and available to the user in an accepted time without being outdated. Timeliness of information systems means having information immediately or in the right time when information requester needs it and represent the system ability to deliver valuable information in time to information seeker or the end user of the system that store or generate the information and the term.

h. **Convenience** (Dai & Salam, 2010; Lai & Wibowo, 2012; Ulhas et al. 2016)

The convenience factor is one of the vital factors for IS success. In supplement, Ease craft can assist IS ability providers cut users’ period and power to choose, admission, find transact, benefit, and post-benefit after they consume the services.

### 3. **THEORETICAL FRAMEWORK**

This research is grounded on DeLone and McLean’s (2003). Theory in which they identified six variables of system success to the mapping of IS success to every of Mason’s effectiveness level, which includes the system quality, use, information quality, individual effect, user satisfaction, and organizational effect; the system quality is parallel to the technical level of the contact, whereas the information quality component is comparable to the semantic the level of contact.

In this study, Mason subcategories of the effectiveness level was employed to map the supplementary four variables. Use is closely connected by Mason’s delivery of the information. While, user satisfaction and individual encounter are related together with information’s impact on the receiver. In what follows, the definition of the IS success model constructs and their dimensions by DeLone and McLean (2003) is elaborated by Petter & Mclean (Petter & Mclean, 2009):

- **System Quality:** is defined as technical success and efficiency of the communication system that generates information. It refers to IS performance with regard to the functionality, reliability, ease of use convenience, and response time.
- **Service Quality:** refers to supporting the staff by the IS section, it is regularly gauged by the reliability, comprehension of the sustenance organization and reaction.
• Information Quality: refers to features of the output of IS, such as completeness, accuracy, and timeliness.
• Intention to Use: Anticipated upcoming use of the IS or output.
• Use: refers to utilizing of IS or its output with regards to the self-reported or actual use.
• User’s Satisfaction: refers to IS friendliness or support of the IS and its output by the users.
• Net Benefits: refers to the effects of IS on the individual, organization, group, industry, community, and others.

It is frequently evaluated with reference to organizational performance, influence on work practices and perceived usefulness. DeLone and Mc Lean (2003) claimed that it is possible to measure system quality with regard to reliability, ease-of-use, flexibility, functionality, data quality, integration, and portability. This should serve as the reminder that the selection of the IS success metrics including the six variables of the IS success should be specified by the nature of the users and stakeholder, the level of analysis, and the purpose of the information system.

In an information system, the following dimension should be taken into account, namely, functionality, flexibility, reliability, efficiency, responsiveness, accessibility, and usability; aligned together with the users (Følstad, Law & Hornbæk, 2012 ; Robert, 2013). Figure 1 shows the theoretical framework for the study that applied the eight (8) of identified factors under system quality and the relationships between Intention to use and user’s satisfaction.

4. RESEARCH METHODOLOGY

This research conducted by quantitative based. By using purposive sampling method, the postgraduate students from a university in Malaysia have been randomly chosen as the research samples. The population of approximately 1172 is given as approximately 287 participants. The researcher 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.

A survey questionnaire was developed and distributed among the respondents. The research utilises a quantitative approach using SPSS and AMOS to investigate the relationships between the intention to use and user satisfaction, and also propose a model concerning the quality factors influencing the intention to use SIS based on DeLone and McLean’s Model. The Model was tested using Structural Equation Modelling (SEM).

5. RESULT AND DISCUSSION

The outcomes of the quantitative analysis revealed the presence of relationship due to the influence mediation of intention to use of SIS on the correlation between user’s satisfaction and system quality. The correlation between a System Quality as an independent variable and the User’s Satisfaction as dependent variable before and after a mediator affects the direct relationship between User’s Satisfaction and System quality. Moreover, the direct effect (regression) of System Quality on User’s Satisfaction is decreased due to the partial mediation effect of Intention to Use of SIS. Moreover, both the indirect effects (relationships) between Intention to Use of SIS and System quality as well as relationship between User’s Satisfaction and Intention to Use of SIS was significant. Thus, there is a partial mediation relationship is happened as a result of the indirect effects of Intention to Use of SIS (mediator).

The research specifies how the different latent variables (system quality, intention to use of SIS, user’s satisfaction) are connected to each other for instance (spurious relationship, direct or indirect effects, and no relationship). A structural model is generally employed to demonstrate the nature of the relationships between variables. Chi-Square technically cannot be non-significant in the structural model because it requires a large
sample. And if it is significant, the non-significant structural model would usually be accepted if CFI, the RMSEA and other indicators are fit. It has been reported that EFA is a standardized solution. Completely standardized solutions have been regularly described in the applied CFA research. The steps of constructing measurement models for three variables (System Quality, User's Satisfaction, and Intention to Use) in a structural model consists of different phases to improve the model fit.

The SEM analysis using AMOS revealed that fit indices were not acceptable. Therefore, the researcher has attained countless steps such as the modifying indices, erasing indicators of weak factor loading if were spotted so as to enhance a model fit in the structural model [10, 43]. If all necessary steps have been completed, the degrees of all fit indices will be increased and the measurement model is considered statistically acceptable in line with the standards of SEM as found in the Table I:

As mentioned before, some steps were applied as a result, the degree for all fit indices was increased. In this study, the final structural model as in Fig. 2. There were strong relationships among three variables (Intention to Use, System Quality, and User's Satisfaction). All correlations were significant and their values were higher than (<0.3), the standard threshold for a significant effect between variables of the study were statistically significant (ρ≤ 0.000) as demonstrated in the final structural model. Furthermore, there has been an increase in the degree of interpretation (R2) for the majority of indicators and the latent variables; the System Quality, User's Satisfaction, and Intention to Use) and their factors.

The degrees of standard regression among these three variables is demonstrated in Table II. Reading the magnitude of path estimate between System Quality and User's Satisfaction = 0.62 (moderate), Intention to Use and User Satisfaction = 0.43 (moderate), System Quality and Intention to Use = 0.71 (strong). These correlations verify that there is an acceptable degree of relationships between the variables. The p-values of all standardized regressions were significant and the goodness of the model is supported in this study.

Examine the mediating influence of intention to use on the relationship between User's Satisfaction and the System’s Quality. To test this hypothesis, the researcher has carry out a mediation analysis based on model of mediation analysis by Baron and Kenny’s (1986) which is considered as a standard model for the customer scholar’s toolkit: the (IV) or independent variable has impact on mediator (M) which consecutively impact on the (DV) dependent variable. A sequence of three regressions which is suggested by Baron and Kenny, shows how impendent variable influences mediator and dependent variable; as independent variable and mediator are incorporated in the similar regression.

The findings revealed that mediator had a partial effect and independent variable had the partial (direct) impact on dependent variable which was less than the impact of independent variable on dependent variable without measuring the effect of mediator. The quantitative analysis results reveal a limited mediation relationship has been occurred caused by the mediating impact of intention to use SIS on the association between user's satisfaction and the system’s quality.

The association between independent variable (System’s Quality) and the dependent variable (User’s Satisfaction) before and after the mediator influence the direct association between User’s Satisfaction and System’s quality. In addition, the direct and causal impact of System’s Quality on User’s Satisfaction is reduced due to the partial mediation effect of Intention to Use of SIS. Moreover, both the indirect effects (relationships) between Intention to Use of SIS and System quality along with the association between User’s Satisfaction and Intention to Use of SIS were significant.
Thus, there was a partial mediation relationship as a result of the indirect effect of Intention to Use for SIS (mediator). The approved mediating role of intention to use SIS on the correlation between user’s satisfaction and SIS system quality reveals the importance of implementing Islamic features in SIS. With the fast developing of SIS and wide application of these systems in many universities all over the Muslim world, every Muslim and non-Muslim can take great benefits from SIS as part in online discussions on various applications. They have the opportunity to request information from the university online and convey their perceptions if the system reflects Islamic features.

6. CONCLUSION

The number of users is growing remarkably in the world for accessing online information system. SIS helps the university in supporting operations management and decision-makers at the administration office. The research approved that providing quality factors in SIS such as (Usability, Accessibility, Functionality, Flexibility, Data quality, Convenience, Responsiveness, and Timeliness) is important to increase mutually intention to use the system and user’s satisfaction easy access alone is not sufficient in attracting users to continue in using SIS. It should be taken into account that understanding all factors that improve the quality of the system such as usability, quality of information responsiveness, and timing of getting the output from the system.

User’s satisfaction is found a significant factor which is difficult to be obtained without understanding the success factors of SIS. It is concluded that implementing Islamic features in SIS would be reflected positively on the intention to use the system as well as enhance user’s satisfaction in which the Islamic users will use the system that does not conflict with the Islamic law or breaching the ethics of Islam. Since the supplied information to knowledge seekers is one of the essential features of Islam which urge Muslims to develop their life through science and consider the development of science in all fields as one of the methods, this study approved that there is a positive association between Islamic features in IS and users’ intention to use the system frequently.

The results reveal that SIS of the university is compatible with Islamic rules, and is not contrary to the Sharia of Islam. Thus, the postgraduate students are satisfied with SIS because it is identical with Islamic law. Moreover, the findings indicate that the development of information system will improve higher education service all over the world including Malaysia. SIS provides strong source of information for users and can change teaching and learning process through a new and effective way to establish online communication between students and their faculty.
Figure. 2: The Final Structural Model
<table>
<thead>
<tr>
<th>Description</th>
<th>Fit-Indices</th>
<th>Initial indices</th>
<th>Final indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normed Ration Model probability</td>
<td>CMIN/DF</td>
<td>1.514</td>
<td>1.362</td>
</tr>
<tr>
<td>Goodness of Fit Index</td>
<td>ρ-Value</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Adjusted Goodness of Fit Index</td>
<td>GFI</td>
<td>0.782</td>
<td>0.806</td>
</tr>
<tr>
<td>Normed Fit Index</td>
<td>NFI</td>
<td>0.804</td>
<td>0.845</td>
</tr>
<tr>
<td>Relative Fit Index</td>
<td>RFI</td>
<td>0.794</td>
<td>0.834</td>
</tr>
<tr>
<td>Comparative Fit Index</td>
<td>CFI</td>
<td>0.923</td>
<td>0.953</td>
</tr>
<tr>
<td>Parsimonious Comparative Fit Index</td>
<td>PCFI</td>
<td>0.879</td>
<td>0.892</td>
</tr>
<tr>
<td>Root mean squared error of approximation</td>
<td>RMSEA</td>
<td>0.043</td>
<td>0.036</td>
</tr>
<tr>
<td>Statistic of Results</td>
<td>PCLOSE</td>
<td>0.999</td>
<td>1.000</td>
</tr>
<tr>
<td>Chi-square</td>
<td></td>
<td>2221.274</td>
<td>1963.535</td>
</tr>
<tr>
<td>Degree of Freedom</td>
<td>DF</td>
<td>1467</td>
<td>1442</td>
</tr>
</tbody>
</table>
TABLE II: THE MAGNITUDES OF STANDARD REGRESSION BETWEEN THESE THREE VARIABLES

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Standard regression (β)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Quality of SIS &gt; User's Satisfaction</td>
<td>0.62</td>
<td>*** $p \leq 0.000$</td>
</tr>
<tr>
<td>System Quality of SIS &gt; Intention to use SIS</td>
<td>0.71</td>
<td>*** $p \leq 0.000$</td>
</tr>
<tr>
<td>Intention to use SIS &gt; User’s Satisfaction</td>
<td>0.43</td>
<td>*** $p \leq 0.000$</td>
</tr>
</tbody>
</table>

7. REFERENCES


28. Mahmud, I., Ramayah, T., & Kurnia, S. (2017), To use or not to use: Modelling end user grumbling as user resistance in pre-implementation stage of enterprise resource planning system. Information Systems, 69, 164-179.
32. Mir, K., & Mehmood, A. (2016), Examining the Success Factors of Online Student Support System at AIOU.


44. Teo, T., Tsai, L. T., & Yang, C. C. (2013), Applying structural equation modeling (SEM) in educational research: An introduction. In Application of structural equation modeling in educational research and practice (pp. 1-21). Brill Sense.


