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# m-Government: Benefits and its Key Attributes for Personalized Services

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# **M-GOVERNMENT: BENEFITS AND ITS KEY ATTRIBUTES FOR PERSONALIZED SERVICES**

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## **Abstract**

Personalization can play an important role for m-government to provide the right service to potential users at this moment. Due to the widespread of m-government services annually by government agencies, citizens feel burdened with the services and they do not know which services are appropriate for them. Hence, personalization can enable the citizens to obtain information from the government easily and quickly based on their needs. This study explores the literature review regarding the benefits of personalization of m-government and identifies the key personalized attributes in m-government. The benefits of m-government services then were proved by conducting the questionnaire survey to respondent at five selected government agencies which are JPJ, JPN, MOE, MPM and KPDNKK. In this study, researchers related to m-government and personalized m-government were collected and the purposes of identifying the attributes were stated. To achieve this, 36 articles obtained for this study from Science Direct (9), IEEE Digital Library (8), Springer Link (8), ACM Digital Library (6) and Emerald Insight (5) databases covering the period from 2006 to 2016 have been analyzed based on the attributes of personalized m-Government. This study also gives an idea to the researchers regarding the appropriate attributes in providing the personalization of m-government services that are effective and easy to use. The research result can provide insights and acts as a guideline for researchers to study important aspects of the personalization of m-government services that can facilitate the development of m-government services.

**Keywords:** personalization, m-Government, benefit, attribute

## **Introduction**

In this technology era, the growth of wireless access has started to give a new revolution to mobile technology to extend its influence with great impact on the development of the world economies.

According to Mobile Economy 2016 (Association, 2016), by the end of 2015, there were 2.5 billion citizens who had access to the internet via a mobile device throughout the developing world. By 2020, almost three-quarters of the world's population will have a mobile subscription and the figure will increase by more than 1.3 billion in the period. The rapid use of ICT offered by the government sector has given citizens an opportunity to take advantages of the services provided for dealing with agencies and businesses.

Furthermore, the development of mobile communications technology does not only act as a platform for the government to reach out of citizens than ever, but it also gives a great opportunity for citizens to communicate with each other more comfortably and to access information and government services quickly without any barriers of time and space. Services and information provided by the government agencies were also cheaper and can be accessed at anytime and anywhere, including education, healthcare, transportation, business and social welfare services.

With the increasing rate of information and services provided by the government, it burdens the citizens to receive information more than they can handle and this influences them to identify which services that are appropriate for their needs(Shambour, Hourani, and Fraihat, 2016). Therefore, personalization is an important aspect that needs to be considered in order to provide the best services to citizens based on their needs and interests(Germanakos et al. 2007). For government, personalization is a new platform for the public sector to provide services to the citizens with less access time and effort. Based on the literature review, there are limited researches focusing on personalized m-Government and most researchers focused on personalized m-services and m-Commerce. Hence, the goal of this study was to identify the key attributes for designing the personalized m-Government. The research result can provide insights and acts as a guideline for researchers to study important aspects of the personalization of m-government services that can facilitate the development of m-government services.

The layout of this paper begins with the review of m-Government development, followed by the personalized m-Government and the trend of personalized m-Government. The next half of this study continues with the methodology used for this paper, the result, the discussion and finally, the conclusion.

## **M-Government**

The emergence of wireless technology has made it easier for individuals and organizations to implement a variety of tasks by leading the trend towards a ubiquitous and pervasive computing environment. M-Government is the next evolution of e-Government. M-government takes computer involvement a step forward and focuses on the use of mobile phones. By using the m-Government, citizens can access government information, make online payment, and deal with government agencies easily and quickly. The use of m-Government should be able to be reached at anytime and anywhere and be the part of their life. So, there is a need for the government to improve the service and address the growing demand for easy, effective and convenience interaction for all parties involved (Kushchu and Kuscu, 2004). Today, the government has the potential to deliver information on demand, execute transactions and provide services in a timely manner. The government should proactively provide services tailored to citizens' needs without having to wait a request from them. Most citizens only use one service in each transaction and they may not know which services that are appropriate for them(Abu Bakar, Abdul Rahman, & Abdull Hamid, 2015).

At present, m-Government is offering services in the form of Short Messaging Service (SMS), Multimedia Messaging Service (MMS) and mobile payment application. The SMS service is getting popular day by day. This SMS is an effective medium that provides citizens with low cost transaction and ease of access to government agencies. It can be used anytime and anywhere as a communication channel. With the features that are available in SMS, it encourages the government to improve and extend the services to rural communities by providing a simple and effective access to government information. The government can also increase its accountability by providing cheaper and quick communication to individual citizens(Mahmud, 2009).

Besides that, MMS is a standard way to transmit multimedia messages from the mobile phones. MMS expands the capabilities of SMS but it only can send 160 characters text messages at each transaction. In addition, MMS has the capability of sending various media including images, videos, slideshows of

multiple images and audio (Abu Bakar et al., 2015). For the mobile payment application, it is a tool developed by the government to facilitate payment services made through mobile devices. This service can save the citizens' time from the long waits when making payments at the counters.

In addition, government has provided m-Government services through two distinct environment which are pull and push messages. The service is requested by citizens when they send message to request for information or services known as pull messages, while with the push messages, information on services and government departments will be given to citizens without being requested by them (Bataineh and Jdaitawi, 2005). When users interact with government websites or agencies, their preference of information would be collected. Then, the government can send the appropriate information according to their needs.

## **Personalized M-Government**

Personalization involves the process of getting the citizens' information online and use that information to provide the services according to the needs and preferences. Personalization is a vital element for mobile application. Although personalization is a new application for m-government, it has been widely used for m-commerce application. Personalization is intended to provide citizens with appropriate information without asking them explicitly of their needs (Lu, Ruan, and Zhang, 2007).

In general, the personalization involves offering services in accordance with the needs and preferences of the citizens. It also refers to the use of information provided by the citizens in producing better designs in products and services that satisfy their needs. According to El-Kiki and Lawrence, personalization allows citizens to customize and produce services that fit to their needs. Many researchers have come forward and reflected that personalization is able to provide the best services to citizens by providing services that meet their needs and preferences efficiently and effectively.

In addition, to encourage the usage of m-Government among citizens, government should provide personalization strategies as it is important to the service-oriented society which can reduce information overload and deliver content and information that is highly relevant to citizens. Personalization is a key success factor for m-Government as it can filter information according to user preferences and track user behaviour.

### **A. Trends in personalized m-Government**

Based on the review of some studies that are related to m-Government, there are various factors that are related to personalized m-Government. The studies refer to: m-Government determinants (Wang et al. 2011); accessing the user needs of m-government (Al-Thunibat, Zin, and Sahari, 2011; Ishmatova, 2007, 2009; Karetsos, 2014); attribute for quality of m-government services (Osman and Osman, 2013); user acceptance of personalization services (Krishnaraju, Mathew, and Sugumaran, 2015); framework for personalized E-Government (Al-hassan, Lu, and Lu, 2009; Tsai, Lin, and Tseng, 2012); implementation of personalized services (Al-Khamayseh et al., 2006; Lu et al., 2010; Ning et al., 2009; Yu, 2010); a hybrid semantic recommendation system (Lu et al., 2010); diffusion of personalized e-Government services (Homburg and Dijkshoorn, 2013); location personalization (Ho, 2012) and the design of personalization system (Kirillov, Shmorgun, and Lamas, 2011; Venkatesh, Chan, and Thong, 2012; Wu et al., 2009). The outcome from literature review is there are limited articles focused on the design of personalization for m-Government services. So, this study acts as a guideline for researchers to implement the attributes for the m-Government environment and to design and develop a personalized system based on user needs.

## **Methodology**

The method adopted in this study is by analysing the articles published during the period 2006 to 2016 and quantitative method. The quantitative method were used, where surveys were distributed at five selected agencies to verify the benefit of m-Government that have found from the literature review. The five targeted agencies which are Malaysian Examinations Council (MPM), Ministry of Domestic Trade, Cooperative and Consumerism (KPDNKK), Ministry of Education (MOE), National

Registration Department Malaysia (JPN), and the Road Transport Department Malaysia (JPJ). To achieve the objective of this study, literature review related to m-Government, benefit of m-Government and personalized m-Government as a main focus were reviewed. However, due to the limited researches related to personalized m-Government, we also considered the researches related to personalized of e-government and m-services to identify the attributes for this study.

The databases used were: Science Direct, IEEE Digital Library, Springer Link, ACM Digital Library and Emerald Insight database. These five databases were carefully selected considering the fact that they were the top databases of the recent published research in the area of m-Government and personalized m-Government. Based on this review, we had to redefine our inclusion and exclusion criteria. Table 1 below shows the inclusion and exclusion criteria. Finally, a total of 28 articles that related to benefit of m-Government and 36 articles that related to personalized m-Government are obtained from five selected databases.

Inclusion Criteria	Exclusion Criteria
<p><b><i>Benefit of M-Government</i></b></p> <p>Articles should have:</p> <ul style="list-style-type: none"> <li>• Contain abstract and full text available</li> <li>• Address the benefit and advantages of m-Government</li> <li>• Focus on benefits of m-Government</li> <li>• Have published between 2006 to 2016</li> </ul> <p><b><i>Attributes for Personalized Services</i></b></p> <p>Articles should have:</p> <ul style="list-style-type: none"> <li>• Contain abstract and full text available</li> <li>• Address the personalization of m-Government</li> <li>• Focus on benefits and the design of personalized m-Government</li> <li>• Have published between 2006 to 2016</li> </ul>	<p>Article focused on:</p> <ul style="list-style-type: none"> <li>• Only contains abstract</li> <li>• Not related to benefit and advantages of services</li> <li>• Studies are not in English</li> <li>• Duplicate studies</li> </ul> <p>Article focused on:</p> <ul style="list-style-type: none"> <li>• Only contains abstract</li> <li>• Not related to personalized services</li> <li>• Studies are not in English</li> <li>• Duplicate studies</li> </ul>

**Table 1.** Inclusion and exclusion criteria

## Result

### A. *Benefit of M-Government*

M-Government services have enabled citizens to interact with government agencies easily and government can be more responsive to citizens' needs and preferences. M-Government provides many benefits to citizens by providing the mobility and ubiquity and ease of use, improving communication and information management, improving services delivery, providing wider accessibility of public service, being more personalized in targeting users, increasing participation and empowerment of citizens, reducing cost of services delivery and providing of location-based government services as shown in Table 2. Citizens are concerned on receiving m-government information easily from the government agencies to achieve the necessary information, make a complaint, the retrieve form and the agency address, make a transaction and ask for emergency management.

The result that related to benefit of m-Government obtained from five selected databases which are Science Direct (7), IEEE Digital Library (6), Springer Link (5), ACM Digital Library (4) and Emerald Insight (6) database. The benefits of m-Government services are shown in Table 2.

Benefit	Source	Frequency
Mobility and ubiquity	(ITU, 2011; Mengistu, Zo, and Rho, 2009; Ntaliani, Costopoulou, and Karetzos, 2008)	3
Ease of use	(Al-Thunibat, Mat Zin, and Sahari, 2010; Hung, Chang, and Kuo, 2013; Mengistu et al., 2009; Ntaliani et al., 2008)	4
Improve communication and information management	(ITU, 2011; Mitrovic and Klaas, 2012; Zamzami and Mahmud, 2012)	3
Improve service delivery	(Al-Thunibat et al., 2010; Mengistu et al., 2009; Wu et al., 2009)	3
Wider accessibility of public service	(Ntaliani et al., 2008; Trimi and Sheng, 2008; Wu et al., 2009; Zamzami and Mahmud, 2012)	4
More personalized in targeting users	(Al-Thunibat et al., 2010; ITU, 2011; Mengistu et al., 2009; Ntaliani et al., 2008; Rossel, Finger, and Misuraca, 2006; Trimi and Sheng, 2008; Wu et al., 2009)	7
Increase participation and empowerment of citizen	(ITU, 2011; Rossel et al., 2006)	2
Reduce cost of services delivery	(Hung et al., 2013; ITU, 2011; Wu et al., 2009)	3
Provision of location-based government services	(Al-Thunibat et al., 2010; Mengistu et al., 2009; Ntaliani et al., 2008; Rossel et al., 2006; Trimi and Sheng, 2008; Zamzami and Mahmud, 2012)	6

**Table 2.** Benefits of m-Government

The survey was conducted to validate the benefits and know the level of use m-Government services among Malaysian citizens. The questionnaires consists of two parts, demographic profiles and the level of use m-Government services. The first part is demographic profiles included age, gender, status, education level, mobile device used, user category and internet access method. The second part is the level of use m-Government covered of government agencies deal, services that have used, frequency of using the services, purposes of using the service, benefit of using m-Government, and awareness of services.

200 surveys were distributed at five selected agencies which are MPM, KPDKK, MOE, JPN, and JPJ. The respondents of the survey were government staffs, private staffs, private sector, students, business partners and public. From the analysis, citizens that age of 18-24 years are shown the highest percentage of using m-Government (28.5%) followed by the age 25-40 years which are 26.5% as shown in Figure 1. The result indicated that the youngster respondents are the mostly used m-Government services because there are exposed of the new technology (Abu Bakar et al., 2015).

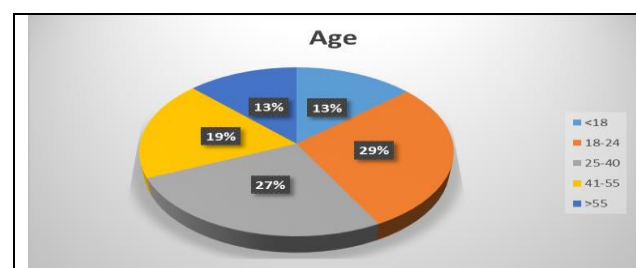


Figure 1: Respondents age

Male respondents (51.0%) are the mostly used m-Government than female respondents (49.0%). Most of the respondents are married (50.0%) shown in Figure 2. For education level, degree holders are the highest percentage of respondents 31.0%, followed by diploma holders 19.5%, STPM 18.0%, SPM 15.5%, Master holders 11.0% and finally PHD holders 5.0%

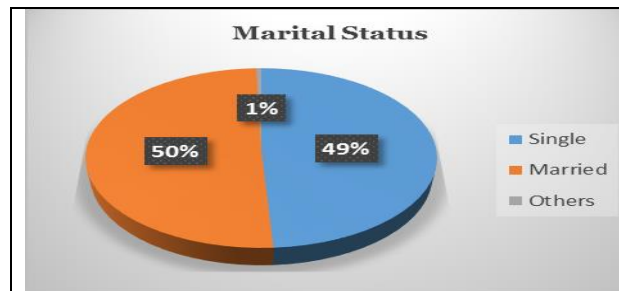


Figure 2: Marital status of respondent's

The device used for searching and getting information from m-Government agencies are by using the mobile phone (63.5%), tablet/Ipad (24.5%) and personal digital assistant (12.0%). Figure 3 shown the user category of using m-Government services which are government staff that stated the highest percentage (29.5%), followed by student (23.5%), private staff (20.0%), public (19.0%), and finally business partner (8.0%). The internet access method used by respondents are wifi (61.0%) and data plan (39.0%) to get the government information.

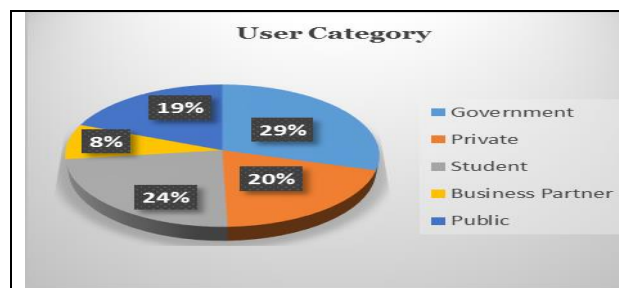


Figure 3: User category of respondent's

The second parts of questionnaire consists of the level of used m-Government services. Citizens are mostly deal with MPM (25.0%), MOE (22.0%), KPDNKK (18.0%), JPJ (17.0%), JPN (16.0%) and others (2.0%) government agencies and mostly respondents that attached on this services are students.

Government have offered four types of services to respondents which are mySMS, myMMS, myUSSD, and myApp. The services that provided to citizen are inquiry, complaint, payment, send application and check application and status. Most of the respondent are used mySMS for checking application (38.2%) and inquiry (35.6%) to government agency. For myMMS, the highest percentage are dealing with complaint service (36.3%), followed by send application (25.0%), inquiry (22.0%), and lastly the same percentage are payment and check application (12.5%). Then, inquiry (29.3%) and check application (25.9%) are the frequently used services by myUSSD application. myApp service, payment are the stated the highest used which are 43.8%, followed by check application (23.4%) as referred Figure 4.

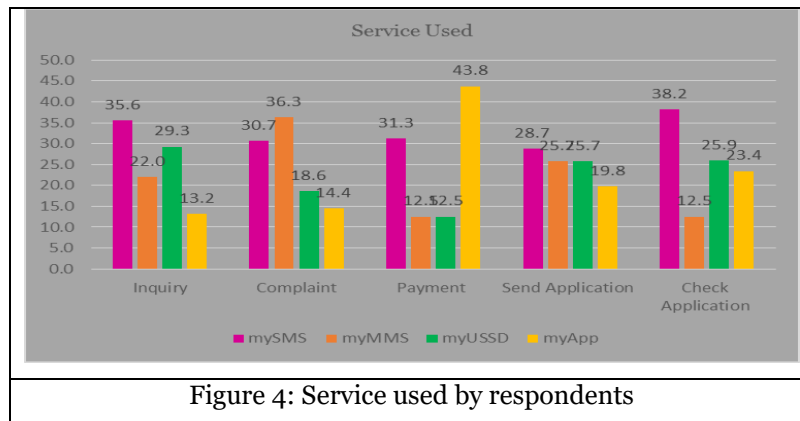


Figure 4: Service used by respondents

For frequently used services, most of respondents are using m-Government services every week which are 42.5%, everyday (29.0%), every 2-3 months (23.0%) and once or twice a year (5.5%). The main purpose of using m-Government are for checking (29.0%) and accessing information (28.5%) from government agencies. Table 3 referred to the benefit of m-Government services, the most suggested benefit that respondents want are the services are ease of use which are 16.0%, followed by more personalized in targeting users (14.0%).

Benefit	N=200	Percentage
Mobility and ubiquity	17.0	8.5
Ease of use	32.0	16.0
Improve communication and information management	14.0	7.0
Improve service delivery	25.0	12.5
Wider accessibility of public service	23.0	11.5
More personalized in targeting users	28.0	14.0
Increase participation and empowerment of citizen	18.0	9.0
Reduce cost of services delivery	22.0	11.0
Provision of location-based government services	21.0	10.5

Table 3: Benefit of m-Government from respondent's perception

Lastly, the respondent awareness of m-Government service also ask in the questionnaires to get the feedback from them. The results obtained were the most of respondents are aware of m-Government services (87.0%) and 13.0% are not aware of the services provided by government agencies.

### ***B. Attributes for Personalized Services***

From the study obtained 36 articles were found related to personalized m-Government from Science Direct (9), IEEE Digital Library (8), Springer Link (8), ACM Digital Library (6) and Emerald Insight (5) database. Some scholars have proposed a number of attributes that should be prioritized for the design of e-Government and m-Government applications Krisnaraju et al., proposed the web personalization for user acceptance of technology in an e-Government context. The important factors to be considered are content, user profile and preferences. Besides, Homburg and Dijkshoorn asserted that, content (information), context (location), and personal information such as interests, preferences, privacy and date (birth and death) are considered to describe the trend of personalization in electronic service delivery in the Netherlands. Personalization of mobile value was added by



Narvekar et al., which identifies a model to analyze the attributes and personalized services offered to the user on a mobile phone the location, user profile such as age, gender, social economic status and preferences are considered.

Additionally, Ho stated that, the information for location personalization should include location, content, user profile and preferences. Furthermore, the personalized attribute for mobile services are content (Ho, 2012; Ning et al., 2009; Osman and Osman, 2013), context (Loeb and Panagos, 2011; Ning et al., 2011; Yeung and Yang, 2010) and user profile (Ho, 2012; Mian, 2010; Narvekar, Ravikumar, and Mantha, 2012; Osman and Osman, 2013). Meanwhile, Ning et al., who studied on services personalization that focused on user centric and simplicity design approach stated that the attributes to be considered for personalized mobile services are location, content, preferences and user profile. The study was carried out by Asif, and Krogstie, which focused on mobile computing and context aware application in mobile student information to provide more user-centric information to students. The personalized attributes that should be considered for that application were location, content, profile, preference, user interface and privacy. On the other hand, the research by Loeb, and Panagos, focused on information filtering and personalization identified location, personal information such as preference and interests that should be taken into account. Besides, there are a little bit of difference for personalized attributes considered by Yeung and Yang, focusing on user profile such as gender, age, occupation status and user category. Most researchers focused on the interests and preferences of user profile.

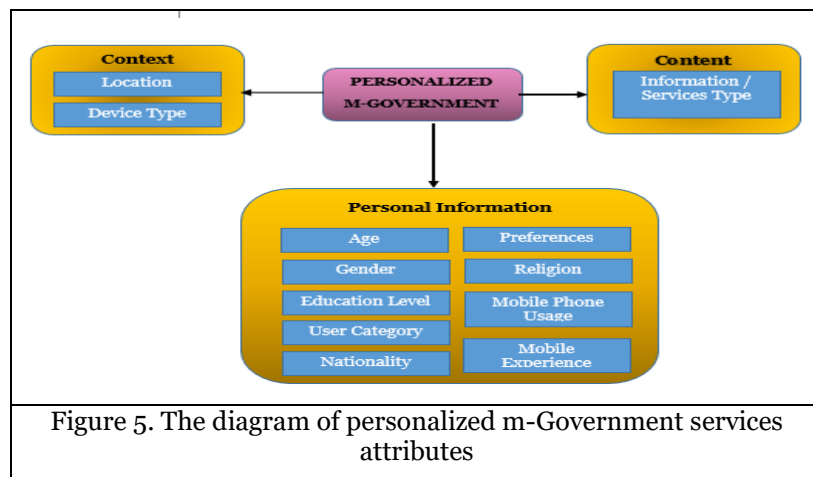
According to the study of personalized e-government and m-Government services by Schmidt et al., Al-hassan and Lu, and also Hassan et al., the attributes to be considered are context (location and device type), content, and user profile including age, gender, interest, preferences, skill level, mobile experience and expertise. The various attributes for personalized m-Government are shown in Table 4.

Attribute	Source	Frequency
• Context		
- Location	(Asif and Krogstie, 2011; Hassan, Jaber, and Hamdan, 2009; Ho, 2012; Homburg and Dijkshoorn, 2013; Loeb and Panagos, 2011; Lu et al., 2007; Narvekar et al., 2012; Ning et al., 2011; Osman and Osman, 2013; Yeung and Yang, 2010)	8
- Device Type	(Hassan et al., 2009; Ning et al., 2011; Xu, Liao, and Li, 2008)	3
• Content (Information)	(Hassan et al., 2009; Ho, 2012a; Krishnaraju et al., 2015; Lu et al., 2007; Ning et al., 2011; Osman and Osman, 2013)	5
• Profile Information		
- Age	(Mian, 2010; Narvekar et al., 2012; Osman and Osman, 2013; Yeung and Yang, 2010)	4
- Gender	(Al-hassan et al., 2009; Mian, 2010; Narvekar et al., 2012; Osman and Osman, 2013; Yeung and Yang, 2010)	5
- User Category/ Occupation	(Al-hassan et al., 2009; Narvekar et al., 2012; Yeung and Yang, 2010)	3
- Interest / Preference	(Adomavicius and Tuzhilin, 2005; Al-Khamayseh et al., 2006; El-Kiki and Lawrence, 2006; Ho, 2012; Homburg and Dijkshoorn, 2013; Ning et al., 2009)	6

- Mobile Experience	(Al-hassan et al., 2009; Mian, 2010)	2
- Mobile Phone Usage	(Al-hassan et al., 2009; Mian, 2010)	2
- Education Level	(Osman and Osman, 2013; Xu et al., 2008)	2

**Table 4.** Compiled chart of personalized m-Government attributes.

Therefore, in Malaysian context, the additional personalized attributes for m-Government services that need to be considered are nationality and religion as displayed in Figure 5. This is because Malaysia has Malaysian citizens and non-citizens, hence government should personalize and give the information based on their needs. As an example, the registration services from National Registration Department is specifically for Malaysian citizens. For the religion attribute, it must be tailored to their religions such as Muslim, Chinese, Indian, Christian or others, so that they can communicate and deal with government agencies easily. MyJAKIM app is appropriate for Muslim religion as they can get the information about prayer time, check the halal products, check the fasting time and iftar time and others.



The result from literature review related to benefits of m-Government and attributes for personalized services are focusing on location and information. For location, government should provide location-based government services to make it easy for the citizens to access information anytime and anywhere. Besides, in terms of information, they want the government to improve communication and information management quickly and the information received should be more consistent and accurate.

## Discussion

From the literature review and data analysis that obtained from 200 respondents at five selected agencies, we can concluded that the benefit of m-Government services are focusing on the content, design, policy and technology. In content aspect, the respondents want government agencies to provide m-Government services that ease of use and improve communication and information management. They also want services that provide more personalized in targeting users in designing the services based on user needs and preferences, and wider accessibility of public service. For policy aspects, government should increase participation and empowerment of citizen and reduce cost service delivery to encourage the usage of m-Government services among citizens. Lastly, for technology aspects, mobility and ubiquity, and provision of location-based government services are the crucial factors to male citizens ease to do transaction and access the information anywhere and anytime.

Furthermore, the attributes for personalized m-Government are also the important aspects that need to be considered to design the m-Government. The personalized m-Government services is new in Malaysian contexts, and they are limited personalized attributes for designing m-Government service in literature review. In Malaysian contexts, the nationality and religion attributes are crucial because of Malaysian citizens have variety of religion and race and they want government to provide services that appropriate for them. Some services are not suitable for other religion for example the myJAKIM services, it is only appropriate for Muslim. Nationality attribute also important to personalized services and will attached at JPN agencies for Malaysian or non-Malaysian citizens.

## Conclusion

This study aims to identify the advantages of m-Government and the key attributes for personalized m-Government services. Literature review from five related databases such as Science Direct, IEEE Digital Library, Emerald Insight, ACM Digital Library and Springer Link were assessed to obtain information and views from researchers related to this study. The benefit of m-Government services are retrieve from literature review and then proof the aspects by distributing the questionnaire survey randomly at citizens in five selected government agencies. The limited researches related to the designs of personalized m-Government services encourage researchers to come out with this study. The literature review focuses on personalized e-government, personalized m-Government and the design of m-government services to contribute in the attributes of personalization m-Government. Under the trend of m-Government in Malaysian contexts, there are 13 factors for personalized m-Government, which consist of three constructs which are content (Information / service types), context (location and device type) and personal information (age, gender, user category, mobile experience, education level, mobile phone usage, religion, nationality, interests/preferences). The key attributes are expected to help the government in designing the personalized m-Government system. Finally, the research result hopes to provide insights and act as a guideline for researchers to study important aspects of the personalization of m-government services that can facilitate the development of m-government services.

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