Assessing Digital Library Effectiveness of Selected Iranian Universities

[1*]Ismail Samadi, [2]Mohamad Noorman Masrek

**[1]Faculty of Information Management
University of Tehran, Tehran, Iran**

**[2]Faculty of Information Management
Universiti Teknologi MARA
UiTM Selangor
Malaysia**

Abstract
Given that digital libraries (DL) have been implemented in most Iranian universities and academic higher learning institutions, knowledge regarding users' usage behaviour is still very limited. Not much is really known about the extent users; especially students exploit the DL for the purpose of enhancing their performance and productivity. Similarly, little is really known about the factors that shape Iranian students' DL usage behavior from users' lenses. To this effect, this study is aimed to investigate the usage behavior of users in a DL environment in selected Iranian universities. In addition, it is also aimed at investigating the determinants of DL usage behavior. The study used the survey research methodology and questionnaire as the tool for collecting data. A total of 750 valid responses was analyzed to test the developed hypotheses and the findings suggest that information quality, systems quality and service quality are significant predictor of DL usage. In addition, DL usage was found to have significant impact on personal sense of accomplishment, satisfaction and talks productivity. The contribution of the study can viewed from both theoretical and practical perspectives. From the theoretical viewpoint, it has developed an empirical based framework depicting the determinants and impacts of DL use. From the practical viewpoint, the developed instrument can be used to gauge the performance of the DL.

Keywords
Digital library, information systems, assessment, impact

1. INTRODUCTION

A digital library (DL) "is a particular kind of information system and consists of a set of components, typically a collection (or collections), a computer system offering diverse services on the collection (a technical infrastructure), people, and the environment (or usage), for which the system is built" (Fuhr et al., 2006). Today, digital library (DL) adoption among Iranian universities and academic higher learning institutions has been very common. It is no longer considered as a lavish technological investment, but rather treated as technological need and necessity crucial to the survival of the university. Various studies have revealed that universities and academic higher learning institutions have benefitted from the installation of the digital libraries (e.g. Chang, 2013; Lwoga, 2013). Of particular interest is, the benefit or impact that the DL has had on users as a result of its use.

In an academic environment, DL usage is purely volitional or optional. Innovative users would effectively use the DL for some specific reasons and objectives, while others may simply ignore it. This situation simply suggests that there are some determining factors that shape the usage behavior of the users. Also, as the DL is being used, the impact differs across users; implying that the manner and nature of the usage could be the predicting factors. Theories and models such as Theory of Reasoned Action or TRA (Fishbein & Ajzen, 1975), Theory of Planned Behavior or TPB

(Ajzen, 1991), Technology Acceptance Model or TAM (Davis, 1989) and Diffusion of Innovations or DOI (Rogers, 1983; 1995) suggest that individual behavior is subject to some predictors such as individual (i.e. user) factors, organizational factors or innovation factors. Models such as an Information Systems Success Model or ISSM (DeLone & McLean, 1992) and The Technology to Performance Chain Model or TPCM (Goodhue & Thompson, 1995) also suggests that individual impact is subject to a degree of usage behavior.

Given that DLs have been implemented in most Iranian universities and academic higher learning institutions, knowledge regarding users' usage behavior is still very limited. Not much is really known about the extent users, especially students exploit the DL for the purpose of enhancing their performance and productivity. Similarly, little is really known about the factors that shape Iranian students' DL usage behavior from users' lenses. To this effect, this study is aimed to investigate the usage behavior of users in a DL environment in selected Iranian universities. In addition, it is also aimed at investigating the determinants of DL usage behavior. Finally, this study also intends to investigate the impact of DL usage behavior among users.

2. THEORETICAL FRAMEWORK

Figure 1 presents the theoretical framework used in the study. The relationship between technological factors and DL used is based on Theory of Reasoned Action or TRA (Fishbein and Ajzen, 1975), Theory of Planned Behaviour or TPB (Ajzen, 1991), Technology Acceptance Model (Davis, 1989), Diffusion of Innovation (Rogers, 1995), and Perceived Characteristics of Innovations or PCI (Moore & Benbasat, 1991). The essence of the theories is that attitudinal belief about the innovations will affect user behavior i.e. innovation use. The attitudinal belief is operationalized differently by researchers. For instance, TAM and TAM 2 used perceived usefulness and perceived ease of use; UTAUT used performance expectancy and performance expectancy; DOI used relative advantage, trialability, compatibility, complexity and observaiblity; PCI used ease of use, image, results demonstrability, visibility, traiability, compatibility, relative advantage, and voluntariness. Besides the aforesaid theories, models by Trice & Treacy (1998), Delone & Mclean (2003), Ali & Money (2005), Jeyaraj et al. (2006), Masrek (2008), Abdul Rahman (2012) and Pembee (2014) had empirically showed the connection between innovation characteristics and innovation use behavior.

Instead of using all the innovation characteristics, the researcher only focused on three, namely, information quality, systems quality and service quality. The reasons for choosing these three constructs is because previous studies on DL context had consistently focused on these three (e.g. Masrek et al., 2010; Abdul Rahman, 2012; Pembee, 2014; Chen & Smith, 2015; and Masrek & Gaskin, 2016). Following Al-Mamary (2014) these three variables is named as technological factors in this study. The relationship between DL use and individual performance is based on Delone & Mclean (2003); Ali & Money (2005), and Masrek (2008). Delone & Mclean (2003) argued that the outcome of IS use should improve user performance and increase user satisfaction. Delone & Mclean (2003) used the term net benefits and explained that it can be operationalized in different ways such as work performance or productivity. Masrek (2008) operationalized the net benefit as comprising three dimensions which are task innovation, task productivity and personal sense of accomplishment.
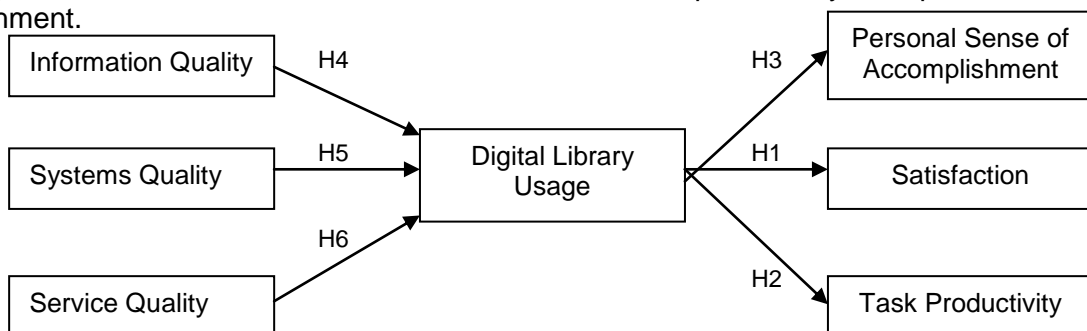

Figure 1 Theoretical Framework of the Study

2.1 User Satisfaction

As pointed by Delone & Mclean (2002), the outcome of using systems is satisfied users. However, it still depends on the experience of using. The feeling of satisfaction will normally develop when users' expectations is fulfilled. In contrast, when their expectations are not met, users will be dissatisfied. In the DL environment, users' expectation are very much related to their information needs. Especially for postgraduate students, they expect that the DL is equipped with latest and comprehensive online databases. Kiran & Diljit (2012) when assessing web DL, indicated that the benefits appeared as functional and emotional. As per functional benefits, it is about user satisfaction in fulfilling their information needs, in line with the definition of DL satisfaction by Theng et al. (1999), that is "the feeling of being pleased with the DL in helping to complete the task successfully". Studies by Masrek et al. (2010), Abdul Rahman (2012), Kiran & Diljit (2012), Chang (2013) and Lwoga (2013); Pembee (2014), Chen & Smith (2015) and Masrek & Gaskin (2016) showed the importance of user satisfaction in DL context.

2.2 Task productivity

Task productivity refers to the extent to which the DL improves the students' academic productivity. Apart from embarking on academic research and composing a thesis or dissertation report, postgraduate students are expected to publish their research findings in journals and also conference proceedings. Certain universities have made it compulsory that research publications as one of the prerequisites for graduation. The three participating universities of this study are also not without exception. It it the norm in most universities that the supervisors are expect their postgraduate supervisees to publish as many articles as they could. Not only that, the latest trend of tertiary education today, is the involvement and participation in innovation and invention competition. Many universities around the world are organizing many events on this respect and postgraduate students are highly encouraged to participate. With all these expectations being burdened on the shoulders of the postgraduate students, the role and contribution of the DL is indeed very significant and substantial. This is because, in order to compose a good research article either for a journal or a conference, one has to also do a literature review, and this necessitates the access and use of the DL. Likewise, to come up with innovative research products for innovation and invention competitions, one has to also do a review of the literature which can be found and retrieved from the DL.

2.3 Personal Sense Accomplishment

Personal sense of accomplishment indicates the users' feelings of self-esteem as the results of using the DL. The fluctuating feeling between low and high self-esteem of postgraduate students is normal during their duration of studies. Postgraduate students, just like any other typical human beings have short terms and long term goals. These goals can be a combination of personal and professional in nature. Professional short term goals can be in the form of completing course assignments or completing research articles for publications. Studies have shown the mutual effect between self-esteem and goal achievements (Rahmani, 2011). Low motivation and low self-esteem will normally lead to low productivity and in the context of postgraduate students this can appear in the form of not being able to complete their course assignments. On the opposite side, not being able to achieve one's goals will also affect self esteem and one good example is when failing to fulfill the supervisor's expectations which make the students more upset and dejected. The use of DL would definitely provide solutions to both of the above mentioned cases. Students with low motivations can always search for reading materials in the DL that will heal and boost their moral and self-esteem. In the same light, the students whose course assignments or proposals get rejected by the supervisors can always rectify and improve the quality of their work through the help of additional literature which can be retrieved from the DL. Kiran & Diljit (2012) used the term

emotional benefit in their study on the outcome of DL use. The items used for measuring this is almost identical to the items used in this study for measuring personal sense of accomplishment.

2.4 Digital Library Usage

Burton-Jone & Straub (2006) stated that in the IS field, there is no generally accepted definition of system use. In their study, the authors defined system use as "an individual user's employment of one or more features of a system to perform a task". Their review of past studies concluded that system use can be categorized into (i) systems use measured as the use of information from the system, and (ii) systems use measured as the use of the systems itself. Based on the categorization of Burton-Jone & Straub (2006), it is quite apparent that in the context of DL, it is appropriate to measure use as the use of information from the system. This is because, the DL nature, the concern is more on the content or information. Further, Burton-Jone & Straub (2006), identified three modes of measuring information from the systems: extent of use, nature of use and frequency of use. In this study, the researcher only focused on the extent of use and the nature of use. As discussed in the next chapter these two modes of use were combined into one concept. In other words a formative model was developed instead of a reflective. The reason of doing this was to capture the totality of use by the users.

Delone & Mclean (2002) cautioned that when measuring system use, researchers must consider the extent, nature, quality, and appropriateness of the system use, and thus, assessment should focus on the full functions of system use as its intended purpose. According to March (1991), two types of system use can drive individual performance: exploration and exploitation. Exploration refers to the search for novel or innovative ways of doing things while exploitation refers to routine execution of knowledge. A balance between exploration and exploitation is necessary for long run performance (March 1991). In a DL context, it is quite common for the user not only to explore, but also exploit its rich information resources for various reasons including academic-related or personal-related matters.

Postgraduate students represent the top generation of users of DL. They are individuals who have grown up with access to internet their whole lives, and therefore are very comfortable using information from DL. Therefore, in the age of information postgraduate students prefer to use DL more than traditional printed materials (Lee et al., 2012). Among different DL, postgraduate students prefer to use easily accessible web sources via search engines rather than library sources (Haglund & Olsson, 2008; Selwyn, 2008; Kim & Sin, 2011; Joo & Choi, 2015). However, those easily accessible web sources are not necessarily credible and reliable. Previous studies claimed that the resources provided by academic digital libraries are more credible and accurate than easily accessible web information (Rieh & Hilligoss, 2007; Lee et al., 2012). Although postgraduate students perceive DL to be more reliable, they still prefer to use search engines to quickly find information needed for completing their class work (Joo & Choi, 2015). To encourage postgraduate students to use more reliable DL resources, it is imperative to understand the underlying reasons of their selection of DL resources. Understanding of the factors associated with the selection of DL resources is critical to come up with strategies to increase the library resource use by postgraduate students, who are a significant segment of user groups in academic DL. In this study, DL resources refer to library collections and materials provided in a digital format accessible remotely through the web, such as e-books, electronic journal articles, online magazines, theses and dissertations, course reserves, and digital archives. Based on the above justification, the researchers argue that DL use will affect individual performance and the following hypotheses are put forward:

- *H1: DL use significantly predicts user satisfaction*
- *H2: DL use significantly predicts with task productivity*
- *H3: DL use significantly predicts a personal sense of accomplishment*

2.5 Information Quality

According to Balog (2011), information quality is the users' perception of a DL's information which is provided to support the information needs. Models by Delone & Mclean (2003) and Masrek et al (2008) showed that information quality is a significant predictor of IS use. In the context of DL, *Masrek et al.* (2010), Chang (2013), Lwoga (2013); Masrek & Gaskin (2016) have shown that information quality is a crucial determinant users' satisfaction with the DL. Masrek & Gaskin (2016) stated that users will not be satisfied with the DL in the absence of information that are accurate, timely, current, precise, complete, concise and relevant, hence, providing quality information in the DL is very crucial in the interest of the users. The authors also stated that if the information displayed on the DL is not updated regularly, the digital resources (databases) subscribed by the library will be underutilized. Pembee (2014) found that information quality was a significant predictor of library information systems use measured in terms of frequency of use, purpose of use and benefits of use. Drawing upon this, the researcher also argues that information quality will significantly affect DL use. Accordingly, the following hypothesis is put forward:

- *H4: Information quality significantly predicts DL use.*

2.6 Systems Quality

In the DL context, systems quality is concerned with the users' perception of a DL's performance in retrieving and delivering information (Balog, 2011). Within the domain of IS research, systems quality was found to be crucial in determining IS use. IS success modeled by Delone & Mclean (2003) also suggest that systems quality is a significant predictor of IS use. The studies are Trice & Treacy (1998), Ali & Money (2005) and Masrek et al. (2008). Trice & Teacy (1998) found that the system quality characteristics that would affect IS use are response time, accuracy of output, stability of the systems, security of the systems and presentation format. Masrek & Gaskin (2016) stated that the critical attributes of measuring systems quality of DLs are availability, reliability, effectiveness and efficiency. Availability and reliability means that the DL should allow access to the systems at remote locations, providing access to content anytime and anywhere (Masrek & Gaskin, 2016). In other words, the DL should be dependable and technically available over time. Effectiveness is concerned with the accuracy and completeness of the information obtained by the users when using the DL for information seeking (Masrek & Gaskin, 2016). Efficiency relates to the amount of effort spent in relation to achieving their information seeking goals (Masrek & Gaskin, 2016). Nontheless, following Trice & Treacy (1998), Delone & Mclean (2003), Ali & Money (2005) and Masrek et al. (2008) this study expects that systems quality will be a significant predictor of DL use. To this effect, it is hypothesized that:

- *H5: Systems quality significantly predicts DL use.*

2.7 Service Quality

For any service provider, such as library, offering quality service that meets the users demand and expectations should always be the first priority. The DL is also not without exception. Because of the importance of service quality, IS Success Model (Delone & Mclean, 1992) also includes this construct in its updated version. Many studies had examined service quality in a web based environment such as Baraka et al. (2013), Bossen et al. (2013), Roky & Al-Mariouh (2015) and Hsu et al. (2015). In the domain of DL studies, service quality was also examined by Masrek et al. (2010), Abdul Rahman (2012) Kiran & Diljit (2012), Chang (2013) and Lwoga (2013), Pembee (2014), Chen & Smith (2015) and Masrek & Gaskin (2016). Most of these studies based their work on the model by Delone & Mclean (2003) but examined the effect of service quality on user satisfaction and not DL use. Following the findings of Baraka et al. (2013), Bossen et al. (2013), Roky & Al-Mariouh (2015) and Hsu et al. (2015), though not in the DL, the researchers still argue that their findings would be also applicable in DL environment. Therefore, it is hypothesized that:

- *H6: Systems quality significantly predicts DL use.*

3. RESEARCH METHODOLOGY

In this study, the survey research methodology was adopted due to its suitability in answering the research questions and achieving the research objectives. The unit of analysis is individual, i.e. postgraduate students who used the DL in their respective universities. After considering the nature of the study, combined with the capacity and resources of the researcher, the appropriate time horizon for data collection was the cross sectional. With regards to the data collection, this study used the questionnaire that was developed through detail processes involving pre-testing and pilot testing. Following Baker (2003), this study identified several experts and prospective respondents to engage in the pre-testing exercise. For the purpose of doing the pilot testing, the questionnaire was self administered to 40 postgraduate students from the three participating universities. The results of the pilot test as shown in Table 1 suggest that the instrument used in the study is highly reliable.

Table 1 Results of Pilot test.

Construct	Cronbach Alpha
DL Usage	0.921
Information quality	0.825
Systems quality	0.911
Service quality	0.880
Task Productivity	0.897
Personal Sense of Accomplishment	0.909
User Satisfaction	0.789

The population of this study consisted of postgraduate students from three Iranian universities, namely University of Tehran, Tehran University of Medical Science and Sharif University of Technology. The postgraduate students were chosen because the nature of their learning process requires them to engage heavily with the DL. As compared to undergraduate students, the postgraduate students are required to do academic research and publish their research work either in journals or conference proceedings. In the process, they will rely heavily on the DL for obtaining academic literature for supporting their research activities. The three universities were chosen instead of other universities because of the comprehensiveness of their DL. As compared to other DL of other universities in Iran, the DL of these universities subscribed more on-line databases such as IEEE Explore, Emerald, ScienceDirect, ACM and etc. In addition, the DL also provides online services such as online booking, online chat with librarians, etc. The maintenance of these DL is also commendable because the information is regularly updated and the DL is also up and running 24 x 7. All these features matched with the developed framework which will look into the aspects of information quality, system quality and service quality. As of 1st January 2013, the total registered postgraduate students in these three universities were: 18360 for University of Tehran, 7100 for Tehran University of Medical Science and 4726 for Sharif University of Technology. If the sample size were to be counted based on the population size, the recommended sample size number for should be about 209 (Bartlett et al., 2001). To achieve the target sample size, the total number of questionnaires distributed was 600 for University of Tehran (UT), 550 for Tehran University of Medical Science, 550 for Sharif University of Technology. The researcher himself with the help of 10 research assistants distributed the questionnaire in the library of the respective universities. The duration of the data collection was set to one month only so as to avoid variation of responses since the DL is constantly updated.

4. FINDINGS

4.1 Response Rate

Based on 1700 questionnaires distributed to the three universities, a total of 1040 or 60.43% were returned (Table 2) University of Tehran has a response rate of 72%, while Tehran University of Medical Scinece has a response rate of 58.5%. The lowest response rate is from Sharif University of Technology (52.%).

Table 2 Response rate.

University	Total Distributed	Total Returned		Total Usable	
	No	No	%	No	%
University of Tehran	600	432	72.00	385	54.67
Tehran University of Medical Science	550	322	58.5	286	53.50
Sharif University of Technology	550	286	52.00	265	48.67
Total	1700	1040	61.17	936	51.29

4.2 Assessment Of Common Method Bias

The results of Harman's single factor test indicate that for a constraint single factor, the accumulated variance is 29.79%, far below the cutoff value of 50%. This finding implies that the data is not experiencing the problem of common method bias.

4.3   Demographic Profiles

As shown in Table 3, a total of 750 respondents involved in this study and out of this number, 496 or 61.1% are males while the remaining are females (33.9%). With regards to digital library experience as shown in Figure 5.5, the majority indicated they have been using digital library for about two years (34.9%). The rest have indicated to have been using the DL for about three years (25.6%), one year (9.2%), four years (14%), and five years (16.3%). As for the level of education pursued, 294 equivalent to 39.2% indicated Phd while the remaining 456 equivalent to 60.8% marked Masters.

Table 3 Demographic profiles of respondents.

		Frequency	Percentage
Gender	1=Male	496	61.1
	2=Female	254	33.9
Digital Library Experience	1	69	9.2
	2	262	34.9
	3	192	25.6
	4	105	14.0
	5	122	16.3
Education	PhD	294	39.2
	Masters	456	60.8

4.4 Measurement Model

In this study, Compositite Reliability (CR), Average Variance Extratced (AVE) and Cronbach's Alpha were assessed to address the convergent validity of measures. The results as shown in Table 5 indicate that all the AVE surpassed the recommended value of 0.5, while the Cronbach's Alpha exceed the recommended value of 0.7.

Table 4 Assessment of Convergent Validity.

	AVE	CR	Cronbach's Alpha
DL Usage	0.670	0.890	0.837
Information Quality	0.627	0.909	0.882
Satisfaction	0.789	0.937	0.911
Sense of Accomplishment	0.726	0.930	0.905
Service Quality	0.692	0.931	0.911
System Quality	0.548	0.879	0.837
Task Productivity	0.734	0.932	0.909

As illustrated in Table 5, discriminant validity can be assumed because the square root of the AVE is greater than the correlation value among other constructs (Note: The square root of AVE are italicized).

Table 5 Assessment of Discriminant Validity.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
[1] DL Usage	*0.819*						
[2] Information Quality	0.349	*0.792*					
[3] Satisfaction	0.320	0.528	*0.888*				
[4] Sense of Accomplishment	0.298	0.521	0.740	*0.852*			
[5] Service Quality	0.350	0.579	0.538	0.542	0.832		
[6] System Quality	0.327	0.465	0.577	0.522	0.667	*0.740*	
Task Productivity	0.334	0.579	0.654	0.753	0.536	0.474	*0.857*

4.4   Structural Model

As shown in Table 6 and Figure 2, all the hypothesized paths are significant as the t value is greater than 1.645. For a substantial model, Cohen (1988) suggests that R^2 should be about 0.35 or greater, while Falk & Miller (1992) recommended 0.10 or above. In this study, the R^2 is 0.165 for DL Usage, 0.102 for satisfaction and 0.089 for a personal sense of accomplishment and 0.111 for task productivity. The values suggest that, except for personal sense of accomplishment, the estimated model is acceptably substantial.

Table 6 Path Coefficient.

|	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
DL Usage -> Satisfaction	0.320	0.323	0.03	10.616	0.00
DL Usage -> Sense of Accomplishment	0.298	0.302	0.032	9.314	0.00
DL Usage -> Task Productivity	0.334	0.338	0.033	9.968	0.00
Information Quality -> DL Usage	0.203	0.203	0.040	5.071	0.00
Service Quality -> DL Usage	0.140	0.140	0.058	2.397	0.017
System Quality -> DL Usage	0.140	0.145	0.054	2.605	0.009
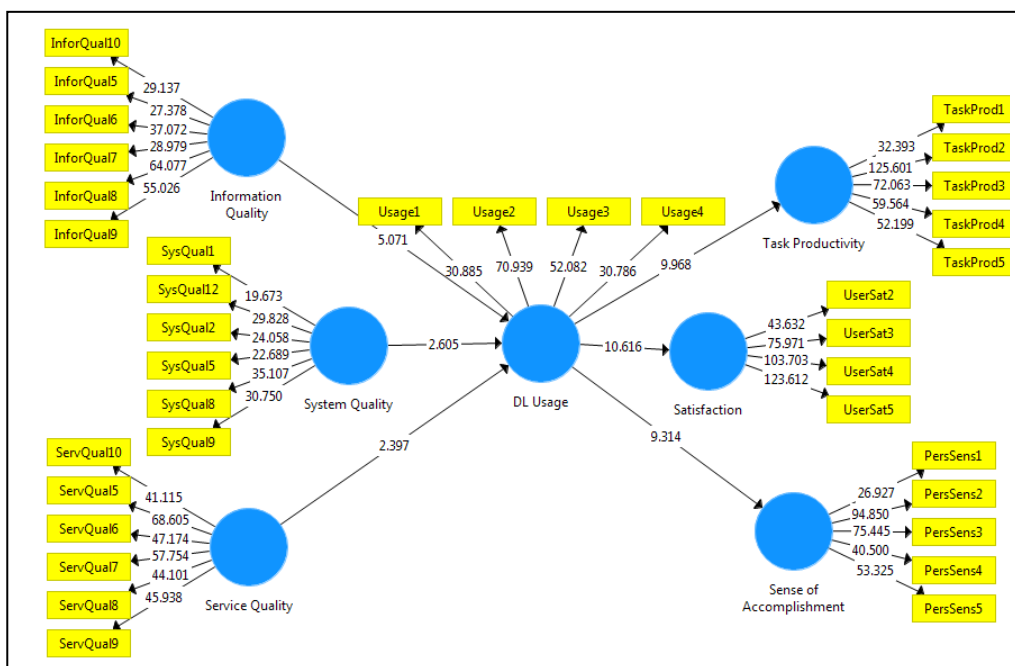
Figure 2 Structural Model

5.   DISCUSSION

The findings further signify the importance of information quality, systems quality and service quality in promoting DL use among postgraduate students. Among the critical information characteristics that would shape use behavior are relevant and appropriateness of format. Users in a DL have diversed information needs. Their information needs are normally driven by their academic courses taken by them. Apart from that, the users also have their personal information needs that emerge from their self-interest and not related to the academic courses. An effective DL should provide relevant information sources that may fulfill users' needs. Relevant information means it is pertinent and meaningful to the user. Borlund (2003) stated that the concept of relevance is acknowledged as the fundamental issue and of central concern to the functioning of an information retrieval system. Kagolovsky & Mohr (2001) described relevant information in the context of information retrieval can be categorized into topical relevance and user-centered relevance. Topical relevance is objective and mainly concerned with terminology while user-centered relevance is subjective to the user. In a DL environment, providing a topical menu or options is an example of how relevant information can be presented to the users.

Digital information or popularly known as digital objects can appear in various format such as audio, video, images or visual graphics. Through the digitization process, the traditional library materials are converted to the electronic format where they can be stored and retrieved in the DL. The source material that is normally digitized include project reports, staff publications, working papers, theses and dissertation. These materials are highly needed by most postgraduate students for supporting their learning process. Nonetheless, given the importance of appropriate format, as indicated by the respondent of this study, the DL of these three universities must be constantly updated so as to ensure that to format of digital information provided to the users are always relevant and usable.

In terms of systems quality, among the important characteristics that would shape user behavior are easy navigation, understandable terminologies and well-organized help functions. This finding is quite consistent with that of Xie (2008). According to Xie (2008), navigation is related to overall interface design. His study found that navigation was rated third most important factor of the overall

assessment of the DL user interface. Masrek & Gaskin (2016) explained that if the navigation of the DL is "difficult and complicated, then the usage will be impacted and non-technologist will not be enthused to use the DL". Easy navigation would normally translate into repeated use of the DL (Xie, 2008). In contrast, poor navigation will result to short engagement by the user. *This is because* users are not able to find what they are looking for and thus frustrating the students. When this happens, users will lose trust and lead to total abandonment of the DL.

Understandable terminologies is another systems quality characteristic, that affect DL use behavior as found in this study. This finding is quite comparable with that of information quality discussed above and also by Abdul Rahman (2012) who found that the problems faced by postgraduate students when using the DL were (i) the instructions used in the DL were too complicated and (ii) there were too many jargons used in the DL. Jargon, acronyms and technical terminologies will give the impression that the DL website is written for specific experts rather than for everybody. This would cause a perception that the DL website is not accessible and inevitably leads to users to seek information elsewhere.

Another important system characteristics that have a bearing on DL use as perceived by respondents of the study is well organized help functions. The importance of user documentation or user manual of a computer based information systems are well documented in the literature. The availability of help function will provide immediate guidance in case when they are confronted with problems in using the DL. One of the popular approaches of providing well organized help function is through the use of Frequently Asked Questions (FAQ). As the name implies, it is a type of dedicated web page that lists questions frequently asked by the DL users, usually about different aspects of the DL website or its services. The benefit of having FAQ is that it will reduce the amount of inquiries received by the reference librarian. Users who are desperate for answers will find them almost immediately

Among the service quality criteria that shaped DL use as found in the study are responsiveness, dependability and instill confidence. In service quality studies, responsiveness is usually defined as willingness to help and respond to customer needs. When applied in DL context, it is about the ability of the DL to respond to a user request or inquiries. Among the services embedded in the DL include reference services in the form of web chat or emails. Through this service, users would normally request the librarians to retrieve materials that they could not access. The librarian will normally respond to the request of the user through the inter library loan service or ILL. Masrek & Gaskin (2016) explained that the ILL service locates needed materials by borrowing or obtaining the materials from other libraries or institutions inside or outside the country. Naylor & Wolfe (2008) discovered that library users were very satisfied when internet based ILL with web interface was introduced by Wichita State University library. This is because the facility had further reduced the amount of waiting for getting the needed materials. Sohail & Raza (2012) elaborated the meaning of responsiveness in the DL context as checking in new journals and newspapers punctually, calling back a patron who has telephoned with a reference question immediately, minimizing computer response time and re-shelving books promptly and minimizing rotate time for inter library loans. Essentially, the ability of the DL to promptly respond to a user request or demands will increase user satisfaction and result users to continue using the DL.

In the context of service quality studies, dependability is identical to reliability and is defined as the ability to perform service dependably and accurately. Kiran & Diljit (2012) explained that reliability or dependability in the context of DL is (i) online document delivery requests are dealt with in the promised time, (ii) online interlibrary loan requests are dealt with in the promised time, and (iii) materials listed in OPAC can surely be found at the library. Sohail & Raza (2012) mentioned reliability of of the DL services include giving accurate answers to reference questions, keeping records consistent with actual holdings / status and computer databases up and running and making sure that overdue notices and fine notices are accurate.

Another service quality criteria that predicts user to use DL is the ability of the service in instilling confidence, normally termed as assurance. Zha et al (2014) noted that assurance reflects the knowledge and ability of the DL service team to instill confidence into users. One approach to instill confidence through the DL is by having personalized services. The advantage of having personalized services is that users are likely to frequently visit their favorite databases subscribed by the DL (Kim & Abbas, 2010).

These findings are consistent with the previous studies, discussed in Chapter Three (i.e. Delone & Mclean, 2003; Ali & Money, 2005; and Masrek 2008). It provides an additional empirical support and further strengthens the IS Success Model (Delone & Mclean, 2003). Given the findings, it is apparent that DL has huge and significant roles in promoting postgraduate performance, which is not only from the academic perspective but also personal self- development. Postgraduate students should be encouraged to intensify and fully use the DL, so as to increase their academic performance and achieving their personal goals by means of information. As shown through the items in the construct of the extent of DL use, the students should fully explore and exploit all the functions and features of the DL. Being selective or merely using several functions or features of the DL, will not guarantee that their information needs can be fulfilled, which in turn could affect their task innovation, task productivity, personal sense of accomplishment and personal satisfaction. As in the construct of the nature DL use, the items used are attuned or geared towards the purpose of using the DL.

As a postgraduate student, the reading should focus more on research, mainly from journals, conference proceedings and thesis reports. By spending more time reading of such materials, their intellectual level will be increased. Other related skills such as analytical and innovativeness will also improve. Studies have shown that, the lack of reading is one of the main reasons why students are not performing academically (Issa et al. 2012). Unlike the undergraduate studies where doing academic research and publishing the research findings is not a primary concern, the postgraduate students are expected to embark on academic research that will result in the creation of new knowledge. By means of the DL, they can retrieve empirical research articles which will be helpful for them in identifying a research topic and doing the research itself.

6. CONCLUSION

Drawing upon the findings of the study, several recommendations are identified. The authorities of the libraries of the participating universities should consider implementing the following so as to increase or intensify the amount of DL use among users, in particular the postgraduate students. The recommendation are (i) periodic Assessment of the DL Performance (ii) user training and (iii) promotional campaigns.

Dobreva et al. (2012) explained that "research and analysis of users is essential to fine-tune the content and approach of DL to the diverging requirements and expectations of incredibly varied communities and to ensure libraries are effective, accessible and sustainable in the long term". Following the advice of Dobreva et al. (2012), it is therefore crucial that the performance of the DL is assessed periodically in terms of its information quality, systems quality and service quality. User study in the form of survey (i.e. using questionnaire), focus groups and interviews should be carried out from time to time. The findings of such studies will inform the authorities on the aspect that need attention for improvements. While the use of the survey is quite common and mostly adopted, qualitative studies in the form of focus groups or case study will provide a more detailed feedback. Rich information that goes beyond numbers will provide a different perspective on how the DL should be improved.

Given that the first point of interaction between the user and the DL is through the DL homepage, studies that focus on its usability and accessibility is deemed crucial. Besides engaging the students as participants, the expert should also be involved to perform a heuristic evaluation. The results of

the studies will provide the necessary inputs for improvising the quality of the DL homepage. Kinns & Blandford (2000) mentioned that the user studies for DL should not only focus of the aspects of interface, but also on the activity of the users when using DL which include searching, browsing, working, reading and writing. To this effect, quasi experimental research design would be the best choice that can be adopted by the library authorities.

One of the key factors to the success of any computer based information systems is user training. Without user training, systems will not be fully utilized or totally being abandoned. Irrespective whether the systems are very sophisticated or user-friendly, user training is still necessary. The situation for DL is also similar. Once implementation has taken place, the user has to be trained on how to use the DL. The training has to be on-going in line with the continuous maintenance of the DL itself. Every time the DL undergoes major updating, user training has to be conducted.

Implementing DL requires a huge amount of money. The on-line databases that are embedded together with the DL such as ScienceDirect, IEEE, Taylor & Francis, Sage Publication, and Emerald requires an annual subscription fee. The hardwares for storing digitized information are equally expensive and require proper maintenance. With all the cost that has to be spent, the DL will definitely a total waste it it is underutilized. One of the ways to increase the intensity of use is to intensify the promotion activities or campaign.

By doing lots of campaigns, the users, especially the students will be aware of the services offered by the DL. These awarenesses, as explained by Bandura (1986) in Social Cognitive Theory will gradually shape a favorable attitude of towards the DL. As shown in this study, as the attitude of the user gets high, his or her use behavior will also increase sparingly. Just as the maintenance activities of the awareness campaign should be done continuously.

Every academic research is bound to have limitations. This study is not without exception. In this study, two groups of antecedent were examined, technological factors and individual factors. The technological factors which are actually the innovation characteristics consists of three dimensions, information quality, systems quality and service quality. As identified by Jeyaraj et al (2006) there are many other technological characteristics besides the three aforesaid qualities. Future studies should consider extending the framework by including other technological characteristics such as task-fit, results demonstrability, trialability, relative advantage etc.

Another group of predictors excluded from this study was the organizational factors. As shown by Masrek (2008), organizational factors were also influential in determining the usage level at the user level perspective. Among the organizational factors that can be examined are resource allocation, top management support, and user support. Combining the organizational factors with technological factors and individual factors will provide a more holistic understanding of the factors that influence DL use behavior.

Although, the study collected data from postgraduate students, the situation of DL use among undergraduate students is still unknown. In the same light, the use among faculty members of academicians of the university is also unknown as it it beyond the scope of this study. Given its limitation, future studies should consider extending the breadth of its population by covering undergraduate students and faculty members. By collecting data from these different groups of users, their usage behavior can be compared.

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