

Factors Influencing Students' Usage Satisfaction Toward University Web Portal: A Pls-Sem Analysis
(Faktor-faktor yang Mempengaruhi Kepuasan Penggunaan Pelajar Ke Portal Web Universiti: Analisis
Pls-Sem)

SYED SHAH ALAM, MD DAUD ISMAIL, MOHD HELMI ALI & ZAHER ZAIN

ABSTRACT

The aim of this study is to empirically examine the factors affecting users' satisfaction with university portals in Malaysia. This study tested seven hypotheses on factors affecting users' satisfaction of university portal with empirical data from a sample of 318 students from Universiti Kebangsaan Malaysia. Data were collected through personal-administered questionnaire. Partial Least Square (PLS) analysis results revealed that system quality, information quality, service quality, user ability, and educational services were significantly influence users satisfaction. Information quality was found as the dominating factor in this research.

Keywords: User satisfaction, university web portals, confirmatory factor analysis, Structural Equation Modeling.

ABSTRAK

Tujuan kajian ini adalah untuk mengkaji secara empirik faktor-faktor yang mempengaruhi kepuasan pengguna dengan portal universiti di Malaysia. Kajian ini menguji tujuh hipotesis mengenai faktor yang mempengaruhi kepuasan pengguna portal universiti dengan data empirikal daripada sampel 318 pelajar dari Universiti Kebangsaan Malaysia. Data dikumpul melalui soal selidik peribadi. Hasil analisa *Partial Least Square* (PLS) menunjukkan bahawa kualiti sistem, kualiti maklumat, kualiti perkhidmatan, keupayaan pengguna, dan perkhidmatan pendidikan secara signifikan mempengaruhi kepuasan pengguna. Kualiti maklumat didapati sebagai faktor yang mendominasi dalam kajian ini.

Kata kunci: Kepuasan pengguna, portal web universiti, analisis faktor konfirmasi, Pemodelan Persamaan Struktur.

INTRODUCTION

In the today's information age, the widespread extension of internet is replacing any organizations' traditional way of public interaction. Organizations are moving forwards in span, the necessity of accessing into large audience with improved operational efficiency become obvious for them (Mentes & Turan, 2012). The proliferation in usage of technologies is observed in organizations; web technology is one of them (Currie, 2000; Poon & Swatman, 1999; Westland & Clark, 1999; Teo & Tan 1998). The web sites are becoming centralized solution for customers and organizations meeting their diverse needs. It performs as a delivery mechanism or platform for services/interactions among stakeholders and simultaneously characterizes the organizations upholding organizations' culture, values, and vision (Iwaarden et al., 2004).

Universities are not lagging behind in the competitions comply with the prediction of Bill Gate in late nineties that technologies and internet will be crucial in both inside and outside class room teaching (Gates 1996). The learning time should not bind within the class hours and for active and comprehensive learning, it passes its beyond. For instance, students may be given quick assignment allowing to be submitted late night or they may be given class lecture ahead of the class so that class assignment can be given based on the free internet resources. Besides, universities are competing in the global environment in terms of international ranking for attracting global students. For these, universities need universal standards in their education curriculum and facilities where teacher, staffs, students, job providers, visitors and regulators could equally evaluate each other. Web portal is such a platform for becoming one stop facilitator for the universities.

A university web portal is an application with a single web-based interface to access aggregated and personalized view of information, resources, applications, and education/academic options from internal and external sources via a network connection in a password-protected setting (Adeyinka et. al., 2012, Al-Debei, et. al., 2013). Besides, it accumulates specific functions, such as search mechanisms, access to databases, user registration and personalization options. Despite the significant changes in the end-user computing environment during the past decade and explosion of web based information systems, there has

been little research on measurement of user satisfaction with web-based information systems especially in the academic domain.

UKM web portal is designed to provide online services to all students, which includes; facilitating admission processes, checking admission status, course registration, payment of tuition fees, requests for accommodation and providing relevant information about the University. In spite of the benefits of this information system to the university students, measuring its overall success will depends largely on students' satisfaction. Measurement of success of UKM web portal performance can only be achieved through a feedback from users. The feedback will act as a signal and a scale for stakeholders to justify their investment in the system and appraise their effort in the system development. This vital feedback can only be achieved through a survey of the web portal IS users to discover their candid view of the system. That is why this study is opted to explore the factors influencing web portal satisfaction and concurrently will shape it through structural equation modeling.

LITERATURE REVIEW

The term satisfaction is an inner state (pleasure or disappointment) resulted from the comparison of outcomes with expectation of individual (Kotler, 2000; Kotler and Keller 2012; Tse and Wilton, 1988; Oliver, 1980). Morgan and Hunt, (1994) viewed satisfaction as a function of consumers belief that the person was treated fairly. That is satisfaction is a combined outcome of perception, assessment and psychological reactions to the persons experience with the product/services (Yi, 1990). So, user satisfaction of web portal is the feelings of users that he or she got exactly the same or less what is supposed to get compared to the standard web portal features or expectations to carry out the purposes.

Customer Satisfaction is a most widely researched subject matter in the academic world from last two decades but users' satisfaction of web portals roughly appeared in the literature since 2005 (Shaltoni et. al., 2015). The information systems acceptance model proposed by Kuo et al. (2005) found empirically that empathy, ease of use, and information quality as well as accessibility influence satisfaction along with their refined scale for perceived portal quality. Liu and Arnett (2000) recommended information and

service quality; system use, playfulness, and system design are the essential predictor for website success. Griffiths, et. al. (2007) suggested that user satisfaction is affected by diverse factors, consisting of visual appeal in case of information system usage. Zviran et. al., (2006) evaluated the link of user-based design with website usability and user satisfaction while Li (1997) incorporated service quality as factor affecting information system performance from the personnel perspective. Pitt *et al.* (1995) concluded that service quality is an intangible measurement tools associated with information systems.

Likewise, several studies dealt with various factors identifying user satisfaction with campus or university portal for instance User ability, design, playfulness, support services availability (Lee et al., 2009), Information satisfaction, system satisfaction (Lee and Kim 2010) Information satisfaction, system Satisfaction (Christy and Matthe, 2011), Information/Content quality, System quality, Ease of use (Tella and Bashorun, 2012). The similar studies based on university portal which identified related factors includes Interaction, invisibility for portal acceptance (Booi and Ditsa 2013), Competition pressure, government support, vendors support for portal adoption (Macharia and Nyakwende 2009), portals Usability, service availability, ease of use for portal usability (Daher and Elkaban 2012), Ease of use, information quality, system quality for perception and use of library portal (Chen 2011), Information quality, systems quality, service quality for library portal effectiveness (Masrek et al. 2010), Informational and transactional content/availability, web site design for portal quality (Abdelhakim et al. 2011).

Hypothesis Development

Researchers have created models to measure information system success (Delone and McLean, 1992; Seddon and Kiew, 1996), emphasizing the need for better and more consistent success metrics. To measure IS success; user satisfaction is possibly the most extensively used single measure (Doll and Torkzadeh, 1998; Igarria and Nachman, 1990; Gatian, 1994). Delone and McLean (2003) IS success model is one of the most widely cited (Heo and Han, 2003) and were used in this study to examine UKM students' satisfaction of UKM web portal.

However, this study considered, along with the technological factor, only four factors from the extended (Dalone and McLean, 2003) IS success model namely system quality, information quality, service quality, and user satisfaction. Since the use of the UKM web portal will be not an option, but rather mandatory to the UKM students, the construct "use" was subsumed in user satisfaction since users' satisfaction of an information system could only be preceded by its use. Net benefit as a construct was dropped since measuring it was out of context in this study. User satisfaction which includes 'use' in this context remains the most viable measure of the IS success. This leads to the modification of the (Dalone and McLean, 2003) IS success model in accessing users satisfaction within the context of the study.

System Quality

System quality indicates the system that supports the application of the web portals and it quality is measured by the applications ease of use, loading speed, easy navigation facility, flexibility, reliability etc. Cameron (1999) defined system quality as the processing quality of an information system and Dalone and McLean, (2003) modify information system model with system quality. Lee and Kozar (2006) described website efficiency, used as alternative to system quality, as demonstration of resources expanded achieving goal in visiting a website. Users find efficiency when they get quick responses without putting much cognitive efforts. Likewise, functionality as part of system quality is found as related to user satisfaction (Gelderman 2002). System quality has also found connected to the user satisfaction in various field such as knowledge management system (Kulkarni et. al. 2006; Wu & Wang, 2006; Halawi et. al., 2007), general information system (Seddon and Yip, 1992; Yoon et. al 1995; Guimaraes et. al 1996; Seddon, and Kiew 1996; Rai et. al. 2002; McGill et. al. 2003; Almutairi and Subramanian, 2005; McGill and Klobas, 2005; Wixom and Todd, 2005). In case of website system quality, (Kim et. al., 2002; Palmer, 2002) found reliability and download time are significantly related to the users satisfaction. All these relations lead to the hypothesis:

H1: System Quality of university portal is significantly related to the satisfaction of users.

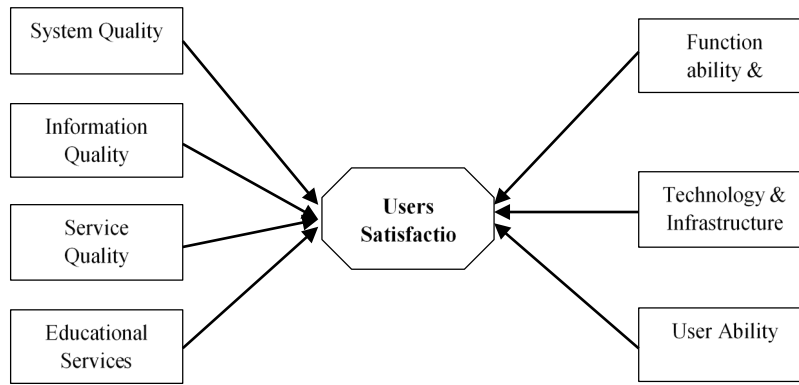


Figure 1: Conceptual framework for students' satisfaction for web portal usage

Information quality for any information system is the extent of superiority in terms of contents, correctness, timeliness and arrangement of information as output (Liao et al., 2006; Masrek et. al., 2010; Tella and Bashorun, 2012). Information in low quality could serve the purposes of users but it stimulates dissatisfaction among users which could lead to search for alternatives. Researchers (Kim et. al., 2002; Palmer, 2002) opened up significant relationship among content, layout and user satisfaction while McKinney and Yoon, (2002) explored information quality as key determinant for user acceptance. The numerous studies (Seddon and Yip, 1992; Seddon, and Kiew 1996; McGill and Klobas, 2005; Almutairi and Subramanian, 2005; Wixom and Todd, 2005; Kulkarni et. al. 2006; Chiu et. al., 2007; Halawi et. al., 2007) recognized that information quality influence the users satisfaction. Besides, the quality of information have significant effect on the managerial satisfaction and others components of information system (Teo and Wong, 1998).

H2: Information Quality of university portal is significantly related to the satisfaction of users.

Service Quality

Even though web portal provide internet interface services where there is no physical presence of service provider until the user struck in any problem. Electrical and mechanical systems are not beyond the technical problems. When it occurs, the system provider must provide quick and reliable services to solve it. Usually, these services are provided by the IS departments and IT support personnel. The responsiveness, accuracy, technical skills of IT professional pacifies the dissatisfaction of users.

Numerous studies established the link of service quality and users satisfaction. Leonard-Barton & Sinha, (1993) found that responsiveness to complain of developers positively related to user satisfaction while Yoon et. al., (1995) examined that developer's skill influence the user satisfaction for an expert systems. Similarly, Leclercq, (2007) exposed that IS functions along with quality of support and service affect user satisfaction. In contrast, Choe (1996) concluded that IS professionals experience do not related to the user satisfaction of accounting information system. Therefore, the following hypothesis is adopted in this study:

H3: Service Quality of university portal is significantly related to the satisfaction of users

Educational services

The necessity for which university web portals are usually created is helping students in term of their educational services like downloading class contents, uploading assignments, took part in the discussion on a given topic by teacher, communicating with faculty members for any assistance etc. It intends to design in such way that it becomes a hub of learning with teacher-students interactions in 24 hours via online. The planned services to students and staff facilitate speeding up administrative process, flexible approach in transactions by the individualized self-services (Bajec, 2005). When students find their education related service in right way, they become satisfied to the portal that is to the university at large. Based on that the following hypothesis is taken:

H4: Educational services from the university web portal are significantly related to the satisfaction of users.

Functionality and design

Functionality and design of web portal refers to the level of user friendliness, knowledge about the web portal and easy to understand by its simple design. Tan and Wei (2006) pointed out that the appearance of a website is a critical factor that develops the perceived information for the performance of better cognitive mapping and assessment regarding decisions for implementation. Zhang et. al., (2000) commented that the effective web designing with attractive appearance could satisfy the users. However, a better functional and perfect designed web portal can satisfy users. Thereby, the following hypothesis is adopted:

H5: Functionality and design of university portal is significantly related to the satisfaction of users

Technology and infrastructure

Technological and infrastructure factors include uninterrupted power supply, necessary up gradation, and sufficient internet facilities. These factors indicate the facilitating conditions which is essential for maintaining constant services. The better the infrastructural support, the higher the satisfaction of users. Infrastructural factors were identified as positively relevant (top most factor) with IS success and adoption (Grover 1993). Zhu et. al., (2003) opened up that physical IT infrastructure influence e-business acceptance in European firms while Grover (1993) failed to get any link for IS structure (the degree to which IS are structured or dispersed within organization) in IT acceptance. Ang, et. al., (2001) concluded that those organizations are decentralized in term of IT structure are more influential on the IT use than the centralized IT structure. Thus, the following hypothesis is offered:

H6: Technology and infrastructure are significantly related to the users' satisfaction of university portal

User Ability

User ability is the primary factor for the information system users and without this the superior system, service and information quality become useless. A user may be short of skill for checking information or surfing internet especially for web based systems. If he or she got help from others or from university, the limitations could be resolved subject to the users learning ability. Though the university level students may not have lacking of basic computer knowledge

but in case of new software they might be in trouble. Thereby the efficacy of campus portal is very much dependent on the appropriate level of competence (Liu et al., 2009). Nielson (1993) used the term learnability in his usability model and defined as the level of simplicity of the website for casual users to learn it. However, several studies identified learnability as a key component of usability of information systems (Brink et al., 2002; Nielson, 1993). Alter (1978) viewed that the computing ability of an IS user can perform efficient communication between the system developer and user for reducing aversion to the use of information systems carrying out purposes. Srinivasan (1985) explained that system user ability can be a source of user motivation to use systems, measured by the accuracy of report content and ease of understanding. Thereby, the following hypothesis can be drawn:

H7: User ability is significantly related to the users' satisfaction of university web portal

METHODOLOGY

The population of this study is the students of Universiti Kebangsaan Malaysia and the sampling frame used was the any students of UKM. There are about few thousand students enrolled and a sample size of 318 can be considered sufficient for this size of target population and for the minimum sample size required by Structural Equation Modeling (SEM) as suggested by Anderson & Gerbing, (1988); Hair et al., (1998), and Shumacker & Lomax, (1996). Survey questionnaires were personally distributed to the respective respondents randomly and collected later on. Convenience sampling method was used to collect the data. The instruments to measure the current study were derived from previous validated study. The scale items to measure the latent constructs in the model were adapted from the scale items used by Shaltoni et. al., (2015) and Nwone S. A. (2014). The study used a 5-point Likert scale (from 1: strongly disagree to 5: strongly agree) in the questionnaires. Before conducting the final survey a pretest was conducted to modify the questionnaire and its wording.

Data from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS) version 20 and the SMART Partial Least Square (PLS) version 2. The study used structural equation modeling (SEM) for finding out the appropriate factors by the exploratory and confirmatory factor analysis method. SEM is a multi-variable analysis that combines the concepts of factor analysis and multiple regression analysis (Hair et al., 2006) and is a second generation

statistical measures (Awang, 2013). The use of PLS SEM is basically different from the covariance based SEM which is more strict in terms of sample size and normal distribution of data etc. (Hair et. al. 2014). For constructs collinearity analysis and for p-value determination, SPSS and MS-excel were employed.

distribution by faculty indicated that 23.8% of the respondents are from FEP and FST each whereas 16.6% of them are FTSM and FSSK each. The least percentage of respondents is from FKAB (10%), FPI (7.5%) and FUU (1.6%).

RESULTS AND DISCUSSION

Profile of respondents

Among the total respondents, about 70% and 30% of them are female and male while 76.5% and 15.4% are Malay and Chinese respectively. Indian ethnicity represents only 8.2% of the respondents. The religion indicates that majority is the Muslim (76.2%) followed by the Buddha (13.5%) and Hindu (8.5%). A least percentage (1.9%) was for the Christian people among the respondents. Respondents are mostly (69.6%) in 21-25 years and below 20 years (27.3%) of age group. Only 2.2% and 0.3% percentage of the respondents are above 35 years and 26-30 years of age group. Besides, the majority of the students (47.6% and 31%) are 3rd students and 2nd year accordingly. The first year student comprises only 21.3% of the survey. The respondent's

Measurement Model

The measurement model determination includes testing internal consistency (composite reliability), Indicator reliability (cronbach's alpha), convergent validity (average variance extracted), discriminate validity (Fornell-Larker Criterion) of the constructs and indicators. The composite reliability is an alternative to the cronbach's alpha which have limitation in case of item numbers in the scale (Hair Jr. et. al. 2014).

In case of composite reliability (table-1), 26 items quality out of 28 items of the constructs based on the rule of thumbs of values 0.5 or higher and low outer loadings (<.40) are to be removed from the scale (Hair et al. 2011). Two items Edu1 (0.3323), Techno2 (-0.35) having low factor loading were deleted from the construct educational services and technological & infrastructure factor as per the principle. The AVE for the construct education services and technological

Table 1. Refined measurement model for user satisfactions

Const.	Items	Load	AVE	CR	Const.	Items	Load	AVE	CR
Education services	Edu2	0.7086	0.6269	0.792	System Quality	SysQ1	0.7886	0.635	0.797
	Edu3	0.8544				SysQ2	0.876		
	Edu4	0.8053				SysQ3	0.7298		
Function ability & design	Function1	0.9362	0.7256	0.852		SysQ4	0.7862		
Info Quality	InfoQ1	0.8412	0.7708	0.878	Techo & infra	Techno3	0.7114	0.641	0.801
	InfoQ2	0.9288				Tecno1	0.8807		
	InfoQ3	0.8615			User ability	UserA1	0.6939	0.581	0.762
Service Quality	SerQ1	0.9082	0.8556	0.925	Satisf- ection	UserSat1	0.8982	0.850	0.922
	SerQ2	0.9404				UserSat2	0.9393		
	SerQ3	0.9261				AVE	CR		

& infrastructure factor were improved (0.4952 to 0.6269 and 0.4952 to 0.581 accordingly) after deletion of items meeting up the threshold value > 0.5 for all the constructs. This means the construct explains more than half of the variance of its indicators (Hair Jr. et. al 2014).

The composite reliability which indicated the internal consistency of the items in the constructs are also above (in fact greater than 0.750) the standard value >0.60 suggesting the required level is achieved. And another criterion for exploratory analysis is the

discriminant validity which means the degree to which a construct is actually dissimilar each other by empirical standards (Hair Jr. et. al. 2014). Fornell-Larker (1981) is a method comparing the square root of AVE value and constructs correlations. If the square root of each construct’s AVE is greater than its highest correlation with any other construct, the discriminant validity is ensured and vice-versa (Hair Jr. et. al. 2014). The discriminant validity (table 2) for all the constructs was confirmed in the study as its square root of each AVE is greater than that of each correlation.

Table 2. Fornell-Larcker Criterion for Confirming Discriminant Validity

	Edu	Fun	Inf	Sat	Serv	Sys	Tec	User	Discriminant Validity
Edu	0.792								Yes
Func	0.562	0.852							Yes
Info	0.403	0.470	0.878						Yes
Sat	0.536	0.437	0.682	0.922					Yes
Serv	0.456	0.416	0.473	0.542	0.925				Yes
Sys	0.44	0.564	0.680	0.643	0.416	0.797			Yes
Tech	0.609	0.355	0.331	0.379	0.390	0.176	0.801		Yes
User	0.360	0.466	0.262	0.312	0.273	0.242	0.216	0.762	Yes

Structural Model

The structural model evaluation in PLS-SEM relates with the measurement of collinearity, coefficients of determination (R²), Predictive relevance (Q²), Size and significance of path coefficients, f² effect sizes, q² effect sizes. A high correlation between two construct

is referred to as collinearity and when these occurred with more than two construct it is called as multi-collinearity. Collinearity proved as problem in the model fit as one or more construct become redundant. The rule of thumb is the Variance Inflation Factor (VIF) value must be below 5 while the tolerance limit must also be greater than the 0.20 (Hair et. al. 2014).

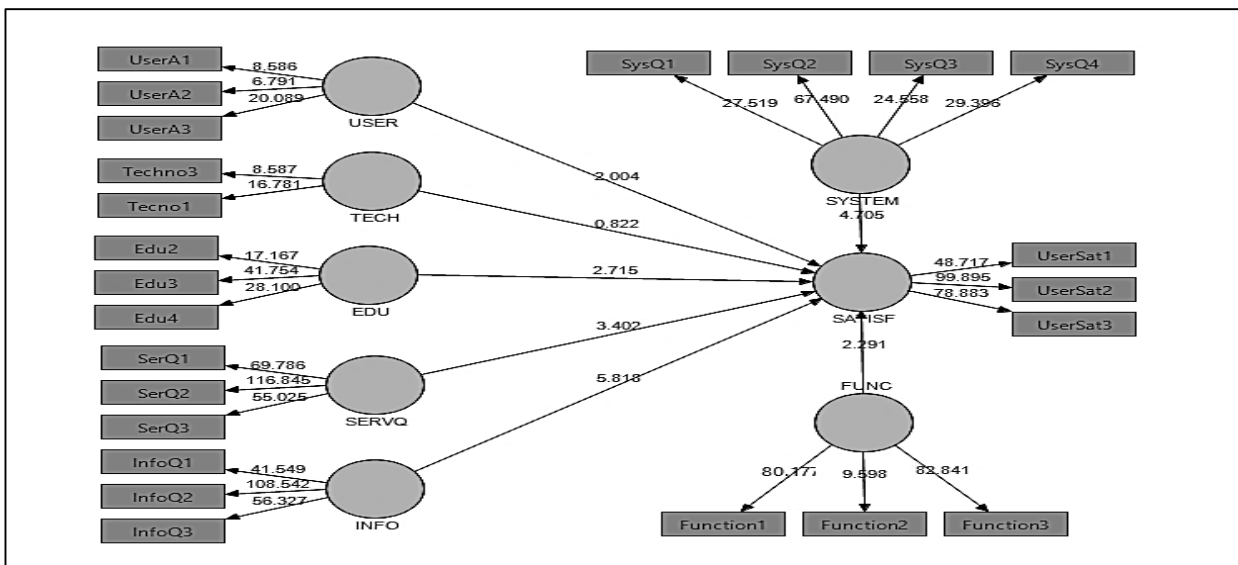


Figure 2. Bootstrapping results of the constructs from Smart PLS

The result (Table 4) indicates that the VIF (>5) and its tolerance limit (>0.20) are satisfactory meaning that there is no collinearity problems. The coefficients of determination (R^2) which measure the model's predictive accuracy found in the model is 0.6126 can be regarded as moderate as it is less than 0.75 and greater than 0.25 (Hair et. al. 2014). The predictive relevance (Q^2) suggested by Geisser, (1974) & Stone, (1974) indicates that value greater than zero is considered as the exogenous constructs have predictive relevance for the endogenous construct (satisfaction) under consideration. The result recommend that the value ($Q^2=0.498$) is well above zero to reckon the sufficient predictive relevance.

The results of this study (see Table 3) demonstrate that there are statistically significant and positive relationships between users' satisfaction and information quality ($\beta=0.338$, $p<0.01$), and system quality ($\beta=0.2955$, $p<0.01$), Educational services ($\beta=0.201$, $p<0.01$), and service quality ($\beta=0.1798$, $p<0.01$). The weakest relationship was found between users' satisfaction and user ability ($\beta=0.0805$, $p<0.05$). Whereas there was no significance relationship

found between users' satisfaction and Technological & infrastructure factor ($\beta=0.0521$, $p>0.10$) and in contrast the Function ability & design construct found interestingly a reverse result with significance ($\beta=-0.1318$, $p<0.05$). Therefore, the results supports H1, H2, H3, H4, H5, H7 and hypothesis number six was not supported.

The findings of the study found most of the factors significant which is in line with the study Nwone (2014) in case of system, service and information quality, technology and infrastructure factors influencing users' satisfaction but unlike to the dominating factor were system quality in assessing university web portal satisfaction. Also, it is in agreement of the Shaltoni et. al., (2015) who found educational services, system quality and information quality are significant factors contributing users' satisfaction while user ability is non-significant factor. This insignificant result is just opposite to the present study where we found it as significant. Though user ability detected as significant here on, it featured least explanatory power for user satisfaction is similar to the research Lee et al. (2009).

Table 3. Hypothesis testing and path coefficients

Hypotheses	Constructs	Path coefficient	T Statistics	p values	Result
H1	System Quality -> Users Satisfaction	0.2955	4.7054***	3.78994E ⁻⁰⁶	Supported
H2	Information Quality -> Users Satisfaction	0.3382	5.8176***	1.45939E ⁻⁰⁸	Supported
H3	Service Quality -> Users Satisfaction	0.1798	3.4016***	0.00076	Supported
H4	Educational services -> Users Satisfaction	0.2006	2.7149***	0.00699	Supported
H5	Function ability & design -> Users Satisfaction	0.1318	2.2906**	0.02264	Supported
H6	Technological & infrastructure factor -> Users Satisfaction	0.0521	0.8217	0.41187	Not Supported
H7	User ability -> Users Satisfaction	0.0805	2.0037**	0.04595	Supported

Notes: *Significant at $p < 0.05$ ($t > 1.645$); **Significant at $p < 0.01$ ($t > 2.326$); ***Significant at $p < 0.001$ ($t > 3.090$); ns = not significant

The next two criteria for measuring structural model are determination of f^2 and q^2 . The f^2 and q^2 values of 0.02, 0.15, and 0.35 indicate an exogenous construct's small, medium, or large effect, respectively,

on an endogenous construct (Hair Jr. et. al. 2014). The present study found the small effects of exogenous constructs on the endogenous construct as all the values are below 0.15 (Table 4).

Table 4. Collinearity, f^2 and q^2 assessment

Constructs	Collinearity: VIF	Tolerance	f^2 effect size	q^2 effect size
Satisfaction ($R^2 = 0.6126$, $Q^2 = 0.4980$)				
Educational services	2.225	.449	0.0467	0.0285
Function ability & design	2.034	.492	0.0212	0.0127
Information Quality	2.146	.466	0.1350	0.0866
Service Quality	1.504	.665	0.0555	0.0329
System Quality	2.389	.419	0.0927	0.0574
Technological & infrastructure factor	1.773	.564	0.0039	0.0024
User ability	1.319	.758	0.0126	0.0078

CONCLUSION

The aim of the study was to find the factors influencing students' satisfaction of web portal usage. The study found that system quality, information quality, service quality, educational services, functionality and design, and user ability are the significant factors affecting users' satisfactions. The most dominating factor identified in the study is information quality. The reason could be student emphasized timely, accurate and relevant information on top of the other factors. Regarding the structural equation modeling of factors of users satisfaction, the models has moderate predictive accuracy and sufficient predictive relevance. Besides, the exogenous variables have small effect to the endogenous variable; user satisfaction.

Recognizing user's feedback on the satisfaction of web portal should help the university authority to rectify the limitations and simultaneously maintain/restore universities overall performance and rankings. Since this study found relevance of web portal qualities (system, service and information) with the users' satisfaction, the authority should adopt universally accepted IT policy to maintain and improve further qualities. Besides, they should care about extension of educational services customized to students. Such service is proposed in this study is to include the online visa processing for international students and online publication payments. Though in many cases university provides online services via portal but it is not entirely online rather the hard copies (for research assistenceship, scholarships application) need to submit physically at the end which could be automated easily. However, technology and infrastructure factors did not find relevance to the satisfaction of the study indicates a scope for enhancing supporting facilities especially the bandwidth of internet (Wi-Fi) which is responsible for the slow operations of web portal. Besides, the result

of the study will contribute to the existing literature by filling gaps of structural equation modeling of factor of web portal satisfaction.

The study was limited to only a particular university (UKM) in Malaysia which can be extended with the composition of few universities around with greater sample size. The methodology here used for data analysis is PLS-SEM which could be replaced by Covariance based structural equation modeling using AMOS or other related software for the more valid results. The present study only considered the system, information and service quality as the quality dimension which could be diversified with the other service quality dimensions like assurance, empathy, responsiveness etc. The study could also be further investigated with the usability issues of web portal.

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Mohd. Zaher Bin Mohd. Zain (Prof. Madya Dr.)
 Pusat Pengajian Pegurusan
 Fakulti Ekonomi & pengurusan
 Universiti Kebangsaan Malaysia
 46300 UKM Bangi, Selangor
 E-mel : zaher.zain@ukm.edu.my

Syed Shah Alam (Prof. Madya Dr.)
 Pusat Pengajian Pegurusan
 Fakulti Ekonomi & pengurusan
 Universiti Kebangsaan Malaysia
 46300 UKM Bangi, Selangor
 E-mel : shahalam@ukm.edu.my

Md Daud Ismail (Prof. Madya Dr.)
 Pusat Pengajian Pegurusan
 Fakulti Ekonomi & pengurusan
 Universiti Kebangsaan Malaysia
 46300 UKM Bangi, Selangor
 E-mel : mddaud@ukm.edu.my

Mohd Helmi Ali (Dr.)
 Pusat Pengajian Pegurusan
 Fakulti Ekonomi & pengurusan
 Universiti Kebangsaan Malaysia
 46300 UKM Bangi, Selangor
 E-mel : mohdhelmiali@ukm.edu.my