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# Evaluation of E-governance Implementation: A Multi-attribute Analysis of E-Government Services Associated with The Annual Hajj Pilgrimage in Saudi Arabia

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**Evaluation of E-governance Implementation: A Multi-attribute Analysis of E-Government**

**Services Associated with The Annual Hajj Pilgrimage in Saudi Arabia**


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**ABSTRACT**

The Hajj pilgrimage is an annual global event in Saudi Arabia. It draws millions of pilgrims worldwide because of its religious significance as the fifth pillar of Islam. Its organization is a massive endeavor for the Saudi government.

This research analyzes the Hajj-related E-Government service systems (websites and mobile apps). This research utilizes a multi-attribute evaluative framework to address two areas of Hajj E-Government services: usability (RQ1) and interaction with the services (RQ2). A combination of heuristic evaluation and survey methods was used.

The heuristic evaluation by three expert evaluators revealed accessibility, interactivity, and functional issues. Users with disabilities or limited digital literacy faced challenges, while the system was ineffective in providing feedback. Functionality issues included confusing menu structures, inconsistent labeling, and unclear search results. Privacy and security concerns were addressed, but presentation issues hindered optimal use.

The survey study with 138 pilgrims found that Hajj pilgrims have an overall positive user experience and acceptance of E-Government services despite moderate satisfaction. The top three most important Hajj services were the accuracy of information, the ability to overcome challenges, and guidance throughout the journey.

These findings suggest that the government can improve E-Government services for Hajj pilgrims by making them more user-friendly and accessible, providing more training and support resources, improving usability through detailed instructions, and continually addressing technical issues by evaluation.

**Keywords**: E-Government services, Heuristic Evaluation, Human-Computer Interaction, Hajj services, Islamic Mass gathering

# CHAPTER 1: INTRODUCTION

## 1.1 Overview of E-Government Services of Hajj

The Internet has radically transformed how individuals, organizations, and governments operate and has become an essential channel for disseminating information, products, and services (Santa 2019). Governments have been able to change the ways that they provide services, moving from using regular paper forms to electronic forms through new technologies. Therefore, government agencies, in search of better ways to operate and deliver improved services to the public, are implementing state-of-the-art Information Systems (IS), commonly referred to as E-Government systems (Park 2007, 150).

Layne and Lee (2001) defined E-Government as "the government's use of technology, particularly web-based Internet applications, to enhance the access to and delivery of government information and services to citizens, business partners, employees, other agencies, and government entities." The Saudi government is developing the Hajj and Umrah services sector, seeking the values that technology adds to this sector and transforming the services into electronic form (websites/ mobile applications). They are investing in technologies to provide high-standard services for the pilgrims. Most of the government's sectors in Saudi Arabia are transforming to electronic government services (E-services). That is reflected positively in the development of traditional and electronic services in Hajj and Umrah services. The E-Government service is "the continuous optimization of service delivery, constituency participation, and governance by transforming internal and external relationships through technology, the Internet, and new media" (Gartner Group 2000). However, developing E-Government services challenges governments to provide the best services in a way that corresponds to the needs and satisfaction of other beneficiaries. Therefore, continuous evaluation

of all services offered is an urgent necessity to keep the beneficiaries fully receiving the required services (Alfadli and Munro 2013, 11; The Economist 2014, Bartels 2002).

**1.2 General Background about Pilgrimage & Hajj**

The religion of Islam consists of five pillars: faith, prayer, fasting, alms/Zakat (giving money to the poor), and Hajj (pilgrimage) (Abuznaid 2006). Hajj is a significant annual event for Muslims from all over the world. It is performed at a specified time every year, during the 8th to 13th days of the twelfth month (Zul-Hijja) of the Muslim lunar calendar. Hajj is the pilgrimage instituted by the Islamic religion, and it is compulsory for all Muslims who are financially and physically able to do so at least once in their lifetime (Utomo et al. 2016). Hajj encompasses several phases that cover material, spiritual, and intellectual aspects (Caidi 2019).

Once they arrive close to Makkah, pilgrims worldwide are bound by several religious duties. They are obligated to carry out several spatial and temporal Hajj rituals. There are various geographic locations where pilgrims must complete the Hajj rituals within a week. The Grand Mosque, Mina, Muzdalifah, and Arafat (three plains in and around Makkah where the pilgrims set up camps for about a week) constitute these spatial zones. Hajj rites must be accomplished within six days; however, there may be occasional time to relax.

The activities that pilgrims engage in over five days, as they undertake the Hajj rites in various spatial areas, are as follows: the first day of Hajj, which is the eighth day of Zulhijjah, is when pilgrims don Ihram clothing and travel to Mina, where they spend the first and second days of the pilgrimage. The pilgrims travel to Mount Arafat early the following morning (day 2 – 9th of Zulhijjah) for a day of reflection and repentance. After spending the entire day in the Arafat area, pilgrims set out on their return trip to Mina after dusk and returned to it after spending the night at Muzdalifah. The pilgrims visit "Jamarat al Aqaba," the first stoning pillar, on the next

day (day 3 - 10th of Zulhijjah), also known as "Yaum Al-Nahr" (the day of Sacrifice), and they throw seven pebbles at it. "Rami-al-Jamarat" is the name of the rite of stoning the Jamarat. The Rami (stoning) must be performed twice daily for the following two days (three times in 3 days). After the stoning ritual, pilgrims have three basic options: sacrifice an animal, visit Masjid Al Haram to conduct "Tawaf" and "Sai," or shave or clip their hair. Pilgrims can still perform these three rites at the Hajj on the remaining days. Although many pilgrims finish these rites on days 4 and 5 (the 11th and 12th of Zulhijjah), due to mobility scheduling, most prefer to undertake these three rituals on the same day (day 3 – 10th of Zulhijjah). While some pilgrims prefer to stay for an additional day, others complete their rites in five days (day 6, 13th day of Zulhijjah).

Felemban et al. (2020) mentioned that Hajj is a ritual journey involving multi-disciplinary fields. A rich body of scholarship on pilgrimage exists from such disciplines as religious studies, anthropology, art, history, architecture, and tourism (Caidi 2019). Hajj and Umrah are essential acts of worship for all Muslims. Hajj's aim and significance have remained unchanged, but its experience has. Pilgrims do all the Hajj rituals in Makkah, but many pilgrims also travel to Medina, north of Makkah, where Prophet Mohammed is buried in his Mosque (Prophet Mosque). A Medina visit is a non-essential part of the Hajj, but millions of pilgrims complete this ritual. Hajj is an example of a heterogeneous, large-scale gathering where most pilgrims participate for the first time and are, therefore, keen to adhere to the ritual's geographical and temporal requirements. The only country that takes care of and hosts Hajj and Umrah is the Kingdom of Saudi Arabia. This is one of the reasons why the government is shifting to e-services to simplify the Hajj for pilgrims.

## 1.3 Saudi and Hajj

The Kingdom of Saudi Arabia is the largest country in the Arabian Peninsula. It lies in the furthermost part of southwestern Asia. It is bordered by the Arabian Gulf, United Arab Emirates, and Qatar in the east; Red Sea in the west; Kuwait, Iraq, and Jordan in the north; and Yemen and Oman in the south. Saudi Arabia hosts the most significant event of mass gatherings among Muslim communities from all over the world. Millions of Muslim pilgrims take the journey to Makkah, Kingdom of Saudi Arabia (KSA), to perform the holy Hajj "Pilgrimage" (Alshenawi 2014). Makkah is a sacred Islamic city in Saudi Arabia's Makkah province that gathers all pilgrims to perform Hajj. The number of pilgrims is growing by about 200,000 people every year (Alshenawi 2014). Millions of pilgrims have been performing Hajj every year, as shown in Table 1. However, due to the precautions instituted during the COVID-19 pandemic, the Saudi government reduced the number of pilgrims to 60,000. In 2022, after two years of the pandemic, the number rose to about 1 million pilgrims. The nationalities of pilgrims (Domestic and International) are from nearly 150 countries worldwide (www.stats.gov.sa).

*Table 1: Number of Pilgrims in the Last Six Years (2017-2022)*

| Year | Total Number |
|------|--------------|
| 2017 | 2,352,122 |
| 2018 | 2,368,873 |
| 2019 | 2,489,406 |
| 2020 | 60,000 |
| 2021 | 100,000 |
| 2022 | 899,353 |

The Hajj event is planned, carried out, and overseen by the Saudi government through the Ministry of Hajj and Umrah and other divisions and ministries. The Ministry of Hajj and Umrah is responsible for offering pilgrims the most excellent services possible from arriving in Makkah until they depart home. The organizers might deal with several administrative issues while considering crowd variety in terms of racial/ethnicity, age, language, and culture, as well as

spatial and temporal restraints (Ahmad et al. 2015; Ahmad et al. 2018). The successful planning and execution of the Hajj event is a top priority for the Saudi government; thus, officials, organizers, and experts are constantly seeking new and improved Hajj control and management methods. Felemban et al. (2020) stated that contemporary issues and solutions develop yearly, which are researched, analyzed, and improved upon the following year (50).

The transformation toward E-Government services in Saudi Arabia in all sectors puts the government under pressure to provide e-services efficiently and effectively. Although Saudi Arabia invests massive funds to use the latest technologies for this transformation, they face many obstacles, including the notable absence of the assessment and evaluation of E-Government services from the user's point of view (Alfadli and Munro 2013). The number of Hajj E-Government services is increasing. However, the assessment and analysis of the E-Government services are still necessary for all aspects (technology, users, and providers) of the E-Government services to address the gaps and problems. The results are likely to help identify factors that influence the users' usage of E-Government services, implement appropriate technology, and simplify and develop the facilities that enhance the experience from the provider side (Alfadli 2015). One of the main points in the literature reviewed is the need to evaluate E-Government services to keep them functional for users continuously.

## 1.4 Significance of the Study

The significance of this study lies in evaluating the Hajj E-Government services in pursuit of critical studies on the subject. First, the researcher chose the core e-services the Saudi government provided through the Ministry of Hajj and Umrah for pilgrims in Hajj rituals. Second, the experts evaluated the usability of these e-services using the criteria retrieved from the literature by three specialized evaluators. Third, the researcher surveyed a representative

sample of pilgrims who have used these E-Government services to learn more about their experience and check the usability level of these provided Hajj e-services. The purpose here is to contribute to the process and help the authorities and decision-makers of the Hajj program by getting the government involved to know more about the usability level of the provided e-services for pilgrims in Hajj. Further, to introduce the pilgrims' point of view about these services to the authorities. Ultimately, this might work as a guide for authorities in developing an enhanced version of E-Government services with higher quality and better usability, which may be implemented successfully considering the pilgrims' perspective, experience level, background, and other concerns this study might discover.

## 1.5 Objective and Research Questions

The objective of the proposed study is to assess the implementation of the e-government services provided for Hajj by evaluating the usability of some of the e-government services offered to pilgrims by the Saudi government through the Ministry of Hajj and Umrah. As the development cycle is rapid in Saudi Arabia, the e-services provided by the government for Hajj are increasing, but they need the evaluation process, which should be mandatory. This study will concentrate on doing that collaboratively with evaluators experienced in usability evaluation and combine that with pilgrims' opinions about the provided services through a survey. The assessment helps to identify and explore the unknown and unnoticeable usability issues in the provided E-Government services for pilgrims that the government may not have noticed.

This study will assess the integrated and implemented E-Government services of Hajj to evaluate the services that the Ministry of Hajj and Umrah provided for pilgrims through heuristic evaluation by experienced evaluators and assess user experience by surveying the pilgrims. In addition, this study will shed light on the usability issues that the heuristic evaluation and

pilgrims survey show on provided Hajj E-Government services. The goal is to ease the process of developing usable E-Government services for the pilgrims.

The proposed study will address the following research questions in two aspects.

*(Usability aspect)*

*RQ1: What are the issues with Hajj E-Government services?*

*(Interaction)*

*RQ2a: What are the motivations for using Hajj E-Government services?*

*RQ2b: How do pilgrims perceive Hajj E-Government services?*

*RQ2c: How do pilgrims experience the Hajj E-Government services?*

Multiple methods, such as heuristic evaluation and survey, are employed to answer these questions.

## 1.6 Definition of Terms

**Hajj:** The Muslim pilgrimage to Makkah that takes place in the last month of the year, and all Muslims who are able physically and financially to do so are expected to make it at least once during their lifetime.

**Mina Valley**: A valley near Makkah where pilgrims perform the ritual of stoning Satan or the Devil on the last day of Hajj. Mina is known for the role it plays during the annual pilgrimage. In Mina, pilgrims stay in tent cities, which the Saudi government has provided to accommodate millions of visiting pilgrims temporarily.

**Muzdalifah:** A valley between Mina and Mount Arafat where pilgrims of Hajj spend the night in open areas. It is where pilgrims gather pebbles to hurl at the Satan pillars of Mina (Ministry of Hajj, 2011b).

**Arafat:** The hill of Arafat, also known as the Mountain of Mercy. It is where the Prophet Muhammad (peace be upon him) gave his last sermon to the Muslims who had accompanied him for the Hajj. Pilgrims need to spend the afternoon on Mount Arafat.

**E-Government Services:** Electronic services (also called Digital government services) are defined as service delivery within government and between government and the public using information and communication technologies.

**Heuristic Evaluation:** An approach to evaluating the design of a given website or app to identify any usability problems that may exist based on the accepted design principles.

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# CHAPTER 2: LITERATURE REVIEW

This chapter is divided into four main sections that review the literature about the E-Government services for this proposed research. The first section shows the research on E-Government services in four subsections: the definition of E-Government, E-Government services, E-Government technology, and E-Government services in Saudi Arabia. The second section reviews the Hajj and technology. The third section covers the social issues relating to Hajj, including social interactions during Hajj, information-seeking behavior, and learning methods for Hajj. The fourth section covers reviewing the evaluation of e-government services in general and in Hajj.

## 2.1 Research on E-Government Services

### 2.1.1 Definition of E-Government

Electronic government (E-Government) is becoming the interest of governments worldwide due to the importance of facilitating and providing services to citizens. According to Layne and Lee (2001), 122-136, "Electronic government refers to government's use of technology, particularly web-based Internet applications to enhance the access to and delivery of government information and services to citizens, business partners, employees, other agencies, and government entities." The World Bank and the United Nations also defined E-Government as "the usage by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that can transform relations with citizens, businesses, and other arms of government." These technologies can serve various ends: better delivery of government services to citizens, improved interactions with businesses and industries, citizen empowerment through access to information, or more efficient government

management. The resulting benefits include less corruption, increased transparency, greater convenience, revenue growth, and cost reductions (United Nations E-Government Survey 2014).

### *2.1.2 E-Government Services*

E-Government, established in the United States of America in 1993, focuses on updating administrative processes to use contemporary information and communication technologies (Almamy 2022). All 193 United Nations Members had their national websites up and running by 2014, and online portals have increased by more than 50% since 2012 (Mustaf et al. 2020). This rise in the number of E-Government websites is expected when the advantages of E-Government are contrasted with the drawbacks of the traditional manner of delivering government services. E-Government services are available to citizens around the clock and only require an active internet connection. E-Government offers benefits that traditional methods cannot match, such as transparency, increased citizen-government contact, cost savings, enhanced service quality, longer service hours, and speed.

E-Government services include government activities over electronic communications among all levels of government, citizens, and businesses to deliver products and services, place and receive orders, provide and obtain information, and complete financial transactions (Al-Nuaim 2011). E-government services transform government, technology, and administrative processes that change how services and information are presented to citizens. Ida and Jansson (2013) mentioned that E-Government services consist of three dimensions:(1) a service, (2) electronic, and (3) public (as contrasted to being private). Basahel and Yamin (2017) classified the relationship between the government and other parties who receive its services into four categories: government to customers (G2C), government to business (G2B), government to government (G2G), and government to its employees (G2E).

Providing the E-Government services efficiently and effectively suggests that governments will gain economies of scale, reduce costs, and provide technology-enabled user services. To achieve these benefits, most governments worldwide are moving toward the transformation of providing their regular services in an electronic form (Bertot 2008, pp.137-142). However, E-Government initiatives are still in the early stages in most developing countries and face many adoption, implementation, and utilization issues. Adoption and utilization levels are fundamental measures of the success of implementing e-government systems. Implementing E-Government services is an iterative process, and the changes are happening rapidly and synchronously with technology development (Bakunzibake et al. 2019, pp.53-73). Successful implementation of Information and communications technologies (ICTs) in government processes and satisfactory usage levels by all government stakeholders are the main goals of E-Government (Alghamdi and Beloff 2016). Many developing countries have been advancing services through e-government and encouraging customers (people) to use these services. Often, this has been a top-down approach, especially in developing countries, instead of evolving by persuasion and traditional ways and means. This has resulted in a significant increase in E-governance, but not necessarily in E-governance that is useful and beneficial to all consumers (Basahel and Yamin 2017).

### 2.1.3 E-Government Technologies

There are many types of technologies for utilizing E-Government services. Although the Internet and computers may be the primary technologies used to frame E-Government services, they are not the only ones. Jaeger and Bertot (2012) identified a variety of technological platforms, including computers, mobile phones, and websites. Sometimes, the government considers how to distribute its services using current technology from its perspective.

Governments use their technology preference as the primary key to providing the services instead of the users' familiarity with these technologies.

Furthermore, the study urged the government to be knowledgeable about the various computer systems, workstations, software programs, and telecommunications to maximize the benefits of the specific E-Government services for the users. The technology serves as a tool to enforce the existing electronic government services rather than as a tool for reform (Kenneth and King 2006). The Cooperation Council for the Arab States of the Gulf has investigated the use of cutting-edge technologies like blockchain and AI for the delivery of governmental, financial, and commercial services, according to the United Nations' 2020 E-Government survey. The importance of ICTs in governance processes cannot be overstated. They can contribute to developing a structured network for service delivery, effectiveness and efficiency, interactivity, accountability, and transparency (Alghamdi and Beloff 2016). Depending on the services they offer customers, several industries employ various technologies and operations.

### 2.1.4 E-Government Services in Saudi

Saudi Arabia's E-Government was founded by Royal Decree No. 7/B/33181, dated September 7, 2003. The Ministry of Communications and Information Technology developed the E-Government. The E-Government Program Yesser was created in 2005 by the Ministry of Communications and Information Technology, the Ministry of Finance, and the Communications and Information Technology Commission (Al-Nuaim 2011). The portal provides about 2500 services to Saudi citizens. The primary objective of the service is to make transactions between citizens, residents, and visitors easier by offering prompt and adequate support. By increasing capacity and efficiency, Yesser also encourages the development of governmental organizations to be sustainable (2022).

Many scholars have researched E-Government in many countries around the Arabian Peninsula. The middle of the twenty-first century's first decade saw the establishment of the Saudi Arabian E-Government (Alghamdi and Beloff 2016).

Researchers in the KSA have studied various aspects of E-Government since its inception. Several obstacles to E-Government adoption in the KSA have been identified, including a lack of IT infrastructure in the public sector, a lack of public awareness of E-Government, a lack of systems to ensure data security and privacy, and a shortage of qualified IT and government service expert personnel (Basahel and Yamin 2017).

E-Government services in Saudi Arabia are developing very fast (United Nations E-Government Survey 2020). The UN Survey noted that Saudi Arabia is among the seven leading Asian countries in E-Government development. It ranks third in E-Government development among the member countries of the Cooperation Council for Arab States of the Gulf (GCC). The E-Government Development Index (EGDI) of Saudi Arabia has moved from highly rated to very highly rated, putting Saudi Arabia among the leading countries in e-government development in the world.

Several studies have discussed the transformation to E-Government services in Saudi Arabia. Basahel and Yamin (2017) mentioned finance, industry, commerce, education, health care, and government sectors. Millions of foreign and local users rely on e-services provided by Saudi Arabia for the Hajj every year. The Kingdom of Saudi Arabia attaches great importance to transforming and delivering its services through E-Government. The 2030 vision of the government strongly emphasizes effective governance and transparency, engagement of all sectors of society, and organization with agility. The implementation of the Saudi E-Government aims to facilitate the interactions and communications between Saudi citizens and government

agencies, as well as between government agencies. To this end, the government has provided many initiatives to overhaul and simplify business processes. To achieve the vision goals, the Saudi Government has published the Unified National Platform, a dedicated source of facilitation and assistance to citizens, residents, business owners, and visitors, offering vast information. The platform is the go-to source for all E-Governmental sources and services. Plus, the Saudi government keeps up with current trends through social media accounts for each government agency, which provides the government with an excellent way of marketing E-Government services and increases the public's awareness about their benefits and potential (Basahel and Yamin 2017). The Saudi Arabian government has started its E-Government program to improve public service delivery, following the global trend (Almukhlifi et al. 2019).

There are now two active E-Government development strategies. The first focuses on using electronic government to deliver specialized public services to residents. The second focuses on improving the efficacy and efficiency of the provision of public services. These objectives resulted in adopting several e-government initiatives, including e-procurement, open data portals, and mobile government. Despite the enormous advancements made in Saudi Arabia's E-Government development, the adoption of E-Government still needs to be improved (Almukhlifi et al. 2019; Basahel and Yamin 2017).

## 2.2 Hajj and Technology

Organizing millions of pilgrims from around the world who gather in Makkah for the Hajj event is difficult. The Hajj audience is diverse in terms of language, age, race, nationality, and culture; as a result, this diversity becomes a challenge for the Hajj rituals to be performed uniformly and effectively. The Hajj event is being carefully planned by the organizers, who also enable researchers to examine cutting-edge approaches and use advanced technology techniques

to raise the caliber of services offered. Felemban et al. (2020) explored the methods to improve the safety and security of the pilgrims during their stay in the KSA. Also, they surveyed the cutting-edge technologies employed for crowd management during previous Hajj activities.

Felemban et al. (2020) mentioned some technologies used for providing E-Government services in Hajj, such as Immersive Technology, Wireless Technology, Computer Vision, Spatial Computing, Social Media, Mobile Application, Big Data Analytics, and Crowd Simulation. These technologies are primarily used for Operation, Monitoring, Planning, and Analysis. Many religiously focused mobile applications are currently available from app shops. Researchers thoroughly analyzed 451 religious apps from the iTunes app store (Campbell et al. 2014). Their research built on Wagner's (2013) work to create a classification scheme for religious applications. They found 11 types of religious apps and divided them into two broad groups: those that focus on spiritual practice and those that incorporate religious content. Sacred textual engagement comprises applications linked to holy books like the Bible and the Quran, and ritual applications, concentrated on accepted religious activities, are two examples of applications centered on spiritual practice. While their study gives academics a place to start when examining religious mobile applications to comprehend how religious goals are incorporated into the design of applications, it also raises the necessity for further research into how users use these programs.

Khan and Shambour (2017) thoroughly analyzed the Hajj-related mobile apps available through the Google Play store. Their study included 246 applications and 51 services. According to their findings, the "Hajj ritual" service constituted the most significant percentage of all the services offered by the applications. There were between 1 and 23 services in the applications. Their findings showed that providers mainly concentrated on creating essential, non-interactive ritual services for the Hajj and Umrah (a smaller-scale pilgrimage). They also discovered that

users' attitudes were the apps were helpful because they could be presentable. The study by Khan and Shambour (2017), which was based on an analysis of applications, primarily focused on the behavioral tendencies of mobile application developers and users.

Alfarraj and Alghamdi (2011) evaluated the web development of government websites in Saudi Arabia to reveal the level of readiness of Saudi government websites. One of the main findings was that the Ministry of Hajj (pilgrimage) needed an online presence. Such an influx of visitors requires comprehensive information and services to facilitate their travel, such as applying for a Hajj Visa or other related services. A website that would provide online services and facilitate information sharing would benefit all Muslims worldwide and the people of Saudi Arabia. The Ministry of Hajj and Umrah improved by moving from no online presence in 2010 to the integrated and complex stage in 2018 and offering the latest, mature electronic services (Alzahrani 2022; Omari 2013). One such improvement, mentioned by Fardoun et al. (2012), is the security control system, which reduces the chance of incidents happening during Hajj. This is done using ICT, image tracking, and pilgrim monitoring to help pilgrims and provide them with all the needed attention effectively and technologically.

**2.3 Social Issues Related to Hajj**

*2.3.1 Social Interactions in Hajj*

Hajj encompasses several phases that cover material, spiritual, and intellectual aspects. Hajj's aim and significance have not altered over time, but the experience of it has. The modern pilgrimage takes place under the shadow of soaring cranes, a sign of Makkah's massive economic and infrastructure development (Shambour et al. 2021). Given that, modern Hajj pilgrims use smartphone apps and Wi-Fi extensively (Felemban et al. 2020). Currently, pilgrims

can tweet, blog, and submit pictures of their Hajj journey as it unfolds. The pilgrims use these tools to stay in touch, record their journey, and carry out their rites.

The pilgrimage (Hajj) is dependent on time and location. The Hajj rituals included a variety of deeds and prayers that were unique to each place and merged into a single set of rites. Timing is essential because pilgrims must spend predetermined lengths of time in each site before moving on to the next, requiring them to perform additional rituals, salutations, and prayers.

Logistics before arrival include a travel agency for the Hajj that the Saudi government has previously approved. The licensed travel agents, also known as Hajj tour operators, Hajj travel guides, or mutations, are in charge of getting their customers' travel visas, making travel and lodging arrangements, and frequently having an imam or a guide on hand to help pilgrims with any queries and to guide them through the rituals (Alshenawi 2014).

Following their arrival at the holy sites, pilgrims continuously encounter new information through their interactions with other people and the environment surrounding Makkah's most sacred sites, as well as through the natural environment (vegetation, temperature), the built environment (buildings, streets, geography), and other participants (Felemban et al. 2020; Caidi 2019).

Hajj is a time and location-sensitive event. Location is critical during the Hajj. One needs to have a thorough awareness of geography and timing. Thus, the pilgrims frequently worry about invalidating their Hajj by failing to adhere to the rituals (Alshenawi 2014).

The sources of information chosen are shaped by this fixation with performing the Hajj "correctly." Pilgrims experience various emotions after deciding to fulfill this religious responsibility, from "Indescribable emotions," enthusiasm, and calm to a variety of mixed

emotions, including feeling overwhelmed, worried, hesitant, anxious, puzzled, and scared (Caidi 2019).

### 2.3.2 Information Seeking Behavior for Hajj

The Hajj information journey begins with the intention of performing the Hajj and comprises logistical, material, spiritual, and emotional preparation. The use of knowledge has mediated and shaped the pilgrims' trip in all of its manifestations (textual, spiritual, physiological, etc.). Pilgrims engaged in various behaviors that shaped cognitive learning both before and during the Hajj, all of which helped them gain a more comprehensive knowledge of the significance of the Hajj in their lives (Majrashi 2018). As pilgrims came to grasp the Hajj landscape, how it affected them, and how they fit in it, information practices associated with pilgrimages became iterative and dynamic, going from the imagined to the experiential and back again (Caidi 2019, Alshenawi 2014).

Information practices among pilgrims typically progress from being generic, nonspecific, and heavily reliant on a few numbers of resources to be explicit, independent, and significantly more complex. Pilgrims need the details of literature on rites, Hajj facilities, geographic locations, and health issues. Along with spiritual, functional, and emotional information, they find gender-specific material (for women) to support Hajj rituals (Caidi 2019).

### 2.3.3 Learning Methods for Hajj

Caidi (2019) mentioned some information resources pilgrims use during the Hajj spiritual journey. The Quran (Islam's holy book) and the Sunnah (the second most important source of authority for Muslims, which encapsulates the practices, customs, and traditions of the Prophet Muhammad) are two of the most critical religious sources that pilgrims could perhaps consult.

Another information source is the personal experience from human sources, typically family members who have performed Hajj before, trusted friends who have also gone to Hajj, imams (community religious leaders), or licensed Hajj travel operators who help pilgrims with the logistics of Hajj. Other resources are the books and guides for the Hajj suggested by imams, relatives, friends, and the internet. In addition to the online reviews of various products and services, Hajj documentaries, government websites, apps, and social media are just a few examples of the electronic resources available (Felemban et al., 2020).

## 2.4 Evaluation of E-Government Services

### 2.4.1 Overview

By analyzing information content and usability, Eschenfelder et al. (1997) described the evaluation of E-Government websites in terms of security, privacy, and information freedom.

According to Huang and Chaob (2001), user-centered design and usability evaluation are essential for E-Government websites. According to Holliday (2002), the usefulness of E-Government websites should be considered, including things like contact information, user feedback from searches, and linkages. Because there is no model, framework, or mechanism for determining if an E-Government service is successful or unsuccessful, Bhatnagar (2004) advises independent auditing and evaluation based on best practices. Bhatnagar continues by saying that media coverage and international recognition are used to measure achievement, yet these entities need to solicit input from the general public. Sakowicz (2003) suggested combining several methods, including online surveys and interviews, to evaluate e-government services. Governments have several challenges, including the conspicuous lack of examination and evaluation of their e-services from the citizen's standpoint. Therefore, developing methods for evaluating their e-services is essential to achieving better outcomes that will increase citizen

satisfaction (Alfadli 2015). Alfadli (2015) also noted that most models developed to evaluate E-Government services are from somewhere other than the citizens' perspective. Instead, they rely on the perspective of governments.

In their 2009 study, Alshawi and Alalwany divided the evaluation of E-Government into three categories: technical, economic, and social. Technical issues include performance measured by the effectiveness of services, tailored information, and services, accessibility measured by the effectiveness of the user interface, accessibility for people with disabilities, and language translation. Economic issues include cost-saving and are measured by money-saving and time-saving. Social issues, which encompass trust in the Internet and trust in government entities, are measured by usability and utility and include openness, measured by quality and transparency. The EGOVSAT model was created by Horan and Abhichandani in 2006 to assess E-Government services based on customer satisfaction. There are two dimensions in the EGOVSAT paradigm (performance dimensions and emotional dimensions). The performance dimensions are utility, dependability, efficiency, customization, and adaptability. The study focuses on how four emotional dimensions—confidence, pleasure, frustration, and satisfaction—affect three dimensions—utility, efficiency, and customization. According to the study, the reliability and flexibility characteristics were eliminated because it was shown that they had little to no influence on the emotional dimensions. The four categories of service, content, system, and organization related to the quality of E-Government services were organized by Papadomichelaki et al. (2006). The study's goal was to develop a high-quality e-government service model. The study defines three factors connected to citizens: website quality (relevancy, accuracy, completeness, appearance, and navigability) and customer service quality (performance, availability, reliability, and security). Even though most nations spend a lot of

money on providing the newest technologies, they encounter several challenges, including the conspicuous lack of assessments and evaluations of E-Government services from the citizens' perspective. Therefore, several sources confirmed the necessity of evaluating e-government services to determine whether governments are achieving the desired goals of their users (Alfadli and Munro, 2013; The Economist, 2014; Bartels, 2002). Evaluation and analysis of the E-Government services were and still are necessary for all the aspects (technology, users, and providers) of the E-Government services to find the gaps and problems. The results are likely to help find factors that influence the user's usage of e-government services, implement appropriate technology, and simplify and develop the facilities that enhance the experience from the provider side (Alfadli and Munro 2013).

### 2.4.2 Evaluation of E-Government Services of Hajj

There have been several analytical evaluations of the Hajj and Umrah systems.

Shambour (2021) presented a multi-criteria evaluation framework to evaluate and improve the usability of services provided by websites that are directly associated with the Hajj and Umrah systems. The study revealed usability issues that visitors to the websites may experience. The evaluation revealed usability errors that users encounter while using the websites. Al-Khalifa (2010) conducted a preliminary review of Saudi Arabian government websites using the W3C's Web Accessibility Guidelines 2.0. The findings show that the Saudi government's websites had several accessibility issues.

Shambour et al. (2018) evaluated several websites that offer Hajj and Umrah services. The authors studied the most famous Islamic websites in terms of visits. According to the evaluation's findings, "Islamweb" and "Ministry of Hajj and Umrah" received the highest scores of 4.13 and 4.07 (out of 5) for their respective websites. The findings also revealed an overall

need for more representation of Islamic websites among the most popular websites worldwide, as determined by a global ranking system that ranks millions of websites in order of popularity (Alexa's world ranking).

Seifali and Fahimifar (2020) examined the visual aesthetic aspects of the top 10 Islamic and Christian websites, including aesthetics, simplicity, color, typography, variety, and homepage image. The findings demonstrated that Christian and Muslim websites have distinctive graphic styles. Majrashi (2018) studied ways to assist the user experience (UX) of religious applications that support the performance of Islamic religious rites during Hajj. According to the study, there has yet to be much research done on mobile applications for the Hajj or other religious purposes by the human-computer interaction (HCI) community. The study focused on the UX of Hajj mobile applications and the utilization and demand for 20 typical mobile application functionalities used to serve pilgrims in Hajj. The offline map was determined to be the most required element through surveys and interviews. The study of the participant reports revealed three main themes: issues with mobile application UX, the significance of application features, and the potential to enhance application UX.

From the analysis, it should be apparent from the previous studies that there are numerous methods for evaluating the user experience of websites. Additionally, the literature studies analyzing the usability of websites that support Hajj and Umrah pilgrims could have been more extensive. This study considers these concerns and contributes by creating a thorough multicriteria evaluation technique to evaluate the usability of the E-Government services of Hajj while taking into account websites and mobile apps that serve the pilgrims.

# CHAPTER 3: METHOD

This chapter is divided into six main sections that illustrate the methodology of this proposed research. The first section explains the study design, mapping research questions with data collection techniques. The second section covers the roadmap of the E-Government services of the Hajj. The third section covers the questionnaire design. The fourth section introduces the heuristic evaluation and presents the evaluators, heuristics, and principles on which the assessment is based. The fifth section offers the instruments that will be used for collecting the data in the proposed research. The sixth section describes the plan for analyzing the collected data for this proposed study.

## 3.1 Study Design

This study will include a combination of questionnaires and heuristic evaluation to evaluate the Hajj E-Government service. Table 2 shows a mapping of research questions with corresponding data collection techniques.

*Table 2: Mapping Research Questions with Data Collection Techniques*

| RQ | Data Collection Techniques |
|---|---|
| **Heuristic Evaluation (Usability)** | |
| *RQ1: What are the issues with Hajj E-Government services?* | Heuristic Evaluation |
| **User Testing (Interaction)** | |
| *RQ2a: What are the motivations for using Hajj E-Government services?*<br>*RQ2b: How do people perceive Hajj E-Government services?*<br>*RQ2c: How are people experiencing the Hajj E-Government services?* | Questionnaire |

Figure 1 shows the overall study plan.
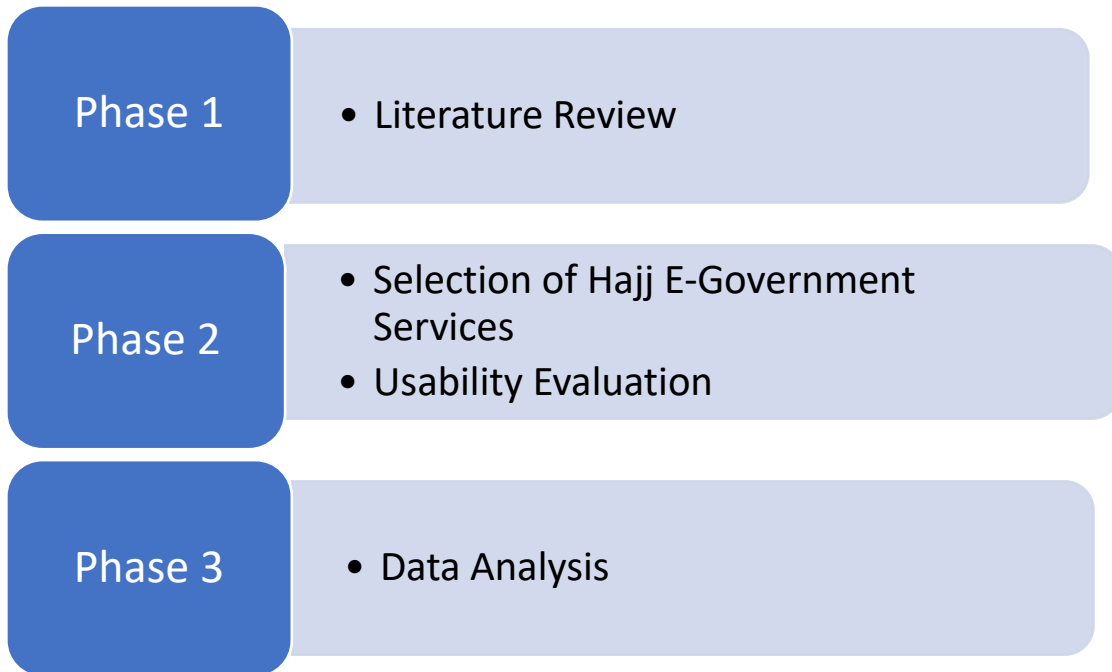
*Figure 1: Overview of Study Plan*

## 3.2 Roadmap for Hajj E-Government Services

Figure 2 shows a roadmap for Hajj E-Government services. It guides the categories of services that each phase of Hajj has. The Saudi government provides services for Hajj in three phases, each focusing on specific services (before, during, and after Hajj). The first impression phase covers all the services pilgrims need before the Hajj starts, such as visas, permits, and vaccination records. The second phase is for the services provided by the government for pilgrims during their six-day journey between Hajj rituals (Arfat, Mina, Muzdalifa, Grand Mosque, and prophet mosque). The third phase is the open information resources that the Saudi government provides for pilgrims to enrich their journey during and after performing the Hajj (Regulations local tourism, news).

**Phase 1: First impression**

Government Services

Pre-Arrival
1. Visa
2. Hajj Permit
3. Covid 19 Vaccination

1.1 Hajj Visa Application
2.2 Reservation and issuance of Hajj permit for citizens and residents.
3.3 Request for Vaccine Approval in the Kingdom.
4.4 Arrival Registration.

Post-Arrival
4. Check-in

**Phase 2: Performing Rituals**

Ritual Sites
5. Grand Mosque & Prophet Mosque
6. Mina
   Arafat
   Muzdalifa

5.1 Information about Mosque.
5.2 GPS map of the Mosque.
5.3 Prayer Time
5.4 Order Local services.
5.5 Live Broadcast.
5.6 Track the crowd.
6.1 Location available services.
6.2 Digital identity for the pilgrim.
6.3 Crowd tracking.
6.4 Food services.
6.5 Map direction.
6.6 Permits.
7.1 Instant Consultation.
7.2 Digital Health Wallet.
7.3 Vaccination Status.
8.1 Emergency Services.
8.2 Communication with safety guards.

Health & Safety
7. Medical care
8. Security services

**Phase 3: Enriching the Experience**

Awareness & Guidance
9. Religious Instructions
10. Regulatory instructions

9.1 Announcement
9.2 News
9.3 Documents Library
10.1 Hajj journey stages and actions.

Government Agencies

G2 (1.1)
G1 (2.2 - 4.4)
G4 (3.3)
G5 (5.1 - 5.6)
G1 (6.1 - 6.6)
G4 (7.1 - 7.3)
G3 (8.1 - 8.2)
G5 (9.1 - 9.3)
G1 (10.1)

**G1.** Ministry of Hajj and Umrah
**G2.** Ministry of Foreign Affairs
**G3.** Ministry of the Interior
**G4.** Ministry of Health
**G5.** General Presidency Of The Affairs Of The Grand Mosque And The Prophet's Mosque

*Figure 2: Roadmap of E-Government Services for Hajj*

## 3.3 Heuristic Evaluation

The heuristic evaluation is a usability engineering method for finding usability problems in a user interface design. It is done by having a small evaluator examine the interface and judge its compliance with recognized usability principles. Heuristic evaluation is a suitable method for finding major and minor user interface problems (Nielsen 1994; Molich and Nielsen 1990). Due to its simplicity and low cost, heuristic evaluation has gained popularity and is frequently employed in usability studies. Heuristic evaluation aims to explain all observed usability problems concerning established usability principles. It is likely easier to generate a revised design for sound, interactive systems according to the guidelines provided by the violated

principle. Also, many usability problems have obvious fixes as soon as they have been identified (Nielsen 1994).

Moreover, it has been confirmed that heuristic evaluation is a very efficient usability engineering method. Therefore, this study used the heuristic evaluation method to assess and discover the usability level of Hajj's selected e-government services. The heuristic guidelines and criteria are adopted from the literature that used them for the same context. The roadmap of the E-Government services of Hajj in section 3.2 is used as a reference for the Hajj services for the evaluators throughout the evaluation process.

### 3.3.1 Evaluators

For the evaluation, three evaluators with experience in communications and information technology were assigned to evaluate the selected E-Government services using the heuristic evaluation criteria proposed by Nielsen and other literature studies. The reason for choosing three evaluators is to overcome the limitations that one evaluator could have. Adding more than one evaluator provided the ability to cover different dimensions through the evaluation and to see the problems from different angles, which enhanced the efficiency and quality of the review. The evaluator goes through the interface several times, inspects the various dialogue elements, and compares them with a list of recognized usability principles (heuristics). Each evaluator will do the evaluation alone to ensure an independent and unbiased assessment from each evaluator. Because the evaluators will be in different places and will maintain formal written documentation of the assessment, the evaluation results will be in the form of a written report from each evaluator.

### 3.3.2 Heuristic Principles

The E-Government services are evaluated through the Heuristic assessment using a checklist adopted from the literature and used for the same purpose. Since the heuristic evaluation was on a domain-specific application (E-Government services of Hajj), the present researcher clarified all the concerns about the domain to ensure the evaluation process went efficiently with respect to the characteristics of the domain. The heuristic checklist is based on Nielsen (1994) and those studies tailored to evaluate E-Government services (Shambour et al. 2021). Table 3 shows the heuristic principles and corresponding inspection questions used in this study.

*Table 3: Heuristic Evaluation Principles and Inspection Questions*

| Principle | Definition | Inspection Questions |
|---|---|---|
| **1. Navigation** | Simplicity on Design and navigation. | 1.1: Easy page navigation and home page access<br>1.2: Getting the information in a few steps<br>1.3: The website/app scope covers the user needs<br>1.4: Easily distinguish fonts, images, videos and links within the website<br>1.5: The locations of buttons, links, and texts are uniform for all webpages<br>1.6: Availability of sitemap<br>1.7: The website/app supports browsing using different screens such as the desktop screen, mobile phones, tablets<br>1.8: logo is visible and usable<br>1.9: Showing the title of current website/app page<br>1.10: Enable search within the website pages<br>1.11: Ability to find the website/app using search engines<br>1.12: Links provided to related website/apps<br>1.13: Enable go up feature |
| **2. Presentation** | Design specifications | 2.1: Meaningful website/app logo<br>2.2: The design of the website/app is attractive and appropriate to the content. |

| | | 2.3: Good classification of topics |
|---|---|---|
| | | 2.4: Simple homepage content |
| | | 2.5: Attractive icons and menu design |
| | | 2.6: Font type and size are appropriate |
| | | 2.7: Attractive colors used on the website/app |
| **3. Functionality** | The function of the services | 3.1: The use of multimedia (text, images, video, etc.) |
| | | 3.2: The use of social media links |
| | | 3.3: The speed of webpage loading |
| | | 3.4: The structure of web design in terms of text, images and video |
| | | 3.5: Enable questions and answers feature |
| | | 3.6: Enable news sidebar and bulletins |
| | | 3.7: Enable advanced search within the website/app pages |
| | | 3.8: Help tool and popup messages |
| | | 3.9: The possible words/suggestion or autocomplete in the search field box |
| | | 3.10: The grammar sentence checker |
| | | 3.11: The support of different browsers |
| **4. Interactivity** | Communication channels | 4.1: Availability of chat options (offline, online) |
| | | 4.2: The support for user feedback |
| | | 4.3: Ability to add comments |
| | | 4.4: Ability to subscribe to the newsletter |
| **5. Accessibility** | Services for all users | 5.1: Number of languages supported by the website/app |
| | | 5.2: Enable text size normalization |
| | | 5.3: Enable color change |
| | | 5.4: Enable reading of website/app contents |
| | | 5.5: Sign language support for the deaf community |
| | | 5.6: Enable video to text transcription |
| **6. Security/Privacy** | Security in the information exchange and in the site navigation. | 6.1: Privacy and Terms of Use |
| | | 6.2: website/app secure connection |

*(Source: Nielsen 1994; Shambour&Alshamrani 2021)*

### 3.3.3 Selected Services for Evaluation

Table 4 shows two selected Hajj E-Government services, which were chosen based on their necessity and importance. They are the only official E-Government resources for guiding and governing the performance of rituals, as shown in phase 2 in the roadmap in Figure 3.

*Table 4: Selected Hajj E-Government Services for Evaluation.*

| Service Provider | Service type | App Name | Description |
|---|---|---|---|
| Ministry of Hajj and Umrah | Website | | The official E-Government service of Hajj that provides guidance, news, announcements, and regulations of Hajj |
| | App | Nusuk | This application provides permit services, pilgrims regulations and guidance during the Hajj and Umrah journey |
| The General Presidency is responsible for the affairs of the Grand Mosque and the Prophet's Mosque. | Website | | Information guidance for Hajj and Umrah and the two holy mosques affairs |
| | App | AlHaramain | This application aims to serve the visitors, pilgrims, and mo'tamren (those who perform Omrah) by providing the guidance in the two holy mosques. |

The above Hajj E-Government services are provided by the Ministry of Hajj and Umrah in Saudi Arabia and The General Presidency for the affairs of the Grand Mosque and the Prophet's Mosque, the main government agencies governing the Hajj and Umrah affairs. All pilgrims, regardless of their nationality, age, education level, gender, or special needs, are willing to use these services, whether they are Citizens, Residents, or Visitors, to perform their rituals. A lot of processes are required to be done using these services by pilgrims throughout performing Hajj rituals so that any usability issue could affect the E-Government service's benefit and ultimately could affect the rite.

### 3.3.4 Procedure

Since the heuristic evaluation will be on a domain-specific application (E-Government services of Hajj), the present researcher of this study will be sure to clarify all the concerns about the domain to ensure the evaluation process goes efficiently concerning the characteristics of the domain. The heuristic checklist is based on Nielsen (1994) and those tailored to evaluate E-Government websites of Hajj, such as Shambour (2021).

The evaluation procedure has different stages. First, the evaluators evaluated the usability of the selected E-Government services in Table 4, following the criteria in Table 3. The second stage is getting the usability issues report ready. The third stage is to rate the usability issues based on each evaluator's severity rating (Nielsen 1994).

The severity rating is focused on three factors:

- The **frequency** with which the problem occurs: Is it common or rare?

- The **impact** of the problem if it happens: Will it be easy or difficult for the users to overcome?

- The **persistence** of the problem: Is it a one-time problem that users can overcome once they know about it, or will users repeatedly be bothered by it?

The following 0 to 4 rating scale can be used to rate the severity of usability problems:

**0** = I disagree that this is a usability problem at all

**1** = Cosmetic problem only: need not be fixed unless extra time is available on the project

**2** = Minor usability problem: fixing this should be given low priority

**3** = Major usability problem: essential to fix, so should be given high priority

**4** = Usability catastrophe: It is imperative to fix this before releasing the product.

The evaluators will receive the list after the actual evaluation sessions, listing the complete set of usability problems discovered and asking them to rate the severity of each problem based on their inspection.

**3.4 Survey**

A survey questionnaire was used to gather data from pilgrims (citizens, residents, and visitors) who had performed Hajj in the last six years. The questionnaire technique can collect data from many participants efficiently and individual participant probing. This technique is needed to facilitate the capture of quantitative and qualitative data. The questionnaire is a more objective research tool that can produce generalizable results. The present researcher will use this technique for data collection in the present study. According to Kendall (2008), questionnaires can provide evidence of patterns among large populations, which would serve this study perfectly since Hajj is considered a mass gathering event (Alshenawi 2014).

The questionnaire was chosen as a data collection technique for the study for three reasons. First, the web-based platforms for questionnaires (e.g., SurveyMonkey) allow researchers to collect data from a large number of participants quickly and inexpensively (Frankfort-Nachmias, Nachmias, and DeWaard 2015). Moreover, participants can complete these surveys at a time that is convenient for them. Second, the questionnaire can be distributed regardless of geographical/physical location. Third, using questionnaires reduces biases that might occur from the personal characteristics of participants (Frankfort-Nachmias, Nachmias, and DeWaard 2015).

### 3.4.1 Participants

The population (N) of this study is pilgrims who performed Hajj in the last six years (2017-2022), the total being (N) = (8,270,000), as shown in Table 1. Pilgrims refer to Citizens, Residents, and Visitors. This six-year period will cover three years before and two years after the pandemic, as shown in Table 1—a total of 138 pilgrims recruited for the study.

### 3.4.2 Survey Distribution

The questionnaire of this study was distributed to pilgrims in two ways. First, the Hajj agency "Motawifs Pilgrims for Southeast Asian Countries" helped distribute the study flyers. Second, A flyer was posted on the Facebook Islamic page "Muscare Group" with around 22,000 followers.

### 3.4.3 Survey Design Matrix

This study seeks the survey user perspective on the motivation, perception, and experience within the E-Government services of Hajj.

The constructs used in this study are inverted from the literature and were adapted to the context of this study. The questionnaire will be designed with six criteria covered by 40 total questions, as Table 5 illustrates. The number of questions will be based on the need to cover all aspects of the research questions so they can be fully answered. The questions indicate the participants' level of perceptions on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree).

*Table 5: Survey Design Matrix*

| Construct | RQ | Questions | Sources |
|---|---|---|---|
| Demographic info | | 1: In which year did you participate in Hajj?<br>2: What is your gender?<br>3: What is your age? | |

| | | 4: What is your nationality?<br>5: What is your education level? | |
|---|---|---|---|
| Motivation | RQ2a | Please indicate your degree of agreement with the following statements. (5-likert scale)<br><br>M1. I use the Hajj E-Government services to gather accurate information about Hajj.<br>M2. I use the Hajj E-Government services to enrich my knowledge about Hajj rituals.<br>M3. I use the Hajj E-Government services to enhance my understanding of Hajj rituals.<br>M4. I use the Hajj E-Government services to increase my ability to overcome challenges on my Hajj journey.<br>M5. I use the Hajj E-Government services to guide me throughout the Hajj journey.<br>M6. I use the Hajj E-Government services to guide me effectively in the ritual places.<br>M7. I use the Hajj E-Government services to enable me to complete the ritual tasks confidently.<br>M8. Overall, the helpful information in Hajj E-Government services motivates me to use them throughout the Hajj journey. | Alkaseasbeh (2019) |
| Perception<br><br>-Usefulness<br><br><br><br><br><br>-Acceptance<br><br><br><br><br><br><br>-Usability | RQ2b | Please indicate your degree of agreement with the following statements. (5-likert scale)<br>The Hajj E-Government services ......<br>USF1. [meet my needs]<br>USF2. [meet my expectations]<br>USF3. [resolve my issues during Hajj]<br>USF4. [direct me effectively throughout the ritual journey.] [are appropriate]<br>When using the Hajj E-Government services ......<br>A1.[I feel safe.]<br>A2.[I trust their information.]<br>A3.[I am familiar with their services.]<br>A4.[I find the answers I am looking for.]<br>A5.[I find the given information is valuable.]<br>A6.[I find the guidance is straightforward.]<br>A7.[I understand all the information clearly.]<br>I feel that the Hajj E-Government services ......<br>USB1. [easy to use]<br>USB2. [very cumbersome to use]<br>USB3. [unnecessarily complicated]<br>USB4. [need more enhancements] | Alkaseasbeh (2019) |

| | | | |
|---|---|---|---|
| -Satisfaction<br><br><br><br><br><br>-Indentation to use | | I am satisfied with ......<br>    S1. [the support from the Hajj E-Government services throughout my Hajj journey]<br>    S2. [the guidance from the Hajj E-Government services in ritual places.]<br>It is likely for me to use Hajj E-Government services ......<br>    I1. [in the ritual places.]<br>    I2. [as the main source of information.] | |
| Experience | RQ2c | E1. I self-taught technology skills before getting involved with Hajj E-Government services.<br>E2. I sought some technical support in order to use the Hajj E-Government services.<br>E3. I learnt to use the Hajj E-Government services quickly.<br>E4. I got assistance through the Hajj E-Government services easily.<br>E5. How would you rate your experience with Hajj E-Government services? | Shambour et al. (2021) |

# CHAPTER 4: Results

In this chapter, the heuristic evaluation results related to RQ1 are reported first, followed by the survey results in the aggregated results corresponding to three research questions presented in terms of motivation, perception, and experience of using the E-Government services of Hajj.

## 4.1 Heuristic Evaluation Results

### 4.1.1 Results for RQ1: Usability

The evaluation results for 43 heuristics to find out the usability issues in the 4 E-Government services of Hajj are shown in Figure 3, which presents the average severity scores of the heuristics for the E-Government app/websites.
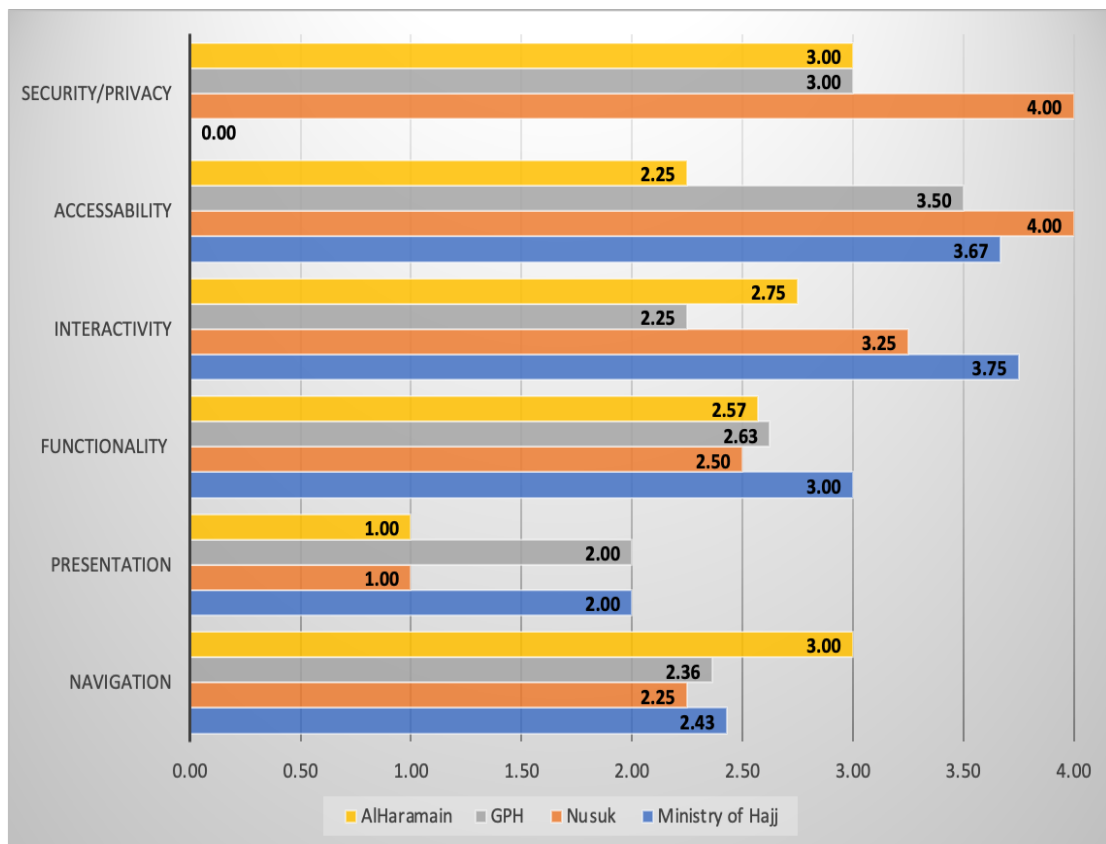


*Figure 3: Heuristic Evaluation Results*

The average usability rate for each aspect of the evaluation is shown in Table 6, ranging from 0 to 4. A score of 0 indicates that the website or app has no usability issues, while a score of 4 predicts an urgent problem that needs to be addressed immediately.

*Table 6: Mean of Heuristic Evaluation Severity Rating (0=no problem,4=catastrophe problem)*

| Heuristics | Website 1 M. of Hajj | Application 1 Nusuk | Website 2 GPH | Application 2 AlHaramain | Average |
|---|---|---|---|---|---|
| Accessibility | 3.67 | 4.00 | 3.50 | 2.25 | **3.35** |
| Interactivity | 3.75 | 3.25 | 2.25 | 2.75 | **3.00** |
| Functionality | 3.00 | 2.50 | 2.63 | 2.57 | **2.67** |
| Navigation | 2.43 | 2.25 | 2.36 | 3.00 | **2.51** |
| Security/Privacy | 0.00 | 4.00 | 3.00 | 3.00 | **2.50** |
| Presentation | 2.00 | 1.00 | 2.00 | 1.00 | **1.50** |
| **Average** | **2.47** | **2.83** | **2.62** | **2.43** | **2.59** |

*Overall Usability*: The average usability severity rates for all the evaluation aspects of Applications and Websites are between (2.43 – 2.83) and below 3, which indicates their usability level. This means that the applications and websites have some major, primarily minor, usability issues that can be fixed.

*Comparison of Usability Among Websites/Apps:* Alharamin app, "Application 2," has the best usability rate of (2.43), followed by the Ministry of Hajj website, "Website 1," with 2.47. Nusuk app (Application 1) has the worst usability rate of (2.83), followed by the GPH website "Website 2," which means that they have more usability issues that need to be fixed.

*Comparison of Heuristic Principles:* Table 6 presents the average scores of the heuristic evaluation for the E-Government services of Hajj across six different aspects. In this evaluation, a smaller number indicates better usability, while a more significant number suggests poorer usability. Among the six aspects evaluated, presentation (1.50) emerges as the most vital aspect with the fewest usability issues across all services. On the other hand, accessibility (3.55) stands

out as the weakest aspect, exhibiting the highest number of usability issues, followed by Interactivity (3.0) and Functionality (2.67). The apps and websites with the lowest usability rates should be prioritized for improvement.

Summary: Website 1 and Application 1, provided by the "Ministry of Hajj," were evaluated for usability. The average severity rate across all evaluation aspects was higher in Website 1 (2.47) than in Application 1 (2.83). This indicates that Website 1 has fewer usability issues than Application 1. On the other hand, Website 2 and Application 2, provided by "The General Presidency for the affairs of the Grand Mosque and the Prophet's Mosque," were also evaluated. The average severity rate for Website 2 (2.62) was higher than for Application 2 (2.43), suggesting that Website 2 has more usability issues than Application 2. When comparing websites and applications overall, it can be concluded that Website 1 (2.47) is more usable than Website 2 (2.62), and Application 2 (2.43) is more functional than Application 1 (2.83). This indicates that the usability level is acceptable for both websites and applications, but there is room for improvement in certain areas.

### 4.1.2 Heuristic 1: Accessibility

The accessibility rate of severity for Application 2 (2.25) is lower than that of Application 1 (4.0), indicating that some minor issues could be addressed in Application 2 to enhance its usability. However, it is crucial to note that the authorities need urgent action to address the accessibility issues in Application 1. With an accessibility rate of 4.0, it suggests that there are significant accessibility barriers within the application that need immediate attention. By fixing these accessibility issues, the usability of Application 1 can be greatly improved, ensuring a more inclusive and user-friendly experience for all users.

For the accessibility of Website 1 and Website 2, both websites have high average accessibility severity rates. Website 1 has an average rate of 3.67, while Website 2 has a slightly lower rate of 3.50. These high rates indicate the presence of significant usability problems that need to be addressed urgently. Given the severity of these accessibility issues, both websites must be given high priority for fixing these problems.

### 4.1.3 Heuristic 2: Interactivity

The interactivity severity rates for Application 2 (2.75) and Application 1 (3.25) provide insights into the level of interactivity within these applications. The lower rate of 2.75 for Application 2 suggests a higher level of interactivity, indicating a more engaging and interactive user experience. On the other hand, Application 1 has a higher severity rate of 3.25, meaning that there are significant issues with interactivity that need to be addressed urgently.

The interactivity severity rates for Website 2 (2.25) and Website 1 (3.75) provide valuable insights into the level of interactivity within these websites. The lower rate 2.25 for Website 2 suggests that it offers a higher level of interactivity, indicating a more engaging and interactive user experience for visitors. However, Website 1 has a higher severity rate of 3.75, revealing significant issues with interactivity that require urgent attention.

### 4.1.4 Heuristic 3: Functionality

The functionality severity rate of (2.50) for Application 1 and (2.75) for Application 2 indicates that both applications have minor usability problems. These problems should be given a low priority for fixing, as they do not significantly impact the functionality of the applications.

Website 1 has a significant usability problem in functionality, as indicated by its functionality severity rate of (3.0). This means that the problem is likely to cause users to have a

negative experience with the website and may even prevent them from using it altogether. Therefore, Website 1 should be highly prioritized to fix this problem.

Website 2 has minor usability problems, as indicated by its functionality severity rate (2.63). These problems are less likely to cause users to have a negative experience, and some users may need to notice them. Therefore, Website 2 can be given a low priority for fixing these problems.

### 4.1.5 Heuristic 4: Navigation

The navigation severity rate of (2.25) for Application 1 and (3.0) for Application 2 indicates that Application 2 has a significant usability problem in navigation, while Application 1 has minor usability problems. Application 2 should be highly prioritized for fixing its navigation problems, as they will likely cause users to have a negative experience with the application. Application 1 can be given a low priority for improving its navigation problems, as they are less likely to cause users to have a negative experience.

The navigation severity rate of (2.43) for Website 1 and (2.36) for Website 2 indicates that both websites have minor usability problems in navigation. These problems should be given low priority for fixing, as they do not significantly impact the functionality of the websites.

### 4.1.6 Heuristic 5: Security/Privacy

The severity/privacy rate of (4.0) for Application 1 and (3.0) for Application 2 indicates that Application 1 has a catastrophic usability problem in security and privacy. In contrast, Application 2 has significant usability issues in security and privacy. Application 1 needs to be fixed and enhanced as soon as possible, as the usability problems in security and privacy are severe and could have serious consequences for users. These problems could allow unauthorized users to access sensitive data, or they could allow users to be tricked into revealing sensitive information. Application 2 also needs to be fixed, but the usability problems are less severe than

in Application 1. Application 2 should be prioritized for improvement, but setting Application 1 is more urgent.

The severity/privacy severity rate of 0.0 for Website 1 and 3.0 for Website 2 indicates that Website 1 has no privacy and security issues, while Website 2 has significant usability problems in severity/privacy. Website 1 does not need to be fixed, as it has no usability problems that could impact the confidentiality and security of users.

Website 2 needs to be fixed as soon as possible, as the usability problems in severity/privacy are severe and could have serious consequences for users. These problems could allow unauthorized users to access sensitive data, or they could allow users to be tricked into revealing sensitive information.

### 4.1.7 Heuristic 6: Presentation

The presentation severity rate of 1.00 for both Application 1 and Application 2 indicates that they have cosmetic problems only in the presentation aspect. These problems can only be fixed if extra time is available on the project**.**

The presentation severity rate of 2.00 for both Website 1 and Website 2 indicates minor usability problems in the presentation aspect. These problems should be given low priority for fixing, as they do not significantly impact the presentation of the websites**.**

## 4.2 Survey Results

### 4.2.1 Demographic Results

Table 7 shows the result of demographic information with 138 respondents. First, (80%) were performing Hajj between (2017-2022), and (20%) were outside that range. Second, more males (70%) than females (30%) participated in the study. Third, the age of the majority of

participants (38%) was (35-44) years old, while (3%) were above 65 years old, and (20%) were

form (25-34) and (45-54) years old, and (9%) of the participants were from (18-25) and (55-64).

Fourth, the nationalities of the participants were (54%) the Middle East, which made up the

majority of the sample, (16%) Europe, (14%) Asia, (9%) Africa, and (8%) America. Fifth,

almost more than half of the participants (57%) have Bachelor/Associate degree (18%), Ph.D.

(17%), or Master's; the majority have undergraduate/graduate degrees (92%), about (8%) have

primary, intermediate, and high school were the minority.

*Table 7: Results of Demographic Information*

| Measure | Item | N | % | Chart |
|---|---|---|---|---|
| Years: Hajj | 2017<br>2018<br>2019<br>2020<br>2021<br>2022<br>Other | 24<br>18<br>22<br>13<br>8<br>25<br>28 | 17%<br>13%<br>16%<br>9%<br>6%<br>18%<br>20% |  |
| Gender | Male<br>Female | 97<br>41 | 70%<br>30% |  |

| | | | |
|---|---|---|---|
| Age | 18 - 24<br>25 - 34<br>35 - 44<br>45 - 54<br>55 - 64<br>65 > | 12<br>28<br>53<br>28<br>13<br>4 | 9%<br>20%<br>38%<br>20%<br>9%<br>3% |



| | | | |
|---|---|---|---|
| Nationality | Asia<br>Africa<br>Europe<br>America<br>Middle East | 19<br>12<br>22<br>11<br>74 | 14%<br>9%<br>16%<br>8%<br>54% |



| | | | |
|---|---|---|---|
| Education | No Education<br>Elementary<br>Middle School<br>High School<br>BS/Associate<br>Master<br>Ph.D. | 1<br>3<br>1<br>7<br>78<br>23<br>25 | 1%<br>2%<br>1%<br>5%<br>57%<br>17%<br>18% |



## 4.2.2 Reliability Results

The reliability tests of three main survey constructs and five sub-constructs were conducted. All eight constructs reached an acceptable reliability (Cronbach's Alpha > 0.70). Each construct was reported in Table 8.

*Table 8: Reliability Results of the Survey Constructs4.2.3 Results for RQ2a: Motivation*

On the Overall motivation scale, the higher the response values are, the more positive pilgrims' overall motivation is for using the E-Government services of Hajj. As shown in Figure 4, the average scores of all eight questions were at a high level (around 3.42–4.04 on the 5-Likert scale: 1=strongly disagree, 5=strongly agree), which indicated an overall positive motivation for using the E-Government services of Hajj. In particular, the top three items were: use the Hajj E-Government services to gather accurate information about Hajj mean = (4.04); use the Hajj E-Government services to increase the ability to overcome challenges on the Hajj journey mean = (3.68); use the Hajj E-Government services to guide throughout the Hajj journey mean = (3.62).



*Figure 4: Result of Hajj Motivation*

### 4.2.4 Results for RQ2b: Perception

**Perception: Usefulness**

The average scores of all five questions for the E-Government usefulness were at a middle level (around 3.33–3.58 on the 5-Likert scale), which indicated an overall positive usefulness of the E-Government services of Hajj as shown in Figure 5. In particular, the top three

items were: appropriate mean = (3.58); meet the pilgrims' need mean = (3.52); direct the pilgrims effectively throughout the ritual journey mean = (3.51).
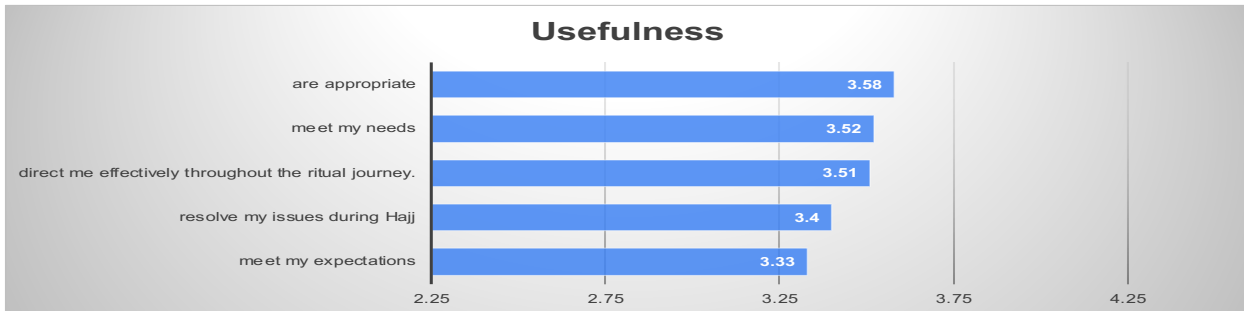


*Figure 5: Result of Usefulness Perception of Hajj E-Government Services*

**Perception: Usability**

The scores of usability questions in Figure 6 showed (around 2.68 – 3.8 on the 5-Likert scale) positive and negative values; therefore, the negative questions were marked with stars. Ease to use mean = (3.62), indicating positive ease to use for Hajj's E-Government services. The need for more enhancement showed a negative sign with a high mean (3.8), which means that the E-Government services need more enhancement. The other two questions about the usability of the E-Government services, unnecessarily complicated mean = (2.72) and very cumbersome to use mean = (2.68), are low, showing positive signs for the E-Government services of Hajj. All in all, the usability level is tremendous and needs more enhancement.
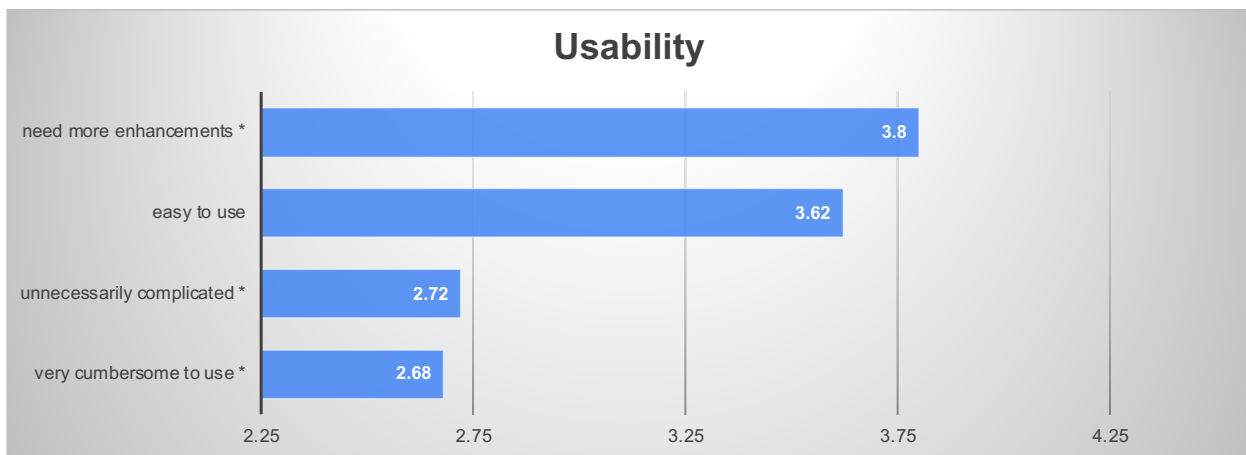


*Figure 6: Result of Usability Perception of Hajj E-Government Services*

**Perception: Acceptance**

The average scores of all seven questions for the acceptance of E-Government were high (around 3.34 – 4.07 on the 5-Likert scale), which indicated an overall positive acceptance of the E-Government services of Hajj, as shown in Figure 7. In particular, the top three items were trust the hajj information mean = (4.07), feel safe mean = (3.9), and find valuable information mean = (3.55).
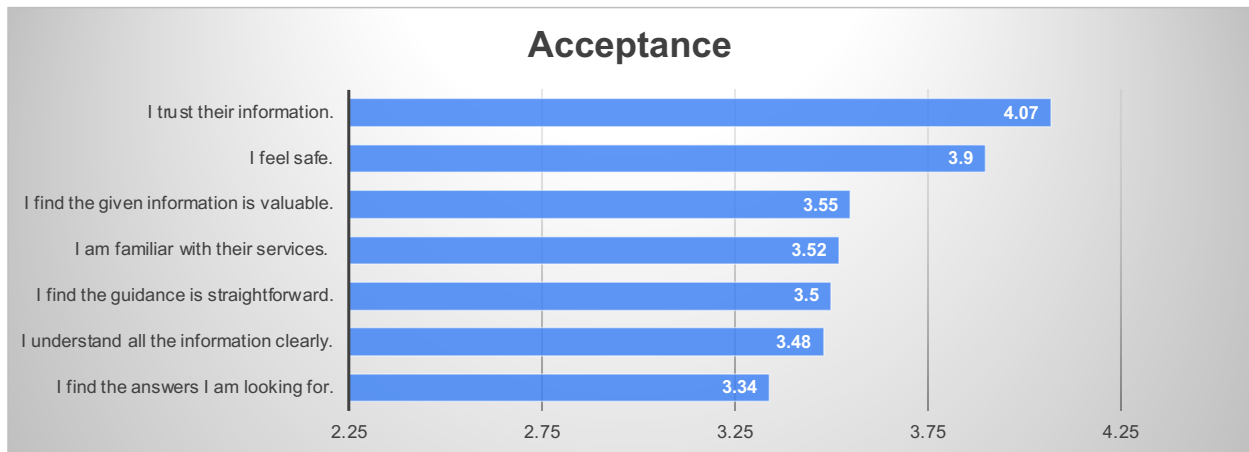


*Figure 7: Result of Acceptance Perception of Hajj E-Government Services*

**Perception: Satisfaction**

The average scores of all two questions for the E-Government satisfaction about the E-Government services were at the middle level (around 3.49 – 3.45 on the 5-Likert scale), which indicated an overall positive satisfaction of the E-Government services of Hajj as shown in Figure 8. In particular, both items were appropriate: the guidance from the Hajj E-Government

services in ritual places mean = (3.49); the support from the Hajj E-Government services = (3.45).



*Figure 8: Result of Satisfaction Perception of Hajj E-Government Services*

**Perception: Intention to Use**

The average scores of all two questions for the E-Government satisfaction about the E-Government services were at the middle level (around 3.42 – 3.70 on the 5-Likert scale), which indicated an overall positive intention to use the E-Government services of Hajj as shown in Figure 9. In particular, both items were appropriate: the intention in the ritual places mean = (3.70); as the primary source of information = (3.42).
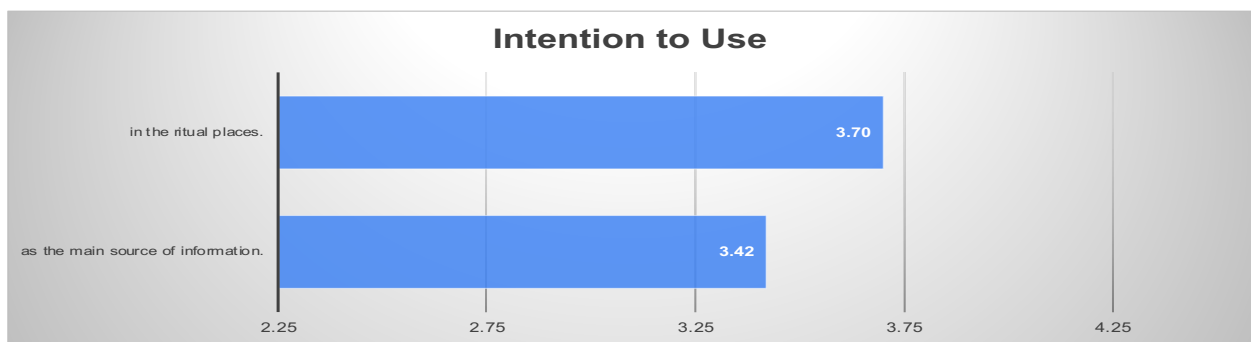


*Figure 9: Result of Intention to Use of Hajj E-Government Services*

### 4.2.5 Results for RQ2c: Experience

As shown in Figure 10, the average scores of three questions were high. The other two questions are a bit low (around 2.49–3.70 on the 5-Likert scale), which indicated a positive experience with using the E-Government services of Hajj for some aspects even with the low

mean in the question that presents overall great experience. In particular, top three items were: rate the experience with Hajj E-Government services mean = (3.70); learn to use the services quickly mean = (3.69); get the assistance easily mean = (3.10); with low mean (2.70) and (2.49) that presents that the E-Government of hajj did not need high effort to be learnable or technical effort with the regular users who are not have advance experience in technology.
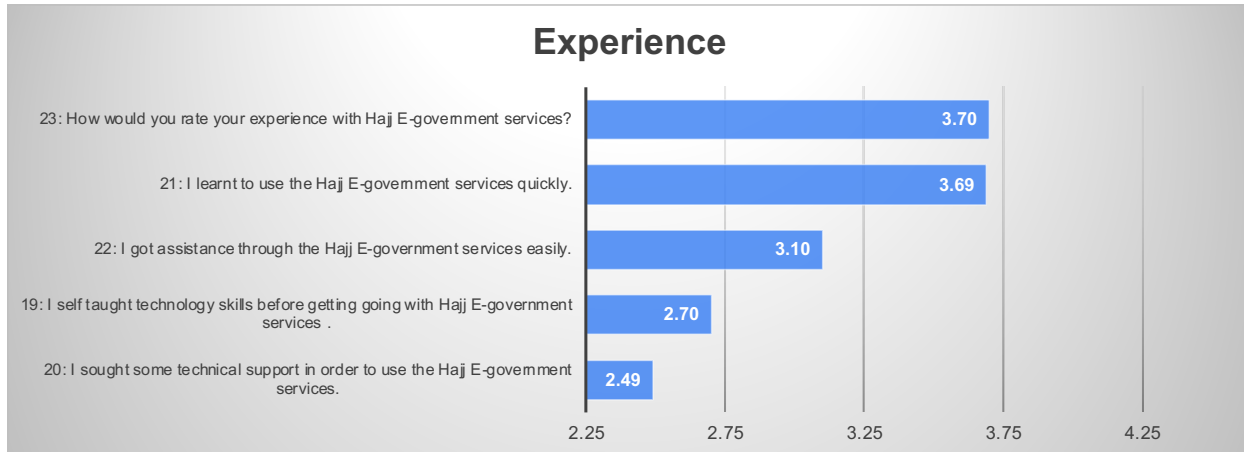


*Figure 10: Result of Experience with Hajj E-Government Services*

### 4.2.6 Inferential Analysis Results

To understand whether pilgrims' citizenship (citizen, non-citizen) and sex (male, female) have differences in their motivation, perception, and experience of using the E-Government services, a T-test has been conducted. Results showed significant difference of motivation citizen > non-citizen: $t(136)=2.20$, $p<.05$). In addition, it showed no difference on perception between citizens and not-citizens $t(136) =4.0$, $p<.001$). However, it presented a significant difference in the experience citizen > non-citizen: $t(136) =4.59$, $p<.001$). Table 9 illustrates the descriptive analysis data for citizens' and non-citizens' motivation, perception, and experience.

*Table 9: Comparison of Hajj (Motivation, Perception, Experience): Citizen vs. Non-citizen*

|  |  | N | Mean | Std. Deviation |
|---|---|---|---|---|
| Motivation | Citizen | 57 | 4.08 | 1.03 |
|  | Non-Citizen | 81 | 3.29 | 1.19 |
| Perception | Citizen | 57 | 3.77 | 0.68 |
|  | Non-Citizen | 81 | 3.22 | 0.95 |
| Experience | Citizen | 57 | 3.51 | 0.84 |
|  | Non-Citizen | 81 | 2.87 | 0.79 |

Figure 11 shows the difference between citizens and noncitizens on the motivation, perception, and experience of using E-Government services of Hajj. Citizens are highly motivated to use E-Government services, and their experience with E-Government services is better than that of non-citizens. The perception of the E-Government services is near each other, so there's not much difference.
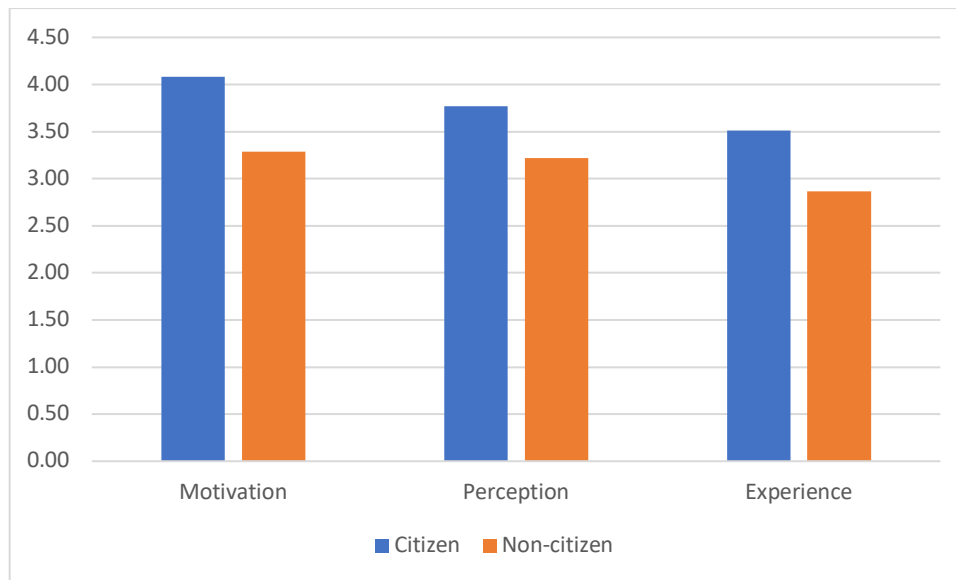


*Figure 11: Comparison of Using Hajj E-Government Services: Citizen vs. Non-citizen*

Table 10 illustrates the descriptive data for the pilgrims' gender motivations, perceptions, and experiences. Motivation is partly more significant for males than female (t (136) = 0.044, *p<.05),*

*and perception has no difference between males and females (t (136) = 0.213, p>.05).*

*Experience is partly significant for males than female (t (136) = 0.046, p<.05).*

*Table 10: Comparison of Hajj (Motivation, Perception, Experience): female vs. male*

|  | Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Motivation | Female | 41 | 3.3506 | 1.26189 | 0.19707 |
|  | Male | 97 | 3.7294 | 1.14773 | 0.11653 |
| Perception | Female | 41 | 3.352 | 0.91598 | 0.14305 |
|  | Male | 97 | 3.484 | 0.87349 | 0.08869 |
| experience | Female | 41 | 2.942 | 0.9146 | 0.14284 |
|  | Male | 97 | 3.214 | 0.84323 | 0.08562 |

Figure 12 illustrates the slight difference between males and females in the motivation and experience of using the E-Government services of Hajj, but there is no main effect on perception.
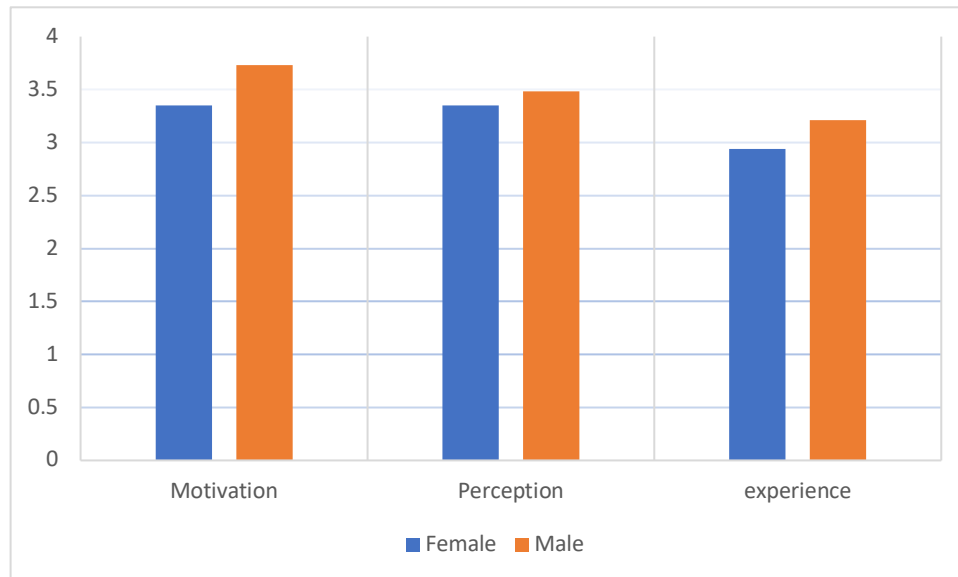


*Figure 12: Comparison of Using Hajj E-Government Services: female vs. male.*

**CHAPTER 5: Discussion**

This chapter discusses the current study's findings in the context of previous studies on evaluating e-government services, as reviewed in Chapter 2. It discusses the results of the four research questions for this study. It also discusses the current research findings from the perspective of previous research.

**5.1 Research Questions Results Discussion**

This section discusses the four research questions for this study according to the results in Chapter 4 for each method.

***5.1.1 RQ 1: What are the issues with Hajj E-Government services?***

The usability evaluation of E-Government services for Hajj is crucial in ensuring that the digital platforms and applications designed to facilitate the pilgrimage experience are user-friendly and efficient (Nielsen Norman Group 2019). The evaluation aims to identify the usability issues and gather feedback from users to help improve the overall experience. The usability evaluation of E-Government services for Hajj provided valuable insights into the strengths and weaknesses of the digital platforms and applications. By addressing the findings from the evaluation, such as improving user-centered design, enhancing accessibility features, optimizing performance, and ensuring robust security measures, the E-Government services for Hajj can offer a seamless and satisfactory experience for all pilgrims.

One critical finding from the usability evaluation is the importance of a user-centered design approach (Alfadli, 2015). The evaluation revealed that some E-Government services needed intuitive navigation and clear instructions, leading to user confusion. This highlights the need for a

user-centered design process that involves gathering user requirements, conducting usability tests, and incorporating user feedback throughout the development cycle.

Another significant result of the evaluation was the need for improved accessibility features. Hajj attracts millions of pilgrims from diverse backgrounds, including individuals with disabilities or limited digital literacy. The evaluation identified challenges these users face in accessing and using E-Government services effectively. It is crucial to incorporate accessibility features such as screen readers, text-to-speech functionality, and language options to cater to a broader range of users (W3C 2023).

Furthermore, the evaluation highlighted the importance of performance optimization. During peak times, when many users access E-Government services simultaneously, there were slow loading times and system crashes. These issues can significantly impact user satisfaction and hinder their ability to complete essential tasks online. Therefore, robust infrastructure and scalable systems are necessary to ensure smooth performance during peak periods (UN DESA 2022).

Additionally, security concerns emerged as a significant finding from the usability evaluation. Users expressed apprehension about sharing personal information on E-Government platforms due to potential data breaches or identity theft. Addressing these concerns requires robust security measures such as encryption protocols, secure authentication methods, and regular security audits (Capgemini 2022).

The results of a heuristic evaluation for the usability of E-Government services of Hajj focus on accessibility, interactivity, functionality, navigation, privacy and security, and presentation. These relate to evaluating the four services (Application 1, Application 2, Website 1, and Website 2) with an average severity score of 1.50 to 3.5 out of 4.

**Heuristic 1 Accessibility:** The evaluation highlighted accessibility concerns in the evaluated services. Users with disabilities or limited digital literacy faced difficulty accessing and using the services effectively. It is essential to incorporate accessibility features such as screen readers, text-to-speech functionality, and language options to cater to a broader range of users. Providing alternative text for images and ensuring proper keyboard navigation is also essential for improving accessibility.

**Heuristic 2 Interactivity:** the findings from evaluating the interactivity aspect of E-Government services for Hajj are concerning, as they suggest that these services are not currently meeting users' needs.

One of the most significant findings is that the systems evaluated are not considered responsive and that user action feedback is unavailable. This is especially important during the Hajj season when many users access the services simultaneously. With responsive feedback, users may become satisfied and continue the services.

Another significant finding is that the evaluated systems do not provide adequate feedback mechanisms. This means that users need help understanding what the system is doing or why it is responding in a certain way. This can lead to confusion and frustration.

Users also have limited control over their interactions with the system. The ability to customize settings is limited, navigation is not always easy, and the undo or correct actions feature is only available in some services. This lack of control can make it difficult for users to complete tasks efficiently and effectively.

Although the services work well in multiple channels, such as web platforms and mobile applications, collaboration, and social interaction features are limited. There are links to these features, but no built-in channel, such as chat support, exists in any of the evaluated services. This

lack of collaboration and social interaction features can make it difficult for users to get help from others or to share information and experiences.

**Heuristic 3 Functionality:** the evaluators assess various aspects to ensure an effective and efficient user experience. Here are some key considerations and findings related to usability functionality from evaluations conducted by experienced evaluators:

Navigation and Information Architecture: Evaluators analyze the website's navigation structure and information architecture to determine if it is intuitive and easy to navigate. Findings include confusing menu structures, inconsistent labeling, or a lack of clear paths to the desired information. Improving navigation through clear labeling, logical grouping of content, and intuitive menu structures can enhance usability functionality.

Search Functionality: Evaluators assessed the effectiveness of search features within the website. Findings included issues such as irrelevant search results, poor search result ranking, or a lack of advanced filtering options. Enhancing search functionality by implementing relevant algorithms, providing advanced filtering options, and improving result relevance can improve usability functionality.

Forms and Data Entry: Evaluators examine the website's forms and data entry processes. Findings included issues such as complex or lengthy forms, unclear instructions, or validation errors hindering users from completing tasks efficiently. Simplifying forms, providing clear instructions and validation messages, and minimizing the number of required fields can enhance usability functionality.

Error Handling and Feedback: evaluators assessed how well the website handles errors and provides user feedback. Findings included vague error messages, a need for more guidance on resolving errors, and confirmation messages for successful actions. Implementing clear error

messages with actionable guidance and providing feedback for user actions can improve usability functionality.

Performance and Loading Times: Evaluators assess the website's performance, including loading times and responsiveness. Findings may include little delayed loading times for some services, unresponsive interactions, and excessive use of server requests. Optimizing website performance by minimizing file sizes, optimizing server response times, and caching resources can enhance usability functionality.

**Heuristic 4 Navigation:** The heuristic evaluation identified issues with navigation in the four evaluated services. Evaluators reported difficulties finding specific features or information due to inconsistent or confusing menu structures and labels. To address this, it was assessed through the consistency and intuitive navigation system across all services. Some labels were not Clear and descriptive, which is essential for allowing users to locate desired functionalities easily.

**Heuristic 5 Privacy and Security:** Privacy and security emerged as significant findings from the heuristic evaluation. Evaluators expressed concerns about sharing personal information on the E-Government platforms. To address these concerns, it is crucial to implement robust security measures such as encryption protocols, secure authentication methods, and regular security audits. Clear privacy policies and transparent data handling practices should also be communicated to users to build trust.

**Heuristic 6 Presentation:** In terms of presentation, the evaluation revealed issues related to visual design and layout. Poor readability was a common finding due to small font sizes or low contrast between text and background colors. This can make reading and comprehending the content challenging for users, especially those with visual impairments or older adults. It is crucial to prioritize legibility by using appropriate font sizes, contrasting colors, and ensuring adequate

spacing between elements. Additionally, cluttered interfaces were identified as a usability issue. Simplifying the interface by prioritizing essential information and removing unnecessary elements can improve user comprehension.

Indeed, the study found that the Hajj E-Government services have fewer usability issues in the presentation than in the functionality aspects. This means the services are generally easier to look at and understand but more challenging to use than possible. The study also found that these usability issues prevent pilgrims from using the services optimistically. This is a significant problem, as pilgrims may need to learn important information or services that could help them have a better experience.

### 5.1.2 RQ 2: What are the motivations for using Hajj E-Government services?

The demographic section of this study formed the foundation for understanding where the respondents' information needs stemmed from. The study surveyed 138 pilgrims. Most pilgrims (80%) performed Hajj between 2017 and 2022. More male (70%) than female (30%) pilgrims participated in the study. Most pilgrims (38%) were between 35 and 44 years old. Most pilgrims (54%) were from the Middle East. Most pilgrims (92%) had an undergraduate or graduate degree.

The findings of this study suggest that Hajj pilgrims have an overall positive motivation for using E-Government services.

The top three items on the Overall Motivation scale were:

- Use the Hajj E-Government services to gather accurate information about Hajj.
- Use the Hajj E-Government services to increase the ability to overcome challenges on the journey.
- Use the Hajj E-Government services to guide you throughout the Hajj journey.

These findings suggest that Hajj pilgrims are primarily motivated to use e-government services to obtain accurate information about Hajj and overcome challenges on the journey. This is likely because Hajj is a complex and demanding pilgrimage, and pilgrims want to be as prepared as possible.

The findings of this study are significant because they provide insights into the motivations of Hajj pilgrims for using E-Government services. This information can be used to develop and improve E-Government services that are more responsive to the needs of Hajj pilgrims.

### 5.1.3 RQ 3: How do people perceive Hajj E-Government services?

**Perception: Usefulness**

The findings of this study suggest that Hajj pilgrims perceive the usefulness of E-Government services to be at a moderate level.

The top three items on the E-Government Usefulness scale were:

- Are appropriate.

- Meet the pilgrims' needs.

- Direct the pilgrims effectively throughout the ritual journey.

These findings suggest that Hajj pilgrims perceive E-Government services as appropriate, practical, and effective. However, there is room for improvement, as the average scores on the E-Government Usefulness scale were lower than those on the Overall Motivation scale.

This suggests that Hajj pilgrims are motivated to use E-Government services, but they sometimes need to perceive these services to be as valuable as they could be. This may be due to several factors, such as technical difficulties, usability issues, or a need for more awareness of the full range of available services.

The findings of this study are significant because they provide insights into the perceptions of Hajj pilgrims regarding the usefulness of E-Government services. This information can be used to develop and improve E-Government services that are more useful and effective for Hajj pilgrims.

**Perception: Usability**

The findings of this study suggest that the usability of E-Government services for Hajj is generally favorable. Still, there is room for improvement—the results indicate that Hajj pilgrims perceive E-Government services as relatively easy to use and incomplete. Overall, the findings of this study suggest that the usability of E-Government services for Hajj is generally positive, but there is room for improvement. Hajj pilgrims perceive E-Government services as relatively easy to use, but they believe these services could be improved.

**Perception: Acceptance**

The findings of this study suggest that Hajj pilgrims have a high overall acceptance of E-Government services.

These findings suggest that Hajj pilgrims trust the information provided by E-Government services, feel safe using these services, and find the information provided by these services to be valuable. This is likely because E-Government services are offered by the government of Saudi Arabia, which is a trusted institution. Additionally, E-Government services are designed to be user-friendly and secure.

The findings of this study are significant because they provide insights into the acceptance of E-Government services by Hajj pilgrims. This information can be used to develop and improve E-Government services that are more acceptable to Hajj pilgrims.

**Perception: Satisfaction**

The findings of this study suggest that Hajj pilgrims have an overall moderate level of satisfaction with E-Government services.

The results indicate that Hajj pilgrims are generally satisfied with the information provided by E-Government services and feel safe using these services. However, the average scores on the E-Government Satisfaction Scale were lower than those on the E-Government Acceptance scale. This suggests that Hajj pilgrims are more accepting of E-Government services than they are satisfied with them.

This may be due to several factors, such as the fact that E-Government services are still relatively new and that there is room for improvement. For example, some Hajj pilgrims may have experienced technical difficulties or usability issues when using E-Government services. The findings of this study are significant because they provide insights into the satisfaction of Hajj pilgrims with E-Government services. This information can be used to develop and improve E-Government services that are more satisfying to Hajj pilgrims.

**Perception: Intention to Use**

The findings of this study suggest that Hajj pilgrims have an overall positive intention to use E-Government services.

The results indicate that Hajj pilgrims generally intend to use E-Government services in the ritual places and as their primary source of information. However, it is essential to note that these scores are lower than those on the E-Government Acceptance scale or the E-Government Satisfaction scale.

This suggests that Hajj pilgrims are more accepting of and satisfied with E-Government services. However, the issue remains whether they will likely use them. This may be due to several factors, such as the fact that E-Government services are still relatively new and that there

is room for improvement. For example, some Hajj pilgrims may need to be made aware of all available E-Government services or find some services that could be more challenging to use.

The findings of this study are significant because they provide insights into the intention of Hajj pilgrims to use E-Government services. This information can be used to develop and improve E-Government services that are more attractive to Hajj pilgrims and encourage them to use them.

### 5.1.4 RQ 4: *How are people experiencing the Hajj E-Government services?*

The findings of this study suggest that Hajj pilgrims have a positive overall experience with E-Government services, but there is room for improvement in some areas. These findings suggest that Hajj pilgrims generally find E-Government services to be easy to use and can get the assistance they need when they need it. However, the E-Government Experience scale suggests that there is room for improvement in terms of the overall experience of using E-Government services. Therefore, as results show, Hajj pilgrims may need help learning E-Government services and may require a lot of technical effort. This is likely due to several factors, such as the complexity of some of the services or the need for more specialized expertise of some Hajj pilgrims. The findings of this study are significant because they provide insights into the experience of Hajj pilgrims with E-Government services. This information can be used to develop and improve E-Government services that are more user-friendly and accessible to Hajj pilgrims.

The study found through the inferential analysis of the data from RQ2a, RQ2b, and RQ2c that there is a significant difference in motivation and experience between citizen and non-citizen pilgrims, with citizens having higher motivation and better experience than non-citizens. There is also a slight difference in motivation and experience between male and female pilgrims, with

males having higher motivation and better experience than females. Still, there is no main effect on perception.

**5.2 Current Research Findings and Previous Studies**

Alfaries (2013) investigated the accessibility of a representative sample of top Saudi Government services and their compliance with WCAG (web content accessibility guideline) recommendations, as well as their usability based on expert reviews. In analyzing the four main principles: perceivable, operatable, understandable, and robust, he notes none of the services have been achieved in level AAA. The study suggested the developer adhere to the existing international accessibility standards and usability guidelines, adopt them to match their context, and follow a continuous assessment model to improve the limitations. The E-government services also need to spread awareness and emphasis on the neglected features to deliver accessible websites for all citizens and residents, especially for those with disabilities.

Alfadli (2015) identified the E-Government evaluation models based on previous research and studies and evaluated each model by identifying its attributes and factors. The study concentrated on evaluating online services provided to citizens by governments. The research then developed a citizen-centered model to evaluate E-Government services.

Shambour (2021) evaluated two websites provided for Hajj (the Ministry of Hajj) and (the general presidency of Haramain) using the heuristic evaluation and questionnaire. The researcher did the assessment individually, and the questionnaire was sent to 38 participants to measure their level of satisfaction while using the websites. The criteria he used for the evaluation was Nielson usability heuristics.

This study follows the same approach as (Shambour 2021). The evaluation was done on two essential apps and two websites given to pilgrims during Hajj by the Saudi government

authorities. I am using two methodologies: heuristic evaluation for usability tests and a survey for user experience.

The study used a mixed-methods approach since there is no one-size-fits-all approach to E-Government service evaluation, as stated by the United Nations E-Government Survey (2020). This involved using quantitative (survey) and qualitative (heuristic evaluation) methods to collect data. A quantitative method was used to determine the pilgrims' motivation, perception, and experience of using the E-Government services of Hajj. A qualitative method is used to test the E-Government's usability to understand user experiences, identify areas for improvement, and gather feedback on specific features or services, as Al-Shammari and Irani (2016).

E-Government service evaluation aims to improve the user experience (United Nations E-Government Survey 2020). Therefore, the present study involved users in the evaluation process and in surveys to determine the issues from the user perspective (expert evaluators) and user motivation, perception, and experience (pilgrims).

The present study aims to help with the government's evaluation results to determine the current issues and improve E-Government services for Hajj end users (pilgrims). To do this, the experts evaluated usability problems in the selected E-Government services of Hajj to help government agencies identify and prioritize the most critical issues to fix. Fixing usability problems can help to achieve more user-friendly, enjoyable, and satisfying e-services for Hajj pilgrims. Moreover, this can lead to cost savings, improved efficiency, and increased adoption of E-Government services. Adding to a better user experience when using E-Government services, reduced frustration for users, more efficient task completion, and improved access to E-Government services for people with special needs, as stated by the World Bank (2012) and the United Nations E-Government Survey (2020).

Shambour (2021) evaluated the usability of two websites related to the Hajj and Umrah system. The MHU website was more usable than the GPH website. Still, both websites have areas for improvement, especially in providing all the information and services that users may need and fixing usability errors.

The current study used criteria from previous studies (Shambour 2021) and (Nielsen 1994) to test the usability of two websites and two mobile apps related to the Hajj and Umrah systems. The apps and websites had good overall usability, but there were some areas for improvement. The apps and websites with the lowest usability scores should be prioritized for improvement. Accessibility was the weakest area, followed by interactivity, functionality, and presentation. This means that the apps and websites could be made more accessible for people with disabilities, and the navigation and features could be improved. Overall, the apps and websites are usable, but there is room for improvement. The researchers recommend that the developers focus on improving accessibility and interactivity.

From the pilgrim's perspective, this study surveyed 138 pilgrims worldwide, men and women with different education levels and ages. Overall, they are motivated to use E-Government services for Hajj because they are accurate. Pilgrims find these services useful, easy to use, trustworthy, and satisfying. They would also be willing to use these services in ritual places. However, there is still room for improvement in these services. Overall, pilgrims have a positive experience with E-Government services for Hajj.

This study improved on previous studies by using three experienced evaluators to evaluate multiple criteria on websites and mobile apps and survey a more diverse group of pilgrims. This makes this study a more comprehensive and up-to-date evaluation of the usability of E-Government services for Hajj.

# CHAPTER 6: Conclusion

## 6.1 Summary

This study aims to evaluate Hajj E-Government services of Hajj from different perspectives, including those of experts and users. The goal is to enrich the literature and support government decision-making by identifying usability issues and user experience.

In other words, the study found what is good about the services and what could be improved. It also tries to identify any usability problems that could be improved for people to use the services.

These findings suggest that the government should focus on improving the motivation and experience of non-citizen and female pilgrims. For example, the government could provide more training and support resources to help these pilgrims learn how to use the E-Government services, and they could also make the services more user-friendly and accessible.

The study also found that Hajj pilgrims have an overall positive motivation and acceptance of E-Government services. However, the usability and satisfaction of these services are still at a moderate level, and there is room for improvement. The top three items that Hajj pilgrims found to be most important are the accuracy of the information provided, the ability to overcome challenges, and guidance throughout the journey. The study also found that Hajj pilgrims perceive the E-Government services as easy to use and that they can get the assistance they need when needed. However, some Hajj pilgrims may need help learning these services, and they require a lot of technical effort to use them.

The findings of this study suggest that the government can improve the E-Government services for Hajj pilgrims by focusing on the following areas: Making the services more user-friendly and accessible, particularly for pilgrims with limited technical expertise. Providing more

training and support resources to help Hajj pilgrims learn how to use the services. Improving the usability of the services, such as by making them easier to navigate, providing more detailed instructions, and addressing any technical issues preventing Hajj pilgrims from using the services effectively. By improving the E-Government services for Hajj pilgrims, the government can make it easier for pilgrims to access the information and assistance they need, leading to a better experience for all involved. Table 11 presents the summary of this research.

*Table 11:Research Summary*

| Evaluation Method | Aspects Assessed | Key Findings/Insight |
|---|---|---|
| *Heuristic Evaluation (Usability)* | Accessibility | Users with disabilities or limited digital literacy faced challenges. The research recommends incorporating screen readers, text-to-speech, language options, alternative text for images, and improved keyboard navigation for enhanced accessibility. |
| | Interactivity | Research recommendation include the evaluation indicates a lack of responsiveness and feedback mechanisms in the assessed E-Government services for Hajj. Users may experience frustration and confusion due to limited control and inadequate collaboration features. Recommendations include improving system responsiveness, enhancing feedback |

| | | mechanisms, providing customization options, and implementing collaboration features. |
|---|---|---|
| | Functionality | Research recommendation include Evaluators identified usability challenges related to navigation, search functionality, forms, error handling, and performance. Recommendations include improving navigation structure, enhancing search features, simplifying forms, providing clear error messages, and optimizing website performance for a better user experience. |
| | Navigation | Research recommendation emphasize Navigation issues, including inconsistent menu structures and unclear labels, were identified in the evaluated services. Recommendations emphasize the need for a consistent and intuitive navigation system across all services, along with clear and descriptive labels for improved user understanding. |
| | Presentation | Research recommendation include visual design and layout issues, such as poor readability and cluttered interfaces, were highlighted. Recommendations include prioritizing legibility |

| | | through appropriate font sizes and color contrast and simplifying interfaces for improved user comprehension, especially for users with visual impairments or older adults. |
|---|---|---|
| | Security /Privacy | Privacy and security concerns arose from the evaluation, emphasizing the need for robust security measures, encryption protocols, secure authentication methods, and transparent communication of privacy policies in or Research recommendation include der to build user trust. |
| *Survey* | Motivation | Overall positive motivation among Hajj pilgrims for using E-Government services. Top motivations include obtaining accurate information, overcoming Hajj challenges, and guidance throughout the journey. This insight is crucial for developing responsive services aligned with pilgrims' needs |
| | Perception (Usefulness) | Moderate perception of E-Government services' usefulness. Pilgrims find services generally appropriate, meeting their needs and directing them effectively. Opportunities exist for improvement, possibly related to technical |

| | | |
|---|---|---|
| | | difficulties, usability issues, or lack of awareness of available services. |
| | Perception (Acceptance) | High overall acceptance of E-Government services. Pilgrim's trust, feel safe, and find value in the information provided. Trust in the Saudi Arabian government and user-friendly design contribute to this acceptance. |
| | Perception (Usability) | Research recommendation include generally positive perception of E-Government service usability, with room for improvement. Pilgrims find services relatively easy to use but believe enhancements are possible. Recommendations include refining usability for a more seamless user experience. |
| | Perception (Satisfaction) | Moderate satisfaction with E-Government services. While pilgrims are generally satisfied, scores are lower than acceptance scores, indicating potential for improvement. Insights include technical difficulties, usability issues, and the evolving nature of E-Government services. |
| | Perception (Intention to Use) | Overall positive intention to use E-Government services, with pilgrims intending to use them in |

| | | ritual places and as a primary information source. Slightly lower scores compared to acceptance and satisfaction suggest room for improvement and increased awareness. |
|---|---|---|
| | Experience | Positive overall experience with E-Government services. Pilgrims find services generally easy to use, but improvements are needed in certain areas, such as difficulty in learning and lack of technical expertise. This insight is valuable for enhancing user-friendliness and accessibility. |
| *Integrated Analysis* | Correlations between methods | The heuristic evaluation results, highlighting usability issues in E-Government services for Hajj, correlate with survey findings. While the heuristic evaluation focuses on specific aspects and severity scores, the survey provides broader insights into user motivation, experience, perception, and satisfaction. |
| *Recommendations* | Areas for Improvement & enhancement | Identified areas for enhancement in E-Government services for Hajj encompass usability refinements in the evaluated e-services, improvements in interactivity responsiveness, implementation of accessibility features like screen readers, enhancements in navigation, |

| | | search, forms, error handling, performance, and strengthened privacy and security measures. Additionally, prioritizing legibility and simplifying interfaces are highlighted for a more user-friendly and accessible experience. |
|---|---|---|
| *Conclusion* | Overall Assessment | The overall assessment of E-Government services for Hajj indicates a positive motivation among pilgrims, moderate perceptions of usefulness and usability, high acceptance, and a moderate level of satisfaction. While there is room for improvement in specific areas such as usability, interactivity, and accessibility, the findings highlight a generally positive intention to use along with overall positive experiences. The identified areas for improvement and potential enhancements align with user-centered design principles, fostering transparency, accountability, and continuous improvement in the services. |

## 6.2 Conclusion

In conclusion, evaluating the E-Government services of Hajj using surveys and heuristic evaluation has provided valuable insights into various aspects. The study and heuristic evaluation findings shed light on several important aspects.

Firstly, the study revealed common issues users face when utilizing E-Government services of Hajj, particularly difficulties navigating through complex processes and accessing relevant Hajj information. These insights can guide future enhancements to ensure a smoother user experience.

Secondly, the evaluation revealed that convenience, time-saving benefits, and accessibility were among the primary factors motivating users to utilize these digital services. Understanding user motivation to use E-Government services is crucial for improving future system services. By addressing users' barriers or concerns, authorities can further encourage participation and engagement.

Thirdly, participants' perception of E-Government services was generally positive. Users appreciated the convenience and efficiency offered by digital platforms but expressed concerns about data security and privacy. Addressing these concerns through robust security measures and transparent communication can enhance user trust and confidence.

In summary, using surveys and heuristic evaluation of Hajj's e-government services provides valuable insights into issues, user motivation, perception, and experience. By addressing the problems identified, adopting a user-centric approach, and continuously improving the services, authorities can enhance the overall user experience and ensure the successful adoption of these services for pilgrims.

**6.3 Limitations**

When considering the opinions of 138 pilgrims about the usability of Hajj E-Government services, there are several limitations to keep in mind. These limitations include:

1) Sample Size: While 138 pilgrims may provide valuable insights, it is essential to note that this sample size may not represent the entire population of Hajj pilgrims. These individuals' opinions and experiences may not fully represent the diverse range of motivations, perceptions, and experiences among all pilgrims.

2) Self-Selection Bias: The pilgrims who choose to participate in providing their opinions may have different motivations or experiences compared to those who did not participate. This self-selection bias can impact the generalizability of the findings and may not capture the full range of perspectives.

3) Recall Bias: Pilgrims' ability to accurately recall their experiences with E-Government services may be subject to recall bias. Their perceptions or emotions during evaluation may influence their memories of specific interactions or difficulties.

**6.4 Implications**

Evaluating E-Government services for Hajj has several implications that can guide improvements and enhance the overall effectiveness of these services (Falatah et al., 2022). The evaluation process for E-Government services for Hajj emphasizes user-centered design, continuous improvement, usability enhancements, accessibility considerations, interactivity improvements, integration with other services, stakeholder engagement, trust and credibility, cost-effectiveness, policy and regulatory compliance, scalability and sustainability, and stakeholder satisfaction. By understanding user requirements and incorporating feedback, organizations can create intuitive, user-friendly services tailored to the specific needs of Hajj

pilgrims. The evaluation process should be an iterative cycle, identifying areas for enhancement and addressing usability issues. It also helps ensure accessibility, enhance interactivity, and integrate e-government services with other relevant platforms. Stakeholder engagement fosters a sense of ownership and trust, while evaluations help build credibility and ensure cost-effectiveness. Compliance with applicable policies, regulations, and legal requirements ensures the services operate within the legal framework. Scalability and sustainability are also considered, ensuring long-term sustainability without compromising performance or user experience. Stakeholder satisfaction is also considered, as well as fostering positive relationships, providing user-friendly services, and meeting the needs of Hajj pilgrims. Evaluating E-Government services for Hajj allows organizations to benchmark their performance against industry standards, encourage innovation and technological advancements, and inform data-driven decision-making. Evaluations help identify user preferences and specific needs, allowing for personalized features and recommendations. User empowerment is also promoted through active feedback and suggestions. Evaluations promote transparency, fostering accountability and informed decision-making. Continuous learning is encouraged through regular assessment, identifying growth areas, and adapting to changing user needs. International collaboration is possible through sharing evaluation methodologies and best practices. Impact assessment helps organizations understand the impact of e-government services on stakeholders, refine strategies, and allocate resources effectively. This process helps e-service providers continuously enhance E-Government services for Hajj, meeting evolving needs and contributing to a successful pilgrimage.

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**Eligibility**

1: In which year did you participate in Hajj?

o   2017

o   2018

o   2019

o   2020

o   2021

o   2022

o   Never

**Part 1: Demographic Information**

2: Gender

o   Male

o   Female

3: Age

o   18 - 24

o   25 - 30

o   31 - 36

o   37 - 42

o   43 - 48

o   49 - 54

o   55 - 60

o   61 - 64

o   <65

o   Other

4: Nationality

5: Education Level

o   PhD

o   Master

o   Bachelor/ Associate

o   Secondary

o   Primary

o   No degree

**Part 2: Motivation to Use the Hajj E-Government Services**

Answer the following questions related to **WHY** you have used or will use the Hajj E-Government Services in ritual places (Grand mosque, Prophet mosque, Mina, Arafat, and Muzdalifa).

6: I use the Hajj E-Government services to gather accurate information about Hajj.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

7: I use the Hajj E-Government services to enrich my knowledge about Hajj rituals.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

8: I use the Hajj E-Government services to enhance my understanding of Hajj rituals.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

9: I use the Hajj E-Government services to increase my ability to overcome challenges on my

journey.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

10: I use the Hajj E-Government services to guide me throughout the journey.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

11: I use the Hajj E-Government services to guide me effectively in the ritual places.

- o  1 Strongly Disagree

- o  2 Disagree

- o  3 Neither Agree nor Disagree

- o  4 Agree

- o  5 Strongly Agree

12: I use the Hajj E-Government services to complete the ritual tasks confidently.

- o  1 Strongly Disagree

- o  2 Disagree

- o  3 Neither Agree nor Disagree

- o  4 Agree

- o  5 Strongly Agree

13: Overall, the helpful information in Hajj E-Government services motivate me to use them
throughout the journey.

- o  1 Strongly Disagree

- o  2 Disagree

- o  3 Neither Agree nor Disagree

- o  4 Agree

- o  5 Strongly Agree

**Part 3: Perception of Hajj E-Government Services**

Answer the following questions related to your **PERCEPTION** of Hajj E-Government Services
in ritual places: (Grand mosque, Prophet mosque, Mina, Arafat, and Muzdalifa).

14: The Hajj E-Government services ......

[meet my needs]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

- o 4 Agree

- o 5 Strongly Agree

[meet my expectations]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

- o 4 Agree

- o 5 Strongly Agree

[resolve my issues during Hajj]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

- o 4 Agree

- o 5 Strongly Agree

[direct me effectively throughout the ritual journey.]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

- o 4 Agree

- o 5 Strongly Agree

[are appropriate]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

- o 4 Agree

- o 5 Strongly Agree

15: The Hajj E-Government services ......

[I feel safe.]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

- o 4 Agree

- o 5 Strongly Agree

[I trust their information.]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

- o 4 Agree

- o 5 Strongly Agree

[I am familiar with their services.]

- o 1 Strongly Disagree

- o 2 Disagree

- o 3 Neither Agree nor Disagree

o 4 Agree

o 5 Strongly Agree

[I find the answers I am looking for.]

o 1 Strongly Disagree

o 2 Disagree

o 3 Neither Agree nor Disagree

o 4 Agree

o 5 Strongly Agree

[I find the given information is valuable.]

o 1 Strongly Disagree

o 2 Disagree

o 3 Neither Agree nor Disagree

o 4 Agree

o 5 Strongly Agree

[I find the guidance is straightforward.]

o 1 Strongly Disagree

o 2 Disagree

o 3 Neither Agree nor Disagree

o 4 Agree

o 5 Strongly Agree

[I understand all the information clearly.]

o 1 Strongly Disagree

o 2 Disagree

o    3 Neither Agree nor Disagree

o    4 Agree

o    5 Strongly Agree

16: I feel that the Hajj E-Government services ......

[easy to use]

o    1 Strongly Disagree

o    2 Disagree

o    3 Neither Agree nor Disagree

o    4 Agree

o    5 Strongly Agree

[very cumbersome to use]

o    1 Strongly Disagree

o    2 Disagree

o    3 Neither Agree nor Disagree

o    4 Agree

o    5 Strongly Agree

[unnecessarily complicated]

o    1 Strongly Disagree

o    2 Disagree

o    3 Neither Agree nor Disagree

o    4 Agree

o    5 Strongly Agree

[need more enhancements]

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

17: I am satisfied with ......

[the support from the Hajj E-Government services throughout my Hajj journey]

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

[the guidance from the Hajj E-Government services in ritual places.]

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

18: It is likely for me to use Hajj E-Government services ......

[in the ritual places.]

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

[as the primary source of information.]

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

**Part 4: Experience with Hajj E-Government Services**

Answer the following questions related to your **EXPERIENCES** with Hajj E-Government

Services in ritual places: (Grand mosque, Prophet mosque, Mina, Arafat, and Muzdalifa).

19: I self-taught technology skills before getting going with Hajj E-Government services.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

20: I sought technical support to use the Hajj E-Government services.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

21: I learned to use the Hajj E-Government services quickly.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

22: I got assistance through the Hajj E-Government services quickly.

o   1 Strongly Disagree

o   2 Disagree

o   3 Neither Agree nor Disagree

o   4 Agree

o   5 Strongly Agree

23: How would you rate your experience with Hajj E-Government services?

o   1 Very satisfied

o   2 Satisfied

o   3 Neither satisfied nor dissatisfied.

o   4 dissatisfied

o   5 Very dissatisfied

# Appendix 2: IRB Certificates



Completion Date 20-Nov-2022
Expiration Date 20-Nov-2025
Record ID 52836299

This is to certify that:

**Moayad Hakeem**

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

**Responsible Conduct of Research**
(Curriculum Group)
**All Learner Groups - Responsible Conduct of Research**
(Course Learner Group)
**1 - RCR**
(Stage)

Under requirements set by:

**Long Island University - Post**

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w7c67e78c-d7b6-4267-ba77-ebcc6d49b1e8-52836299

# CITI PROGRAM

Completion Date  20-Nov-2022
Expiration Date  20-Nov-2026
Record ID        52836300

This is to certify that:

**Moayad Hakeem**

Has completed the following CITI Program course:

Not valid for renewal of
certification through CME.

**CITI Conflicts of Interest**
(Curriculum Group)
**All Groups - Conflicts of Interest**
(Course Learner Group)
**1 - Basic Course**
(Stage)

Under requirements set by:

**Long Island University - Post**

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w50b8c75c-3e5a-49f3-8a9c-705611ab1bc5-52836300

Completion Date  20-Nov-2022
Expiration Date  20-Nov-2025
Record ID        52836306

This is to certify that:

**Moayad Hakeem**

Has completed the following CITI Program course:

Not valid for renewal of
certification through CME.

**Human Subjects Research**
(Curriculum Group)
**Social-Behavioral-Educational Researchers and Students Working with Human Subjects**
(Course Learner Group)
**1 - Basic Course**
(Stage)

Under requirements set by:

**Long Island University - Post**

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w5fac3d05-42f7-434c-8b1a-c410b5198ff5-52836306

**Appendix 3: Supporting Letters**

شركة مطوفي حجاج دول جنوب شرق آسيا
**Motawifs Pilgrims For South East Asian Countries Company**

شركة مساهمة مقفلة – رأس المال ( 221,000,000 ) ريال سعودي
Closed Joint Stock - Share Capital ( 221,000,000 ) Saudi Riyals

Subject: Supporting Letter

To Whom It May Concern,

This is Office No.39 for Pilgrims from Southeast Asia. As the researcher Moayad Hakeem asked

Upon LIU approval, we are happy to distribute a link to an online survey of a research project

entitled "Evaluation of E-government Services Associated with The Annual Hajj Pilgrimage in

Saudi Arabia "in our communication channels with pilgrims.

Subject: Supporting Letter

To Whom It May Concern,

I am the MusCare Group's owner on Facebook. There are 22,000+ members currently in this group. Upon LIU approval, I am happy to distribute a link to an online survey of a research project entitled "Evaluation of E-government Services Associated with The Annual Hajj Pilgrimage in Saudi Arabia" in my Facebook group.

Feel free to contact me if you need any more information at admin@muscare.org.

Mohammad Liajul Hassan

# Appendix 4: IRB Approval Letter

Date:02/08/2023
Faculty Investigator: Qiping Zhang

## LONG ISLAND UNIVERSITY
## INSTITUTIONAL REVIEW BOARD (IRB)

## RESEARCH PARTICIPANT INFORMED CONSENT FORM

| | |
|---|---|
| Study Title: | Evaluation of E-governance Implementation: A Multi-attribute Analysis of E-government Services Associated with The Annual Hajj Pilgrimage in Saudi Arabia |
| Faculty Investigator: | Qiping Zhang, Palmer School of Library and Information Science, 720 Northern Blvd, Brookville, NY 11548 Qiping.Zhang@liu.edu, +1(516) 582-3691 |
| Student Investigator: | Moayad Hakeem, Palmer School, moayad.hakeem@my.liu.edu, +1(917) 825-4830 |

You are being asked to join a research study. Participation in this study is voluntary. Even if you decide to join now, you can change your mind later without any penalty or loss of benefits. If you wish to stop, stop right away. If you want to withdraw from the study, you can do it anytime.

This is an anonymous survey, no identifying (name, address, email) information will be collected in this study.

The purpose of this research is to analyze the E-governance structure from a holistic system perspective. This research intends to address two areas of Hajj E-government services: usability (how well Hajj E-government services are delivered and used), and interaction with the services (pilgrims' motivation, perception, and experiences).

If you agree to be in the study, we will ask you to provide your answers to 39 questions in an online survey.

**What are the risks or discomforts of the study?**
The risks associated with participation in this study are no greater than those encountered in daily life. You may get tired or bored when we are asking you questions or you are completing questionnaires. You do not have to answer any question you do not want to answer.

Although your IP Address will not be stored in the survey results, there is always the possibility of tampering from an outside source when using the Internet for collecting information. While the confidentiality of your responses will be protected once the data is downloaded from the Internet, there is always the possibility of hacking or other security breaches that could threaten the confidentiality of your responses.

**Are there benefits to being in the study?**
There is no direct benefit to you from being in this study. This study may benefit society if the results lead to a better understanding of the application of e-government services to mass gathering issues in general and more specifically to the Saudi implementation of E-governance services to Hajj pilgrimage with a potential to help millions of pilgrims from across the globe annually.

**How will the confidentiality of your biospecimens and/or data be protected?**
Any study records that identify you will be kept confidential to the extent possible by law. The records from your participation may be reviewed by people responsible for making sure that research is done properly, including members of the Long Island University Institutional Review Board and officials from government agencies such as the National Institutes of Health and the Office for Human Research Protections. (All of these people are required to keep your identity confidential.) Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

**What should you do if you have questions about the study?**
Contact the student investigator: Moayad Hakeem at +1(917)825-4830, moayad.hakeem@my.liu.edu or faculty investigator: Qiping Zhang at 516-582-3691, Qiping.Zhang@liu.edu. You can also contact the department chair: Bea Baaden at bea.baaden@liu.edu. If you cannot reach the investigators, you can contact the IRB office at osp@liu.edu and irb-post@liu.edu.

Informed Consent Form July 2021

# Call for Participation

**Title :** *Evaluation of E-government services Associated with The Annual Hajj Pilgrimage in Saudi Arabia*

**Research Purpose :**

The purpose of this research is to analyze the E-governance structure from a holistic system perspective. This research intends to address two areas of Hajj E-government services: usability (how well Hajj E-government services are delivered and used), and interaction with the services (pilgrims' motivation, perception, and experiences).

**Eligibility :**

- You must be above 18 years old.
- You must already performed Hajj in the last six years.

**What :**

- You will fill out an online survey.
- Time requirement: about 15 minutes.

**Survey link:**

https://forms.gle/sJ3vPPtwionRuFmp6



SCAN ME

**Faculty Supervisor:**
Dr. Qiping Zhang
qiping.zhang@liu.edu
(516) 299-2180

**Researcher Contact:**
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moayadhakeem@hotmail.com