

An Investigation on the Advantages and Limitations of the Current Mobile Applications for Hajj Services

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Summary

Hajj is the fifth pillar of Islam; a Muslim should perform Hajj at least once per life if he has the capability. Millions of Muslims head to Makkah each year to perform this pillar. The advances in the information and communication technologies coupled with the ubiquitous utilization of smartphones lead to an increase demand for mobile applications that assist the pilgrims in performing different activities smoothly. This research reviews the current mobile applications (apps) for hajj and presents taxonomy of the available apps and their services in helping pilgrims to perform their hajj activities in an effective manner. The research also presents a framework consisting of four categories for evaluating hajj apps namely, provided services, the maps, supported languages, and installation rate. In addition, the research presents a set of criteria within each category. The findings of this research present also the advantages and limitations of utilizing mobile apps for the driven hajj services.

Key words:

Hajj services, Mobile apps, Mobile services.

1. Introduction

Recently, mobile apps are used in most aspects of our daily lives including religion. Digital religion has gained popularity as significant research area in the past two decades. Campbell in [1], explained digital religion as a bridge that links and extends online religious practices and spaces into offline religious contexts, and vice versa.

Hajj is the fifth pillar of Islamic religion and all capable Muslims are requested to perform Hajj at least once in their lifetime. Muslims represent a fourth (23%) of the world's population and approximately 2 million pilgrims perform Hajj every year. The religious duties of Hajj performed in the Holy land of Makkah on the 12th month (Dhul Hijjah) of the lunar Islamic calendar. Every year millions of Muslim pilgrims perform their Hajj duties in the same place and at the same time. They come from different countries with diverse social backgrounds and they speak different languages. These conditions introduce some challenges in their holy journey. Making intentions and wearing Ihram at Miqats are the first steps in Hajj

rituals. On the eighth day of Dhul Hijjah, pilgrims go to a place near to Makkah named as Mina. On the ninth day of Dhul Hijjah, pilgrims go to another place near to Makkah

named as Arafat and stay until sunset. Next, they move to third place near to Makkah named as Muzdalifah. On the tenth to thirteenth days of Dhul Hijjah the pilgrims perform the throwing of stones in place nearby Makkah called Al-Jamarat. Finally, Hajj finishes by accomplishing the farewell circling (Tawaf al-Wadaa) around the holy house (Ka'bah) and leaving Makkah. During the holy journey of Hajj, several rituals must be accomplished at a specific time and at different places [1]. The Umrah is another ritual that could be performed at any time of the year. Pilgrims also visit the city of the prophet Mohammed, peace be upon him (Al-Madinah Al-Monawarah). Figure 1 displays a map of places for performing Hajj rituals.

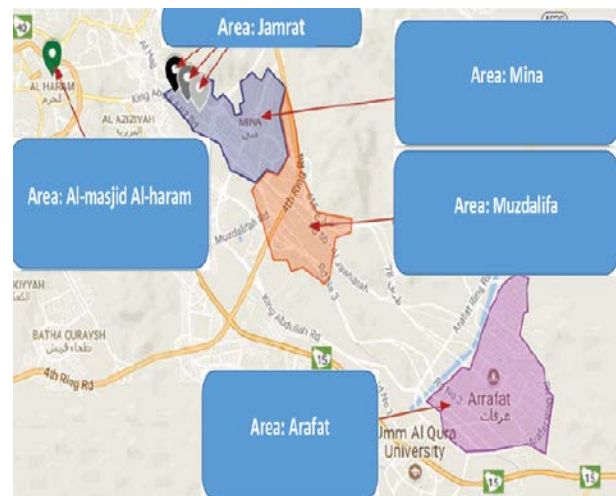


Fig. 1 Hajj areas with approximate boundaries.

As Hajj rituals performed annually by pilgrimages from all over the world with diverse languages at the same time in the same locations, various issues may arise throughout this immense gathering regarding the correctness of the hajj rituals performed by pilgrims. There is significant need for supporting the pilgrims with the potential services to perform hajj rituals correctly and perfectly [2]. The potential services include for example, the intermediate communication between pilgrims themselves and between them and hajj organizers, multimedia illustrations to guide the pilgrims throughout all the ritual places. The ministry

of Hajj in Saudi Arabia have been devoting great efforts to make the hajj an easy journey and assist the pilgrims by all means such as offering hajj guidance booklets in many languages to explain how to perform pilgrimage rituals, road signs using multi-language and language translators. Recently, mobile apps have been used in many aspects of our daily lives. This is due to their advantages they offered and their characteristics of being used anytime and anywhere. For example, there are several mobile apps. For health services [3-6]. In the education field also there are many Mobile apps. [7-12]. Researches also explored the mobile apps for tourism industry [13, 14] and for spiritual and religious services [15, 16].

The new advances in information and communication technologies are utilized during the Hajj season to control and observe the variant Hajj activities; however the advanced capabilities of the smartphone apps could be used effectively to make the Hajj experience easier and safer. However, there is a need for studying and reviewing the current mobile applications for Hajj. The main contributions of this paper are:

- Reviewed the available Hajj apps which aim at helping pilgrims with their Hajj holy journey. These Hajj apps are evaluated based on certain criterion related to their support of pilgrims in performing their hajj rituals.
- Enumeration of the advantages and disadvantages of the available apps for Hajj.

This paper presents a review of the advances and limitations of the current mobile apps for performing Hajj rituals. The paper is organized as follow: section 2 presents the literature review, the used methodology is explained in section 3, results and discussions are shown in section 4. Section 5 concludes the paper.

2. Literature Review

Researchers have developed a number of mobile applications for helping pilgrims performing Hajj and Umrah rituals. Ahmed et al. [17] developed mobile-based applications to assist pilgrims in reading and understanding the different activities and rituals of Hajj and Umrah, by offering a translation of Hajj and Umrah activities and rituals to the pilgrims' language. They also incorporate the voice recognition technology in their developed app, to help pilgrims to recite the supplications correctly while performing all Hajj and Umrah rituals. The authors in [17] also employed the Google speech to text function which needs internet connectivity and does not support the Arabic names, and all of the holy places have Arabic names such as Mina, Muzdalifah and Mount Arafat, so it is a difficult challenge to the function to convert those names.

Akhlaq et al. [18] suggested a framework that is used as a crowd-sourcing platform to specify the pilgrims' requirements for services. Their proposed framework utilizes mobile sensory data to define the user's context. This framework was employed to develop a mobile application for various spatio-temporal services. Zeki et al. [19] proposed a dictionary mobile application to in helping the pilgrims who are Malay language speakers. The proposed app also supports the translation to other languages such as Arabic and English. In [20], Fathi and Kray developed a mobile app to notify pilgrims about the crowd and congestion level nearby the Holy Ka'bah. This app could also be utilized as an automatic counter for the number of rounds in Tawaf around the Ka'bah. Mohamed et al. in [21], developed an android app that offers a step-by-step guide for performing Umrah; starting from preparation at home up until the pilgrimage journey is completed.

Shaout and Shahzeb in [22], proposed ALHajj app which is an interactive guide to help the pilgrims in performing Hajj perfectly, AlHajj app covers all the Hajj activities and supports interactive maps to allow pilgrims to walk through the process of the Hajj in order to get better understanding of Hajj activities and locations. In [23], Al-Aidaros et al., proposed a multi-modal mobile application called the Personal Digital Mutawwif (PDM), the proposed app utilizes the location based services to help pilgrims during all the rituals of Hajj. In addition, it has the capability to display the Arabic text and the translation in Malay language.

3. Approach and Methodology

The research methodology used in this research is explained in Fig. 2. As shown in Figure.2, the research methodology involves three steps:

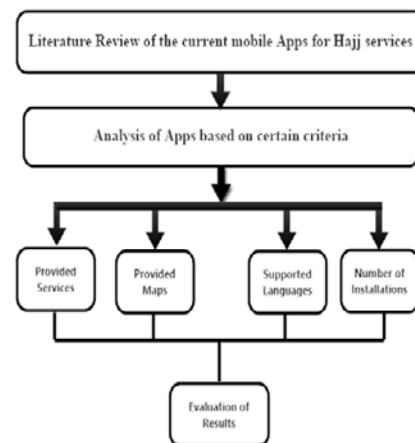


Fig. 2 The proposed methodology.

Section 2 presented the different mobile apps that have been developed for Hajj, and published as research papers in international journals and conferences. Recently, there are many mobile applications for Hajj and Umrah ritual available for use. The focus is basically on studying apps which utilized appropriate methods to achieve easy Hajj rituals and efficiency. Thus, the review of Hajj apps is performed based on the multiple dimensions such as the Offered Hajj and Umrah services, maps, Supported Languages and Installation rates.

4. Results and Discussion

A survey was conducted, for the available different mobile apps that have been deployed for Hajj and published as research papers in the available international journals and conferences. The survey also covered the importance of both Hajj and Umrah apps stored in the Google Play. Table 1 displays the different services provided by the apps covered in this study and the number of apps which share the same service. Next, table 2 shows services in both Hajj and Umrah apps which are developed by researchers.

Table 1: Services provided by the studied Mobile apps

Service abbreviation	Service Name	Number of apps.
S1	Hajj ritual	19
S2	Umrah ritual	18
S3	Supplications	20
S4	Maps	12
S5	Multi-Languages	8
S6	Voice recognition	1
S7	Prayer schedule & timing	8
S8	Weather conditions	4

Table 2: Services in Hajj and Umrah apps developed by researchers.

App	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8
Mobile Doa and Zikir for Hajj (MDZ4H) [17]	Y	Y	Y	X	Y	√	N	N
Towards a mobile and context-aware framework from crowdsourced data[18]	Y	Y	Y	Y	Y	N	N	N
M-Umrah [21]	N	Y	Y	Y	Y	N	N	N
ALHAJJ APP [22]	Y	N	Y	Y	Y	N	N	N
Personal digital mutawwif [23]	Y	N	Y	Y	Y	N	N	N

4.1 Offered Hajj and Umrah Services

Hajj and Umrah services are an important feature for helping pilgrims perform Hajj and Umrah rituals conveniently and correctly, it is also significant for continues learning of pilgrims. Examples for Hajj and Umrah services include the material essential to learn the pilgrim how to perform Hajj correctly step by step , also it includes the motivational messages from the Quran and Hadeeth to guarantee that pilgrims stay inspired and performing Hajj rituals correctly and conveniently. This research presented the different Hajj and Umrah services offered in the studied Hajj apps. As shown in figure 3, the results demonstrate that the supplications service is the dominant service when compared with other services offered by the apps, as supplications service is supported by all of the studied apps, followed by “Hajj ritual” and “Umrah ritual” services with 0.95 % and 0.90 % respectively. Moreover, “Prayer schedule & timing” service have support of 40%. The “weather condition” service is supported by 0.20% of the apps. The “Voice Recognition” service achieved the lost support of 0.05 among the studied apps.

Table 3: Services provided by Apps published in Google app store.

No.	Application Name	Supported Servi	Supported langu	Provider	Number of Downloads	Reviews rate/# Reviewers	Last Update
1	WeSalam	S1, S2, S3, S7		Salam Technolo FZE	100,000-500,0	4.6/12,200	7/8/2019
2	Manasikana	S1, S2, S3, S4, S5, S8	1, 2, 3, 4, 6, 7	Ministry of Hajj & Umrah	50,000-100,0	4.5/520	10/9/2018
3	Mutawef	S1, S2, S3, S4,	1	Madar Softwar	500,000-1000,0	4.8/8,145	8/8/2019
4	Hajj Umrah	S1, S2, S3, S4, S	3, 8	IT Departem t DawateIslami	100,000-500,0	4.9/2,931	3/8/2019
5	Hajj Guide	S1, S2, S3, S4, S	2	Business Autom.	500,000-100,0	4.8/598	30/6/2019
6	Hajj Mabroor	S1, S2, S3, S5	3, 5, 8	Dr. Najeeb M Qa	5,000-10,000	4.9/130	11/5/2016
7	Hajj Help	S1, S2, S3, S4, S	3	App Engineers	5,000-10,000	4.8/50	18/6/2018
8	Navi Hajj	S1, S2, S3, S4,	3	Urbsoft	5,000-10,000	4.5/184	18/9/2015
9	Haj Umrah & Ziyarate Madina	S1, S2, S3	3, 5, 8	Deeniyat Educati and Charitable T	10,000-50,00	4.8/495	26/7/2019
10	Duas for Hajj an Umrah	S1, S2, S3, S4	3	TAKBIR	10,000-50,00	4.6/165	6/2/2018
11	Rehnuma-e-Ha	S1, S2, S3	8	EBMACS	10,000-50,00	4.4/264	9/4/2019
12	Labbaik: Hajj & Umrah	S1, S2, S3, S7,	3,8	Rightclick Softw	10,000-50,00	4.4/30	27/4/2016
13	Smart Hajj	S1, S2, S3	1	Smart Orientati	5,000-10,000	4.6/30	31/7/2019
14	Hajj & Umrah Complete Guid	S1, S2, S3, S4	3	Salsabeel	5,000-10,000	4.4/34	13/6/2019
15	Manasik Hajj an Umrah	S1, S2, S3	1	Al-Reda Apps	100,000-500,0	4.8/878	27/4/2016

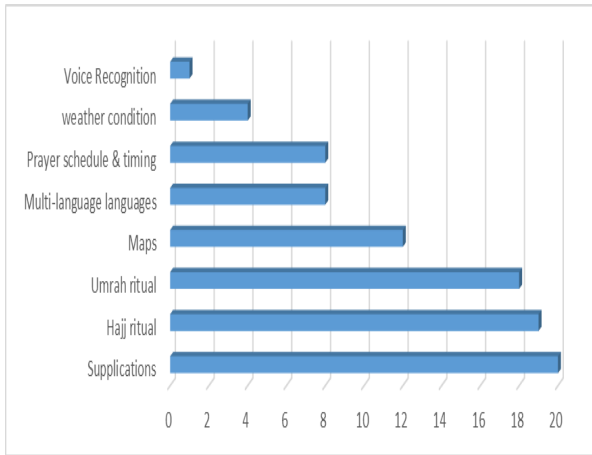


Fig. 3 Statistics of main services offered by studied apps.

4.2 The Maps

Pilgrims can learn more about Hajj activities by walking through the interactive maps. Interactive maps enable the pilgrims to go to each place that need to be visited in the right order. The navigation algorithm uses offline maps stored smartphone applications. The results show that the “map” service is supported by 60% of the studied apps.

4.3 Supported Languages

There are many languages in the Muslims world the studied apps support 8 languages in total, covering the some of the languages used Muslims around the world. The results demonstrate that the “Multi-language languages” service is supported by 40% of the studied apps. Fig. 4 shows that 60% of the studied apps support the English language. The Urdu and Arabic languages are supported by 40% and 27% respectively.

The supported language are numbered as follow:

- 1- Arabic, 2-Bengali, 3-English, 4-French, 5- Hindi,
- 6- Malay, 7- Turkish, 8- Urdu.

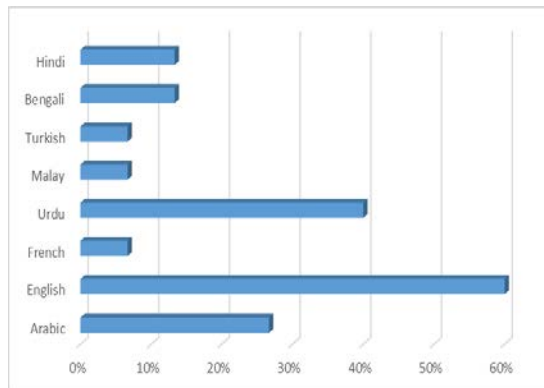


Fig. 4 Percentage rates of the supported languages in studied apps.

4.4 Installation Rate

The number of downloads of the app is an excellent indicator of the usability of the app. The number of downloads depend on many factors such as the provided services and the supported languages. Figure. 5 explains the number of apps categorized by the number of downloads. This figure indicates that most of the apps were downloaded are in the range 5,000 - 10,000 and 100,000- 500,000.

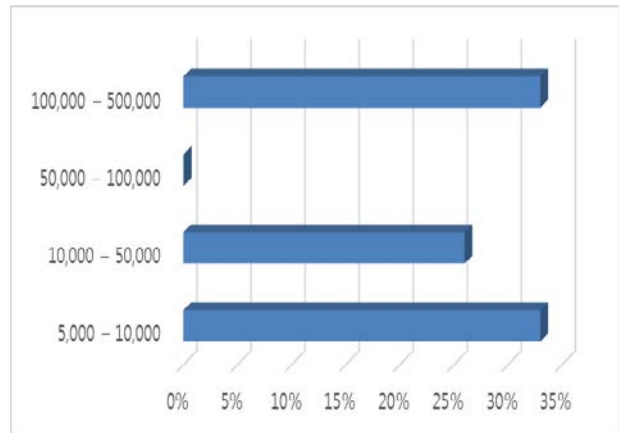


Fig. 5 The number of apps for each downloads scale.

5. Conclusion

Every year millions of Muslims travel to the holy places in Makkah for performing Hajj. There are many mobile apps provide services to help pilgrims to perform Hajj activities properly. This research reviews the currently available apps for Hajj and Umrah services. The findings of this research aims to encourage more researchers to involve in exploring new approaches and methods to help pilgrims by providing an improved mobile based services, to enable them perform the Hajj and Umrah rituals easily and conveniently. Due to the significant benefits offered by the apps to the pilgrims, hajj apps can be integrated with different techniques to offer efficient solutions.

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