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EXAMINING THE EFFECT OF LEARNING MANAGEMENT SYSTEM QUALITY AND PERCEIVED USEFULNESS ON STUDENT'S SATISFACTION

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ABSTRACT

The application of educational technology, especially learning management system (LMS), has increased rapidly since the last few years. LMS has been developing very rapidly and the arising issue now is on how to manage it in order that online courses would be both successful and efficient. In this regard, the issue of user satisfaction has been frequently highlighted in the literature. User satisfaction has been found to significantly forecast the success or failure of LMS implementation. Hence, this study will look into the success factors impacting user satisfaction and LMS outcomes. Specifically, the conceptual evaluation model used in measuring LMS success is detailed. This study specifically seeks to explore the relationship between the proposed factors and student satisfaction, while also measuring LMS outcomes. The attained results evidence the positive impact of all proposed factors on student satisfaction. Also, the results indicate that higher rate of user satisfaction increases the benefits for the students.

Keywords: *Distance learning, learning management system, User satisfactions, Information quality.*

1. INTRODUCTION

The application of learning management system (LMS) is now common in higher education domain particularly in distance learning or online courses. Indeed, there has been an increase in the use of LMS in the practices of teaching and learning in this domain [1]. The effective LMS implementation can be reflected by its usage by end users [2], and at present time, satisfaction of end has become an important subject. This is because more and more institutions are using LMS in their online courses, and for this reason, an evaluation method is needed for measuring its effectiveness. For all organization, to have satisfied customers or users is one of their aims, and this especially true among universities. In this regard, the application of LMS in the delivery of courses is regarded to be a crucial goal for the universities in the management and evaluation of the work produced by the students. User satisfaction is a notion that means the degree to which the stakeholders are confident that the technology employed is fulfilling their requirements [3], and is regarded as the key variable that demonstrates the difference in marketplace success [4]. Apart from that, user satisfaction affects product, and therefore, having the concept analyzed will assist product improvement [5].

As mentioned by several researchers, information system (IS) that fulfils students' requirements will increase the students' satisfaction [6], and vice versa [7]. Besides, past LMS studies were mostly evaluating one type of LMS, and for this reason, a study that considers multiple LMS programs will be of value in obtaining results that are more generalized and valid [8-10]. The perceptions of students in LMS utilization need to be comparatively analyzed. Similarly, there should be more studies on the subject to improve the knowledge on distance learning courses and their effect on student satisfaction [11].

Considering that they are the biggest shareholders in the system of education, students have been chosen as target in this study[12]. Accordingly, it is important to examine the satisfaction level of students towards the learning

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system. Meanwhile, the level of satisfaction is dictated by a number of factors which also impact users including: the type of service needed by students, the types of services provided by LMS, the availability of LMS services required by students. As such, the factors impacting satisfaction of student towards learning management systems in distance learning courses are examined in this study. This research aims to answer the following question: to which extend the learning management system quality and perceived usefulness effect student's satisfaction? In the next section we will discuss the related issues regarding the evaluation model.

2. LITERATURE REVIEW

A comprehensive evaluation model for evaluating LMS effectiveness is yet to be available. However, the notion of student satisfaction in the context of LMS use takes into account factors including the following: the content prevalence and extensiveness, ease of access and navigation, and course staff approachability [13]. However, the factors of perceived usefulness, system quality and service quality, which may impact the satisfaction of students, were not taken into account. In other studies, the factors of usage frequency and service quality were reported as impacting student satisfaction [14]. On the other hand, issues relating to accessibility, poor technical support and low technology skill might reduce satisfaction of students while also causing high levels of frustration towards online courses [15]. User's loyalty towards service enterprises has close linkage to user satisfaction. Within the context of service, quality and value have been recommended as the antecedents of satisfaction, whereby satisfaction appears to be a mediator to the influence impacted by quality and value on loyalty [16, 17].

DeLone and McLean (1992) introduced a more integrated interpretation of IS and an IS success model that is more comprehensive. Here, information quality and system quality are both regarded as the impacting factors for IS usage and user satisfaction [18, 19]. IS success dimensions have been examined and it was found that qualities of technology including system, service and information quality affect system usage, perceived usefulness, and user satisfaction [20]. Also, Wixom and Todd (2005) constructed a model for user satisfaction and technology acceptance, and this model was tested on 465 participants from 7 organizations, in regards to their software usage for data warehousing. From the results, the authors concluded the presence of a significant impact of information and system quality on perceived ease of use and perceived usefulness. Furthermore, the authors proposed the performance of additional investigation to be carried out on to see the effects of the design as well as development of information technology as predictor to usefulness, ease of use, and the associated variables [21]. Many studies on LMS employed different variables to predict user satisfaction particularly with respect to culture influence, utilization capacity, as well as adoption of technology adoption.

Among the independent variables used in predicting satisfaction of students in the use of LMS include course discipline, size, and year, posted content, staff size, instructor status, and support in the form of surveys and forums [22]. Also, studies on learning management system perception have not highlighted on the significance of system capabilities (e.g., functionality and accessibility of learning management system; service quality including follow up service, empathy, help desk, information quality; assurance of information accurateness, availability, consistency, relevancy, reliability, legibility, timeliness and inclusiveness) which are integral in assuring success to distance learning programs.

3. METHOD AND RESEARCH MODEL

This section highlights the research model of this study and the hypotheses that this study will test. The research model that this study proposed was established to denote the linkage between technology acceptance model (TAM) and the model of IS success. In the context of technology acceptance, the constructs of perceived usefulness is used in measuring user behaviour.

In this study, the significance of the success of LMS according to IS perspective is demonstrated. In this respect, the foregoing factors are obtained from

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the continuing development and improvement in the establishment, design as well as the delivery of the integral facilities for users of distance learning. Accordingly, the attributes of the proposed research model can be viewed in Figure 1.

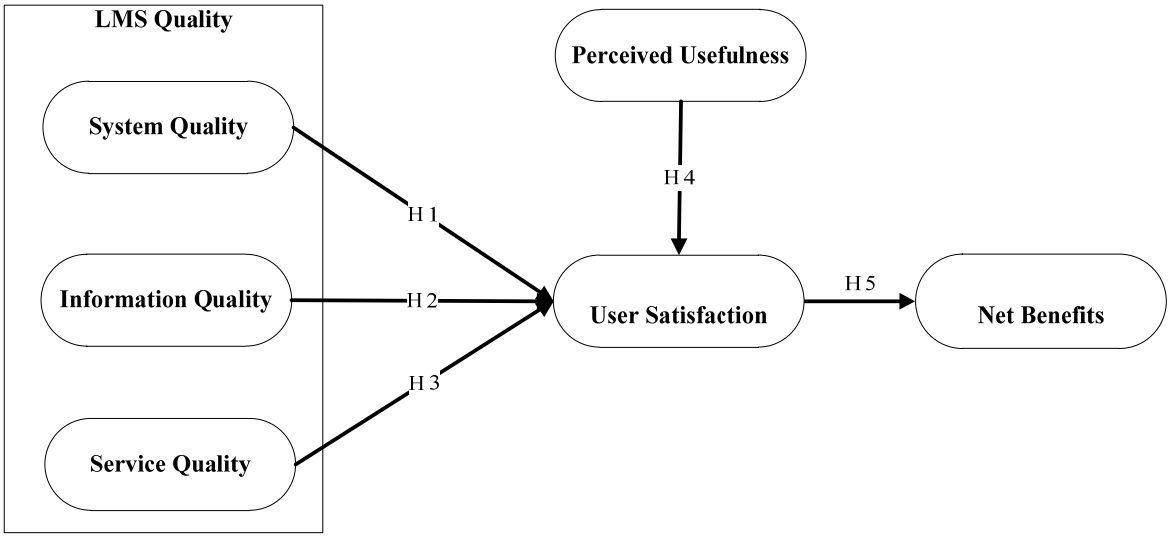

Figure 1: Proposed Research model

4. RESEARCH HYPOTHESIS AND MODEL CONSTRUCTS

The quality of educational technology significantly impacts utilization and satisfaction towards learning system [23]. In this regard, the effect of educational technology quality on the behavior of learner will be worth the scrutiny. Further, user satisfaction has been found to be impacted by factors including attitude and system output, difficulty of task and type of system, user expectation, and perceived usefulness. User satisfaction has been reported to be impacted by factors including system effort and effectiveness [24], technological issues (System quality) [25], as well as by perceived usefulness, and perceived service quality [26]. User satisfaction can also be gauged using quality dimensions including service quality, system quality and information quality [27].

In the context of developers, in measuring user satisfaction, among the considered constructs include accurateness of content, language and learnability, format and timeliness, speed and efficiency, documentation, aesthetics and enjoyment, motivation and job satisfaction [28].

For the context of this study, the constructs used for measuring student satisfaction towards LMS use in distance learning courses are as follows: service quality, system quality and information quality and perceived usefulness. Accordingly, the theoretical model proposed in this study called the User Satisfaction Evaluation Model (see Figure 1) specifies the association between the proposed constructs (i.e., perceived usefulness, system quality, service quality and quality of information) and student satisfaction. The constructs of the model in addition to the related hypothesis are detailed in the ensuing sections.

- **System Quality**

In information technology (IT) studies, the measurements that are commonly used in making prediction on system quality include: accessibility, efficiency, language, flexibility, timeliness, and factors of integration [21, 29]. In systems of online learning including LMS, the quality of the system is associated with the observation of students on the performance of the system. Such perception is measurable via factors as follows: availability, ease

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of learning, usability, response time and recognition of user expectations [30]. In past studies, system quality has been found to directly impact student satisfaction [29, 31]. As such, the hypothesis below is proposed.

H1: System quality is positively related to user satisfaction.

- **Information quality**

Information quality is commonly linked to measurements including accuracy, currency, conciseness, completeness, precision, timeliness of output, relevance, format, in addition to reliability[32]. For online learning, information quality denotes LMS's perceived output. In this regard, the indicators that are commonly employed in projecting information quality are as follows: format, completeness, accuracy, timeliness, adequacy, relevance, understandability, as well as accessibility [19, 33]. In past works on user satisfaction, Infromation Quality was reported to significantly affect user satisfaction [27, 34]. As such, the hypothesis below is proposed.

H2: Information quality is positively related to user satisfaction.

- **Service quality**

The purpose of measuring quality of services within the context of online distance-learning is yet to be explored by scholars [35]. In essence, service quality reflects the quality of support services that are offered to end users. Accordingly, the measurements of service quality include the constructs of responsiveness, reliability, assurance, tangibles, besides empathy of the system [33, 36, 37]. For online courses, among the commonly used measures of service quality include reliability, responsiveness, and empathy, all of which, greatly impact student satisfaction [38]. The researcher opines that better service provided to the students will generate higher level of satisfaction. As such, the hypothesis below is proposed.

H3: Service quality is positively linked to user satisfaction.

- **Perceived Usefulness**

Perceived usefulness entails the anticipation of users that the use of the proposed system can increase work performance [39]. The factors of relevancy and usefulness are the primary measurements of students' perception [21]. As reported in the literature, perceived usefulness significantly affects student satisfaction [40]. As such, the hypothesis below is proposed.

H4: Perceived Usefulness is positively linked to user satisfaction.

- **User Satisfaction**

User satisfaction encompasses LMS's potential impact and the total evaluation of user experience in LMS usage. Accordingly, two different variables that define user satisfaction are as follows: LMS expectation, and affirmation of the expectation [41, 42]. The literature denotes that user satisfaction impacts LMS's benefit or net outcomes [19, 29]. As such, the hypothesis below is proposed.

H5: User satisfaction is positively related to net benefit.

5. DATA COLLECTION

This study employed questionnaire for data collection, and the questionnaire was constructed taking into account the findings of past works. Pilot test was conducted and the reliability of the questionnaire was affirmed. During this pilot stage, suggestions and comments provided by the participant were addressed. The questionnaire was also sent to two experts for revision. The finalized questionnaire comprised of 28 items on used measurements as follows: system quality which is represented by 6 items, information quality which is represented by 6 items, service quality which is represented by 5 items, perceived usefulness which is represented by 3 items, student satisfaction which is represented by 3 items, and net benefit which is represented by 4 items. In addition, 3 items are included to represent the respondent's background information. The sample in this study comprised 285 students of distance learning at four universities, and the size of the sample size is in line with the earlier recommendations concerning the survey[43]. The items in the questionnaire (except for the 3 items for respondent's background) employ 5 point-Likert-scale (1=Strongly Disagree; 2=Disagree; 3=Neutral;

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4=Agree; 5=Strongly Agree) for measuring the questionnaire items.

6. DATA ANALYSIS

Data analysis was performed using SPSS (Statistical Package for the Social Sciences) and SEM (Structural Equation Model). The testing of reliability was the first step of analysis. In this regard, the reliability testing (coefficient alpha) of .80 or .90 denotes a scale that is well-constructed [44]. For the questionnaire of this study, the value of reliability testing is .898, which denotes the scale being well-constructed. The resultant value of reliability testing for each construct is detailed in Table 1.

The descriptive statistics in data analysis provide summarized information of the obtained outcomes. In descriptive statistics, data are presented in graphic and numerical form. Such representation eases comprehension and interpretation of user [45]. Frequency distributions and descriptive statistics present the overall view while also representing the properties of the gathered data. Standard deviation and means are presented in descriptive statistics, and these standard deviation and means were computed for the scaled variables. Table 1 shows the details.

As shown by the descriptive statistics results, the obtained mean value for all factors is above 3.69, whereas for all factors, the corresponding means are unchanged. This denotes the closeness of the results around the mean, which denotes the identicalness of students' opinions. The standard deviation values obtained in this study are between 0.79 and 1.00. The obtained values denote small variations in students' opinions.

Table 1: Measurement Model's Coefficient Alpha Value And Descriptive Statistics

Construct	Cronbach alpha	Mean	SD
System Quality	**.922**	3.69	.889
Information Quality	**.918**	3.73	.808
Service Quality	**.887**	3.75	.840
Perceived Usefulness	**.904**	3.84	.895
User Satisfactions	**.845**	3.75	.787
Net Benefit	**.802**	3.84	.839

7. DEMOGRAPHIC INFORMATION

The obtained background information of the respondents shows that most respondents were between 20 to 40 years old. The majority of respondent's study online learning (51.2%). With respect to respondent's gender, the table below shows that 52.6% of the participants were male and 47.4% were female. The demographic information can be viewed in Table 2.

Table 2: Sample Characteristics

		N	%
Age	less than 20	27	9.5
	20 - 24	88	30.9
	25 - 29	77	27.0
	30 -40	72	25.3
	41 - 50	12	4.2
	over 50	9	3.2
Gender	Male	150	52.6
	Female	135	47.4
LMS Utilization	100% Online learning	146	51.2
	Hybrid Learning	61	21.4
	On campus learning supplement	64	22.5
	Other	14	4.9
Field of Study	Art and Humanities	27	9.5
	Social Sciences	34	11.9
	Natural or Physical sciences	13	4.6
	Mathematic or computer Sciences	71	24.9
	Engineering	24	8.4
	Law	6	2.1
	Medicine and health sciences	10	3.5
	Education	33	11.6
	Business	67	23.5
Total		285	100

8. MEASURE OF FITNESS

In the context of SEM, the most challenging issue is the model evaluation [46]. It is crucial to have knowledge on model evaluation prior to conducting the analysis. In constructing the

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structural model, the first step is determining the linkage between the perceived variables. For the purpose, experimental knowledge and relevant theory studies are employed. Then, a statistical method is employed for the evaluation of the theory. In testing CFA, requirements to be fulfilled are: multivariate normality, missing data, sufficient sample size, tools of measurement, construal of model fit indices, tested research hypothesis, outliers, and identification of parameter, [47].

As proposed in past research, for every free parameter, there should be a least 10 participants estimated [29, 48]. In this study, 5 parameters were employed with a sample size of 285. In SEM, the most common fit index is the chi-square statistic ($\chi 2$) [49, 50]. The value of chi-square denotes the amount of data that do not match with the theories. As such, the CMIN linked with the higher probability value (P) denotes closer match between the perfect fit and hypothesis [51-54]. The obtained chi-square value for the proposed model is 9.031 with the P value of 0.060. This denotes the aptness of the proposed model, and that the model is not different when compared with other models. Based on the model's total fit measurement, the Chi-sq/df is 2.258 at 5 degree of freedom (df). In other words, the model had a perfect fit. Figure 2 presents the User Satisfaction Evaluation Model fit measures in summary form.

As can be seen from figure, the model proposed has a clear fit with the data. In general, the advantages of fit measures that this study highlights are in line with the recommendations of past studies. As can be construed from the results of test, the model's hypotheses are accepted and the hypotheses are all good predictor of the model.

9. HYPOTHESES TESTING AND DISCUSSION

The following Figure 2 highlights the standardized regression weights of the proposed research model hypothesis. In addition, the correlation between the independent variables as the SEM modification index suggests the correlation of the aforementioned variables.

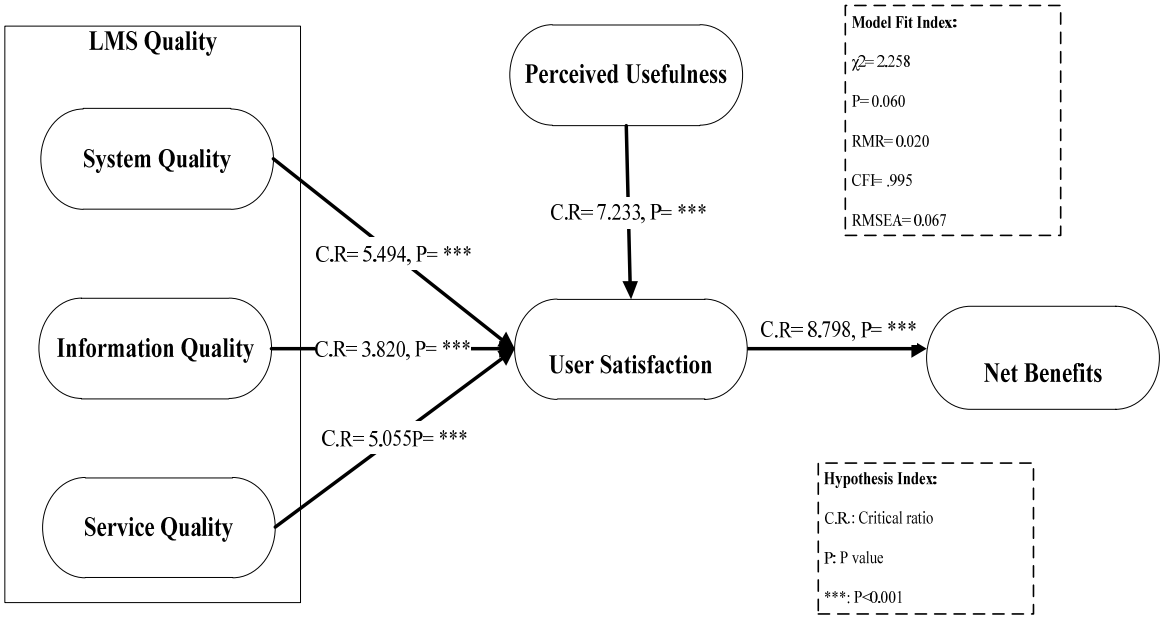

Figure 2: Structural Model

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The primary purpose of this study is to measure the importance of factors which contribute to LMS success in the context of distance learning programs. This study evidences strong significant effects among all independent and dependent variables. SEM was used in research model validation. Here, the CMIN/DF value of 2.258 was attained, which denotes a very good fit. SEM is therefore appropriate for hypothesis testing, with the utilization of regression analysis. As evidenced by the results, system quality imparts the highest impact on student satisfaction in term of LMS quality, with obtained C.R value of 5.49 (strong significant effect). Hence, the importance of the factors of availability, usability, ease of learning, realization of user expectations and response time, are proven in this study [30]; all these denote the major predictor of student satisfaction.

Perceived usefulness has been reported to significantly impact student satisfaction [40]. The next significant construct is perceived usefulness with the attained C.R value of 7.23. Hence, the increased usefulness of LMS will increase student satisfaction. Service quality is the third significant construct with C.R of 5.05, implying that if LMS offers service of good quality (e.g., 24/7 service), ready to use services, high level of training, student satisfaction will increase [8, 55]. In addition, the factor of information quality appears to impart similar impact on student satisfaction just like service quality. As also demonstrated by the results, information quality significantly impacts student satisfaction with C.R of 3.82. As such, accuracy, relevance, timeliness, completeness, adequacy, format, understandability, and accessibility of quality information[19, 33] are all crucial to the successful LMS usage in online courses. Somehow, this finding is contradictory to Green et al. (2012) who concluded non-significant effect of delivery format on student satisfaction [14].

The results show that 4 hypotheses namely H1, H2, H3 and H4 have identical value (C.R greater than 3.8) in impacting the satisfaction of students. User satisfaction significantly predicts system outcomes [27, 56]. As suggested by past works, student satisfaction impacts the outcomes or the net benefit of LMS usage [19]. In this regard, H5 which denotes the linkage between student satisfaction and net benefit was tested and C.R of 8.79 was achieved. The result implies the strong impact of student satisfaction on the outcomes or net benefit from LMS usage. In other words, feeling more satisfied with LMS usage will cause students to reap more benefit from the use itself. Apart from that, students' inclination of usage is also expected to increase [57].

Accordingly, system quality, information quality and service quality and perceived usefulness are regarded as the factors impacting user satisfaction, which mediates net benefit. This study contributes through demonstrating the use of the factors that have been found to impact user satisfactions. The research model analysis via SEM shows that linkage within the proposed model presumably measures both the effect and cause in the success factors, aside from the success measures. Presumably, the proposed model impacts (negatively or positively) the quality of LMS, which in turn will affect net benefit and user satisfaction.

This study was confined to students enrolled in distance learning courses, and for this reason, bigger sample size may validate the research model better. Additionally, considering the differences in viewpoints embraced by different users, it might be useful to measure satisfaction of students within a different context as this may increase the validity of results. For future research, other factors that this study did not employ (e.g., training and LMS usage experience) should be used. These factors might also impact user satisfaction.

10. CONCLUSION

The assessment of LMS can assure the positive effect and effective implementation of distance learning courses. Accordingly, the important factors impacting the satisfaction of distance learners were ascertained and they are as detailed as follows: 4 independent variables (information quality, service quality, perceived usefulness, and system quality), and 2 dependent variables: net benefit and user satisfaction.

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Applicable data were obtained from distance learners using the survey method. Learner's perceptions of the effect of LMS particularly with respect to their benefits and satisfaction level were then analyzed. The results were in support of all hypotheses. Additionally, the regression analysis evidenced the significant impact of the proposed factors on user satisfaction. In specific, system quality has the strongest significant impact on student satisfaction in term of LMS quality. It is also crucial to monitor the quality of LMS considering that its usage in universities is more widespread than ever nowadays. Finally, the development and studies of LMS should consider also the viewpoints of lecturers.

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