Investigating the Predictors of Digital Library Engagement: A Structured Literature Analysis

Mohamad Rahimi Mohamad Rosman
Universiti Teknologi MARA Kelantan, Malaysia
Email: rahimi.rosman@yahoo.com

Mohd Nasir Ismail
Universiti Teknologi MARA Kelantan, Malaysia
Email: nasir733@uitm.edu.my

Mohamad Noorman Masrek
Universiti Teknologi MARA Shah Alam, Malaysia
Email: mnoorman@uitm.edu.my

Digital library is no longer considered a lavish use of technology but rather a mandatory need for users, especially postgraduate students. Each year, public and academic libraries invest a lot of money to subscribe to various digital resources, such as online databases, electronic books, electronic journals, and electronic magazines. However, many of these organizations have difficulties justifying their digital library investment due to lack of usage among the users. This underutilization of digital libraries is credited to the lack of digital library engagement among the users. Digital library engagement is defined as a deep and long-time use of digital library resources. Some researchers equate engagement to usage; however, engagement goes beyond the generic term of usage and may include multiple dimensions such as affective, cognitive, and behavioral. Previous works on the digital library have mostly focused on the generic definition of use instead of engagement. Researchers believe that the lack of study on digital library engagement causes the underutilization of digital libraries' resources. Despite the rising interest in the digital library, no research has studied digital library engagement predictors. Therefore, this paper aims to discuss the predictors of digital library engagement at the conceptual level. A structured literature review methodology was adopted; a total of 135 pieces of literature were included in this study. In total, 30 predictors of digital library engagement were identified, and these predictors were grouped into four factors:

https://doi.org/10.47657/1586

technological, individual, organizational, and contextual factors. Grounded on the previous literature on the digital library, the contributions of this paper are as follows: first, this paper identified a list of predictors of digital library engagement from past digital library literature, second, this paper categorized the predictors into four factors, and finally, this paper proposed a conceptual model for further validation of the predictors.

Keywords: Predictors, Digital library, Digital library engagement, Usage, Under utilization.

INTRODUCTION

A digital library is a collection of organized digital documents, objects, and services (Alhaji, 2009). It includes online databases, electronic journals, images, text, videos, and sounds. Researchers argue that DL provides effective ways to deliver services to the readers (Xu & Du, 2018) using organized digitalized information (Lynch, 1994). Digital libraries (DL) have grown significantly over the past few decades. The usage of DL is considered crucial in the face of industrial revolution 4.0 (IR4). The aftermath of IR4 led to digital disruptions, blurring the boundaries between digital and the real world (BRICS Development Working Group, 2016). In the context of universities, the necessity of having DL has become mandatory. DL is no longer considered a lavish technology (Samadi, Masrek, & Yatin, 2014) but as a crucial need, especially in students' context (Chiong, Kiing, Ler, Lim, & Wong, 2016; Masrek & Samadi, 2017).

Linking DL to the concept of Information System (IS), it is a well-known fact that the DL architecture was built upon high-end information system processing (Fox, 2002). According to Khan and Bhatti (2017), the new concept of DL integrates several aspects of conventional library systems, including library resources, library services, and a new specialized skill among Library and Information Science (LIS) practitioners. Moreover, libraries digitize information because of three essential reasons, (1) provide access to material via web, (2) increase access to collection/material/files, and (3) preserve material of important value (Rafiq & Ameen, 2013). The evolution of DL started in 1945 through Bush's vague idea, which mentioned that the next generation of library system would depend on the individual use of private files and library, which can store all resources within a complex integrated system. The DL is considered the next improvement of Online Public Access Catalog (OPAC), one of the LIS practitioners' key technologies.

https://doi.org/10.47657/1586

For the past few decades, DL researchers have attempted to define digital technology in the library. The works of Masrek and Gaskin (2016) and Samadi (2016) claimed that terms such as "digital web library," "electronic library," "library portal," "virtual library," "digital library," and "online library" had been used regularly in previous literature. However, it can be concluded that the term "digital library" or DL is the most popular term and have been used by many DL researchers (Alhaji, 2009; Asad, Masrek, Khalid, & Saima, 2017; Cai & Zheng, 2017; Hamzat & Mabawonku, 2018; Khan & Bhatti, 2017; Masrek & Samadi, 2017; Samadi, 2016; Yamaguchi & Richardson, 2018). Since the inception of DL, there has been extensive research on DL reported in the literature. Yet, there is a need to conduct more research on DL to further strengthen the field (Masrek & Samadi, 2017).

The topic of DL has received considerable attention over the years; however, one major drawback is the lack of DL usage reported by several researchers (Bagudu & Sadiq, 2013; Chiong et al., 2016; Matusiak, 2012; Sahak & Masrek, 2014). Therefore, Masrek and Samadi (2017) suggested a need to redefine the concept of DL usage. In their seminal article, Masrek, and Samadi (2017) introduces the concept of Digital Library Engagement (DLE). Contrary to the conventional definition of usage, DL engagement evaluates the user interaction with the DL more effectively by assessing users on the following four dimensions; focus attention, felt involvement, aesthetic, and novelty. An engaged individual contributes to improved satisfaction and recommends its usage to others (Masrek & Samadi, 2017). However, despite the rising interest in DL, no research to the best of our knowledge has studied the predictors of DL engagement. Therefore, the following research question is posed:

RQ1: What are the predictors of digital library engagement?

The rest of this paper is organized as follows: the next section provides a brief literature review relating to research on DL usage. The predictors identified from the literature are categorized into four factors: technological, individual, organizational, and contextual. Next, the DL engagement predictors' findings are summarized, a conceptual model is proposed, and future directions and further exploration into this topic are discussed. Finally, the paper is concluded, and the limitations of the study are outlined.

https://doi.org/10.47657/1586

LITERATURE REVIEW

Background of the Study

Over the past decades, libraries, archives, and resource centers have had to deal with the uphill task of managing their resources, particularly in terms of structured and unstructured digital resources. Many digital resources were produced in the same period, such as online databases, electronic documents, videos, email, and images. According to Burnett, Clarke, Edwards, and Illsley (2006), users spend up to 30% of their time searching through the organizational repository, for example, the library web portal, online databases, and the Internet.

The interest in DL has been around for the past decades. The foundation of DL was introduced into a clear picture by Licklider in 1965. In his seminal paper, Licklider (1965) suggested that a library needed: (1) distributed processing information system, (2) interaction between human and computer, (3) proper practices of document management, and (4) easy retrieval of library resources. Consequently, Collins (1965) also argued that there was a need for a new perspective of libraries toward new technologies that would change the way people find and access scholarly information. However, it is the idea of Swanson (1964) that led to the development of the Online Public Access Catalog (OPAC). Yet, the information management communities had to wait until the 1990s for the idea to be realized (Su, 1994). The growth of DL was spearheaded by the introduction of the Digital Library Initiative (DLI); several workshops were conducted and research grants were made available, which helped accelerate the rapid growth of DL (Griffin, 2000).

Digital Library Engagement

According to Baroudi, Olson, and Ives (1986) and O'Brien and Toms (2010), user engagement with information systems (IS) is one of the predictors that affect several aspects such as system quality, system success, and improved user satisfaction. Several researchers equated user engagement to usage. However, it can be said that engagement goes beyond the concept of usage and can include multiple dimensions for example, affective, cognitive, and behavioral (O'Brien & Toms, 2010). In their seminal article, Masrek and Samadi (2017) suggested the need for a new concept to replace DL usage by introducing the concept of digital library engagement. DL engagement goes beyond the conventional definition of usage by focusing on several dimensions: focus attention, felt involvement, aesthetic, and

https://doi.org/10.47657/1586

novelty (Masrek, Razali, Ramli, & Andromeda, 2018; Masrek & Samadi, 2017; O'Brien, Cairns, & Hall, 2018; O'Brien & Toms, 2008, 2010).

In this study, DL engagement is defined as deep and long-time use of DL (Mohamad Rahimi Mohamad Rosman, Mohd Nasir Ismail, & Mohamad Noorman Masrek, 2019; Samadi, 2016). It involves identifying users' mental concentration toward the subject (DL) and evaluating the dimensions mentioned above (focus attention, felt involvement, aesthetic, novelty). As found out by Masrek and Samadi (2017), DL engagement encourages an individual to continue using the DL, as well as promoting its usage to their colleagues. DL engagement also ensures information system success (O'Brien & Toms, 2010).

To find support for DL engagement's new concept, this study reviewed the IS and psychology domains' literature. From IS's perspective, user engagement is considered a two-factor variable; user involvement and user participation (Baroudi et al., 1986; Hwang & Thorn, 1999). User involvement is defined as users' mental or psychological state toward the information system and its development process (Hwang & Thorn, 1999). Out of the two, user involvement is considered a stronger predictor of information system usage (Baroudi et al., 1986; Hwang & Thorn, 1999). From a psychological perspective, work engagement is considered a significant predictor of employee performance. An engaged individual (usually one with vigor, dedication, and absorption) will tend to view their job as a pleasing activity rather than a burden (Bakker & Demerouti, 2007a). These workers usually work hard because they feel that they are doing something fun, thus reflecting on their job performance.

Predictors of Digital Library Engagement

In the past two decades, many DL researchers have produced models, frameworks, assessments, and methods for adopting, assessing, evaluating, and accessing DL. However, due to its expensive investment, researchers call for more research and instrument on DL (Masrek & Samadi, 2017). Thong, Hong, and Tam (2002) and Hong, Thong, Wong, and Tam (2002) are considered to be among the earliest works on the DL acceptance and adoption model. Thong et al. (2002) investigated the influence of interface characteristics, organizational context, and individual differences toward DL adoption and use. Adopting Technology Acceptance Model (TAM), the authors found several variables, for instance, interface characteristics and organizational characteristics had a significant positive effect on DL adoption. At the same time, individual differences help the user to

https://doi.org/10.47657/1586

interact with the DL easily. In similar research, Hong et al. (2002) investigated the influence of individual differences and system characteristics on DL usage. They found out that Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) are significant predictors of DL usage.

Extending the works of previous studies, Ramayah and Aafaqi (2004) utilized TAM's theory to investigate the influence of self-efficacy on DL use among university students in Malaysia, with the majority of the respondents being undergraduate students. The authors reported that self-efficacy has a significant positive impact on PEOU when predicting DL usage among university students. In another similar work, Masrek, Jamaludin, and Awang Mukhtar (2010) developed a model for investigating DL effectiveness by focusing on technological factors including information quality, service quality, and systems quality predictors for user satisfaction and specific impact to the individuals. Samadi et al. (2014) extended the study by introducing DL and individual characteristics as an antecedent for DL use and individual performance. They found out that the degree of DL usage influences the individual impacts.

Therefore, based on the previous work and relevant literature on DL, the majority of previous studies are conducted on the individual levels, and few factors are highly noticeable; individual factors (Ali & Money, 2005; Hong et al., 2002; Masrek, Karim, & Hussein, 2007; Park, Roman, Lee, & Chung, 2009; Pembee, 2014; Samadi, 2016; Trice & Treacy, 1988), technological factors (Ali & Money, 2005; Hong et al., 2002; Masrek et al., 2007; Park et al., 2009; Pembee, 2014; Rahman, Jamaludin, & Mahmud, 2011; Samadi, 2016; Trice & Treacy, 1988), organizational factors (Ali & Money, 2005; Masrek, 2008; Masrek et al., 2007), and contextual factors (Bakker, Demerouti, & Sanz-Vergel, 2014; Mohamad Rahimi Mohamad Rosman et al., 2019).

https://doi.org/10.47657/1586

METHODOLOGY

This study adopted the structured literature search of Webster and Watson (2002). According to Webster and Watson (2002), a literature search should be performed in three steps. First, the literature search must start with leading journals in the respective fields. Second, the researcher must perform a backward search to consider relevant literature. Third, the researcher must perform a forward search to identify any literature citing the literature. The following process is illustrated in figure 1.

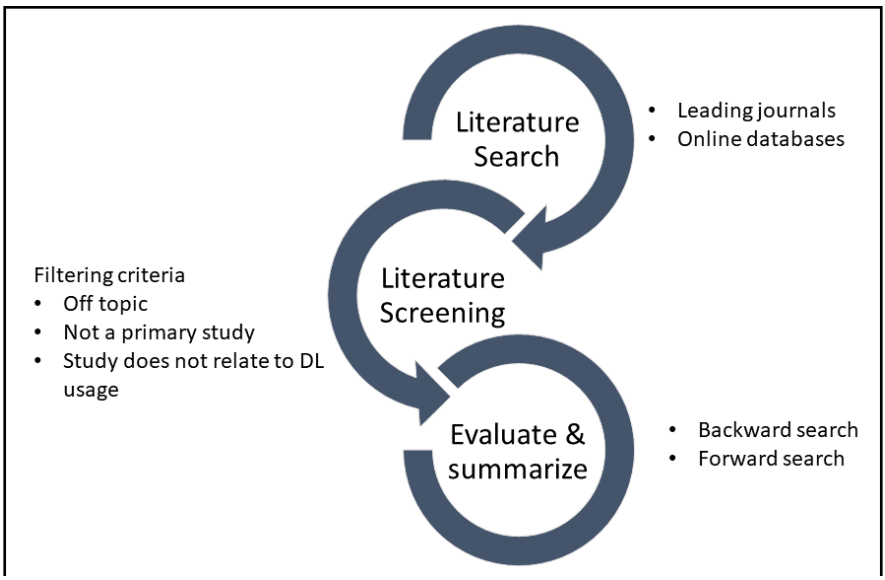

Figure 1. Literature search process

For this study, we performed a three-step procedure of literature search. In the first phase, we searched the relevant literature using top journals on Library and Information Science (LIS) and Information System (IS). The journals considered were Aslib Journal of Information Management, Journal of Librarianship and Information Science, Information and Organization, Library and Information Science Research, International Journal of Information Management, Library and Information Science Research, Information System Research, Journal of Information Technology, European Journal of Information Systems, Scientific Data, Information, Communication and Society, and Journal of Academic Librarianship. The following search engines were also used: IEEE Xplore, Scopus, Emerald, ProQuest, and Science Direct. The keywords used were 'digital library' AND 'use', 'electronic library' AND 'use', 'electronic resources' AND 'use', 'online resources' AND 'use', and 'digital

https://doi.org/10.47657/1586

resources' AND 'use'. We limited the search result to research papers, books, and theses. A total of 512 hits were recorded and exported into a referencing software, EndNote X7. EndNote X7 'Find Duplicates' function was used to remove duplications of title, trimming the total results to 471 literature. We manually rechecked the literature to remove any literature that was not related to DL, trimming the results to 126 papers.

During the second phase, 126 pieces of literature were screened based on the MacDonald, Cairns, Angus, and de Andrade (2013) exclusion criteria: (1) literature that did not relate to DL (off-topic), (2) literature without empirical contribution (not a primary study), and (3) studies that do not relate to DL usage. During the screening process, we skimmed through the literature's title to determine the relevancy of the literature to the topics. Next, we performed a quick analysis of the abstract. As a result, 115 pieces of literature were selected for the third phase.

For the third phase, we followed the qualitative analysis procedure outlined by Glaser and Strauss (1967). First, we skimmed the literature to identify critical issues. Second, we analyzed each literature by focusing on the abstract, research model, discussion, and conclusion. Third, we identified potential variables (predictors) for the development of the conceptual model. To determine whether to consider citing previous literature, backward and forward searches were performed using Thomson Reuters Web of Science and Google Scholar. Finally, 135 papers were found to be relevant to the topic of interest. The subsequent section will discuss the list of predictors of DL engagement.

RESULTS

The result of an extensive systematic literature search showed that 30 predictors were significant for DL engagement. Subsequently, this study also found that the predictors can be categorized into four factors: technological factors, organizational factors, individual factors, and contextual factors.

Technological Factor

The technological factor is the most prominent predictor of DL engagement. Technological factor can be defined as the extent of technology influencing users toward DL engagement. The following table 1 shows the technological predictors of DL engagement:

https://doi.org/10.47657/1586

Table 1

Technological predictors of DL engagement

Factors	Predictor	Citing Literature
Technological	Perceived Usefulness	Masrek and Gaskin (2016), Thong et al. (2002) Hong et al. (2002), Vaidyanathan, Sabbaghi, and Bargellini (2005), Asad and Saima (2016), Dahlan Karia, Asaari, Ramayah, and Lee (2006), Park et al (2009), Jeyaraj, Rottman, and Lacity (2006), Ju and Albertson (2015)
	Perceived Ease of Use	Masrek and Gaskin (2016) , Thong et al. (2002) Hong et al. (2002), Vaidyanathan et al. (2005) Asad and Saima (2016), Nov and Ye (2008), Dahlan et al. (2006), Park et al. (2009), Jeyaraj et al (2006), Ali and Money (2005), Ju and Albertson (2015)
	Systems Quality	Samadi et al. (2014), Xu and Du (2018), Masrek and Gaskin (2016), Thong et al. (2002), Masrek et al. (2010), Vaidyanathan et al. (2005), Asad and Saima (2016), Nov and Ye (2009), Nov and Ye (2008), Pembee (2014)
	Information Quality	Samadi et al. (2014), Xu and Du (2018), Masrek and Gaskin (2016) , Masrek et al. (2010), Asad and Saima (2016), Nov and Ye (2009), Nov and Ye (2008), Rahman et al. (2011), Pembee (2014)
	Service Quality	Samadi et al. (2014), Xu and Du (2018), Masrek and Gaskin (2016), Masrek et al. (2010), Rahman et al. (2011)
	Task Fit	Goodhue, Klein, and March (2000), Goodhue and Thompson (1995), D', D', Masrek et al. (2007), Ali and Money (2005)
	Terminology	Thong et al. (2002), Vaidyanathan et al. (2005) Vaidyanathan et al. (2005), Asad and Saima (2016), Nov and Ye (2009)
	Navigation	Thong et al. (2002), Vaidyanathan et al. (2005) Asad and Saima (2016)

https://doi.org/10.47657/1586

As expected, two important predictors from the Technology Acceptance Model (TAM), which are perceived usefulness and perceived ease of use, were the most used predictors of DL engagement. Similarly, the IS Success Model of DeLone and McLean (1992) was also relevant and widely used by DL researchers as a predictor of DL engagement.

Organizational Factors

Organizational factor contributes to the success of the information system as perceived by the users. In this context, organizational factors can be related to organizations' internal and external sources that encourage DL engagement among the users. The following Table II shows the organizational factors of DL engagement:

Table I

Organizational Predictors of DL engagement

Factors	Predictor	Citing Literature
Organizational	Relevance	Thong et al. (2002), Hong et al. (2002), Ramayah and Aafaqi (2004), Dahlan et al (2006)
	System Accessibility	Thong et al. (2002), Ramayah and Aafaq (2004), Dahlan et al. (2006)
	System Visibility	Thong et al. (2002), Dahlan et al. (2006), Miller and Khera (2010)
	Top Management Support	Masrek et al. (2007), Jeyaraj et al. (2006), Trice and Treacy (1988)
	Subjective Norms	Masrek et al. (2007), Miller and Khera (2010), Jiang, Chen, and Lai (2010), Jeyaraj et al. (2006)
	Technical User Support	Pembee (2014), Masrek et al. (2007)
	Functional Integration	Masrek et al. (2007)

Subjective Norms and Relevance were found as the most prominent organizational predictors from the literature. Other predictors, including System Accessibility, System Visibility, and Top Management Support, were also strong empirical support.

https://doi.org/10.47657/1586

Individual Factors

The individual factor is the extent of individual intrapersonal and interpersonal influence toward human-computer interaction (Hong et al. (2002). It is believed to be the most relevant factor for IS success. The following Table III shows the individual predictors of DL engagement:

Table II

Individual Predictors of DL engagement

Factors	Predictor	Citing Literature
Individual	DL Efficacy	Samadi et al. (2014), Thong et al. (2002), Hong et al. (2002), Ramayah and Aafaqi (2004), Nov and Ye (2009), Nov and Ye (2008), Pembee (2014), Masrek et al. (2007), Miller and Khera (2010), Jeyaraj et al. (2006), Ali and Money (2005)
	Computer Experience	Thong et al. (2002), Park et al. (2009), Jeyaraj et al. (2006), Ali and Money (2005)
	Domain Knowledge	Thong et al. (2002), Hong et al. (2002), Park et al. (2009)
	Attitude towards DL	Masrek et al. (2007), Koohang and Ondracek (2005)
	Personal Innovativeness	Samadi et al. (2014), Masrek et al. (2007)
	Resistance to Change	Nov and Ye (2009), Nov and Ye (2008)
	Computer Anxiety	Nov and Ye (2009), Nov and Ye (2008)
	English Literacy	Asad and Saima (2016), Miller and Khera (2010), Park et al. (2009)

DL Efficacy is found to be the most used predictor in the DL studies. Originating from the IS concept of computer self-efficacy, DL efficacy was a strong predictor of information system success; therefore, it was a worthy inclusion in most DL studies. Moreover, knowledge of the search domain also plays an important part that influences DL engagement. For example, Arshad and Ameen (2018) found out that the lack of knowledge on the domain (i.e. searching technique) prevented users from determining the quality of the information

https://doi.org/10.47657/1586

resources (i.e. e-journals); henceforth, relying on untrusted sources of information resources.

Contextual Factors

Contextual or the environment factor is the least studied factor from the context of DL researchers. There are only a few researches within the DL stream that have included the contextual predictors into their research model to the best of our knowledge. Therefore, some predictors from IS and psychology streams were included in the study to address this limitation. The following Table IV shows the contextual predictors of DL engagement:

Table III

Contextual Predictors of DL engagement

Factors	Predictor	Citing Literature
Contextual	Uncertainty	Chau and Tam (1997), Trice and Treacy (1988)
	Competitive Pressure	Bhattacharya and Wamba (2015), Jeyaraj et al. (2006)
	Institution Pressure	Jeyaraj et al. (2006), Delmas and Toffel (2010)
	Vendor Availability	Kini (2007)
	Task Resources	Airila et al. (2014), Albrecht, Bakker, Gruman, Macey, and Saks (2015), Bakker and Demerouti (2007b), Salanova and Schaufeli (2008), Simbula, Guglielmi, and Schaufeli (2011), Trépanier, Fernet, Austin, Forest, and Vallerand (2014), Xanthopoulou, Bakker, Demerouti, and Schaufeli (2007)
	Task Complexity	Masrek et al. (2007), Bhattacharya and Wamba (2015), Karimi, Somers, and Gupta (2004), Trice and Treacy (1988), Ali and Money (2005)
	Task Demand	Albrecht et al. (2015), Trépanier et al. (2014), Bakker and Demerouti (2007b)

Despite the importance of the contextual factors, DL literature has shown a lack of evidence for such predictors. However, since the concept of engagement has

https://doi.org/10.47657/1586

long existed within other domains such as IS and psychology, this study included some predictors from the respective domains. Task resources were found to be the most prominent predictor, particularly in the domain of IS and psychology. Task complexity was also mostly used by IS researchers in user involvement study, whereby this study currently proposes the IS concept equivalent to the concept of DL engagement. The subsequent section will discuss the proposed conceptual model for future study.

The Conceptual Research Model

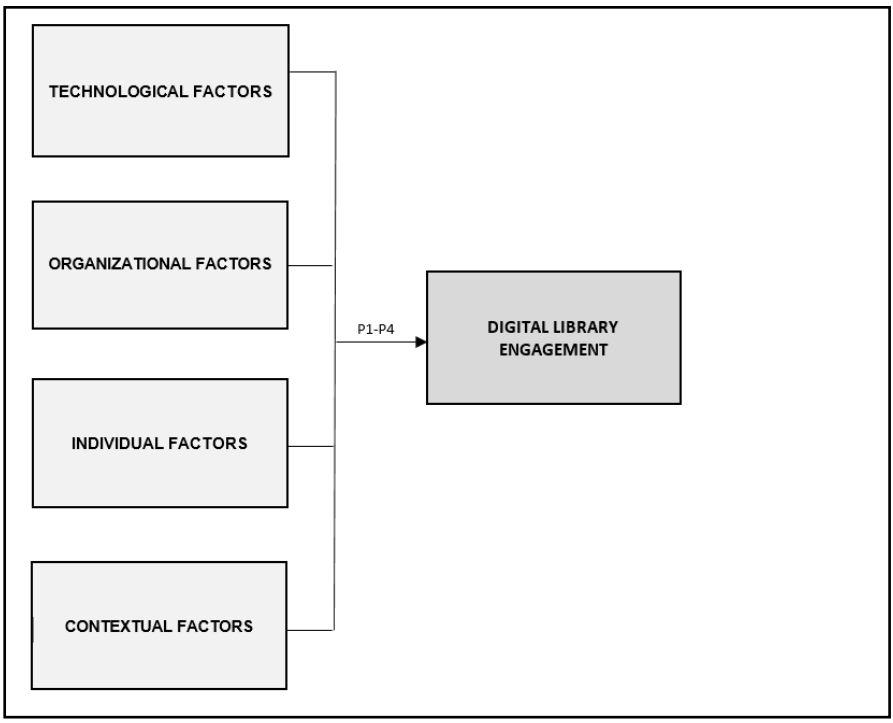

Figure 2. Basic research model

Figure 2 shows the proposed conceptual model for the study. The resultant model consisted of four factors: technological factors, organizational factors, individual factors, and contextual factors. The factors were expected to influence the dependent variable, namely, Digital Library Engagement. The digital library engagement variables were adopted from Masrek and Samadi (2017) studies and O'Brien and Toms (2010); focus attention, aesthetic, novelty, and felt-involvement.

Based on previous literature on DL, these predictors were expected to have a significant and positive relationship with DL engagement. The relationship between

https://doi.org/10.47657/1586

the predictors with DL engagement was based on previous works on DL and theories from LIS, IS, and the psychological domain.

Linking technological factors and digital library engagement is based on Davis (1989) Technology Acceptance Model, Venkatesh, Morris, Davis, and Davis (2003) Unified Theory of Acceptance and Use of Technology (UTAUT), and IS Success Model of DeLone and McLean (1992). The theories posit that an individual's attitude toward behavior (i.e. DL engagement) will affect the behavior's outcome. In this context, TAM operationalized attitude using Perceived Ease of Use and Perceived Usefulness while UTATUT operationalized attitude using Performance Expectancy and Effort Expectancy, whereas IS Success Model operationalized the attitude based on three factors; Information Quality, Systems Quality, and Service Quality. Subsequently, the works of previous authors namely, Samadi et al. (2014), Masrek and Gaskin (2016), Thong et al. (2002), and Ali and Money (2005), also proved that technological factors have a positive relationship with DL engagement.

The relationship between organizational factors and DL engagement is based on the Technology-Organization-Environment (TOE) framework by DePietro, Wiarda, and Fleischer (1990), as well as supported by the previous studies of Jeyaraj et al. (2006) and Masrek (2008). Organizational factors contribute to the success of the information system as perceived by the users.

Linking individual factors and digital library engagement are based on Fishbein and Ajzen (1975) Theory of Reasoned Action (TRA), and Ajzen (1991) Theory of Planned Behavior (TPB). The theories posit that individuals' behaviors (i.e. use of an information system/adoption) are driven by behavioral intention (i.e. DL engagement) wherein the behavioral intention is driven by the attitude toward the behavior, subjective norms, and perceived behavior control. Subsequently, previous models of Samadi et al. (2014), Masrek (2008), Trice and Treacy (1988), Ali and Money (2005), and Jeyaraj et al. (2006) also supported the relationship between individual factors and DL engagement.

In the context of contextual factors, previous theories of Bandura (1986), Social Cognitive Theory (SCT), and T-O-E framework of DePietro et al. (1990) provide the theoretical support of the relationships. The theories posit that when the environment (contextual) and specific behavior (i.e. Dl engagement) interact, it will usually involve the individual perception toward the environment. In turn, the behavior and attitude are modified by the environment. Previous works of Bakker and Demerouti (2007b), DePietro et al. (1990), and Jiang et al. (2010) also supported the relationship between contextual factors and DL engagement.

https://doi.org/10.47657/1586

Therefore, based on the above argument, this study outlined four propositions of the study:

- P1: Technological factor has a significant and positive relationship with DL engagement.
- P2: Organizational factor has a significant and positive relationship with DL engagement.
- P3: Individual factor has a significant and positive relationship with DL engagement.
- P4: Contextual factor has a significant and positive relationship with DL engagement.

DISCUSSION

As stated in the introduction, the study's purpose is twofold; first, to identify the predictors of DL engagement, and second, to propose a conceptual model of DL engagement. To answer the first purpose, a structured literature review was conducted; papers were screened and reviewed. A list of predictors of DL engagement was identified from the LIS, IS, and psychology domain literature. Interestingly, we categorized the predictors into four factors, technological, organizational, individual, and contextual.

Subsequently, to answer the second purpose, a basic research model was proposed. We conceptualized the concept of DL engagement based on the previous works from LIS and e-commerce. A total of four propositions were outlined for future study. However, we did not identify any specific variable selection for each factor, nor did we highlight each variable's importance.

Our research suggests that two problems still linger over DL researchers. First, limited studies have been done on the contextual factors from the perspective of LIS. Due to this area's neglect, this study had to look into other domains to find supporting literature. Second, most DL research conceptualizes the concept of usage quite narrowly, focusing on certain indicators such as cumulative, reliance, diversity, and context, with a lack of focus on the users' psychological and mental perspective. Third, there is a need to identify more DL engagement factors, surpassing the factors that we introduced in this study. One suggestion is to look beyond the LIS perspective, including the political and socio-economic factors.

https://doi.org/10.47657/1586

CONCLUSION

In this study, we performed a structured literature review to search for articles relevant to DL. A total of 30 predictors were identified throughout the process. These predictors were then categorized into four factors: technological, organizational, individual, and contextual factors. The contributions of the paper are as follows. First, we identified a list of predictors for DL engagement from the past literature on DL by adopting the structured literature review methodology. Second, we categorized these predictors into factors: technological, organizational, individual, and contextual. Third, we proposed a basic conceptual framework for future study.

This study will be of interest to several parties, namely, practitioners, academicians, government policymakers, and DL vendors. Practitioners can use the predictors identified in this study to improve DL engagement among their library users. Academicians may use the resultant research model and the predictors to develop the curriculum of LIS further. On the other hand, government policymakers can use the result of the study to prepare the government digital library policy in line with IR4, and at the same time, justify the investment made for the DL initiative. For the DL vendors, the study results can help them improve the effectiveness of their products further.

This study will be limited in several ways. First, we only listed all the predictors of DL engagement. We did not specify the specific selection of variables for each factor. Future studies should develop a proper procedure for the selection of variables for each factor. We suggest an expert review process for further validation of the variable's selection. Second, we only considered four types of factors. Future research may consider other factors, including socio-economic and political factors.

Acknowledgment

We would like to thank the panel of experts involved in the expert review process for this research project. Without their passionate participation and input, the predictors' selection and validation could not have been successfully conducted. Also a big thank to Research Management Centre (RMC) of Universiti Teknologi Mara for their support throughout the research process.

https://doi.org/10.47657/1586

REFERENCES

Airila, A., Hakanen, J. J., Schaufeli, W. B., Luukkonen, R., Punakallio, A., & Lusa, S. (2014). Are job and personal resources associated with work ability 10 years later? The mediating role of work engagement. *Work & Stress, 28*(1), 87-105.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Albrecht, S. L., Bakker, A. B., Gruman, J. A., Macey, W. H., & Saks, A. M. (2015). Employee engagement, human resource management practices and competitive advantage: An integrated approach. *Journal of Organizational Effectiveness: People and Performance, 2*(1), 7-35.

Alhaji, I. U. (2009). Digitization of library resources and the formation of digital libraries: A practical approach. Retrieved from http://www.academia.edu/download/46146706/alhaji_paper.pdf

Ali, A. S. B., & Money, W. H. (2005, 03-06 Jan. 2005). *A Study of Project Management System Acceptance.* Paper presented at the Proceedings of the 38th Annual Hawaii International Conference on System Sciences.

Arshad, A., & Ameen, K. (2018). Academic scientists' scholarly use of information resources in the digital environment: Perceptions and barriers. *Global Knowledge, Memory and Communication, 67*(6/7), 467-483.

Asad, K., Masrek, M. N., Khalid, M., & Saima, Q. (2017). Factors influencing the adoption of digital reference services among the university librarians in Pakistan. *The Electronic Library, 35*(6), 1225-1246. doi:10.1108/EL-05-2016-0112

Asad, K., & Saima, Q. (2016). Understanding research students' behavioural intention in the adoption of digital libraries: A Pakistani perspective. *Library Review, 65*(4/5), 295-319. doi:doi:10.1108/LR-06-2015-0070

Bagudu, A. A., & Sadiq, H. (2013). Students' Perception of Digital Library Services: A Case Study of International Islamic University, Malaysia. *Library Philosophy and Practice (e-journal)*.

Bakker, A. B., & Demerouti, E. (2007a). The job demands-resources model: State of the art. *Journal of Managerial Psychology, 22*(3), 309-328.

Bakker, A. B., & Demerouti, E. (2007b). Towards a model of work engagement. *Career development international, 13*(3), 209-223.

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD–R approach. *Annu. Rev. Organ. Psychol. Organ. Behav., 1*(1), 389-411.

https://doi.org/10.47657/1586

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*: Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Baroudi, J. J., Olson, M. H., & Ives, B. (1986). An empirical study of the impact of user involvement on system usage and information satisfaction. *Communications of the ACM, 29*(3), 232-238.

Bhattacharya, M., & Wamba, S. F. (2015). A conceptual framework of RFID adoption in retail using TOE framework. *International Journal of Technology Diffusion, 6*(1).

BRICS Development Working Group. (2016). *Skill Development for Industry 4.0 - Global Skills Summit 2017*. Retrieved from www.globalskillsummit.com /Whitepaper-Summary.pdf

Burnett, S., Clarke, S., Edwards, R., & Illsley, R. (2006). Document collaboration: linking people, process, and content. *Technology evaluation and comparison report, Butler Group*.

Bush, V. (1945). As we may think. *Atlantic Monthly*.

Cai, H., & Zheng, D. (2017). Digital Library use Intention Research: An Explanation based on Theory of Reasoned Action and Technology Acceptance Model. *DEStech Transactions on Computer Science and Engineering*(csae).

Chau, P. Y., & Tam, K. Y. (1997). Factors affecting the adoption of open systems: an exploratory study. *MIS quarterly*, 1-24.

Chiong, C. P., Kiing, S. M., Ler, Y. P., Lim, Q. J., & Wong, Y. J. (2016). *Behavioural intention of undergraduates to adopt digital library: An investigation into private universities in Malaysia.* (Bachelor of Commerce (hons) Accounting), UTAR, Malaysia.

Collins, E. (1965). Libraries of the future.

D'Ambra, J., & Wilson, C. S. (2004). Explaining perceived performance of the World Wide Web: uncertainty and the task-technology fit model. *Internet Research, 14*(4), 294-310.

D'Ambra, J., & Rice, R. E. (2001). Emerging factors in user evaluation of the World Wide Web. *Information & management, 38*(6), 373-384.

Dahlan, N., Karia, N., Asaari, M. H. A. H., Ramayah, T., & Lee, G. T. (2006). Role of organizational context on digital library's success factor. *Emerging Trends and Challenges in Information Technology Management*, 712-714.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

https://doi.org/10.47657/1586

Delmas, M. A., & Toffel, M. W. (2010). Institutional pressures and organizational characteristics: Implications for environmental strategy.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information systems research, 3*(1), 60-95.

DePietro, R., Wiarda, E., & Fleischer, M. (1990). The context for change: Organization, technology and environment. In L. G. Tornatzky & M. Fleischer (Eds.), *The processes of technological innovation* (pp. 151-175). Lexington, MA: Lexington Books.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. MA: Addison-Wesley.

Fox, E. A. (2002). Overview of digital library components and developments. *Computer Science Technical Reports*.

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory; Strategies for Qualitative Research*. Chicago, IL: Aldine Publishing.

Goodhue, D. L., Klein, B. D., & March, S. T. (2000). User evaluations of IS as surrogates for objective performance. *Information & management, 38*(2), 87-101.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS quarterly*, 213-236.

Griffin, S. M. (2000). NSF/DARPA/NASA Digital Libraries Intiatives: A Program Manager's Perspective. *Successes & Failures of Digital Libraries*.

Hamzat, S. A., & Mabawonku, I. (2018). Influence of Performance Expectancy and Facilitating Conditions on use of Digital Library by Engineering Lecturers in universities in South-west, Nigeria. *Library Philosophy and Practice*, 1-16.

Hong, W., Thong, J. Y. L., Wong, W. M., & Tam, K. Y. (2002). Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics. *Journal of Management Information Systems, 18*(3), 97-124.

Hwang, M. I., & Thorn, R. G. (1999). The effect of user engagement on system success: a meta-analytical integration of research findings. *Information & management, 35*(4), 229-236.

Jeyaraj, A., Rottman, J. W., & Lacity, M. C. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of information technology, 21*(1), 1-23.

Jiang, Y., Chen, D., & Lai, F. (2010). Technological-personal-environmental (TPE) framework: A conceptual model for technology acceptance at the individual

https://doi.org/10.47657/1586

level. *Journal of International Technology and Information Management, 19*(3), 5.

Ju, B., & Albertson, D. (2015). Examining user-driven factors for intentions to use video digital libraries. *Proceedings of the Association for Information Science and Technology, 52*(1), 1-4.

Karimi, J., Somers, T. M., & Gupta, Y. P. (2004). Impact of environmental uncertainty and task characteristics on user satisfaction with data. *Information systems research, 15*(2), 175-193.

Khan, S. A., & Bhatti, R. (2017). Digital competencies for developing and managing digital libraries: an investigation from university librarians in Pakistan. *The Electronic Library, 35*(3), 573-597.

Kini, R. B. (2007). Vendor availability: a key factor for outsourcing in Chilean ICT sector. *Information management & computer security, 15*(5), 350-361.

Koohang, A., & Ondracek, J. (2005). Users' views about the usability of digital libraries. *British Journal of Educational Technology, 36*(3), 407-423.

Licklider, J. C. R. (1965). Libraries of the Future.

Lynch, C. A. (1994). The integrity of digital information: mechanics and definitional issues. *Journal of the American Society for Information Science (1986-1998), 45*(10), 737.

MacDonald, L., Cairns, G., Angus, K., & de Andrade, M. (2013). Promotional communications for influenza vaccination: a systematic review. *Journal of health communication, 18*(12), 1523-1549.

Masrek, M. N. (2008). *Determinants and Impacts of Intranet Utilization: A Case Study at Selected Malaysian Companies.* Kulliyyah of Information and Communication Technology, International Islamic.

Masrek, M. N., & Gaskin, J. E. (2016). Assessing users satisfaction with web digital library: the case of Universiti Teknologi MARA. *The International Journal of Information and Learning Technology, 33*(1), 36-56.

Masrek, M. N., Jamaludin, A., & Awang Mukhtar, S. (2010). Evaluating academic library portal effectiveness: A Malaysian case study. *Library Review, 59*(3), 198-212.

Masrek, M. N., Karim, N. S. A., & Hussein, R. (2007). Antecedents and Impact of intranet utilization: A conceptual framework. *Journal of Information Technology Impact, 7*(3).

https://doi.org/10.47657/1586

Masrek, M. N., Razali, M. H., Ramli, I., & Andromeda, T. (2018). User engagement and satisfaction: The case of web digital library. *International Journal of Engineering and Technology (UAE), 7*(4), 19-24.

Masrek, M. N., & Samadi, I. (2017). User engagement in academic web digital library. *International Journal of Civil Engineering and Technology, 8*(9), 789-799.

Matusiak, K. K. (2012). Perceptions of usability and usefulness of digital libraries. *International journal of humanities and arts computing, 6*(1-2), 133-147.

Miller, J., & Khera, O. (2010). Digital Library Adoption and the Technology Acceptance Model: A Cross-Country Analysis. *The Electronic Journal of Information Systems in Developing Countries, 40*(1), 1-19.

Mohamad Rahimi Mohamad Rosman, Mohd Nasir Ismail, & Mohamad Noorman Masrek. (2019). Investigating the Determinant and Impact of Digital Library Engagement: A Conceptual Framework. *Journal of Digital Information Management, 17*(4).

Nov, O., & Ye, C. (2008). Users' personality and perceived ease of use of digital libraries: The case for resistance to change. *Journal of the Association for Information Science and Technology, 59*(5), 845-851.

Nov, O., & Ye, C. (2009). Resistance to change and the adoption of digital libraries: An integrative model. *Journal of the Association for Information Science and Technology, 60*(8), 1702-1708.

O'Brien, H. L., Cairns, P., & Hall, M. (2018). A practical approach to measuring user engagement with the refined user engagement scale (UES) and new UES short form. *International Journal of Human Computer Studies, 112*, 28-39. doi:10.1016/j.ijhcs.2018.01.004

O'Brien, H. L., & Toms, E. G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology, 59*(6), 938-955. doi:10.1002/asi.20801

O'Brien, H. L., & Toms, E. G. (2010). The development and evaluation of a survey to measure user engagement. *Journal of the Association for Information Science and Technology, 61*(1), 50-69.

Park, N., Roman, R., Lee, S., & Chung, J. E. (2009). User acceptance of a digital library system in developing countries: An application of the Technology Acceptance Model. *International Journal of Information Management, 29*(3), 196-209.

https://doi.org/10.47657/1586

Pembee, P. K. (2014). *Factors influencing the use of library information systems by staff and students in Kabarak University.* (Master Thesis), Kabarak University, Kabarak University, Kenya.

Rafiq, M., & Ameen, K. (2013). Digitization in university libraries of Pakistan. *OCLC Systems & Services: International digital library perspectives, 29*(1), 37-46.

Rahman, A. L. A., Jamaludin, A., & Mahmud, Z. (2011). Intention to use digital library based on modified UTAUT model: Perspectives of Malaysian postgraduate students. *International Journal of Information and Communication Engineering, 5*(3).

Ramayah, T., & Aafaqi, B. (2004). Role of self-efficacy in e-library usage among students of a public university in Malaysia. *Malaysian Journal of Library & Information Science, 9*(1), 39-57.

Sahak, M. D., & Masrek, M. N. (2014). Library Usage of Medical Students: A Comparative Analysis of First Year and Third Year Students in Universiti Putra Malaysia. *Procedia-Social and Behavioral Sciences, 129*, 127-132.

Salanova, M., & Schaufeli, W. B. (2008). A cross-national study of work engagement as a mediator between job resources and proactive behaviour. *The International Journal of Human Resource Management, 19*(1), 116-131.

Samadi, I. (2016). *Determinants and Impacts of Digital Library Usage: A Survey Among Selected Iranian Universities.* (Doctor of Philosophy (Information Management)), Universiti Teknologi MARA Puncak Perdana, Shah Alam.

Samadi, I., Masrek, M. N., & Yatin, S. (2014). The effect of individual characteristics and digital library characteristics on digital library effectiveness: A survey at University of Tehran. *World Applied Sciences Journal, 30*(30 A), 214-220.

Simbula, S., Guglielmi, D., & Schaufeli, W. B. (2011). A three-wave study of job resources, self-efficacy, and work engagement among Italian schoolteachers. *European Journal of Work and Organizational Psychology, 20*(3), 285-304.

Su, S.-F. (1994). Dialogue with an opac: how visionary was Swanson in 1964? *The library quarterly, 64*(2), 130-161.

Swanson, D. R. (1964). Dialogues with a catalog. *The library quarterly, 34*(1), 113-125.

Thong, J. Y., Hong, W., & Tam, K.-Y. (2002). Understanding user acceptance of digital libraries: what are the roles of interface characteristics, organizational context, and individual differences? *International Journal of Human-Computer Studies, 57*(3), 215-242.

https://doi.org/10.47657/1586

Trépanier, S.-G., Fernet, C., Austin, S., Forest, J., & Vallerand, R. J. (2014). Linking job demands and resources to burnout and work engagement: Does passion underlie these differential relationships? *Motivation and Emotion, 38*(3), 353-366.

Trice, A. W., & Treacy, M. E. (1988). Utilization as a dependent variable in MIS research. *ACM SIGMIS Database: The Database for advances in information systems, 19*(3-4), 33-41.

Vaidyanathan, G., Sabbaghi, A., & Bargellini, M. (2005). User acceptance of digital library: An empirical exploration of individual and system components. *Issues in Information Systems, 6*(2), 279-285.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *Management Information Systems Quarterly, 26*(2), 3.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2007). The role of personal resources in the job demands-resources model. *International journal of stress management, 14*(2), 121.

Xu, F., & Du, J. T. (2018). Factors influencing users' satisfaction and loyalty to digital libraries in Chinese universities. *Computers in Human Behavior, 83*, 64-72. doi:https://doi.org/10.1016/j.chb.2018.01.029

Yamaguchi, M., & Richardson, J. (2018). Demonstrating academic library impact to faculty: a case study. *Digital Library Perspectives, 34*(2).

https://doi.org/10.47657/1586