Evaluating the Success of Information Systems based on System Quality, Information Quality and User Satisfaction

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Abstract: Computer *Information Systems* is vital to organizations including *Higher Education Institutions* (HEIs) in this era of Big Data and Internet of Things. One example of such system is the *Lecturer Information System* (LIS). This paper reports the evaluation of LIS success at UC TATI, an HEI in Malaysia based on system quality, information quality and user satisfaction. A survey was administered through the distribution of an online questionnaire to academic faculty members. Results were loaded into the statistical Package for Social Sciences for analysis. An assessment was conducted to test the reliability and validity of the measurements used. Descriptive statistics and reliability analysis were used to analyze the data. Results have demonstrated the feasibility of approach to evaluate IS success. In addition, empirical analysis has indicated positive findings with regards to system quality, information quality, user satisfaction and system success.

Keywords: Information system success, technology acceptance model, users satisfaction, information systems success model

1. Introduction

Information System (IS) is an integrated set of components for collecting, storing and processing data. IS is vital to organizations such as *Higher Education Institutions* (HEIs) in this era of Big Data and Internet of Things [1]. IS in HEIs includes lecturer portal, student portal, student performance monitoring and *Course Assessment Reports* (CAR). Common features in these ISs include student registration, course enrolment, examination result, and course scheduling modules. University College TATI (UC TATI) is a HEI in Malaysia that offers undergraduate and postgraduate programs including electrical, mechanical, chemical, manufacturing, computing, creative media and technology management. A *Lecturer Information System* (LIS) is used for academic management at UC TATI.

The LIS is a digitalization effort of all academic-related activities. It automates most of tasks through timetable generation, result preparation, and record keeping. LIS is a central repository that stores the students' academic records. The main goal of LIS is to improve work performance of its users. An effective LIS reduces repetitive tasks and automates the generation of reports for decision-making activities [2]. This paper reports the evaluation of LIS at UC TATI based on *system quality*, *information quality* and *user satisfaction*.

2. Lecturer Information System

LIS is a system used to gather, store and analyze information regarding student academic records. The use of LIS in HEIs is not only limited to assisting lecturers, but also the management in decision making activities. A well interfaced IS will increase productivity and user satisfaction [2]. By the same token, lack of software quality would revert users to manual work process [3].

It has been proven in [4] that there is high association between perceived IS quality and IS satisfaction. In addition, information quality makes IS more valuable to its users [4]. Both system and information qualities affect the overall satisfaction of IS users [5]. The use of computerized LIS is most effective as the data are more accurate and reports can be generated in a timely manner [6].

There are numerous approaches for evaluating the success of IS for example [7-9]. Although the demand for specific approach for assessing the benefits of IS investments are acknowledged, there is a lack of universally accepted framework to evaluate IS success. IS have been assessed through empirical validation [10]; quality dimensions [11]; and success models such as the *Technology Acceptance Model* (TAM).

TAM is regarded the most robust and influential in explaining IS perceptions [12-13]. TAM has undergone few revisions including TAM2, TAM3 and *Technology Readiness Acceptance Model* (TRAM) [14]. TAM, *Users Satisfaction* [13-15] and *Information Systems Success Model* [13-15] were referred to in formulating the basis for LIS evaluation at UCTATI. In addition, *software quality* also affects IS evaluation [17][18]. Among the quality criteria that should be considered in evaluating IS success include *functionality*, *reliability*, *usability*, *efficiency* and *portability* [17].

As such, IS success for LIS at UCTATI are based on the following factors:

- System quality – Performance of the LIS, assessed through reliability, usability, efficiency, stability, security, responsiveness, portability and maintainability [13].
- Information quality - Output of the LIS, assessed through accuracy, precision, currency, timeliness, reliability, completeness, conciseness, format and relevance [18].
- User Satisfaction - Experience and affective attitude when interacting with the LIS [19].

The main functions of the LIS are scheduling, student register, CV and *Outcome Based Education* (OBE) modules. The critical functions in LIS are the *Schedule* module and *OBE* modules. Schedule is a class assignment for lecturer displayed by year, semester and session. OBE is an online course plan, *Course Learning Outcome* analysis, *Program Outcome* analysis and automatic CAR generation. The LIS is under the purview of the Academic Department (JPAK). These module enables JPAK to better manage students' and lecturers; and generate report in a timely manner. This study is prompted when UC TATI stated implementing the LIS at its main campus. Main functions of manual academic work process now into online form.

Figures 1-6 illustrate the screenshots of LIS including main page, scheduling, course analysis, student register, list of mentee and CV.
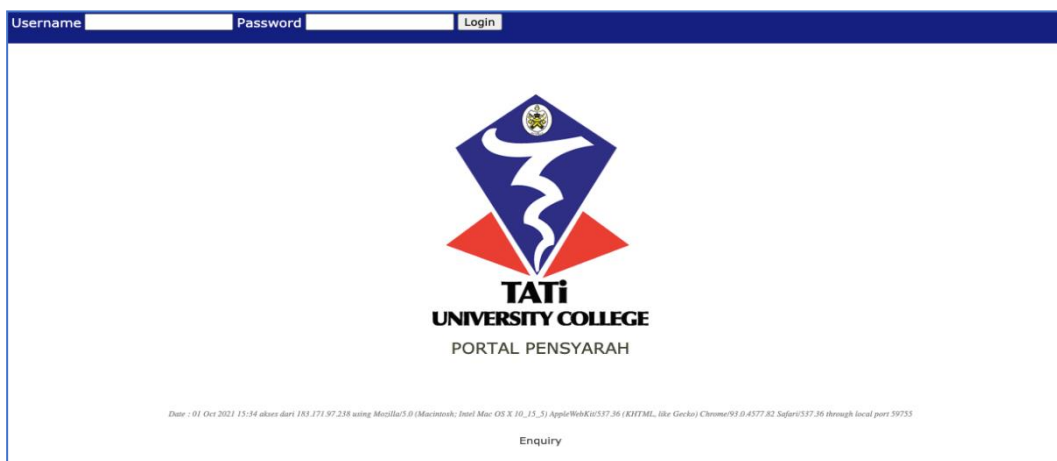

Fig. 1 - Main page

Fig. 2 - Scheduling page

Fig. 3 - Course analysis page

Fig. 4 - Student register page

Fig. 5 - Mentee page

Fig. 6 - CV page

3. Methodology

A survey was administered through the distribution of an online questionnaire. The respondents were academic faculty members from two faculties: the Faculty of Computer, Media & Technology Management and the Faculty of Engineering Technology at UCTATI. A total of 150 questionnaires were distributed with a response rate of 45.4%. This rate was acceptable based on [20].

The questionnaire was divided into three sections. Section A gathers respondent's personal information such as gender, age, education level, and work experience. Section B consists of LIS usage including access to the system, access frequency and duration. Section C consists of information on system quality, information quality, user satisfaction and system success using a 5-point Likert scale, ranging from *Strongly Disagree* to *Strongly Agree*. Perceptual measures were used to capture data on LIS success and technological factors. Constructs in the questionnaire were based on [14]. Front page of the questionnaire is illustrated in Figure 7.
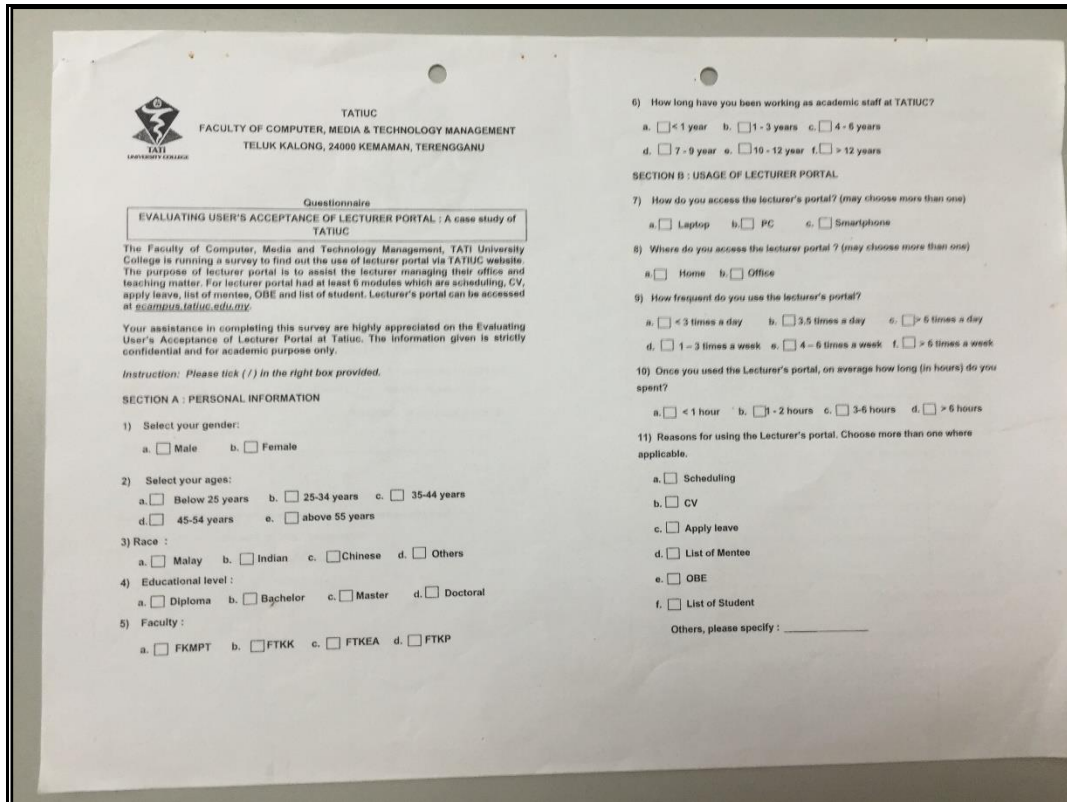
Fig. 7 - Front page of the questionnaire

Results of the survey were loaded into the *Statistical Package for Social Sciences* (SPSS) version 22 for analysis. An assessment was conducted to test the reliability and validity of the measurements used. Descriptive statistics and reliability analysis were used in analyzing the data.

4. Result and Discussion

4.1 Reliability Analysis

Cronbach's Alpha Coefficient was used to test the reliability of the questionnaire (Table 1). The reliability coefficients of all three variables were above 0.70, which is considered highly reliable [21]. Since the results shows a range higher than 0.7, it can be concluded that the questionnaire was a reliable measurement instrument based on [22].

Table 1 - Cronbach's Alpha Coefficient Reliability Test

Variables	Items	Alpha
System Quality	6	0.783
Information Quality	10	0.953
User Satisfaction	4	0.93

4.2 Demographics

The respondents comprised of 35.4% male and 64.6% female respondents. 61.5% were between the age of 25-34, 30.8% between 35-44, and 7.7% were between 45-54. In terms of education qualifications, 3.1% holds a Ph.D., 73.8% holds a master's degree, 15.4% holds a bachelor's degree and 7.7% are diploma holders. 15.4% have more than 12 years of work experience, 3.1% have less than a year, and the rest have between 1 to 12 years of work experience. Most of the respondents access the LIS using *laptop* (64%), 17% use *personal computers* and 19% use smartphones. LIS is mainly accessed from the campus (72%).

LIS access frequency are presented in Table 2 and Figure 8 where 84.6% of the respondents spend an average of 1-2 hours accessing the LIS on a daily basis.

Table 2 - LIS access frequency and duration

Access Frequency	Percentage
< 1-3 times a day	29.2
3-5 times a day	4.6
> 6 times a day	4.6
1-3 times a week	29.2
4-6 times a week	23.1
> 6 times a week	9.2
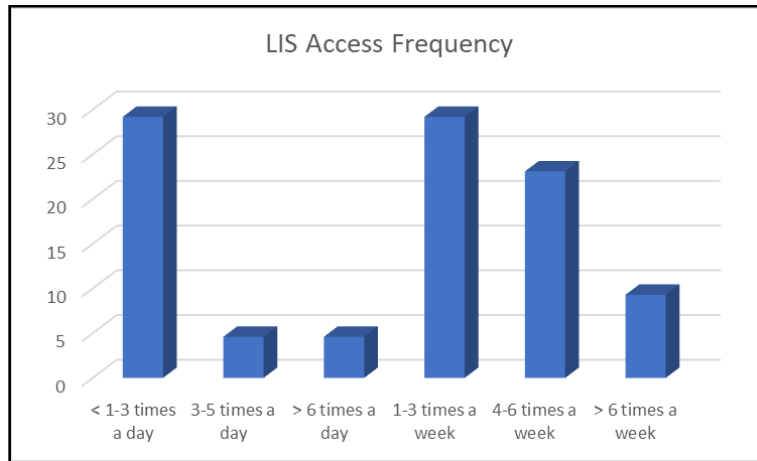
Fig. 8 - LIS access frequency

Tables 3-5 and figures 9-11 illustrate the responses for questions in Section C regarding system quality, information quality and user satisfaction respectively.

Table 3 - System quality

	Responses					Mean
	Strongly Disagree	Disagree	Fair	Agree	Strongly Agree	
Q1	0.0	7.7	23.1	55.4	13.8	3.75
Q2	0.0	4.6	40.0	44.6	10.8	3.62
Q3	1.5	7.7	43.1	43.1	4.6	3.42
Q4	3.1	13.8	40.0	38.5	4.6	3.28
Q5	3.1	9.2	52.3	27.7	7.7	3.28
Q6	6.2	15.4	43.1	30.8	3.1	3.68
	2.3	9.7	40.3	40.0	7.4	
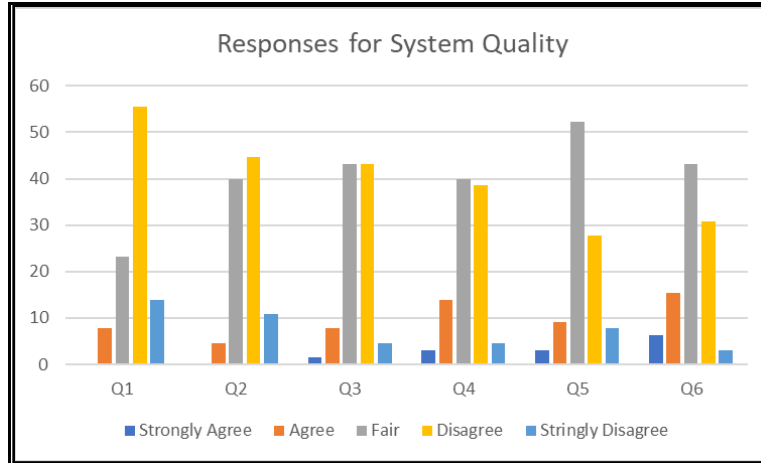
Fig. 9 - Responses for System Quality

Table 4 - Information Quality

%	Responses					Mean
	Strongly Disagree	**Disagree**	**Fair**	**Agree**	**Strongly Agree**	
Q1	0	9.2	46.2	38.5	6.2	3.42
Q2	1.5	6.2	46.2	38.5	7.7	3.45
Q3	0	13.8	40	41.5	4.6	3.37
Q4	1.5	9.2	43.1	38.5	7.7	3.42
Q5	3.1	7.7	43.1	43.1	3.1	3.35
Q6	6.2	15.4	41.5	33.8	3.1	3.12
Q7	1.5	12.3	55.4	26.2	4.6	3.2
Q8	1.5	9.2	52.3	32.3	4.6	3.29
Q9	3.1	12.3	44.6	33.8	6.2	3.28
Q10	1.5	13.2	44.6	36.9	4.6	3.31
	1.99	10.85	45.7	36.31	5.24	
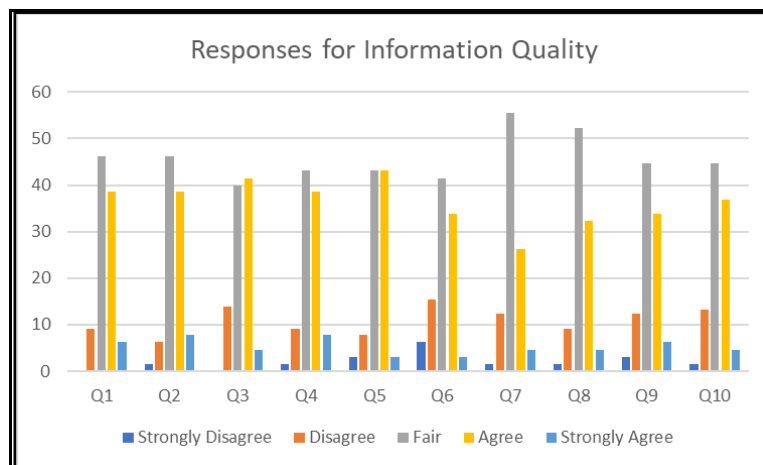
Fig. 10 - Responses for Information Quality

Table 5 - User satisfaction

	Responses					Mean
	Strongly Disagree	Disagree	Fair	Agree	Strongly Agree	
Q1	3.1	6.2	38.5	49.2	3.1	3.14
Q2	7.7	7.7	49.2	33.8	1.5	3.31
Q3	3.1	7.7	47.7	38.5	3.1	3.37
Q4	3.1	7.7	43.1	41.5	4.6	3.43
	4.25	7.33	44.63	40.75	3.08	
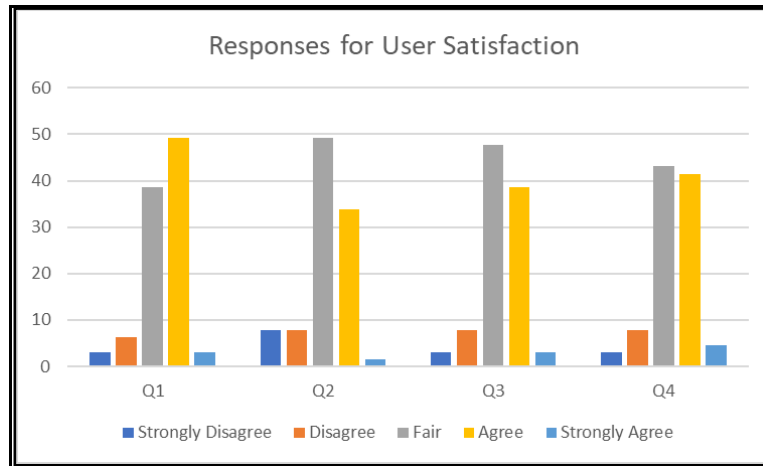
Fig. 11 - Responses for user satisfaction

System Quality is recorded high in items Q1, Q2 and Q6 with mean scores of 3.75, 3.62 and 3.68 respectively where "*LIS allows information to be readily accessible to users*", "*LIS makes information accessible*" and "*LIS is versatile in addressing needs as they arise*".

Information Quality is recorded high in items Q1, Q2 and Q4 with mean scores of 3.42, 3.45 and 3.42 respectively where "*the output produced by LIS provides sufficient information*", "*information content meet my needs*" and "*LIS provides reports that meet my needs*".

User Satisfaction is recorded high in items Q3 and Q4 with mean scores of 3.37 and 3.43 where "*LIS meet my expectations*" and "*Overall, I am satisfied using the LIS*". Table 6 presents the mean scores for each acceptance level. The mean scores are classified into three categories according to the level of user acceptance. Negative (0.00-1.66), Neutral (1.67-3.33) and Positive (3.34 – 5.00). Results reveal that the acceptance level of the LIS is positive (score between 3.34 and 5.00).

Table 6 - Mean Score for user acceptance of LIS

	System Quality	Information Quality	User Satisfaction	Acceptance Level
Mean	3.51	3.32	3.31	3.38

5. Conclusion

This study has demonstrated the feasibility of an integrated IS success model based on system quality, information quality and user satisfaction. This study also has shed light to the use of Lecturer Information System at UC TATI. Empirical analysis has indicated positive findings with regards to system quality, information quality, user satisfaction and system success. The result also showed that the LIS is generally accepted especially by academic staffs with OBE module being the most popular module. Academic staffs use OBE module for entering student marks and generate the *Course Assessment Report*.

More than half of the staffs found the LIS easy to use and user-friendly. In addition, results also suggested that there is a high association between "*information quality*" and "*user satisfaction*", concurring with previous studies such as [23]. Future work in this area includes the assessment of process quality, service quality and collaboration quality.

Acknowledgement

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