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## Determinants of Digital Reference Services Acceptance in Malaysian Academic Libraries

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**Abstract** This study investigated the potential influence of user perception of performance expectancy, effort expectancy, information quality, service quality and perceived enjoyment on Digital Reference Services (DRS) acceptance. The paper is based on quantitative research and the data were gathered through questionnaires. This research was conducted among the postgraduate students in Malaysian Research University Libraries. A total of 892 usable questionnaires were collected. The model identified the structural relationships among the constructs, which were examined through Structural Equation Modelling (SEM) with AMOS. The results of the analysis indicated a good fit for the proposed model, and the research findings also supported the positive and significant effects of performance expectancy, information quality and perceived enjoyment on DRS acceptance. However, no significant relationship was found between effort expectancy and service quality with the acceptance of DRS. The results in this paper may assist library in rethinking the ways of increasing the use of DRS. The literature on the determinants of DRS acceptance is still limited. This empirical study will contribute to the available body of research on technology acceptance in the academic library contexts.

**Keywords** Digital Reference Services, effort expectancy, information quality, perceived enjoyment, performance expectancy and service quality

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### Introduction

It is important for a variety of reasons to investigate the factors that influence users behaviour on technology acceptance. This research study looked at the relationships among factors that potentially influence the user technology acceptance for DRS. DRS over the Internet such as E-mail, Facebook, Web Form, Instagram, and Twitter have become very popular, and are being used increasingly by many libraries. Hence, the DRS present a great opportunity for libraries to use this medium to communicate and promote their library services. DRS are initiated electronically, often in real-time, where users can communicate with the reference librarian 24/7 without needing to be physically present at the library for traditional reference services. These conveniences can serve as a key driver of DRS acceptance. However, as more of the technology is developed, another form of DRS will emerge. Therefore, librarians need to take quick action to adopt the technology to meet user demands. This situation also acts as an impetus to conduct intensive studies in order to identify which factors may influence library users when considering the acceptance of DRS.

### Literature Review

Several studies on various aspects of DRS in academic libraries concentrate on reporting the changes that have occurred in academic libraries' reference services due to rapidly evolving technologies. Literature in this study



includes performance expectancy, effort expectancy, information quality, service quality and perceived enjoyment.

### **Performance Expectancy and Effort Expectancy**

Taken from The Unified Theory of Acceptance and Use of Technology (UTAUT) this study focuses on two constructs namely performance expectancy and effort expectancy. Performance expectancy is the first construct of the UTAUT model. Performance expectancy is defined as the degree to which an individual believes that using the system will help him/her to attain gains in work performance. Meanwhile effort expectancy can be defined as the degree of ease associated with the use of the system [1].

This two constructs had also been used previously by Schaper and Pervan [2] as technology factors and had been found to have a statistically significant with behavior intention. On the other hand, Orji [3] developed an extended model, based on UTAUT to predict user acceptance of electronic library system indicated that all UTAUT construct including performance expectancy and effort expectancy are critical components that affect acceptance and use of electronic library system. In others study each of the constructs from the UTAUT model (training, performance, and effort) were significantly correlated with the actual implementation behavior (usage) [4].

In another study by Abd. Latif, Adnan and Zamalia [5] had modified UTAUT model in a study to investigate factors that are expected to influence the intention of postgraduate students to use digital library. With the data from 534 postgraduate students from four public intensive RU in Malaysia namely University of Malaya (143), Universiti Kebangsaan Malaysia (135), Universiti Putra Malaysia (138) and Universiti Sains Malaysia (118). Their results also confirmed that performance expectancy and effort expectancy are the influential predictors for intention to use digital library. On the other hand, Serben [6] also confirmed that performance expectancy and effort expectancy have a positive influence on the user's intention to use and usage behavior of social media. Interestingly, in a study to determine the factors that influence the intention to use and actual usage of e-Syariah Portal by Syariah users in Malaysia performance expectancy and effort expectancy was found to be the most influential predictors of intention to use e-Syariah Portal [7]. Performance expectancy and effort expectancy, therefore, should be components of any user acceptance model, and they are especially important in models attempting to explain technology acceptance.

### **Service Quality and Information Quality**

In the context of DRS, the librarians are available and give same effort to provide assistance in which DRS connects the users with librarians and help them to receive direct assistance at anytime and anywhere. Hence, it is important for the user to accept the content and services provided by a DRS. Elaina [8] said that most people thought that approachability and the correct answer were equally important in reference service. McClure, Lankes, Gross and Choltco-Devlin [9] further mentioned in the measure of any reference service (either traditional or digital) the correct answers is one of the most fundamental and keystones in assessing the quality of reference service. Therefore, the researcher felt that information quality and service quality provided by librarian through DRS are also affected the acceptance of DRS in which library user are influenced to used DRS by receiving a positive respond and assistance provided by the librarians. Previously Bicknell [10] also indicates that many reference studies before had assumed that a user's primary need in reference service is to receive an accurate answer. As a result in a study of chat reference service used by Kibbee, Ward and Ma [11] found that nearly 90% of the respondent reported as very good or excellent of the completeness answer of their reference questions. In particular, with this positive response of the information and service quality provided by librarian through DRS, it will also affect the acceptance of DRS. This result is in line with findings of Abd. Latif, Adnan and Zamalia [5] who studies the intention to use the digital library and found that information quality and service quality are important in predicting an intention to use digital library. On the other hand, Wang and Chuan-Chuan Lin, [12] also had found both information quality and service quality is the significant factors that influence the blogger's usage intention.



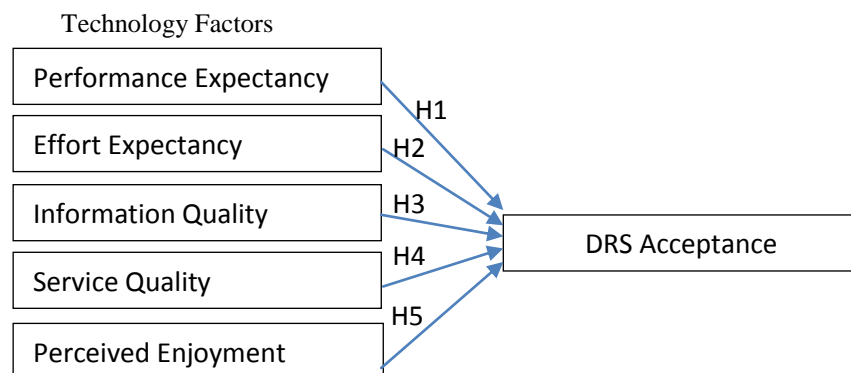
Service quality is likely to be more important for in DRS because it provides all the services in the DRS process of input process and output. On the other hand in Research Universities environment high information quality and service quality are necessary to support research environment. Therefore the users seem to choose the channel that they perceive will give detail and up-to-date information and responsiveness to all their information need. Hence, following Al-Busaidi and Al-Shihi [13] in this study technology factors will consist variables such as information quality and service quality as proposed by Delone and McLean [14] used to predict DRS acceptance. However, system quality as proposed by Al-Busaidi and Al-Shihi as one of the technology factors indicator were not used in this study since system quality and performance expectancy and effort expectancy are relate to one central issue that is system characteristic and system ability.

### Perceived Enjoyment

Lee, Cheung and Chen [15] indicate that perceived enjoyment as a mean to explain system usage. Among DRS in this study blog, Facebook, online chat, Twitter and Instagram are related to social interaction hence the interacting process can be fun and enjoyment. This can guess that individuals may use technology because it is enjoyable. Hence user would likely to use DRS because the interacting process yields fun and enjoyment. As perceived enjoyment also included in a technological acceptance factors in the model to explain user acceptance of blog by Hsu and Lin [16], therefore in this study it posited that enjoyment is the determinants of DRS acceptance. This proposition is supported by a study of Facebook page events as a medium for promoting special events to consumers [17]. The findings showed that perceived enjoyment has a positive impact on attitude toward using Facebook. On the other hand perceived enjoyment had the largest direct effect on intention to use and becomes an as important factor that affecting acceptance [18]. More interestingly, it was confirmed through previous studies that perceived enjoyment had a significant influence on microcomputer usage [19] system usage [20] and had a significant effect on different dimension including frequency of Internet usage, daily Internet usage and diversity of Internet usage [21].

### The Proposed Model

This study uses a quantitative approach to examine the relationship between performance expectancy, effort expectancy, information quality, service quality and perceived enjoyment on DRS acceptance. The research framework of the study is shown as follows:



*Figure 1: Proposed Model*

The hypotheses of the study are:

H1: There is a significant relationship between performance expectancy and the acceptance of DRS.

H2: There is a significant relationship between effort expectancy and the acceptance of DRS.

H3: There is a significant relationship between information quality and the acceptance of DRS.

H4: There is a significant relationship between service quality and the acceptance of DRS.

H5: There is a significant relationship between perceived enjoyment and the acceptance of DRS.



### Digital Reference Services Acceptance

In this model, the intention and attitude toward use construct are not included since the all the variables are proposed to affect directly to DRS acceptance. The justification is, this model is clearly focused more on usage. As the study was to the current users of all DRS tools hence, actual use of DRS is more significant than the study of the behavioral intention to use the system. In addition, in a comparatively studied model with and without the 'attitude toward use' construct by Teo and Noyes [21] found the models without attitude toward use had a significantly better model fit. More interestingly, it was found that there has no relationship between attitude to towards use and actual usage in a study of Virtual Pen multimedia web annotation system..

On the basis of several studies [19-20, 22-23], frequency is used to measure the DRS acceptance. Eight different common types of DRS (e-mail, Web forms, online chat, Facebook, Instagram, Twitter, YouTube, and blog) were measured in this study. Similarly others previous study [24-26] are also had used more than one DRS technologies during their study. Therefore, users had a variety of different experiences around their choice of communications mode.

### Research Methodology

The research was quantitative in nature. The target sample for this survey was postgraduate students from 5 Malaysian Research University libraries, who have already had experience in using DRS. The type of sampling design used in this study was stratified random sampling, where each research university library was exactly represented in proportion to its size in the population. A total of 2294 self-administered questionnaires were distributed to the students, where 1497 respondents returned the questionnaires, indicating a response rate of 64.4%. However, only 1395 usable completed surveys. 503 of those surveyed had never used the DRS, thus resulting in 892 valid questionnaires. To test the hypotheses of this study, Structural Equation Modeling (SEM) using AMOS 21.0 (Analysis of Moment Structures) was conducted.

### Results

#### *Descriptive Analysis of Sample*

The gender statistics revealed that 41.4% ( $n = 369$ ) of the respondents were males, and 58.6% ( $n = 523$ ) were females. The largest number of respondents were in the age group of 25 – 29 years, i.e. 60.1% ( $n = 536$ ). This was followed by 18.9% ( $n = 169$ ) who were 30 – 34 years old, 9.5% ( $n = 85$ ) who were 35 – 39 years old, 4.5 % ( $n = 40$ ) who were below the age of 24 years, 3.3% ( $n = 29$ ) who were 40 – 44 years old, and only 3.7% ( $n = 33$ ) who were above the age of 45 years. This showed that more than half (61.5%) of the DRS users were in the youngest age group (between 25 - 29 years old). As expected, the largest group of students, 69.8% ( $n = 623$ ), were Master's students, and 30.2% ( $n = 269$ ) were PhD students. The largest number of respondents were in semester 1 ( $n = 219$ ), followed with 2( $n = 212$ ), 3 ( $n = 153$ ), 4 ( $n = 119$ ), 5 ( $n = 91$ ), 6 ( $n = 49$ ), 7 ( $n = 16$ ), 8 ( $n = 16$ ), 9 ( $n = 7$ ), 10 ( $n = 4$ ), 11 ( $n = 3$ ) and semester 12, 13, 15 each only represent 1 respondents. In terms of the mode of study, 82.2% ( $n = 733$ ) of the students were full-time and 17.8% ( $n = 159$ ) were part-time students. Out of these students, 54.8% ( $n = 489$ ) of them were living on campus and 45.2% ( $n = 403$ ) were living off campus. In order to find out more about technology availability, DRS users were asked to mark one of the two options (yes and no) on whether they have an access to the Internet connectivity. This finding is expected, as all DRS tools require users to have an Internet access. As a result, of this group, about 94% ( $n = 837$ ) had Internet access, whereas 6% ( $n = 55$ ) did not have Internet access. The small percentage of users without an Internet access had presumably used their university or library networks and wireless when using DRS via the Internet. In terms of the number of hours they spend per day using the Internet. 38.3% ( $n = 342$ ) of DRS users claim that they have used the Internet 4-6 hours per day, followed by 28.8% ( $n = 257$ ) who used it 7-9 hours, 23.2% ( $n = 207$ ) who used it more than 10 hours and 9.6% ( $n = 86$ ) indicated that they used the Internet less than 3 hours per day suggesting they had access to the Internet from their PCs /laptop. These statistics reveal that a good percentage of students have used their device for Internet access and the majority of them spend more than 4 hours doing so in one day. This finding indicates that the students are comfortable with the Internet and implies how important of Internet technology has become for the DRS users.



**Reliability of constructs**

Most of the items used in this study have been confirmed by previous literature. However, the items were reviewed in terms of reliability and validity. This was evaluated through reliability (cronbach alpha), composite reliability, convergent and discriminant validity. The Cronbach's alpha before the confirmatory factor analysis was conducted was between 0.89 and 0.94. The closer the Cronbach's alpha is to 1, the higher is the internal consistency reliability [27]. Therefore, the survey was considered to be a reliable measurement instrument. The detailed analysis of the results is shown in the Table 1 below.

**Table 1: Cronbach's Alpha**

<b>Variables</b>	<b>Cronbach's Alpha</b>
Performance expectancy	0.947
Effort expectancy	0.910
Information quality	0.896
Service quality	0.929
Perceived enjoyment	0.935

**Confirmatory Factor Analysis (CFA)**

The confirmatory factor loadings and their significance for the constructs are shown in Table 1. These standardized loadings were used to determine the relative important of the observed variables as indicators of the constructs. Based on Hair *et al* [28] factor loading mean values greater than  $\pm 0.50$  are generally considered necessary for practical significance. As indicated in Table 1, all of the factor loading estimates are greater than 0.6 and most of them greater than 0.7. Meanwhile, all construct reached construct reliability (CR) values greater than 0.92, which exceed the suggested value of 0.60 recommended by Bagozzi and Yi [29]. In addition, all construct reached Average Variance Extracted (AVE) reliability evaluation based on AVE satisfied the recommended value of 0.50 [31].

**Table 2: Results of the Measurement Model**

<b>Constructs</b>	<b>Item</b>	<b>Factor Loading</b>	<b>CR (minimum 0.6)</b>	<b>AVE (minimum 0.5)</b>
Performance expectancy	PE1	0.84	0.923	0.669
	PE2	0.87		
	PE3	0.62		
	PE4	0.74		
	PE5	0.89		
	PE6	0.91		
Effort expectancy	EE1	0.75	0.930	0.691
	EE2	0.83		
	EE3	0.84		
	EE4	0.80		
	EE5	0.88		
	EE6	0.88		
Information quality	IQ1	0.85	0.952	0.769
	IQ2	0.87		
	IQ3	0.88		
	IQ4	0.88		
	IQ5	0.89		
	IQ6	0.89		
Service quality	SQ1	0.86	0.944	0.737
	SQ2	0.87		
	SQ3	0.89		
	SQ4	0.87		
	SQ5	0.81		
	SQ6	0.85		
Perceived enjoyment	PEN1	0.89	0.917	0.786
	PEN2	0.90		
	PEN3	0.87		



**Structural Equation Modeling**

Structural equation modeling was used to test all the hypothesized relationships (See Table 2). The estimated values of fit indices showed a good structural model fit to the data for the proposed research model in this study. The indices for the overall goodness-of-fit demonstrated that this model fitted the data quite well, where the GFI = 0.899, NFI = 0.942, CFI = 0.959, TLI = 0.955, and RSMEA = 0.050. Hence it is concluded that the proposed research model fits the data reasonably.

**Table 3:** Testing of Hypotheses Using Standardized Estimates (Hypothesized Model)

			Estimate	S.E.	C.R.	P	Remarks
Digital reference service use	<---	Performance Expectancy	0.074	0.035	2.117	0.034	Supported
Digital reference service use	<---	Effort Expectancy	-0.004	0.037	-0.119	0.905	Not Supported
Digital reference service use	<---	Information Quality	0.097	0.040	2.454	0.014	Supported
Digital reference service use	<---	Service Quality	-0.159	0.041	-3.879	***	Not Supported
Digital reference service use	<---	Perceived Enjoyment	0.108	0.038	2.812	0.005	Supported

Note: The standardized parameter estimates ( $\beta$ ) were statistically significant based on the critical ratio (CR) value of  $\pm 1.645$  ( $p < 0.05$ ) for a one-tailed test of significance.

The parameter estimates and critical ratio values for the research model are presented in Table 3. As can be seen, 3 of the 5 research hypotheses were supported. Hypothesis H1, H3 and H5 were statistically significant and in the hypothesized direction, while hypotheses H2 and H4 were rejected because they were not statistically significant.

**Discussion**

In answering to the research question above, the study found that performance expectancy had the significant direct effect of DRS acceptance. Typically, they used the software if they felt it would improve their performance. The relationship is expected, as many previous studies have found the same effects of performance expectancy on technology acceptance [2, 3, 6, 31, 32]. It is of interest to note that performance expectancy is seen by the user has one of the most important factors in the acceptance of DRS. The direct effect of DRS acceptance of performance expectancy implies that the strength of an individual's to use DRS is influenced by the degree to which the person believes that using the DRS would enhance their performance (For example find an article, book or other information resources to support the research activities).

On the construct of effort expectancy, this study has been unable to demonstrate evidence that it has a significant effect on DRS acceptance. Thus, H2 were rejected. The negative contribution of effort expectancy construct in the study indicates that the construct does not have an effect on the acceptance to use DRS. The finding is contrary to the findings of Serben [6] who had found effort expectancy is significantly related to the behavioral intention to accept and use of social media. This inconsistency may be attributed to the user experience in using the DRS tools. According to Venkatesh et al. [1] the effort expectancy effort construct is significant only during the first time of adoption and using the system, and it becomes non-significant over periods of extended and sustained usage. Hence Kocaleva, Stojanovic and Zdravev [33] had confirmed that the effort expectancy and facilitating conditions have the strongest effect of intention to use new technology. In this study, it was found that DRS users are comfortable with Internet and 90.4% of them spend more than 4 hours doing so in one day. This finding indicates that the DRS users are comfortable with the Internet and familiar to all kinds of Internet and DRS tools. Probably, using a DRS tool such as Facebook, e-mail, Instagram and etc. are to be routine for them. Hence the DRS is not very complex but is very easy to use. Therefore the effort expectancy effort construct is not relevant to use in this study.





The results of this study demonstrate that the use of DRS is influenced by the quality of the information received. Information quality refers to the perceived output produced by the system. The common characteristics of information quality include including the accuracy of the information, reliability, completeness, relevance, precision and up to date of the information. This finding confirms the findings of a number of previous studies [34-38] that information quality has a significant effect on the use technology. Thus, H3 were accepted. The positive perceptions of students which tend to be good on the information quality significantly influence the DRS usage. Therefore, the findings of this study suggest that, in order to attract more people to use DRS, the librarian must provide high-quality information, accuracy, reliability, completeness, relevance, precision and up to date information.

The study found an insignificant relation between service quality and DRS acceptance. Thus, H4 were rejected. Yet, studies found that service quality is significantly related to technology acceptance [38-39]. In this study, the insignificant relation as the users does not care about the responsiveness, reliability and empathy of personnel staff in handling the DRS. This may suggest that enhancing service quality is not the only means of achieving user acceptance of the technology. The results which show the negative correlative between the DRS acceptance and service quality reveals that in the case of high service quality will not lead to the increase of DRS acceptance. This finding is consistent with Abd Latif, Adnan and Zamalia Mahmud [5] work on the digital library. Which reported that service quality is negatively related to intention to use digital library. In the context of Learning Management System, Al-Busaidi [13] found insignificant of the self-efficacy and service quality on the system usage. Dwivedi *et al.*, [37] also reported that the service quality construct did not have a significant effect on a RFID system use. They further explained one possible reason for the insignificant role of the service quality construct is the majority of respondents have familiar with the system because they already used the system with a number of times and may not need human assistance. Hence they concluded that service quality construct is more relevant in adoption or implementing of the new system.

The majority of previous studies have found that the perceived enjoyment construct is significant with technology acceptance [15, 17, 19-21, 40-42]. Once again, the findings from this study in relation to this construct are in line with the findings reported in the majority of previous studies. The possible reason for this implied that users were more likely to use DRS because they felt that it was playful and enjoyable. Therefore, enjoyment in using DRS must be taken into account by the librarian. To achieve that goal, the librarian should seek to implement the technology that more playfulness, leisure and fun. Besides that promoting the playfulness of DRS could be a positive strategy for increasing usage. Hence, library should point out the advantages of DRS and persuading students that it is not only a platform that one can enjoy or have fun with; it can also serve as a simple and enjoyable that would better help them to get information need and solving problem specifically related with library and research activities.

### **Conclusions**

This study focused on the factors that affect the acceptance of DRS in Malaysian research university libraries. A model was proposed that included performance expectancy, effort expectancy, information quality, service quality and perceived enjoyment. The results showed that all the direct relationships between performance expectancy, information quality, perceived enjoyment, with DRS acceptance were supported. Considering the extensive impact of Internet technology has in changing the way library and user to communicate today, libraries are expected to take advantage of this new technology to serve their online users and keep up to date with technological options that can improve communication. Hence it is worthwhile to study and better understand the acceptance of this technology. Therefore more constructs should be identified by future researchers to measure the impact of particular construct towards the acceptance.

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