Factors Affecting the Usage of Library E-Services in the Aftermath of COVID-19 Pandemic

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ABSTRACT

The emergence of pandemic disease caused havoc throughout the countries. A disease like no other before, Novel Coronavirus 2019 (COVID-19) has affected most of the countries in the world, regardless of the nation's reputation. The danger of deadly infection has caused many governments to lockdown their countries, limiting access and freedom of movement. Malaysia, as well, is affected by this deadly predator. The government of Malaysia has announced the movement control order (MCO) to break the chain of spread. The order caused many service providers to reshape and transforms their service delivery. Libraries are one of the service providers that are affected by this movement control order. Thus, libraries have shifted their operation towards the e-services, in which users can access the library from the comfort of their own house. However, little is known regarding the factors affecting the usage of library e-services in the context of a pandemic. Thus, this study aims to investigate the factors affecting the usage of library e-services in the aftermath of COVID-19 pandemic. A quantitative study was conducted; a total of 192 responses were recorded and analyzed. Findings show that six out of seven hypotheses were accepted. The result shows that information quality and responsiveness are significant predictors of the usage of library e-services, while perceived barriers did not have a significant relationship with the usage of e-services.

Keywords: *Digital Library, e-Services, Usage, and Perceived Barriers.*

INTRODUCTION

The world celebrates the coming of the year 2020 with a nightmare of Novel Coronavirus 2019 (COVID-19). According to the World Health Organization (WHO), Novel Coronavirus 2019 (COVID-19) is a new strain that was discovered at end 2019 and never been identified in humans' body previously. This virus can be transferred easily from human to human. It can spread from person to person through small droplets from the nose or mouth which are spread when a person with COVID-19 coughs or exhales. The objects and surfaces around the person that exposed with the droplets able to catch by those who touch it, then touching their eyes, nose or mouth. Besides, research also found that this virus can be transmitted from a person with COVID-19 who coughs out or exhales droplets. Therefore, people are kept remind to stay more than 1 meter (3 feet) away from a person who is sick.

COVID-19 was originated from the city of Wuhan, China. This disease has affected triple to other countries after two weeks, said general director of WHO. As of 5th of April 2020, this pandemic has affected more than 1 million people and 64,000 deaths: a fatality rate of 5.4% worldwide. The merging of this spreading disease has shocked the whole world as it can kill those effected in just 2 weeks. Hence it has caused panic condition among the citizen along with ruining the social connection and economic. Due to the critical consequences, most of the countries have announced to lock down all their activities. Lockdown is a situation where people are asked to remain in the place and barricade the doors (Lane, 2019). People are not allowed to go out without any important purpose. However, the message did not achieve its objective as the society reluctant to stay at their place. In Italy and Malaysia for example, it forces famous singers and media personalities engaging in a mingle-shaming campaign which appeal the society to stay at home (Povoledo, 2020). Both countries are badly affected by the virus as a society still lack the awareness about this killer virus. Malaysia prime minister declared movement control order (MCO) for their society in 2 weeks which prohibited all sort of public and wide gatherings of participants, as well as cancelling all religious event, sporting exhibition, social, and all sort of event that capable to pull a large number of crowd. On top of that, all public necessities such as the universities, schools, and business entity will also be closed, however, essential community services such as hypermarkets, post-office, hospital, banks, and pharmacies will continue to be opened during the period of MCO.

Lucky the invention of technology in all the information agencies enable libraries to serve the users even the countries are in the middle of a lockdown. Since libraries have been close temporarily (some partially open), most libraries offer their services via digital as the society are not able to be in a crowded place. Other than sharing the information and awareness via the social media and official website, most of the libraries are focusing on their campaign to encourage their users to use the digital services. For example, the National Library of Malaysia (PNM) offers free access to their digital collection by accessing through the u-Pustaka official website. On the other hand, the New York Public Library gives the initiative for users to use a mobile application to borrow research databases and access to a multitude of online resources. The library provides a wide collection of digital offerings, including e-books for borrowing on their SimplyE application, research databases, and access to a multitude of online resources.

Being an academic library that supports teaching and learning activities, Perpustakaan Tengku Anis (PTA), Universiti Teknologi MARA (UiTM) Cawangan Kelantan also undergoing huge transformation process, or so-called as 'the new norm' by reengineering their library services into the digital platform, known as the e-service. Throughout the movement control order, they offer the users to use their digital library services and facilities such as Library eResources which contains an online database, eBook, eJournal, institutional repository, and electronic question paper system. The library also manages user's education program and online research consultancy activities to assist the users to have their need even the library was close. It became more helpful as the referral consulting service via 'Chat with Librarian' is offered. Besides, the use of the Web-Based Integrated Library System (WILS), library allow the users to do the online renewal, Inter Library Loan (ILL) Backup library materials, loan or return status and so on just from user's place.

Based on the discussion above, the study aims to investigate the factors affecting the usage of library e-services in the aftermath of COVID-19 pandemic. The subsequent sections are organized as follow. First, the study discusses a few of the related literature to understand the issues of the problem. Second, a research model was developed. Third, the methodology, findings, and discussion of the study were presented, and finally, a recommendation for future study was provided.

LITERATURE REVIEW

A digital library is a collection of electronic resources, such as online databases, electronic journals, electronic books, etc (Mohamad Rosman, Ismail, and Masrek, 2019). A good digital library will combine three components of people, collection and technology which mean people can access the collection using the information system (Schatz, 2003). The use of digital services by the library users will indicate the success of the library objective Abdul Rahman, Jamaludin, and Mahmud (2011) believed there are many factors able to influence the use of digital libraries such as information quality, performance expectancy, and effort expectancy. Byrne (2003) wrote that linguistic and ownership are among the issues relating to the quality of information. Some of the users are lack of language ability which make them very difficult to go through all the digital collection or communicate with the library's staff. In term of performance expectancy, it shows a different level of usefulness for difference age, but it does not influence by gender (Abdul Rahman, Jamaludin, and Mahmud, 2011). The study indicated that ageing user finds difficulties in using the information system and it is considered less useful when conducting their task. The lack of information technology literacy may lead to lower performance expectancy among the users and resulting in the user to perceive the system as not useful and not satisfying

Khan and Qutab (2016) indicated that research on digital libraries should be user-oriented and not just system-oriented. User perceptions will address the real user's need (Shiri, 2008). Feby, Hanim, Niken (2019) mention that user perception is a primary element in application usage. It is supported by Li and Liu (2019) who believe that the main objective of the digital library is to provide information and services, hence library must indicate what is the communities need rather than increasing the collection. People who acknowledged the advantages and benefits of the digital library would be more intention to use the digital library (Abdul Rahman, Jamaludin, and Mahmud, 2011). This includes something that absent in traditional library but offers in the digital library such as remote access, 24-hour access, and faster access (Liu, 2011).

The tendencies of users who use the library e-services will affect the usefulness and usability of the digital library. Khan and Qutab (2016) stressed that it is important to know user's feedback either the system is easy and useful to them or not. Masrek and Gaskin (2016) indicated that the combination of information quality, systems quality, service quality, perceived usefulness, perceived ease of use and cognitive absorption are factors of user satisfaction. Therefore, the study on digital library enables to improve the design and construction of DLs (Li and Liu, 2019). The result indicated that the new approach to the library system may well be implemented to the library and its user.

In another work, Mohamad Rosman, Ismail, and Masrek (2019) work on improving the state of utilization of library e-services through an improve conceptualization of digital library engagement. Contrary to the traditional definition of usage, DL engagement evaluates the concept of usage-based on multiple dimensions; affective, cognitive, and behavioural perspective. The work suggests that the factor underlying technological factors (service quality, information quality, and system quality) should have a significant relationship with the usage of library e-services. Moreover, the usage (DL engagement) should be able to work as a mediation between technological factors and perceived benefits.
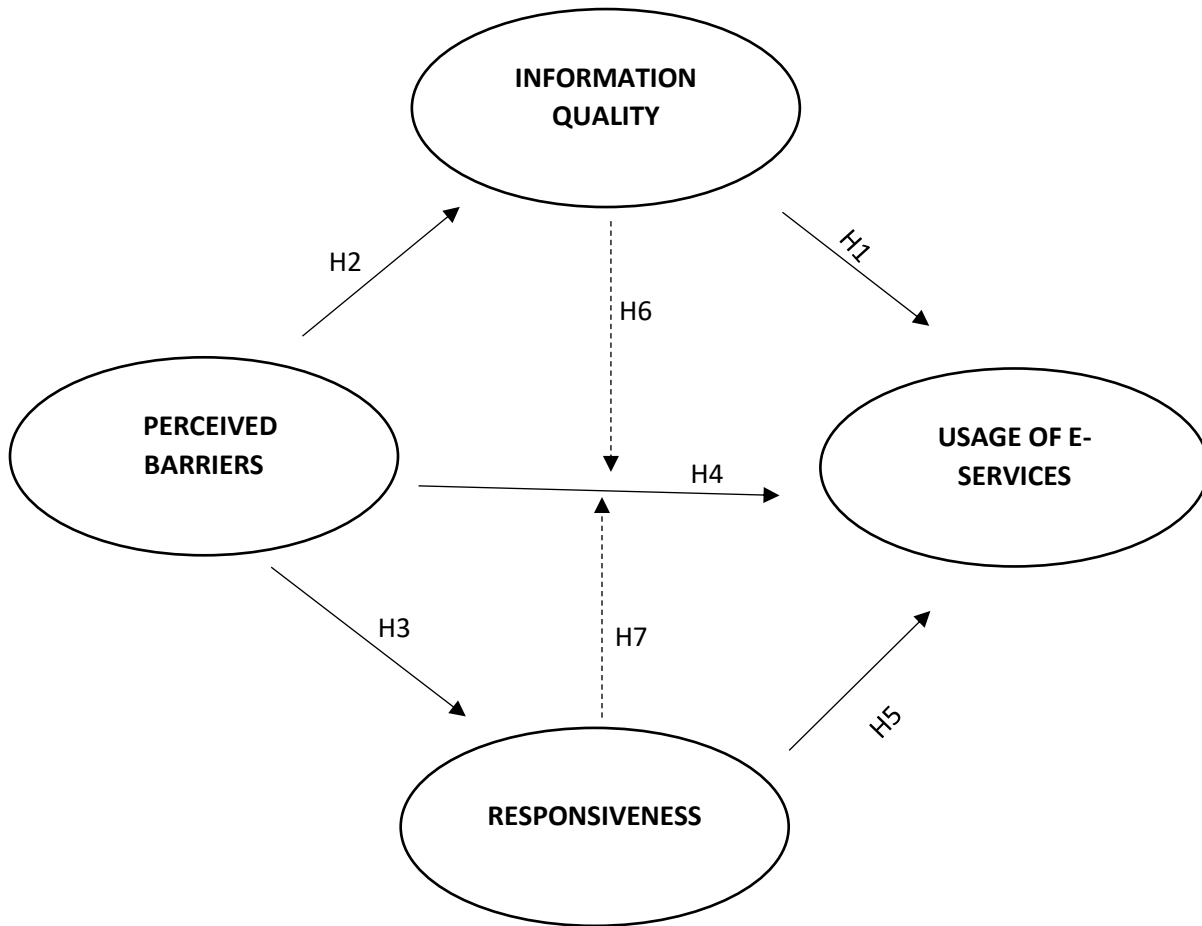
RESEARCH MODEL

Fig 1 Research model

Based on the research model, the research method is designed to identify the factors affecting the usage of library e-services. Based on a thorough literature review, three factors were selected as an independent variable: perceived barriers, information quality, and responsiveness. In the context of the research, the usage of library e-services is the dependent variable, selected based on research gaps, as well as in continuation with the similar studies, such as Masrek and Gaskin (2016), Khan and Qutab (2016), and Samadi and Masrek, (2015).

Information Quality

Information quality is operationalized as the extent of the value in which the information is provided to the user (Wang, and Strong, 1996). It describes the extent of the value of information being perceived by the user, as well as the output produce by an information system (i.e. digital library). As mention by Allahawiah (2013), the extent of information quality can be assessed based on two items: (1) informativeness, and (2) security. Concerning informativeness, the term is operationalized as the ability of the information system or the website to always kept the user aware of its features, products, or services. Several authors find a positive correlation between information quality and usage (Allahawiah, 2013; Mirza Hasan Hosseini, Leila Rahmani-nejad, and Seyed-Hasan Hosseini, 2012). For example, Allahawiah (2013)

mention that information quality affects the extent of user satisfaction in the context of Al-Balqa Applied University. Similarly, Mirza Hasan Hosseini, Leila Rahmani-nejad, and Seyed-Hasan Hosseini (2012) also found out that information quality has a positive and significant relationship with online customer usage and customer satisfaction. Therefore, this study posits that:

H1: Information quality has a significant relationship with the usage of e-services.

Perceived barriers

Boslaugh et al. (2005) define perceived barriers as whether respondents report that a variety of barriers keep them from performing a certain activity such as using the library's e-services. It is barriers to performing the behaviour in conducting the action (McClanahen, 2007). In this study, the items concerning COVID-19 diseases were developed as an indicator of perceived barriers.

The spread of the COVID-19 has affected all types of the organization including the library. As a social place, the library will have many visitors daily that able to increase the spreading of disease. Hence it affected the library services as well. However, the digital library will be a good initiative for the users to get access to library services. It can avoid the user perception that they can catch infection to any virus through touching the surface of a book (Hayes, 2019). This study posits that perceived barriers have a positive relationship with information quality, responsiveness, and usage of library e-services. Kim, Yoo, and Yang (2020) mention that information quality, perceived barriers, and system quality influence the elements of flow – that may influence engagement or disengagement with the topic of interest. The following are the hypothesis of the study.

H2: Perceived Barriers has a significant relationship with information quality.

H3: Perceived Barriers has a significant relationship with responsiveness.

H4: Perceived Barriers has a significant relationship with the usage of e-services.

Responsiveness

Responsiveness is operationalized as the extent of user assessment on the information system responsiveness towards a request for services. Mirza Hasan Hosseini, Leila Rahmani-nejad, and Seyed-Hasan Hosseini (2012) consider responsiveness from the perspective of employees' readiness and willingness to deliver timely service to the customer. On the other hand, Najib Mohammed Aljunaid (2006) mention that responsiveness can relate to the frequency of online store providing services or product that can meet the needs of the customers. From the perspective of library and information science (LIS), responsiveness can be related to the ability of the library e-services to respond to the user request promptly with minimal delay. As found out by Allahawiah (2013), responsiveness has a positive relationship with usage and satisfaction in the context of Al-Balqa Applied University. On the other hand, Mirza Hasan Hosseini, Leila Rahmani-nejad, and Seyed-Hasan Hosseini (2012) also found a positive correlation between responsiveness (i.e. return ability) with usage and satisfaction. Therefore, the hypothesis for this study has identified as below:

H5: Responsiveness has a significant relationship with the usage of e-services.

Mediating effect

Moreover, information quality and responsiveness are hypothesized as a mediator between perceived barriers and usage of library e-services. For example, responsiveness helps to ease the effect of perceived barriers by providing frequent feedback through consistent user support and technological assistance. On the other hand, the quality of the e-services will be indicated based on the user able to get the library's staff to react quickly and positively (Allahawiah, 2013); thus, help the user to mitigate the effect of perceived barriers. The studies of Ruzgar, Kocak, and Ruzgar (2014), Sharma, Khan, and Arya, (2019), and McDowellJoy and Karriker (2009) also provide empirical evidence of the mediating effect of information quality and responsiveness in the relationship between the independent variable and dependent variable. Therefore, the hypothesis for this study has identified as below:

H6: Information quality mediates the relationship between Perceived Barriers and usage of e-services.

H7: Responsiveness mediates the relationship between Perceived Barriers and usage of e-services.

RESEARCH METHODOLOGY

Sampling and Response Rate

This study adopted a quantitative research methodology. Based on previous instruments, a structured questionnaire was developed, and the instrument was pre-tested by experts in library sciences, especially in the digital library. The items were adapted from the previous study of Masrek and Gaskin (2016), Khan and Qutab (2016), and Samadi and Masrek, (2015). Then, the questionnaire was finalized; after being analyses by the experts and modified based on their recommendations. A pilot test of 50 respondents was performed to determine the reliability of the instrument. The data collection then begins through an online survey, which was developed using Google Form, and distributed to the targeted respondents. The respondents are selected among the students at Universiti Teknologi MARA (UiTM) Kelantan, Malaysia due to easy access to the sampling frame. A random sampling technique was adopted. An invitation email was sent to 250 students; in which a total of 198 responds were recorded for a response rate of 79%. However, a total of 6 responses had to be excluded because of empty row sets; leaving only 192 valid responses (77% response rate). To assess the non-response bias, a follow-up invitation email was sent to the non-response responders, however, no further responses or communication received; probably due to communication problem and geographical problem as a result of COVID-19. Therefore, data analysis proceeds with 192 respondents. The data was analyzed based on descriptive using Statistical Package for Social Science (SPSS) version 22 and inferential analysis based on Partial Least Square Structural Equation Modeling (PLS-SEM) using SmartPLS version 3.28. The following sections will discuss the finding accordingly.

FINDINGS

The following table 1 shows the demographic profile of the respondents. 192 respondents have responded the survey. The gender profile showed 76.6% (n=147) of respondents are female, while 23.4% (n=45) are male. The age of respondent is mostly between 20 – 30 years (n=160 or 83.3%), below 20 (n=28 or 14.6%), and 31-50 (n=4 or 2.1%). From the locality perspective, the majority of respondents are from Kelantan (n=124 or 64.6%), Perak(n=17 or 8.9%), Terengganu (n=13 or 6.8%), Pahang (n=13 or 6.8%),

Selangor (n=4, 5.7%), Kedah (n=4 or 2.1%), Kuala Lumpur (n=4 or 1.8%), Pulau Pinang (n=2 or 1.8%), Johor (n=2, 1.0%) and Perlis (n=1 or 0.5%). Further, 40.1% (n=77) respondents are from Faculty of Information Management, follow with Faculty of Business and Management 34.9% (n=67), Faculty of Administrative Science and Policy Studies 16.1% (n=31) and Faculty of Accountancy 8.9% (n=17). All the respondent divided into 66.7% (n=128) diploma level, and 30.1% (n=60) of degree level.

Table 1 Descriptive analysis of demographic profiles

Item		Frequency	%
Gender	Male	45	23.4
	Female	147	76.6
Age	Below 20	28	14.6
	20 - 30	160	83.3
	31 - 50	4	2.1
State	Kelantan	124	64.6
	Terengganu	13	6.8
	Pahang	13	6.8
	Kedah	4	2.1
	Perlis	1	0.5
	Pulau Pinang	3	1.6
	Kuala Lumpur	4	2.1
	Selangor	11	5.7
	Johor	2	1.0
	Perak	17	8.9
Faculty	Faculty of Information Management	77	40.1
	Faculty of Administrative Science and Policy Studies	31	16.1
	Faculty of Business and Management	67	34.9
	Faculty of Accountancy	17	8.9
Level of Study	Diploma	128	66.7
	Degree	60	31.3

The following table 2 shows a summary of the measurement model analysis. A total of the single run was performed during the initial model analysis. The initial run shows that all factor loading, average variance extract (AVE), Cronbach's alpha and composite reliability meet the expected threshold as suggested by Hair, Sarstedt, Hopkins, and G. Kuppelwieser (2014) (factor loading is ≥ 0.5, AVE ≥ 0.5, CR ≥ 0.7). The factor loading for information quality between 0.924 to 0.956 (AVE 0.888, CR 0.975), responsiveness between 0.879 to 0.925 (AVE 0.812, CR 0.956), perceived barriers between 0.878 to 0.889 (AVE 0.782, CR 0.935), and usage of e-services between 0.9478 to 0.955 (AVE 0.903, CR 0.974). Therefore, it is assumed that convergence validity has been ascertained.

Table 2 Final assessment of convergence validity

Construct	Indicators	Factor loading	Average Variance Extract (AVE)	Cronbach's alpha	Composite Reliability
Information Quality (INQ)	INQ1	0.924	0.888	0.968	0.975
	INQ2	0.956			
	INQ3	0.939			
	INQ4	0.943			
	INQ5	0.948			
Responsiveness (RES)	RES1	0.879	0.812	0.942	0.956
	RES2	0.925			
	RES3	0.901			
	RES4	0.906			
	RES5	0.893			
Perceived Barriers (PEB)	PEB1	0.884	0.782	0.908	0.935
	PEB2	0.878			
	PEB3	0.885			
	PEB4	0.889			
Usage of e-services (USE)	USE1	0.949	0.903	0.964	0.974
	USE2	0.950			
	USE3	0.948			
	USE4	0.955			

The next step is to access the discriminant validity. A Fornell-Larcker Criterion was conducted. The following table 3 shows the result of the Fornell-Larcker Criterion assessment. The table shows that the square root of the AVE is bigger compared to its previous value, therefore indicating that discriminant validity has been achieved.

Table 3 Result of Fornell-Larcker Criterion

INQ	0.942			
PEB	0.226	0.884		
RES	0.834	0.297	0.901	
USE	0.69	0.279	0.68	0.95

To further confirmed the discriminant validity, a further analysis was conducted based on the recommendation of Henseler, Ringle, & Sarstedt (2015), and Ramayah, Cheah, Chuah, Ting, and Memon (2018). Henseler et al (2015) suggested to performed Heterotrait-Monotrait Ratio (HTMT) test to confirm the discriminant validity. The following table 4 shows the results of HTMT. No value is above > 0.9, indicating a sufficient result to confirmed discriminant validity.

Table 4 Result of Heterotrait-Monotrait Ratio (HTMT)

	INQ	PEB	RES	USE
INQ				
PEB	0.231			
RES	0.871	0.311		
USE	0.713	0.291	0.712	

Next, a bootstrapping technique was performed to check the bias-corrected confidence intervals. The value of 1 was observed between the 5.00% and 95.00% confidence interval. The result shows that there is no value of 1 straddle within the confidence interval, therefore indicating that the discriminant validity has been ascertained.

Table 5: Bias-Corrected Confidence Intervals

Constructs	Original Sample (O)	Sample Mean (M)	Bias	5.00%	95.00%
INQ → USE	-0.283	-0.197	0.086	-0.61	-0.104
PEB → INQ	-0.13	-0.105	0.025	-0.388	0.107
PEB → RES	0.099	0.084	-0.015	-0.171	0.368
PEB → USE	-0.042	-0.037	0.005	-0.318	0.235
RES → USE	-0.056	-0.005	0.05	-0.37	0.135

The following table 6 shows the result of structural model analysis. The result show that four hypotheses are accepted: INQ → USE, PEB → INQ, PEB → RES, and RES → USE. Information quality has a positive relationship with the usage of library e-services (H1: Supported, t=3.148, p=0.002). Perceived barriers have a positive relationship with information quality (H2: Supported, t=2.817, p=0.005), and responsiveness (H3: Supported, t=3.679, p>0.000). Responsiveness also has a positive relationship with the usage of library e-services (H5: Supported, t=2.230, p=0.026). Perceived barriers, however, is not deemed to have a positive relationship with the dependent variable in the context of this study (H4: Not Supported, t=1.494, p=0.136).

Table 6: Relationship between variables (Direct Effect)

| Hypothesis	Relationship	Coefficient	Std Deviation	t-value	p-values	Decision
H1	INQ → USE	0.41	0.13	3.148**	0.002*	Supported
H2	PEB → INQ	0.226	0.08	2.817**	0.005*	Supported
H3	PEB → RES	0.297	0.081	3.679**	0.000**	Supported
H4	PEB → USE	0.094	0.063	1.494	0.136	Not Supported
H5	RES → USE	0.31	0.139	2.23*	0.026*	Supported

Note: *t > 1.645, p-value > 0.05, ** t > 2.58, p-value < 0.01

The subsequent table 7 shows the interaction effect of the study. A total of two hypotheses were developed for this study. Results show that both hypotheses are accepted. First, information quality mediates the relationship between perceived barriers and usage of library e-services (H6: Supported, t=2.103, p=0.036). Second, responsiveness mediates the relationship between perceived barriers and usage of library e-service (H7: Supported, t=2.047, p=0.041). The next figure shows the final structural model of the study.

Table 7: Relationship between variables (Interaction Effect)

Hypothesis	Structural path	Coefficient	Std Deviation	t-value	p-values	Decision
H6	PEB → INQ → USE	0.093	0.044	2.103*	0.036*	Supported
H7	PEB → RES → USE	0.092	0.045	2.047*	0.041*	Supported

Note: *t > 1.645, p-value > 0.05, ** t > 2.58, p-value < 0.01
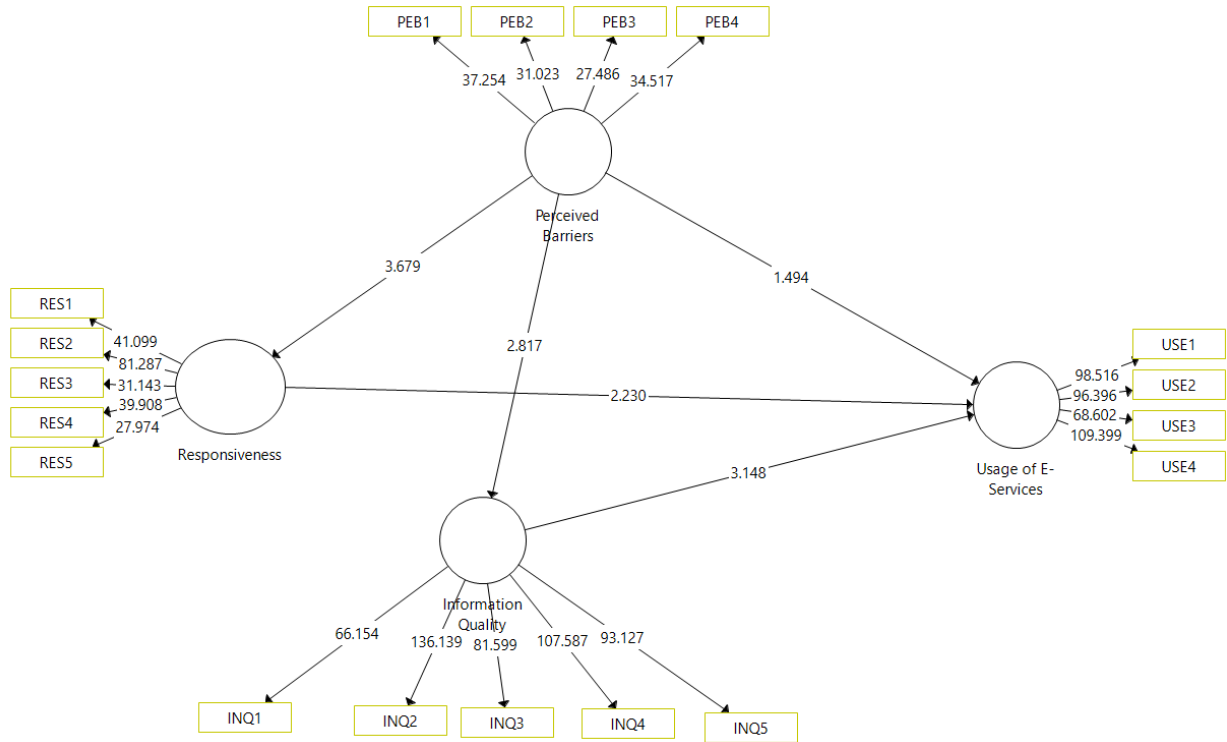
Fig 2 Final Structural Model

DISCUSSIONS

The finding revealed that perceived barrier has no significant influence on the usage of the e-services among the respondents. It can be deduced because the respondents are among of the higher education students who frequently used the e-services content such as e-journal and e-book as references to complete their daily task and assignment (Zia and Tariq, 2014). MCO condition may also not affecting their searching and use the e-services due to the best offer of Internet support from the telecommunication providers during the orders. Moreover, the National Library of Malaysia also states that more than 18,000 users have registered as a new member of U-PUSTAKA throughout 10 days of MCO; thus indicating that perceived barriers provide a positive effect to the usage of library e-services.

The result also supports the literature review toward information quality as a positive intention in using e-services. Students are always looking for timely, current, precise, complete, concise, and relevant information as to their references during completing their task (Masrek, 2016). Hence, they need reliable sources such as library e-services all the time especially due to the geographical and inaccessibility issues during the MCO.

Consistent with the finding previously, the result showed that the responsiveness significantly affects the usage of the e-services during the MCO. Respondent agrees that they are happy to use the e-services even they are not facing the library staff personally. This is because they can get any feedback just only using the e-services quickly and in time as the library offers referral consulting service via 'Chat with Librarian' as well as messaging through the social media.

CONCLUSION

In this paper, a quantitative research design was performed to investigate the factors affecting the usage of library e-services in the aftermath of COVID-19. Three factors; perceived barriers, information quality, and responsiveness were included as part of predictors. The instrument was developed, pre-tested, and actual data collection was conducted. Then, an analysis based on SPSS (descriptive) and PLS-SEM using SmartPLS (inferential) were conducted. Measurement and structural model analysis were also shown in the findings section.

The contributions of this paper are as follows: first, the paper provides empirical evidence on the factors influencing the usage of library e-services in the context of Malaysia, Second, the paper provides a validated research model on the usage of library e-services in the context of COVID-19. Third, this study provides empirical evidence that perceived barriers do not significantly influence the usage of library e-services. Fourth, this study added to the body of knowledge in the topic of library e-services.

However, this study is not without limitation. First, this study uses minimal numbers of factors as the predictors of e-services usage. Further study should consider adopting more factors such as design, usability, navigational structure, perceived usefulness, service quality, and system quality. Second, this study focusses on the theory generalization rather than population generalization. Although valid, a widespread survey should be conducted in the future to gain insight into the diverse demographic profile of respondents. Third, this study conceptualizes perceived barriers into a single dimension; the future study should consider multiple conceptualizations of perceived barriers and analyze based on higher-order construct using SmartPLS. Fourth, this study did not identify any outcome of library e-services usage. Future study should include the possible outcome of usages such as performance, satisfaction, and perceived benefits.

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