

# USER SATISFACTION WITH LEARNING MANAGEMENT SYSTEM (LMS): A CASE OF ASSUMPTION UNIVERSITY

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**Abstract:** *As times are changing. Technology integration becomes challenging and also progressively harder to replace. This brings changes to teachers' instructional roles in the classroom. Rather than using technology for its sake, the university can develop a vision of how technology can improve teaching and learning. eLearning can be used to promote the professional development opportunities, it is offering possibilities of convenience, accessibility, and personalization. With technology becoming more affordable, it's really no surprise that eLearning becomes comparative and competitive tool. The objective of this research is to implement teaching and learning process with the purpose to understand how LMS (Learning Management System) supports learning process. The research is comprised of 2 phases. The first phase of the research involved a qualitative study by searching some related documentary data to the study. The second phase of research, a quantitative method was undertaken; three hundred and seventy-five questionnaires were distributed to respondents. The results from the qualitative survey suggested that the university should put more focus on the needs of users and thereby improve user satisfaction and the findings from a quantitative method point out the strong relationship between management information system (MIS) quality towards user satisfaction as well as perceived importance of the IT attributes of IT applications provided by the university. Furthermore, the results also contribute to our knowledge by providing support the contention that user satisfaction depends on LMS quality that means the quality of management information system has an influence on user satisfaction. A user who has perceived better LMS quality is more satisfied with IT applications provided by his or her institution.*

**Keywords:** *User Satisfaction, eLearning, Learning Management System, LMS, Management Information System, MIS, IT Application, Education, Information System, Information Technology*

## 1. INTRODUCTION

Because technology is credited as being a significant factor in increasing productivity in many industries, some people believe that more effective use of technology in educational institutions could do more to improve educational opportunities and quality. Research indicates that while there are poor uses of technology in education, appropriate technology use can be very beneficial in

increasing educational productivity (Byrom & Bingham, 2001; Clements & Sarama, 2003; Mann, Shakeshaft, Becker, & Kottkamp, 1999; Valdez, McNabb, Foertsch, Anderson, Hawkes, & Raack, 2000; Wenglinsky, 1998).

Advances in technology mean that it can now be an effective tool in learning and development. Many educational institutions are utilizing technology as an effective tool for monitoring and improving organization's performance. As such, it is no longer the issue in education if technology should be used. Indeed, there are massive potential benefits in making use of technology to enhance teaching and learning. The current emphasis is also ensuring that technology is used effectively

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to create new opportunities for learning and to promote student achievement. By using appropriate software for teaching and learning, it can stimulate students become more motivated to learn, students can learn at their own pace, receive individual attention, and also become more student-centered.

Educational institutions coming out from their previous legitimate status are now looking for reforms able to guarantee their quality. However, educational is not transformative on its own. Development for technology use should be an integral part of the educational institutions technology plan or an overall improvement plan. However, it requires the assistance of educators who integrate technology into the curriculum, align it with student learning goals, and use it for engaged learning projects. Darling-Hammond and Berry (1998) noted that teacher quality is the factor that matters most for student learning. Therefore, development for technology use becomes the key issue in improving the quality of learning in the classroom.

Although technology is more prevalent in educational institutions, several factors affect whether and how it is used. Those factors include the allocation of computers for equitable access, technical support, effective goals for technology use, and new roles for instructors, time for ongoing professional development, appropriate training for users at different skill levels, user incentives for use, availability of software, and sustained funding for technology. Moreover prospective students searching for the right university expect to be able to register online, find information about academic programs and other services on the web, communicate with faculty and admissions counselors electronically, and even apply for and receive financial aid on line. Once enrolled, this Internet-savvy generation expects to check grades, access a myriad of courses, and monitor their financial and personal records online.

Accordingly, to become a leader in educational arena is not easy. Many administrators of educational institutions may be uncomfortable providing leadership in technology areas. They may be uncertain about implementing effective technology in ways that will improve learning. Of significance here, it is vital for educational institutions to determine that the uses of technology have linkages to important educational learning expectations.

In the past, application of technology to Thai Higher Educational Institutions was often motivated by a desire to implement “teacher proof” instruction. Technology was viewed as a “black box,” something that could be bestowed on educational institutions from above. An increasing body of literature on technology implementation efforts suggests that this goal was not only unrealistic but also fundamentally misguided. To be effective, technology, faculty members and students must work together to provide challenging learning opportunities. As the uses of technology have linkages to important education learning expectation, and effective uses of technology has become major themes associated with education. Educational institutions need to share the change process, encourage and support professional development opportunities related to technology. Lack of appropriate technology infrastructure and support can cause implementation problems.

As the objective of this study is to implement teaching and learning process with the purpose to understand how LMS (Learning Management System) supports leaning process. The findings of this research will be very useful for all faculty members and administrators of Assumption University so that they can apply them to implement the use of technology in their teaching and learning process.

## **2. LITERATURE REVIEW**

As the objective of this study is to implement teaching and learning process

with the purpose to understand how IT supports learning process. As construed briefly in Chapter 1, much has been written about how information technology (IT) could be and has been used to enhance quality of teaching and learning process.

Universities are being challenged to provide high quality education in flexible ways. Fracer & Deane, (1997) suggests that teamwork (group work) has long been accepted as an effective learning strategy. Numerous authors also hypothesize that technology can enhance learning and develop instructional effectiveness. Research indicated that technology provided more timely feedback, allowed for individualized pace and focus of learning, incorporate interactive exercises, facilitate cooperative learning, overcome the limits of time and space by providing for asynchronous opportunities for students, provide access to up-to-date information, and allow for drill and practice (Fraser and Deane, 1999; Pailing, 2002; Sell, 1997; Vockell and Brown, 1992).

Research on the instructional uses of technology has revealed that teachers often lack of the knowledge to successfully integrate technology in their teaching and their attempts tend to be limited in scope, variety and depth. Thus, technology is used more as “efficiency aids and extension devices” rather than as tools that can “transform the nature of a subject at the most fundamental level”. (McCormic & Scrimshaw, 2001).

Some uses of IT are merely technological replacements for the standard mode lecture delivery, and probably be primarily effective in lower level learning domains (Koehler 1998). Pailing (2002) also suggested that E-learning should complement not replace traditional training. DeCaro and Seaton (1997) also found that IT could increase the amount of interaction between students and between students and faculty. Since there are many advantages from adopting IT to teaching and learning, Frost and Strauss (1997) proposed many potential benefits of

integrating IT into the classroom. These include increased quality of information, collaboration, presentation, and organization.

Likewise, in discussing the use of IT in the social sciences, Berson (1996) asserts that the assessment of the efficiency and effectiveness of computer technology in social studies remains in its infancy with a limited research base.

## **2.1 Information**

As has been discussed, information can make the difference between staying in business and going broke. Organizations today depend on high-quality information to develop strategic plan, identify problem, and interact with other organization. According to Burch and Grudnitski (1986), they stated that the quality of information rests on three pillars: accuracy, timeliness and relevance. It is the ability of a nation or institution to aggregate and manipulate these three pillars that defines it as either information rich or information poor. Information is as important as an impetus for development that whether it is economic information, technological information, military information, socio-cultural information, or whatever, the nation, institution or company that has access to, or control over information will have enormous advantages over and above those institutions that do not have access or control.

## **2.2 Information System (IS)**

The information systems (IS) discipline is primarily concerned with the successful implementation of information technology (IT) in organizations. IS are an essential component of the solutions to many of the problems faced by organizations to cope with the current challenges. In this light, it can be argued that successful IS development can be identified by certain characteristics or metrics. An IS may thus be considered successful if it meets criteria such as fulfilling user needs and organizational

objectives/goals (which are in themselves both multifaceted, and partial). At the same time, a variety of factors may affect systems during their development and implementation. As a result of these factors, the evaluation of a system in terms of its "success" is an inherently complex phenomenon.

While, as noted earlier, IS success is a multidimensional construct (Delone and McLean, 1992; Saarinen, 1996), so surrogates measures have been developed and are usually in use to measure IS success. Two surrogate measures are system usage (Swanson, 1974; Ein-Dor et al., 1984; Snitkin and King, 1986) and user satisfaction (Bailey and Pearson, 1983; Ives et al., 1983; Baroudi and Orlikowski, 1988).

Delone and Mclean (1992) described a number of IS success measures after reviewing 180 studies. According to them research has focused on areas such as systems quality (i.e. IS interface, availability, response time, etc.), system usage, user satisfaction, individual impact and organizational impact.

Delone and Mclean (1992) also developed a model of IS success .The model focused on the influence and inter-relationships between these various factors. Amoroso and Cheney (1991) also noted that system quality and information quality are two major constructs of user satisfaction. Delone and McLean's (1992) model suggests that both system usage and user satisfaction are affected by these two factors. However, the proposed relationships in their model were not tested empirically. Garrity and Sanders (1998) measures IS success at different levels as the organizational level (i.e. how a system contributes to organizational performance), the process level (i.e. efficient use of resources) and, the individual level (i.e. the users' perception of utility and satisfaction).

### **2.3 Information Technology (IT)**

To provide more information, more quickly than ever before, high-quality information technology can enhance the organization to develop efficiency and effectiveness at each stage of the strategic decision-making process.

A review of the literature indicates that management quality of information technology has direct impact towards organization performance. One of the most cited contributions of IT-based quality is convenience. (Alen, 1997; Baily and Gordon, 1988; Cline, 1997; Milligan, 1997; Reed, 1998). Lerew (1997) suggested that the level of satisfaction would increase when customers enjoy the convenience of accessing their accounts at any time through interactive voice response systems.

### **2.4 Learning Management System (LMS)**

In recent years, technologies have made big changes in education. Rapid advances in technology and changes in workplace habits are also changing the future of learning. Learning Management System (LMS) has become increasingly irresistible in education.

There are a wide variety of terms for digital aids or platforms for education, such as "course management systems", "virtual or managed learning platforms or systems", or "computer-based learning environment", the term "learning management system" has become an effective way for educational institutions to encourage the development of students as well as boost productivity.

*Gilhooly (2001) stated that an LMS delivers and manages instructional content, and typically handles student registration, online course administration, tracking, and assessment of student work. This educational platform is innovative tools which help educational institution to create, adopt, administer, distribute and manage all of the activities related to e-learning or can act as a complement to classroom learning. Learning management systems help the instructor deliver material to the students,*

administer tests and other assignments, track student progress, and manage record-keeping.

Since there are many benefits when organization use Learning Management System (LMS), it is vital for organization to make the **management of everything related to learning much more comprehensive, personalized, of a high quality** and enhanced through the use of virtual classrooms and multimedia content. Lopes (2014) stated that in the web there is considerable valuable information, but there are also several mistakes and controversies instead of teaching possibly will confuse the student. Park (2011) emphasized that instructors need to be aware that the standardized formats available in the LMS may disciplinary characteristics and pedagogical development become generalized. According to Philips, McNaught, & Kennedy (2012), the key to success in transformed models of online learning and teaching is to facilitate active participation and collaboration by students in problem solving and knowledge production.

In this paper, the use of LMS has been discussed. In particular, the issues of its quality and user satisfaction must be considered. As such, it is vital for educational institutions to determine that the uses of LMS have linkages to important educational learning expectations.

## 2.5 User Satisfaction

User satisfaction is one of the key constructs in the IS success model developed in the early 1990s (Seddon, 1997; DeLone and McLean, 1992). This model conceptualized IS success at three different levels: the technical, semantic and influence/effectiveness levels. The technical level is captured by system quality, representing various system characteristics such as system reliability, online response time, system accuracy, system flexibility, ease of use etc. (Hamilton and Chervany, 1981; Swanson,

1974). The semantic level refers to the quality of the output of the information system in terms of information accuracy, timeliness, relevance, format, informativeness, usefulness, sufficiency, understandability, reliability, comparability, quantifiability, freedom from bias, currency, clarity and uniqueness (Bailey and Pearson, 1983; King and Epstein, 1983; Ahituv, 1980; Gallagher, 1974; Swanson, 1974). The technical and semantic levels are antecedents to the influence/effectiveness level, which includes usage and user satisfaction. These effectiveness variables are, however, not independent. They interact with each other, as increased usage is likely to enhance satisfaction and vice versa. IS success depends on the extent to which these three levels are translated into positive impacts on individuals and the organization.

## 2.6 Discussion of Disconfirmation Model

Patterson developed one of the most widely recognized models in 1993 known as the *Disconfirmation of Expectations Paradigm*. Any difference between expectations and perceived performance is known as *Disconfirmation*. The disconfirmation model is one of the primary theories for explaining satisfaction in the marketing literature (Yi, 1990). The theory stipulates that satisfaction is determined by the intensity and direction of the gap between perceived performance and a cognitive standard. As illustrated in **figure 2.1**, the model is constructed on the basis of comparing perceived performance and expectation, which can be summarized as the followings:

### Comparison Process and Result

1. Perceived Performance > Expectation  
Result: High satisfaction (Delight)
2. Perceived Performance = Expectation:  
Result: Merely Satisfied
3. Perceived Performance < Expectation:  
Result: Dissatisfaction

Regarding the consequence of confirmation, mixed findings were reported. While some researchers argued that mere confirmation should lead to satisfaction (Miller, 1977; Swan and Combs, 1976), others suggested that it would result in indifference, as there were no "pleasant surprises" (Erevelles and Leavitt, 1992; Kennedy and Thirkell, 1988).

The disconfirmation model is grounded in the adaptation level theory, which postulates that perception of stimuli, i.e., perceived performance, is linked to an adapted standard, i.e., the cognitive standard (Bearden and Teel, 1983). Expectations are frequently adopted as the cognitive standard in the marketing literature. According to the expectancy theory (Tolman, 1932), expectations are formed by personal experience and understanding of environmental factors, taking into account practical feasibility. They are therefore sometimes referred to as "predictive expectations" or "expected expectations" (Miller, 1977).

## **2.7 IT Applications in Education**

Technology can be an appropriate vehicle for promoting meaningful, engaged learning. It allows students to work on authentic, meaningful, and challenging problems, similar to tasks performed by professionals in various disciplines; to interact with data in ways that allow student-directed learning; to build knowledge collaboratively; and to interact with professionals in the field. Technologies also can be used to promote the development of higher-order thinking skills and allow opportunities for teachers to act as facilitators or guides and often as a co-learner with the students.

Technology platforms and the Internet have created tremendous opportunities for new education paradigms, ushering in new economy driven by knowledge and access to information. Perhaps the most dramatic have been those

resulting from the provision of CD-ROM facilities, which have enabled users to access current and archival journal literature rapidly and to become aware of otherwise unknown literature sources.

An educators need quality programs, resources and staff development to fully apply the Internet. The Internet allows for unique instructional techniques, and as its presence grows the benefits will not be limited just to individual students who are learning more and better but should also extend to society at large. The Internet acts as a major enabler, liking people to anytime-anywhere learning and as a catalyst to help revolutionize educational system. It benefits instruction by increasing student motivation, encouraging higher-level thinking, involving parents, giving teachers tools to improve instruction, using the resources of the whole wired world, expanding learning time and preparing them for the future. While all of these expectations are reasonable, the level of IT adoption and the use that is made of the new technologies differs widely between universities. There is no doubt that the introduction and use of Internet has brought demonstrable benefits to all the universities surveyed together with their users.

Although technology is more prevalent in educational institutions, several factors affect whether and how it is used. Those factors include placement of computers or equitable access, technical support, effective goals for technology use, new roles for teachers, time for ongoing professional development, appropriate coaching of users at different skill levels, faculty members and students, incentives for use, availability of educational software, sustained funding for technology, and perceived IT policies measured by institutional encouragement to use IT.

Access to technology is an important issue for user, especially for teachers and students. Although educational institutions may have computer available, one factor that determines their use is where those computers are located. If

computers are connected to the Internet but are not in a convenient location, the availability to users will be limited (McKenzie, 1999).

Finally, university can ensure the effective use of educational technology by addressing all these factors: placement of computers for equitable access, technical support, and effective goals for information technology use, new roles for teachers, time for ongoing professional development, appropriate coaching of teachers at different skill levels, teacher incentives for use, availability of educational software, and sustained funding for technology. Through such efforts, university can help students realize their learning goals through the use of technology and also enable them to gain important skills for their future education and careers.

### 3. RESEARCH METHODOLOGY

Zikmund (1994) suggested that survey is a research technique in which information is gathered from a sample of people by use of a questionnaire; a method of data collection based on communication with a representative sample of individuals. Davis (1996) said that surveys differ from observation studies in that they require interaction with the respondent. He also mentioned that surveys have been used successfully to help test hypotheses, evaluate programs, describe populations, build models of human behaviour, develop useful measurement scales, and make other methodological improvements in business research.

This section describes a research technique by operating under procedures as follow:

- 3.1 Determining sample size
- 3.2 Research instrument
- 3.3 Formulating research instrument
- 3.4 Data collection
- 3.5 Data analysis and the statistical used in data analysis
- 3.6 Hypothesis Statements

#### 3.1 Determining Sample Size

The sample of this research is calculated by using Taro Yamane (Yamane, 1973) formula with 95 % confidence ( $Z_{\alpha/2} = 1.96$ ) that the allowance for sampling error with a 5 % level of error.

The calculation formula is presented as follow:

$$n = \frac{N}{1 + N * (e)^2}$$

Where :

n = sample size required

N = number of people in the population

e = allowable error (%)

Therefore, the amount of the sample size for this research would need to be 375.

#### 3.2 Research Instrument

The questionnaire was divided into two parts. The part I of the questionnaire consists of respondents' demographic data (e.g., gender, age, and status). Personal attributes, experience perception in using IT and duration of use were also included in this part.

In the part 2 of the questionnaire, the three attributes of Management Information System Quality were operationalized by 24 items. These items were developed based on the focus group interview with students in Assumption University.

To rate the scale of the selected attributes, the 5-point scale (i.e., Likert Scale) with multiple items will be applied on each item. The students were asked about their perceived importance and performance of each attribute of LMS Website.

Importance and performance will be rated on a 5-point scale, where

1 = Very low

2 = Low

3 = Neutral

4 = High

5 = Very high

To rate the scale of the selected attributes, the 5-point scale (i.e., Likert Scale) with multiple items will be applied on each item. The students were asked about their perceived importance and performance of each attribute.

### **3.3 Formulating Research Instrument**

After constructing the questionnaire, the researcher will test its validity and reliability with the appropriated number of students. The reliability test will be conducted to examine the internal consistency of multi-item constructs. The format and understandability of question wordings will be examined too.

After getting the reliable and valid questionnaires, the researcher will determine a mode of data collection. Two major methods will be utilized to collect the data required and to determine the basic set of attributes of IT applications that are important to user satisfaction.

### **3.4 Data Collection**

The questionnaires were randomly distributed to the various classrooms to ensure that the collected data can be represented various users from the studying group.

### **3.5 Data Analysis and the Statistics used in Data Analysis**

In this study, descriptive and inferential statistics methods are used. Descriptive statistics are used in describing parameters of students' personal data. The aims of descriptive statistics are to describe the differential of one situation to another and to diagnose the events by using frequency and percentages.

The objective of this research study is to test users' attitude towards LMS Website. Results will be processed as follows:

The demographic information of the respondents will be analyzed by using frequency and percentages.

1. The information of different users' satisfaction towards LMS website will be ranged and presented in form of Mean and Standard Deviation.

2. The information of different background and environment that influence users' satisfaction towards LMS website will analyzed by using t-test and F-test.

3. Likert scales will be used in scoring the collected questionnaires.

### **3.6 Hypothesis Statements**

The hypothesis statements are set as follows:

H<sub>a1</sub>: There is a difference between user satisfaction about the expectation and perception of information attributes.

H<sub>a2</sub>: There is a difference between user satisfaction about the expectation and perception of system attributes.

H<sub>a3</sub>: There is a relationship among user perception about information quality and user satisfaction.

H<sub>a4</sub>: There is a relationship among user perception about system quality and user satisfaction.

H<sub>a5</sub>: There is a relationship among users' demographic characteristics, information quality, and system quality and user satisfaction.

## **4. DATA ANALYSIS**

Distribution is the most significant theoretical distribution in statistics. It is a Standard of comparison for describing distribution of sample data is used with inferential statistics that assume normally distributed variables. The characteristics of location, spread and shape describe distributions. Their definitions, applications, and formulas fall under the heading of "descriptive statistics" (Cooper, 2001).

Descriptive statistics is an efficient means of summarizing the characteristics



of large set of data, which can be presented in frequency tables, bar charts, pie charts, cross tabulation, histogram and percentages. For the purpose of analyzing the data, the analysis of descriptive statistics is segmented as follows:

#### 4.1 Summary for Personal Data

The result has shown that 225 respondents of the sample size were male and 125 respondents were female, representing 42.7% and 47.3% respectively. The most of respondents are senior student representing 60% and 57 respondents are sophomore students; representing 23.7%. Majority of the sample size is in age group under 22 years, representing 36.3% in combine. Moreover, it has also shown that 69 respondents are in the age of 21 years, representing 19.7%, 228 respondents are in age between 22-23 years or 65.2.%, 39 respondents are in age of 24 years and, 14 respondents are in age of over 25, representing 4% respectively.

#### 4.2 t-Test of Difference between Expectation and Perception Elements of Information Aspect

To compare the level of users' perception about the information attributes and system attributes. The t-test will be used to test a hypothesis stating that the means scores on some variable will be significant different for two independent samples or groups. The result in Table 4.1 has shown that the comparison of the users' perception indicated a significantly higher value for the importance of updated and related to the appropriate time period than the perceived performance ( $t=14.394$ ,  $p<.001$ ). The users also perceived the benefit factors e.g., available and provided when needed and meet the user's needs for the level of details needed. Significantly higher means of ( $t = 12.933$ ,  $p<.001$ ), and ( $t =12.411$ ,  $p<.001$ ) were illustrated. On the other hand, significantly lowest means of error free factors ( $t =7.144$ ,  $p<.001$ ) was also found. So there is a significant difference between users' perception about the expectation and perception of information attributes.

**Table 4.1 t-Test of Difference between Expectation and Perception Elements of Information Aspect**

Information on LMS Website	Expectation	Interpretation	Perception	Interpretation	t-value	Sig. (2 tailed)
Updated and related to the appropriate time period.	3.95	High	3.12	Neutral	-14.394	0.00
Error free.	3.42	Neutral	3.01	Neutral	-7.144	0.00
Relevant, concise, and clear.	3.95	High	3.33	Neutral	-12.301	0.00
Available and provided when needed.	4.01	High	3.22	Neutral	-12.933	0.00
Suited to the user's needs.	3.93	High	3.32	Neutral	-12.193	0.00
Provided in a form that is easy for user to understand.	4.06	High	3.40	Neutral	-11.110	0.00
Meet the user's needs for the level of details needed.	3.97	High	3.31	Neutral	-12.411	0.00
Effective in helping user complete the tasks.	3.98	High	3.31	Neutral	-11.934	0.00

**Table 4.2 t-Test of Difference between Expectation and Perception Elements of System Aspect**

System on LMS Website	Expectation	Interpretation	Perception	Interpretation	t-value	Sig. (2 tailed)
Advanced.	3.89	High	3.39	Neutral	-9.107	0.00
Easy to access.	4.09	High	3.44	Neutral	-10.461	0.00
Accurately performed and reduce error rates.	3.78	High	3.24	Neutral	-9.322	0.00
Enable user to accomplish task more quickly.	3.80	High	3.38	Neutral	-8.786	0.00
Provide high security such as invasion of privacy.	3.94	High	3.57	High	-8.577	0.00
Give error message that clearly tell user how to fix problems.	3.73	High	3.18	Neutral	-10.028	0.00
Have all the functions and capabilities in helping user complete the tasks.	3.90	High	3.39	Neutral	-10.074	0.00
Prompt and efficient (provided when needed.).	3.99	High	3.38	Neutral	-11.521	0.00
Designed for all levels of users.	3.88	High	3.46	Neutral	-7.258	0.00
Easy for user to find the needed information.	3.99	High	3.39	Neutral	-10.062	0.00
Pleasant interface (e.g., easy reading characters, clear sequence of screens, highlighting simplified task)	3.91	High	3.53	High	-7.058	0.00
Clear organization of information on the system.	3.96	High	3.51	High	-8.291	0.00

Notes: <sup>a</sup> Each item is measured based on 5-point Likert scale (1=Very low/5=Very high).

<sup>b</sup> Mean Differences were tested by independent *t*-test; *t*-value is illustrated in italic parentheses

\*\* Significant at the 0.05 level

Table 4.2 has shown that the comparison of the users' perception indicated a significantly higher value for the perceived importance of prompt and efficient when needed ( $t=11.521, p<.001$ ). The users also perceived the benefit factors e.g., easy to access and have all the functions and capabilities in helping users complete the tasks. Significantly higher means of ( $t = 10.461, p<.001$ ), and ( $t = 10.074, p<.001$ ) were illustrated. On the other hand, significantly lowest means of pleasant interface ( $t = 8.291, p<.001$ ) was also found. So there is a significant difference between users' perception about

the expectation and perception of system attributes.

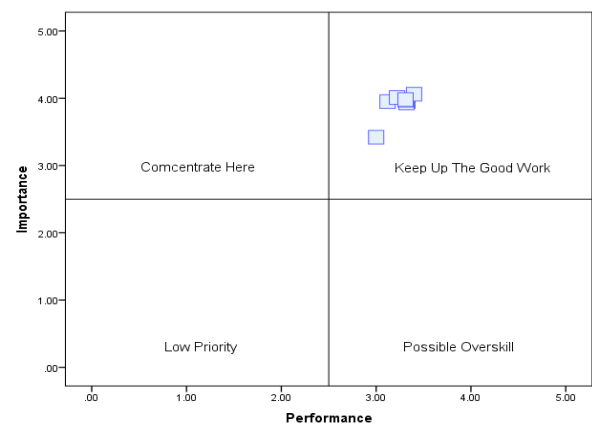


Figure 4.1: Importance-Performance Grid for Information Items.

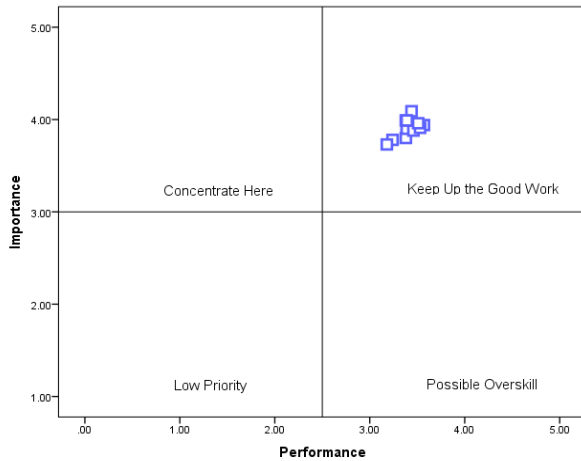


Figure 4.2: Importance-Performance Grid for System Items

To identify a set of critical success factors, the importance-performance analysis produces a graphical display on separate measures of importance versus performance on individual factors and attributes. Importance scores were either above or below the performance mean. This combination resulted in four classification possibilities. These include: quadrant I (high importance/low performance) – “concentrate here”; quadrant II (high importance/high performance) – “keep up the good work”; quadrant III (low importance/low performance) – “low priority”; and quadrant IV (low importance/high performance) – “possible overkill” (see Figure. 4.1 and 4.2).

By using a central tendency of mean, the attribute importance and

performance scores are ordered and classified into high or low categories; then by pairing these two sets of rankings, each attribute is placed into one of the four quadrants of the importance performance grid as shown in Figure. 4.1 and 4.2.

To determine whether the two variables are associated, the  $\chi^2$  (chi-square) statistical analysis of the data was carried out. The result has shown in the table 4.3. the result has shown that Pearson chi-square is significant on (3 *df* = .859, *p* = .835) with G-square (likelihood-ratio chi-square) value of .856 on (3 *df*, *p* =.836) for the tests of independence for overall satisfaction by gender, (12 *df* = 18.297, *p* = .107) with G-square (likelihood-ratio chi-square) value of 18.767 on (12 *df*, *p* =.094) for independence for overall satisfaction by age, ( 12 *df* = 19.963, *p* = .068) with G-square (likelihood-ratio chi-square) value of 22.025 on (12 *df*, *p* =.037) for independence for overall satisfaction by access frequency, and ( 3 *df* = 2.282, *p* = .516) with G-square (likelihood-ratio chi-square) value of 2.179 on (3 *df*, *p* =.536) for independence for overall satisfaction by place. The result has shown that four variables are not associated. In other words, it fails to reject the null hypothesis of independence.

Table 4.3 Chi-Square-Based Measures of Association Overall Satisfaction

Variables	Pearson Chi-square			Likelihood Ration			Contingency Coefficient	
	Value	df	Asymp.Sig. (2-sided)	Value	df	Asymp.Sig. (2-sided)	Value	Approx.Sig.
Overall Satisfaction by Gender	.859	3	.835	.856	3	.836	.049	.835
Overall Satisfaction by Age	18.297	12	.107	18.767	12	.094	.223	.107
Overall Satisfaction by Access Frequency	19.963	12	.068	22.025	12	.037	.232	.068

Variables	Pearson Chi-square			Likelihood Ration			Contingency Coefficient	
	Value	df	Asymp.Sig. (2-sided)	Value	df	Asymp.Sig. (2-sided)	Value	Approx.Sig.
Overall Satisfaction by Place	2.282	3	.516	2.179	3	.536	.080	.516

\*\* Significant at the 0.05 level

**Table 4.4 Correlation Matrix**

Pearson Correlations							
	User Satisfaction	Information	System	Gender	Age	Access Frequency	Place
User Satisfaction	1	.411**	.423**	.032	.055	.177**	.041
Information	.411**	1	.795**	-.003	.132*	.261**	-.059
System	.423**	.795**	1	.070	.037	.231**	-.021
Gender	.032	-.003	.070	1	-.200**	-.326**	.111*
Age	.055	.132*	.037	-.200**	1	.246**	.009
Access Frequency	.177**	.261**	.231**	-.326**	.246**	1	-.046
Place	.041	-.059	-.021	.111*	.009	-.046	1

\*\* Correlation is significant at the 0.01 level (2-tailed). \* Correlation is significant at the 0.05 level (2-tailed).

**Table 4.5 Regression**

Model	R	R <sup>2</sup>	adjusted R <sup>2</sup>	Std. Error	Change Statistics				
					R <sup>2</sup> Change	F Change	df1	df2	Sig. F Change
1	.423 <sup>a</sup>	.179	.177	.688	.179	76.050	1	378	.000
2	.441 <sup>b</sup>	.194	.189	.682	.015	6.366	1	377	.012

a. Predictors: (Constant), System, b. Predictors: (Constant), System, Information, c. Dependent Variable: User Satisfaction

To provide more accurately predicting the satisfaction levels of LMS users, multiple regression analysis would be applied to identify the factors that lead to increased satisfaction for use in differentiated information technology attributes.

For purpose of examining the contribution of each independent variable to the regression model, stepwise regression analysis was applied in this study. Table 4.4 displays all the correlations among independent variables and their correlation with dependent variable.

Examination of the correlation matrix reveals that the correlation coefficient for overall user satisfaction and information is .411. The number of respondents in the sample answering both items is 380, *p-value* for the correlation is .000. The result has shown that information variable was associated. In other words, the null hypothesis of independence was rejected.

As shown on table 4.4, the correlation coefficient for overall satisfaction and system is .423, *p-value* for the correlation is .000. The result has shown that there is a statistically significant

relationship between system and user satisfaction. Thus, the null hypothesis of independence was rejected.

As describe in the prior section, information attributes, system attribute, gender, place and age were the variables to be added to the regression model in the stepwise procedure. The multiple  $R$  and  $R^2$  values have both increased with the addition of information variable and system variable.

In the first step of the stepwise estimation, the results from the regression table (table 4.5) show that the multiple  $R$  is .423 (42.3%) and  $R^2$  is .179 (17.9%) of the total variance. As information variable was the next variable to be added to the regression model in the stepwise procedure. The multiple  $R$  and  $R^2$  values have both increased with the addition of information variable. The  $R^2$  increased 15 percent. The adjusted  $R^2$  also increased to .189 and the standard error of the estimate decreased from .688 to .682. Both of these measures also demonstrate the improvement in the overall model fit.

By reviewing the bivariate correlations of each variable with overall

user satisfaction in Table 4.4. The result has shown that of the six original independent variables, three variables (gender, age, and place) had non-significant bivariate correlations with the dependent variable. Thus, access frequency variable has significant bivariate correlations, yet its partial correlations is no significant.

The final regression model Table 4.5 is the result of system and information variable being added. The model with two independent variables (System and Information) explain about 44 percent of the variance of LMS user satisfaction. The adjusted  $R^2$  of .194 indicates no overfitting of the model. Also, the standard error of the estimate has been reduced to .682.

As shown on table 4.5, model summary provides summary detailing the measures of overall fit for the regression model and the overall correlation between the variable left in the models and the dependent variable. Each of the variable added to the equation made substantial contributions to the overall model fit, with substantive increases in the  $R^2$  and adjusted  $R^2$  while also decreasing the standard error of the estimate.

**Table 4.6 Analysis of Variance**

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.969	1	35.969	76.050	.000 <sup>b</sup>
	Residual	164.591	378	.473		
	Total	200.560	379			
2	Regression	38.934	2	19.467	41.795	.000 <sup>c</sup>
	Residual	161.626	377	.466		
	Total	200.560	379			

a. Dependent Variable: User Satisfaction

b. Predictors: (Constant), System

c. Predictors: (Constant), System, Information

**Table 4.7 Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.191	.242		4.914	.000	.714	1.668
	System	.613	.070	.423	8.721	.000	.475	.751
2	(Constant)	1.064	.246		4.328	.000	.580	1.547
	System	.382	.115	.264	3.319	.001	.156	.608
	Information	.281	.112	.201	2.523	.012	.062	.501

a. Dependent Variable: User Satisfaction

**Table 4.8: Excluded Variables**

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	Information	.201 <sup>b</sup>	2.523	.012	.134	.367
	Access Frequency	.083 <sup>b</sup>	1.672	.095	.089	.947
	Age	.040 <sup>b</sup>	.818	.414	.044	.999
	Place	.050 <sup>b</sup>	1.021	.308	.055	1.000
2	Access Frequency	.068 <sup>c</sup>	1.364	.173	.073	.930
	Age	.020 <sup>c</sup>	.404	.686	.022	.970
	Place	.058 <sup>c</sup>	1.209	.227	.065	.995

a. Dependent Variable: User Satisfaction

b. Predictors in the Model: (Constant), System

c. Predictors in the Model: (Constant), System, Information

The table 4.6 is the ANOVA table, the overall final model fit in term of the *F* ratio is 41.795. The squared error that would occur will be reduced by 19 percent. This reduction is deemed statistically with an *F* ratio of 41.795 and a significance level of .000.

This indicates that all four independent variables (System and Information) are significant predictors of the overall LMS user satisfaction, and therefore, there is a significantly significant difference in the mean of user satisfaction between LMS attributes. Thus, the hypothesis that there is no liner relationship between the predictor and dependent variable is rejected.

As shown on Table 4.7, the addition of information variable brought a second statistically significant predictor of LMS user satisfaction into the equation. The

regression weight of .281 is complemented by a beta weight of .201. The two regression coefficients, plus the constant, are all significant at the 0.05 level.

Table 4.8 provides a summary of variables that have not been entered into the model. In this case, access frequency, age, and place were not entered into the model. Even though these three variables were included in the model, these variables were not significant in the confirmatory model. As a result, the research considers reducing the influence allotted to these variables and even possibly omit them from consideration as influences on LMS user satisfaction.

In conclusions, it is noted that the two major influences (system and information) are primary components of the perceptual dimensions identified through factor analysis.

**Table 4.9 Summary of Results from Hypothesis Testing**

Hypothesis Statements	Results
H <sub>a1</sub> : There is a difference between user satisfaction about the expectation and perception of information attributes.	Significance
H <sub>a2</sub> : There is a difference between user satisfaction about the expectation and perception of system attributes.	Significance
H <sub>a3</sub> : There is a relationship among user perception about information quality and user satisfaction.	Significance
H <sub>a4</sub> : There is a relationship among user perception about system quality and user satisfaction.	Significance
H <sub>a5</sub> : There is a relationship among users' demographic characteristics, information quality, and system quality and user satisfaction.	No Significance

After conducting statistical analysis, the summary of results from Hypotheses Testing is shown in Table 4.9, it reveals that there is no significance for the fifth hypothesis. In contrast, this research also indicates that there is significance for the first, the second, the third, and the fourth hypothesis.

This implies that the set of information and system factors is contributing to user satisfaction while users' demographic factors are considered as less influences on LMS user satisfaction.

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

Although quality management and information technology have been extensively researched over recent years. However, there has not been found on the relationship among information technology applications, management information system (MIS) quality and user satisfaction.

As the objective of this study is to develop a valid instrument to measure the impact of information and system quality on user satisfaction and produce the suitable model to measure user satisfaction on LMS applications in Assumption University. As such, the students of Assumption University who have participated or experienced in using LMS applications offered by institutions are asked to fill out the self-administered questionnaires.

In this study, the Importance-Performance Analysis (IPA) technique was tested to find out the MIS success on LMS applications in Assumption University. The application of IPA technique in studying represents a good step towards the development of IT satisfaction theory. This technique enables a better understanding of IT user perception, which is important in explaining the dynamic nature satisfaction and the variability of its determinants over time. Moreover, the technique also identifies strengths and weaknesses of LMS applications in Assumption University in terms of two criteria that users use in making a choice and presents pictorially and graphically all results into the right areas.

The outcome of analytic approaches are investigated and evaluated including the relationship of key variables (e.g., the importance and performance (I-P) of IT application attributes. The analysis of inferential statistics involves the analysis and verification for hypothesis statements in the population, the item analysis

including Principal Components Analysis (PCA).

This research reports on a successfully developed construct that can be applied to measure the IT applications - user satisfaction relationships. The measures proposed were tested to be reliable and valid. Detailed item analysis confirmed that all the items were appropriately assigned to their respective measures. Moreover, the all-embracing literature review and qualitative pretesting helped to ensure that the measures have content validity.

This research offers a set of 2 major categories with their respective dimensions to study into. The dimensions of information and system form the measure of user satisfaction. Even though there is a variety of different dimensions that are not considered in each of the categories as discussed, it is believed that the offered dimensions are more critical and have priorities over other dimensions.

However, different points of view, for example, “whether system usage leads to user satisfaction” exist in the several researches. It may be argued that whilst system usage may lead to user satisfaction and user satisfaction may influence users to engage in more or further use of the system. The findings of the research indicate a significant positive relationship between system usage, in term of accessibility, availability, response time, ease of use, conservation of time, convenience, privacy, accuracy, multifunctional capabilities, interface and use of advanced IT and user satisfaction. It is believed that the better quality of system usage dimensions, the high level of user satisfaction. The outcome of this research is very educational, though not necessarily as expected.

The research also contributes to our knowledge by providing support the contention that user satisfaction depends on LMS quality that means the quality of management information system has an influence on user satisfaction. A user who has perceived better LMS quality is more

satisfied with IT applications provided by his or her institution.

In addition, this study found that the demographic variables such as age, access frequency, and place were found to be non-significant predictors of level of user satisfaction attribution. An explanation for this might be that users’ demographic characteristics are not a function of the overall user satisfaction. A user who rates higher levels of overall satisfaction with LMS applications provided by the institution might not spend more time on institution website or even access to the system somewhere else. Conversely, a user who rates lower levels of overall satisfaction might be male or female.

As we know, today the world has become completely dependent on computerized systems for almost everything. Managing information and related information technology (IT) is critically important to the survival and success of organization and advances in technology mean that it can now be an effective tool in learning and development. Many educational institutions are utilizing technology as an effective tool for monitoring and improving organization’s performance. For this reason, whether technology should be used in educational institutions is no longer the issue in education.

## **5.2 Recommendations**

As effective information technology is one of the important determinants of the success of the organization. Recognition of the various elements, besides MIS quality and system usage, that contributes to overall user satisfaction become critical. Similarly, it is just as critical to identify other elements, in addition to system usage, that has a direct impact on MIS quality. Importantly, a high quality of information in term of time, content, and form dimension and good organizational management including management system, technical support,



financial incentive, IT policies can also help ensure better LMS quality.

This strongly supports that the management support needed for IT applications implementation, along with the consolidation of the system and the technical support necessary to keep the technology operational must be taken into consideration of the management.

To remain competitive, the organization should develop the technology plan that includes professional development for technology use as an essential component, create strategies for IT learning that utilize learning cultures and just-in-time support, clearly specify the intended outcomes of the IT development, pursue strategies for obtaining and sustaining funding to provide the necessary equipment upgrades, and equipment maintenance to achieve the goals.

In addition, organization needs to proactively integrate information, system, and organizational management into their efforts in order to improve MIS quality as well as higher level of use satisfaction. Moreover, to ensure that technology is used effectively, the ongoing improvement of information technology and management information system should be taken as a major vision. Organization should remain in close contact with the IT industry to keep updated on the latest IT developments.

To ensure that the information technology will be used effectively, one factor that determines the use is where those computers are located. Although computers are connected to the Internet but they are not available in a convenient location, the availability to user will be limited. To make the best use of limited connections and equipment, it was suggested that the organization should explore the strategies for allocating computers.

The researcher suggested that in future studies the IT applications attributes such information, system, and organizational management could be used to research in all educational level in supporting quality management practices in

order to promote the use of information technology and achieve better quality performance with higher level of satisfaction. These attributes have been proven to be a nonthreatening means of quantifying the efficiency and effectiveness of newly implemented IT applications. Furthermore, the instrument provides not only an overall assessment of user satisfaction, but also the capability to analyze which aspects of IT application attribute are most problematic.

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