SMART HAJJ

A Mobile Application to Guide the Pilgrims to Perform Hajj

by

Ain Farhanim Solha binti Salem

17002202

Dissertation submitted in partial fulfilment of the requirement for the

BACHELOR OF INFORMATION SYSTEMS (Hons)

SEPTEMBER 2021

Universiti Teknologi PETRONAS

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CERTIFICATION OF APPROVAL

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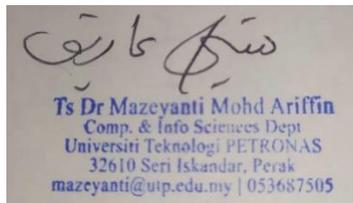
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UNIVERSITI TEKNOLOGI PETRONAS

SERI ISKANDAR, PERAK

September 2021

CERTIFICATION OF ORIGINALITY

This is to certify that I am fully responsible for the work submitted for this project, that the original work except specified in the references and acknowledgements, and that the original herein have not been undertaken or done by unspecified sources or persons.

Ain

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Date: 29th November 2021

ABSTRACT

Performing Hajj at Mecca's largest mosque (Masjidil Haram) has conventionally been the ultimate goal for Muslims. Many of the candidates, on the other hand, are unfamiliar with the area surrounding the massive mosque, as well as the Hajj steps, which include a long list of rules and obligations to fulfil. Their challenges in following the hajj processes are hoped to be resolved by the mobile application guidelines for doing hajj, which is proposed in this study. The pilgrims are given information and guidance using the Smart Hajj application. We are implementing agile methodology as it is the most effective and dependable way for completing the project, it is employed as the software development life cycle. Agile development is expected to deliver apps more quickly and efficiently because the project may be communicated more frequently during the development period. As a result, the concept of launching a Smart Hajj app for pilgrims will result in the creation of an interactive and comprehensive Hajj learning tool that will ensure the pilgrimage journey become more effective and efficient.

ACKNOWLEDGEMENT

Bismillahirrahmanirrahim,

First, all praise and appreciation to Allah, the Almighty, for showering His blessings on me upon completing my responsibility as a student and giving me chance to complete my Final Year Project.

I'd like to thank my respected supervisor, Dr. Mazeyanti for allowing me to conduct research and providing me with helpful guidance throughout the semester. Her enthusiasm, vision, support, and motivation really help me throughout my project. She showed me how to conduct my research and present my findings in the most clear and concise manners. Working and studying under her direction was a wonderful honor and privilege. I am truly grateful for everything she has done to me. I would like to also express my gratitude Dr Noreen Izza for also helping me in preparing the contexts and references for my project especially regarding the Hajj contents and mobile application development. Without her help and support, I might not be able to make this project happened.

Also, not to forget my supportive family and close friends who are always there for me when I need them. I owe my them a debt of gratitude for their love, prayers, support, care, and sacrifices in guiding and preparing me for the future. Big thanks to everyone that are involved directly or even indirectly through these two semesters. Without their support, I might not be able to complete this project on time.

Thank you.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

- What is Hajj?

  A pilgrimage is a spiritual and moral trip undertaken by a person in pursuit of spiritual and moral relief. The Hajj is a religious pilgrimage to Makkah, Saudi Arabia, which takes place once a year. One of Islam's five pillars is performing Hajj. Adult Muslims who are physically and financially competent must make Hajj at least once in their lives. The annual Hajj pilgrimage is the world's largest religious gathering. Every year, millions of pilgrims from throughout the world attend (Brunn, 2015; Jamil, Basalamah, Lbath, & Youssef, 2015). In 2017, or 1438H according to the Islamic calendar, 2.3 million pilgrims conducted Hajj (General Authority for Statistics, 2017).

- Pillars of Hajj
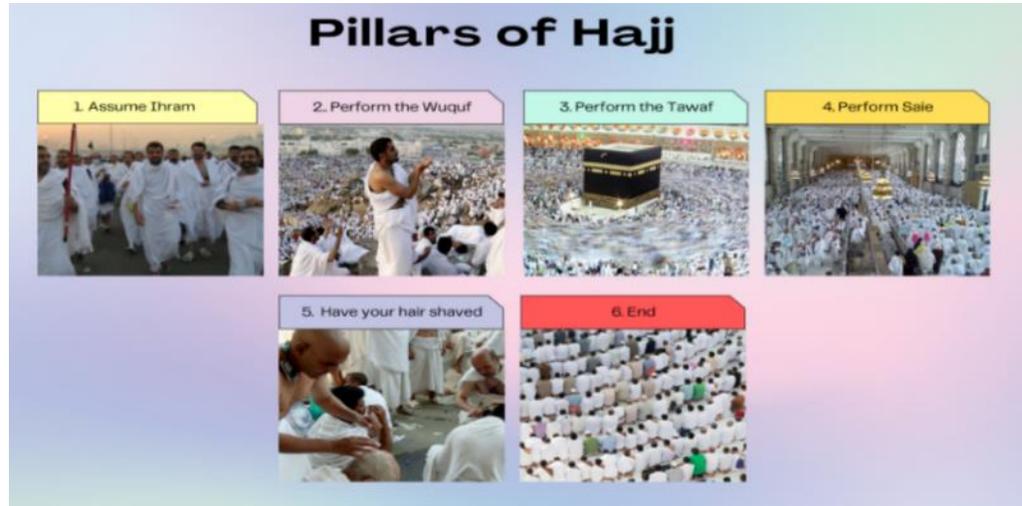
Figure 1 : Six Pillars of Hajj

SmartHajj will mostly use the six Pillars of Hajj in explaining the steps and processes in performing Hajj so that users/ the pilgrims can follow the steps easily and in ordered manners. There are 6 Pillars of Hajj which are assume Ihram, perform Wuqf, perform Tawf, perform Saie, have your hair shaved and end or it means you fulfill all the steps. [1]

- Why Smart Hajj?

Over the last two decades, digital religion study has grown in popularity as a significant topic within Internet studies (Khan & Shambour, 2017). Campbell (2012) created the phrase "digital religion" to describe the technological and cultural or religious space created when the online and offline worlds collide. "A bridge that integrates and expands online religious practices and places into offline religious situations, and vice versa" is how digital religion is defined (Campbell, 2012). Since decades, religion has had a role on the Internet and in digital culture, and it continues to grow online (Campbell, 2012). The area of digital religion is strongly linked to the study of religion and mobile phones (Cho & Campbell, 2015). According to Bell (2006), there has been an increase in the use of technology (particularly mobile phones) to promote religious rituals.

1.2 Problem Statements

Across all religions, mobile technology is widely employed to promote various spiritual reasons (Campbell, 2006, 2010). Several programmes have been developed in Islam to assist travellers in performing the Hajj ceremonies properly (Khan & Shambour, 2017). However, just a small amount of study has been done to look into pilgrims' needs for features included in these apps and their user experiences (UXs). The content of mobile applications designed for usage in moving and busy environments, such as the Hajj, could be visualised to improve the user experience. The user must immediately absorb the material, particularly while executing activities. Pictures and diagrams can sometimes help people absorb content more quickly than words alone. This conclusion could explain why Khan and Shambour (2017) found that Hajj apps that provided visualised services were downloaded more frequently. Another study evaluating the effect of religious affiliation on trust in electronic commerce indicated that Muslims trusted the Muslim site substantially more than other religious or neutral sites (Siala et al., 2004).

1.3 Scope of Study

- This study aims to develop a mobile application using Flutter as a platform for pilgrims, students, adults, and haji vendors.

- This study emphasizes on verified Hajj guidelines and Hajj courses for everyone especially during pandemic time.

- The attention of the study is focusing on how to develop a reliable platform and interactive micro-modules following the Pillars of Hajj.

1.4 Significance

- To assist the pilgrims to learn Hajj/attend online courses during pandemic time.

- Ubiquitous online resources available anytime and from anywhere accessible to everyone.

1.5 Objectives

- To develop a mobile application that guide pilgrims to perform Hajj with interactive micro-modules following the Pillars of Hajj.

- To test the functionalities and features of the mobile application that include.

  reading, video simulation, checklist, FAQ, short quizzes and online courses.

CHAPTER 2

LITERATURE REVIEW

2.1 Related Articles on Hajj

2.1.1 The Effectiveness of Hajj Apps Toward Increasing the Pilgrims Understanding

"A list of necessary things, activities to be performed, or points to contemplate that acts as a reminder," according to the dictionary. [2] Checklists have the potential to revolutionize our productivity and the way we complete tasks (Parsons,2018). You won't forget anything if you use checklists. So, if you're going to do something over and over again and want to get it correctly the first time, make a checklist (Andy,2014). The use of checklists is critical throughout the app's life cycle, especially throughout the design and update phases. Checklists are helpful for better organizing tasks or activities and swiftly validating the most important ones. They were designed to eliminate mistakes and ensure uniformity and thoroughness in the completion of any activity. As a result, the significance of these checklist items should be interpreted on a case-by-case basis (Spigel, S. Wambugu, and C. Villella, 2019).

The building of a computer model of something, especially for the purpose of studying and mimicking a situation or process, is known as video simulation (Gaba, 1999). Users can benefit from simulation as a method of completing activities. It's seen to be a good method because it's practically equivalent to going on a real journey, which includes cognitive work (Alessi, M. S., and Trollip, 2014). The value of employing video simulation education to supplement traditional learning methods and enhance knowledge is explained by Clark and Paivio's dual coding theory (Clark & Paivio, 1991). This idea explains how images and visualization might enhance the learning of abstract material (Chi, Pickrell, & Riedy, 2014). Simulations allowed us to interact directly with virtual objects, providing direct experience involvement and immediate feedback (Swaak & De Jong, 2001).

2.1.2 Users need and experience of Hajj mobile and ubiquitous systems

The major goal was to analyze customer demand and experiences with existing Hajj mobile applications, rather than designing or building original mobile software for Hajj (Shambour, 2017). Rather than relying on a single scale to measure UX, subjectively examine the UX of mobile applications with users from all backgrounds and levels of experience to uncover UX issues and potential chances for improving Hajj mobile applications (Hodson, 2014). Rather than designing or building new Hajj mobile software, the purpose of our study was to look at customer demand for and experiences with existing Hajj mobile apps (Amro and Nijem, 2012). Rather than relying on a single scale to measure UX, subjectively examine the UX of mobile applications with users from all backgrounds and levels of experience to uncover UX issues and potential chances for improving Hajj mobile applications (Hodson, 2014).

In general, Khan and Shambour (2017) employed an application analysis to look at the behavioral trends of mobile application suppliers and users. Khan and Shambour (2017) evaluated Hajj applications based on several criteria, including engagement, functionality, aesthetics, and information quality. Rather than designing or building new Hajj mobile software, the purpose of our study was to look at customer demand for and experiences with existing Hajj mobile apps (Amro and Nijem, 2012). Emotional (character interactivity people toward an interface), Functional (to attract a targeted group of users and retain loyalty), Cognitive (simplicity), and Aesthetic (user interface design/visual) elements all play a role in UX (Kiranjeet Kaur, Khairul Safee Kalid, Savita K. Sugathan, 2019).

2.1.3 Influence of Age on Performance and User Experience

Understanding the viewpoints of older individuals on portal user interface (UI) and user experience (UX) may lead to increased accessibility and acceptance among the elderly. The focus of UI is usually on the visual aspect of a design, such as colour, text, and graphics. Usability, utility, function, credibility, and satisfaction with the use of technology are all part of the user experience (Canziba E, 2018). The generation Y (those born between 1980 and 1994) has been the subject of recent study on mobile and online commerce (Palfrey and Gasser, 2010; Kumar and Lim, 2010). Researchers have just recently began to look into the potential of the greying market, also known as the silver market, which consists of people aged 50 and up (Kohlenbacher and Herstatt, 2008). In their study, Kumar and Lim (2008) discovered significant differences in loyalty and satisfaction with mobile services between Generation Y and the so-called Baby-Boomers (born between 1946 and 1964). As previously said, the silver market in many industrialised countries will develop dramatically over the next two decades, and this must be taken into account while forecasting and managing technological advancements in the sphere of mobile business apps (Reisenwitz et al., 2007).

2.1.4 Importance of Micro Learning

Microlearning can enhance mastery learning and is an important component of blended learning (C. Milligan, 2013). When compared to completing a course block with one or more interruptions, this can have a positive impact on their ability to learn specific information (P. A. Bruck, 2008). Small and well-planned chunks of units or activities enable learning in small steps (in contrast to the traditional way of learning through hour-long courses). Micro learning becomes short-term, consumable, and manageable as a result (D. Kovachev,2011). Micro learning can be defined as an estimate of the time required to perform a certain learning job, such as answering a question, memorizing a piece of information, or locating learning materials (T. Hug, 2005). As a result of the widespread usage of mobile devices, micro learning has exploded, and it has become a major learning tool in the mobile environment (E. Garca-Barriocanal, 2006). Microlearning and mobile learning have some similarities in that they are both individually referable, self-contained, reusable, and re-mixable (A. Leene,2006).

2.2 Comparative Study

We compared Smart Hajj with three hajj mobile application which is Bekal Haji and Umrah, Hajj guide and Oemrah and Hajj. Bekal Haji and Umrah only provide simple guidance, one video for umrah, one video for hajj and some questions that are common to the pilgrims. Hajj guide provides users with a good hajj information with clear graphics, but the content used are not enough for overall steps included. There are no videos provided and the FAQ consists of common questions and answers. Lastly, we also compared our apps with Oemrah and Hajj where the language is in German. They arranged the hajj info in checklist order together with audio. There are no graphics used, no videos for hajj and no FAQ page for the users.

Smart Hajj will provide video simulations, comprehensive smart modules for hajj info, hajj videos for each pillar, FAQ page, online hajj courses, short quizzes and sharing sessions. Hajj steps are well-explained in simple graphics and precise explanations where it follows six pillars of Hajj. We are the only Hajj application that provide Hajj Courses for the pilgrims as well as the checklist features where it is very useful for the users to ensure they do not miss any steps. We provide hajj information in smart modules, so it is easier to understand. We also provide hajj video simulations so that the pilgrims can see how the place for each step of Hajj looks like and what they should do for each step.

Table 1: Smart Hajj Comparative Study

SmartHajj	VS	Bekal Haji & Umroh	Hajj Guide	Oemrah & Hadj
Malaysia	**Developer**	Indonesia	Saudi Arabia	German
Yes	**Checklist Feature**	No	Yes	No
Videos are given by topics and to conclude all the important steps.	**Video Simulations**	Short and detailed videos for Umrah and Hajj.	None	None
Hajj steps are explained in orders with simple graphics and precise explanations.	**Smart Modules for Hajj Info**	Not complete	Efficient steps are well-explained in detail with simple graphics and short paragraphs.	Efficient steps are well-explained in detail with simple graphics and short paragraphs.
Users can see common questions based on each pillar.	**FAQ Page**	Users can only see common questions and answers	Users can only see common questions and answers	None
Yes	**Online Hajj Courses Registration**	No	No	No
Yes	**Hajj Quiz**	No	No	No

CHAPTER 3

METHODOLOGY/ PROJECT WORK
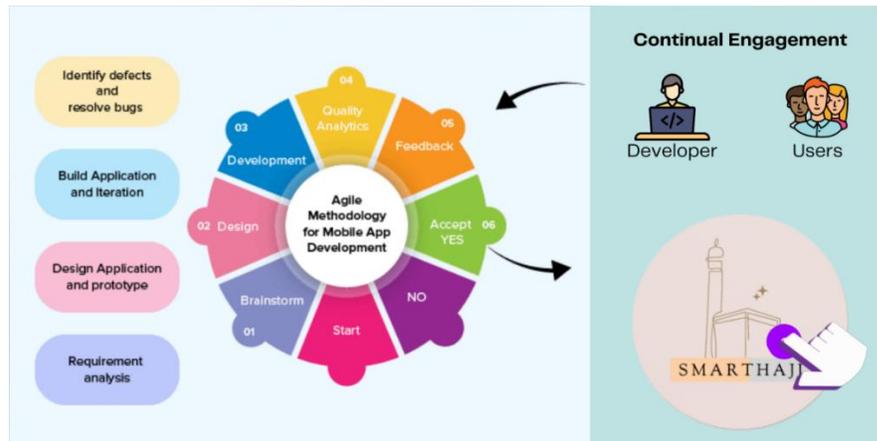
Figure 2: Agile Methodology

Using this agile methodology technique for SmartHajj development allows us to work on multiple portions of the app at the same time while maintaining constant communication with developers and users. The entire project is made up of discrete modules such as brainstorming, design, development, quality analytics, and feedback. The agile software development strategy not only reduces the related risk, but also gives developers complete freedom and flexibility to create a high-quality program that adapts fast to changes after delivery. There are better ways to detect and anticipate hazards in an agile framework, as well as an effective plan to ensure that the project proceeds smoothly as anticipated. SmartHajj is a religious content application in which the information collected must be suitable for usage and verified. With more visibility, predicting risks and developing effective mitigation strategies becomes easier. SmartHajj teams, collaborators, project managers, and clients all benefit from Agile methodology. It comprises faster solution implementation, higher agility and flexibility in any adjustments, greater success as more focused effort, enhanced development procedures, faster delivery dates, faster fault and error identification, and efficient project management.

The agile technique is more of an integrated and enhanced management approach to software development. This method helps to reduce the number of frequent errors or flaws by allowing repeats and adjustments. It comprises the participation of professional team members in a collaborative effort, with everyone being assigned a separate task as part of the intended development cycle sequence.

3.1 Tools

The tools employed in this project are divided into two categories which are research tools and software development tools. The following is the list of the tools used in each category:

Table 2 : Development Tools

Research Tools:	Software Development Tools:
Google Scholar, Tabung Haji Website.	Adobe XD, One Drive, Flutter, Android Studio.

3.2 Methods/Tools Used

Figure 3 : Google Scholar Logo

Google Scholar is a free web search engine that provides access to the full text or metadata of scholarly literature in a number of formats and subjects. Preprints, abstracts, technical reports, and other scholarly content are all peer-reviewed online academic journals and books, as well as conference papers, theses and dissertations, preprints, abstracts, and other scholarly material. Users' needs and experiences with Hajj mobile and ubiquitous technologies were covered in the study as three issues for literature review: The Effectiveness of Hajj Apps Toward Increasing Pilgrims Understanding is a study of how to design for the world's greatest religious annual gathering.

Figure 4 : Tabung Haji Logo

Lembaga Tabung Haji is the Malaysian Hajj Pilgrims Fund Board. It was previously known as the Lembaga Urusan dan Tabung Haji (LUTH). The Tabung Haji website offers pilgrims advice and tools, primarily on how to save for their pilgrimage to Mecca by investing in Shariah-compliant ways. We use the content from the website's modules, as well as videos for each of the Hajj pillars, in the Smarthajj application.

Figure 5 : Microsoft Forms Logo

Microsoft Forms (formerly Office Forms) is an online survey creator in Microsoft Office 365. Users can design automated scoring surveys and quizzes, as well as data that can be automatically transmitted to Microsoft Excel. We expected 50 people to respond to the poll for SmartHajj, but we only got 40. In designing the Hajj application, our goal is to learn about users' preferences and needs.

Figure 6 : Adobe XD Logo

Adobe XD is a vector-based user experience effective design tool for internet and mobile apps created and marketed by Adobe Inc. Before we began the production process, the user interface (UI) for Smart Hajj was developed or drawn in Adobe XD, along with a preview of the digital content.

Figure 7 : Android Studio Logo

Built on JetBrains' IntelliJ IDEA software and customized exclusively for Android development, Android Studio is the official integrated development environment for Google's Android operating system. SmartHajj will be developed with Android Studio to use Android Studio emulator.

Figure 8 : Flutter Logo

Google's Flutter is an open-source user interface software development kit. It is used to create cross-platform applications from a single codebase for Android, iOS, Linux, Mac, Windows, Google Fuchsia, and the web. SmartHajj uses Flutter for apps development by using Dart language.

3.3 Design

The functionality and interface of the SmartHajj system will be depicted using the Unified Modelling Language (UML) and wireframe throughout the design process. To observe the clear flow of the application, the system's use case diagram would need to be built during the design phase before beginning the User Interface (UI) design. Smart Hajj access and features are controlled by the platform owner. The person in charge is in charge of the online courses and the live agent. Users may access Hajj Information, while Pilgrims can access Hajj Information, Live Agent, and Hajj Courses.

Figure 9 : Use-Case Diagram
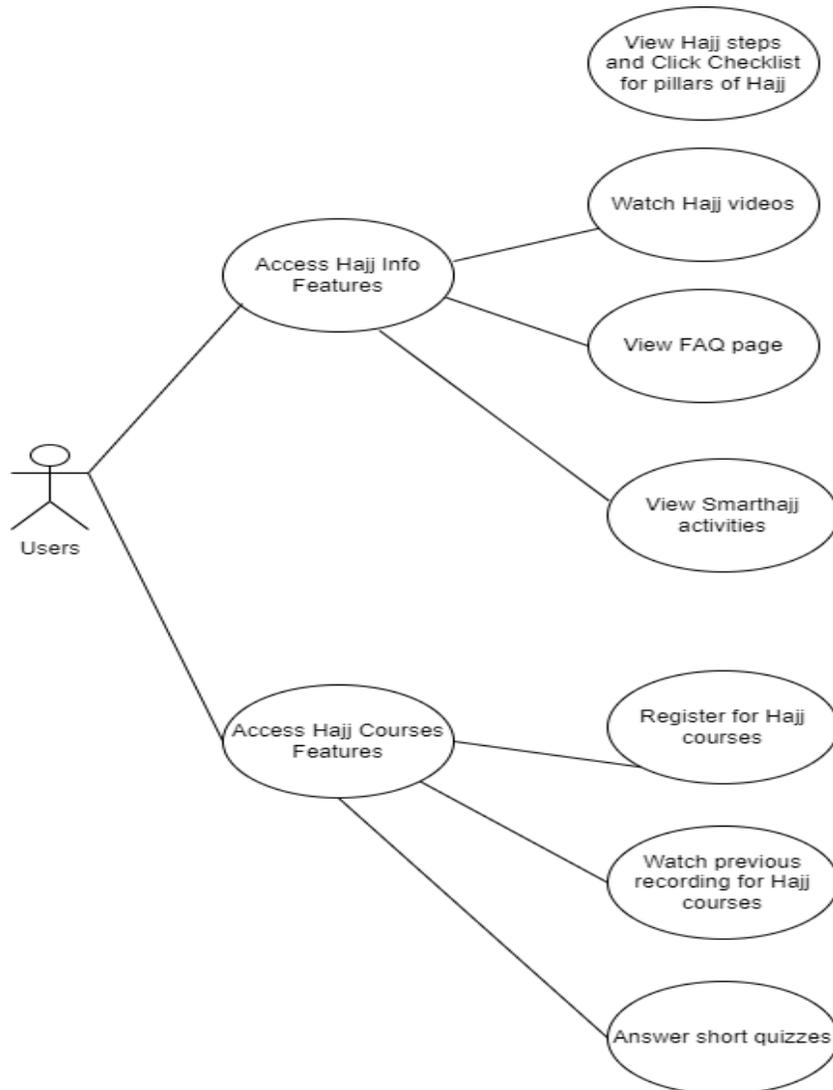
3.4 Project Gantt Chart and Milestone

| SmartHajj Project Elements	Week																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
FYP2																	
Phase 1: Development																	
Initiate Prototype Development	■	■	■	■													
Initiate Digital Content			■	■	■												
Phase 2: Testing																	
Continuation of Development Phase					■	■											
Prototype Testing					■	■											
Fixed Testing						■											
Submission of Progress Assessment 1						■											
Phase 3: Deployment and Maintenance																	
System Implementation						■	■	■									
System Maintenance								■	■	■	■						
Submission of Draft Dissertation										■	■	■					
Submission od Dissertation (Soft bound)												■					
Phase 4: FYP2 Completion																	
Mockup Presentation and Preparation													■	■			
Continuation of Development Phase															■		
Submission of Progress Assessment 2																■	
Submission of Project Dissertation (Hard bound)																	■

Figure 10 : Gantt Chart

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CHAPTER 4

RESULTS

4.1 Survey Results

1. Age Range

Under 18	0
18-24	33
25-34	1
35-44	4
45-54	2
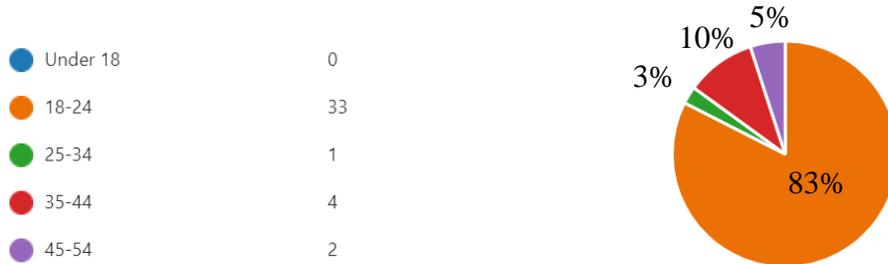
Figure 11 : Survey on Age

2. Common Hajj courses in Malaysia provide us with abundance of information that might be confusing and hard to digest for some people. Do you agree with the problem statement?

Yes	26
No	5
Maybe	9
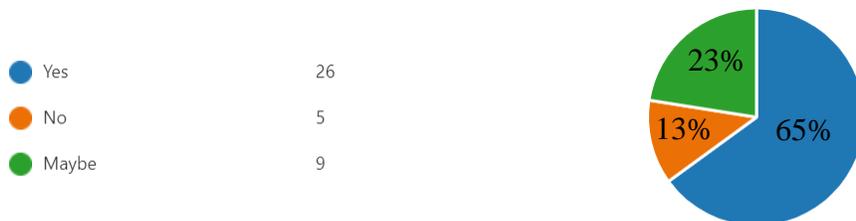
Figure 12 : Survey on Problem Statement

3. Available mobile applications on the market provide the pilgrimage participant with incomplete guidelines and most of the developers are not from Malaysia. Do you agree with the problem statement?

● Yes	23
● No	1
● Maybe	16

40%
58%
3%

Figure 13 : Survey on Problem Statement

4. Have you seen any mobile applications regarding Hajj especially in Malaysia?

|	
● Yes	11
● No	23
● Maybe	6

15%
28%
58%
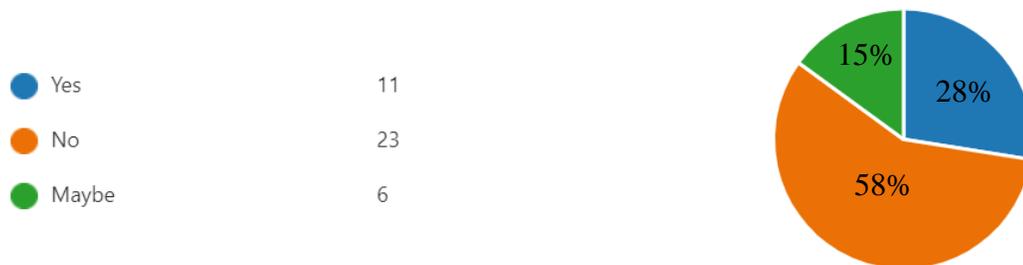
Figure 14 : Survey on Existing Mobile Applications

5. Are you interested to have an application that you can use to guide you throughout your pilgrim's journey/hajj?

|	
● Yes	38
● No	0
● Maybe	2

5%
95%

Figure 15 : Survey on Hajj Application

6. Would you prefer to study Hajj by books/modules or through your mobile application?
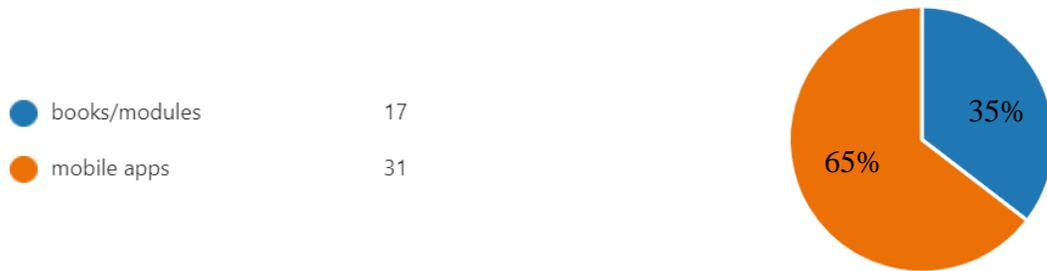
Figure 16 : Survey for Preferred Way to Study About Hajj

7. During this pandemic era, does online Hajj course sounds effective? Will it help you to understand better if it is delivered well?
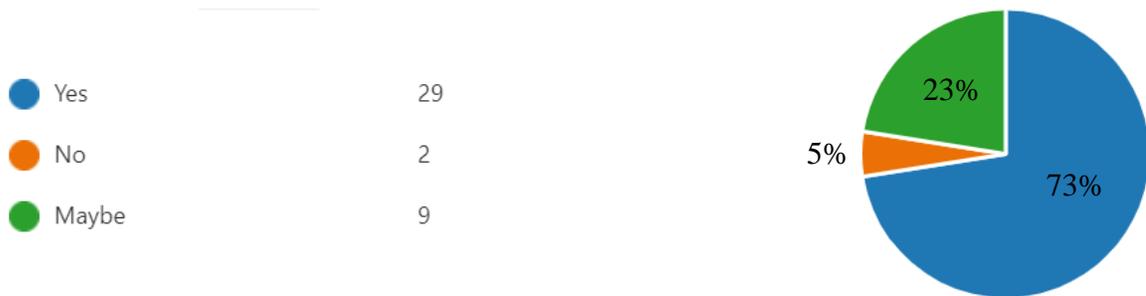
Figure 17 : Survey for Effective Hajj Online Course

4.2 System Architecture

Users
Login

Users
(The Pilgrims)

Users can browse apps
in Bahasa Melayu

FREE

Main Feature:
Hajj Info

FAQ

User can view common
QnA based on each Hajj
steps

Users able to see the Hajj steps
smart modules with checklist

Users able to see hajj
videos for each Hajj Steps

Users able to view
Smarthajj activities

-Able to join sharing sessions
with speakers/ collaborators/
influencers
-Able to join virtual Hajj
exploration

Main Feature:
Hajj Courses

FREE

Users can watch
recording of the previous
online courses

Users able to register
for online courses

Users receive certificate
of participation

Users can answer quiz

Users receive certificate
of completion

via email

*Figure 18 : System Architecture*

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4.3 User Interface (UI)
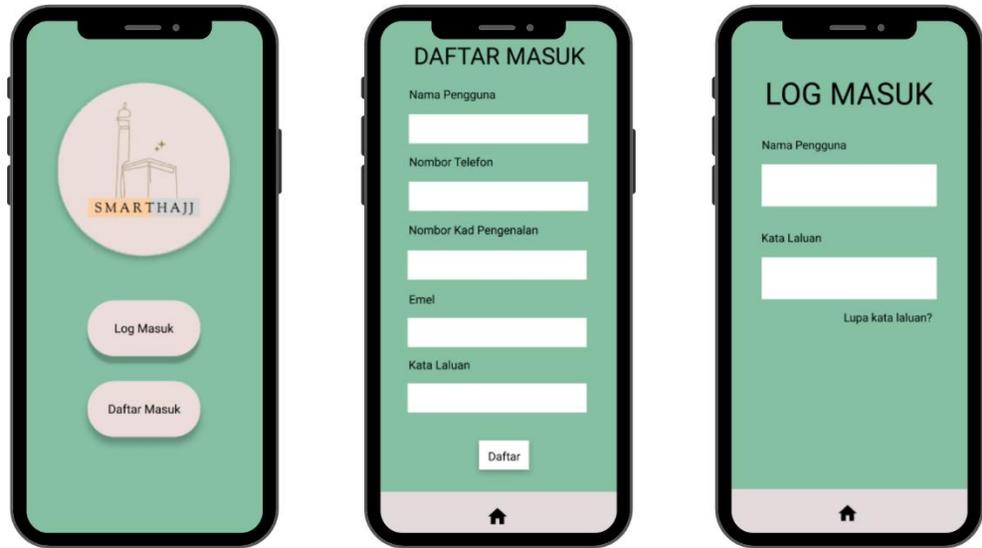

Home Page   Signup Page   Login Page
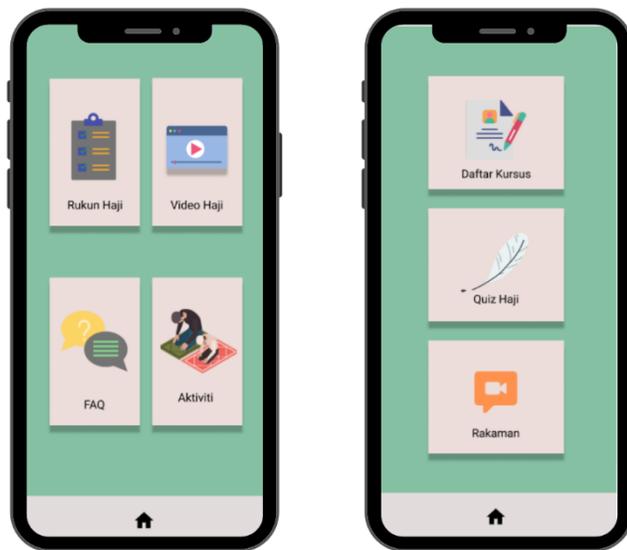
Info Hajj Page   Hajj Course Page

Figure 19 UI: Smart Hajj Main Page
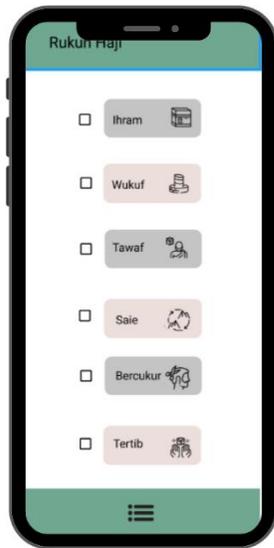
Hajj Pillars Page
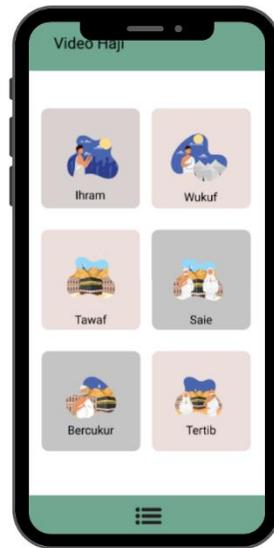
Hajj Videos Page

Figure 20 UI: Info Hajj (Hajj Info)
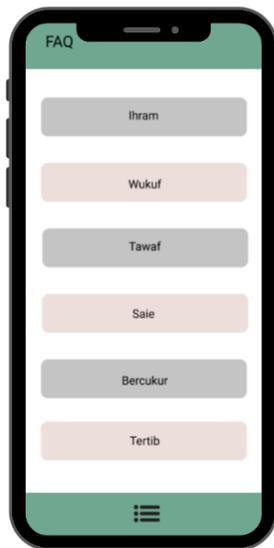
FAQ Page
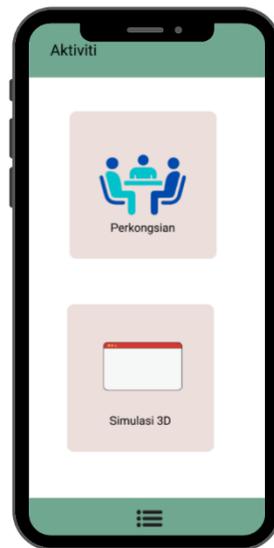
Activities Page

Figure 21 UI: Info Hajj (Hajj Info)

Figure 22 UI: Kursus Haji (Hajj Courses)
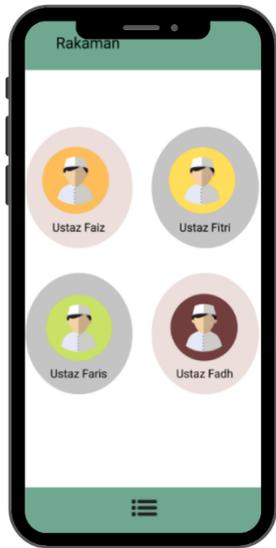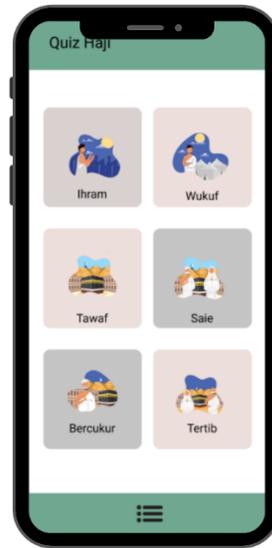
Recording Page   Hajj Quiz Page   Hajj Courses Page

Smart Modules in Smarthajj

Figure 23 UI: Micro-Modules Examples in Smarthajj

4.4 Functionality Test Script – Hajj Pilgrims

Table 3 Task 1 Functionality Test Script

TASK 1	
Goal	Info Hajj Main Features
Inputs	1. Hajj info
Outputs/ Assumptions	Able to click checklist once done with each pillars, view smart modules for 6 Hajj steps, move the smart modules back and forth.
Steps	1. Click any 6 steps of Hajj 2. View hajj guidance and able to click back and forth 3. Go back to main page and click once done with each hajj steps 4. Able to view smart modules
Result	Smart modules, checklist
Remarks	Hajj steps infographics shown based on 6 pillars of Hajj.

Table 4 Task 2 Functionallity Test Script

TASK 2	
Goal	Info Hajj Main Features
Inputs	2. Hajj Videos
Outputs/ Assumptions	Able to view short videos for each Hajj Pillars
Steps	1.Choose any 6 pillars of Hajj 2. Able to watch video on each pillars chosen
Result	Short videos explaining each Hajj pillars
Remarks	-

Table 5 Task 3 Functionality Test Script

TASK 3	
Goal	Info Hajj Main Features
Inputs	3. FAQ section and Activities for Smarthajj
Outputs/ Assumptions	Able to view FAQ Page and Smarthajj Activities
Steps	1.View FAQ Page based on each pillar of Hajj 2. Able to watch Smarthajj activities via video recording 3. Able to register for Smarthajj sharing session
Result	View FAQ page, watch #D simulation video and register for sharing session
Remarks	Both main features fall under Hajj info

Table 6 Task 4 Functionality Test Script

TASK 4	
Goal	Hajj Courses Main Features
Inputs	1. Courses Registration
Outputs/ Assumptions	Able to register in SmartHajj application
Steps	1.Choose any session provided 2. Provide name and email
Result	Further details will be emailed right after the registration
Remarks	4 sessions to choose

Table 7 Task 5 Functionality Test Script

TASK 5	
Goal	Hajj Courses Main Features
Inputs	2. Hajj Quizzes
Outputs/ Assumptions	Able to answer short quizzes
Steps	1.Answer quiz based on 6 pillars of Hajj 2. Submit
Result	Further details will be emailed right after the registration together with certificate of completion
Remarks	6 parts to answers based on 6 pillars of Hajj

Table 8 Task 6 Functionality Test Script

TASK 6	
Goal	Hajj Courses Main Features
Inputs	3. Hajj Courses Recordings
Outputs/ Assumptions	Able to watch previous Hajj courses recordings
Steps	1.Able to choose 4 different session 2. Users can watch the session in app
Result	Recordings of previous Hajj courses
Remarks	-

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 Conclusion

To sum up, the objective to perform Hajj with interactive micro-modules following the six Pillars of Hajj are achieved with complete and user-friendly modules inside the apps. This mobile application is suitable for self-study whenever they need any references regarding Hajj not only for the pilgrims but also for everyone that would like to learn more about Hajj. The problem statement where hajj courses provide the users with abundance of information that might be confusing and hard to digest for some people is being solved by having micro-modules following the six Pillars of Hajj. Significance such as to assist the pilgrims to learn Hajj/attend online courses during pandemic time can be achieved as it is restricted to attend any physical class for the time being. During the app's development, we are following the agile development cycles to enable seamless and smarter management and processes in creating SmartHajj.

5.2 Future Work

Following the agile methodology cycle, we have completed all steps needed. To benefit the project's tools and methods successfully, further study and knowledge is necessary. Smart Hajj will perform more improvement in term of the digital content with knowledge experts to give the users the best content for the apps. We will also enable different levels of user's level section for example, beginner, intermediate or senior level as the one who are performing the pilgrimage. This feature will enable people experience better and gain more inputs from Smarthajj that will be much more beneficial to them. This proposed project will allow users to have a useful Hajj application for them to refer along their pilgrimage journey as we bring our mobile devices wherever we go. We would like to do more collaborations with Hajj travel agency that can expose us more to Hajj pilgrimage in order to make a full use of our applications and also make teaching learning/ hajj courses easier for them.

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APPENDICES

Table 9 : Element within UX plays a part within their field

Elements within UX	Functions
Emotional	character interactivity users towards an interface
Functional	to attract a targeted group of users and maintain loyalty
Cognitive	simplicity
Aesthetic	user interface design/visual

Table 10 Must-Have Characteristics of Microlearning Design

Characteristics	Explanation
Addresses A Single Performance-Based Objective	Training delivered contains information that's targeted and focused. This reduces cognitive overload and helps learns to fight the forgetting curve.
Leverages Existing Content	Good microlearning design leverages existing content used in classroom training such as PPTs, PDFs, videos, etc. to create micro modules.
Follow The Minimalist Design Trend	Follows the minimalist design trend by using crisp content along with relevant visuals. There's no room for unnecessary elements that do not aid the learning process.
Delivers Short and Useful Bursts of Learning	Content that's short and extremely useful. Design microlearning in a way that makes it easy for the learner to accomplish tasks on the job.
Uses A Variety of Formats	Mix and match a variety of learning formats to engage learners. The principle of "Form Follows Function" is applicable in microlearning design as well. This means your choice of microlearning asset or format depends on the purpose it's intended to achieve.
Adheres To A Mobile-First Design	Designed in a way that supports learning on multiple devices. It is best to follow a mobile-first design while developing microlearning solutions.
Provides Intuitive Access	Short and focused and hence suitable for learners who are looking for specific information. It is much easier to provide microlearning modules as searchable components on the LMS as compared to lengthy eLearning modules.

Usefulness	Age					Grand Average
	<20	20-24	25-30	>30		
H1. Online environments enhance my learning experience.**	3.28	3.39	3.55	3.85		3.37
H2. Online learning increases my productivity.**	3.18	3.34	3.45	3.73		3.30
H3. Online learning improves my performance in my studies.**	3.19	3.31	3.43	3.64		3.28
H4. Overall, I find the online learning system will be useful in my studies.**	3.48	3.60	3.86	3.94		3.58
Tendency						
I1. I consider that online learning is important for me.**	3.57	3.63	3.71	4.00		3.62
I2. I consider that online learning is needed for me.**	3.30	3.42	3.60	3.97		3.40
I3. Overall, I have an interest for online learning.**	3.68	3.74	3.87	4.08		3.73

*Figure 24 : Personality and Perceptions toward Online Learning by Age Categories*
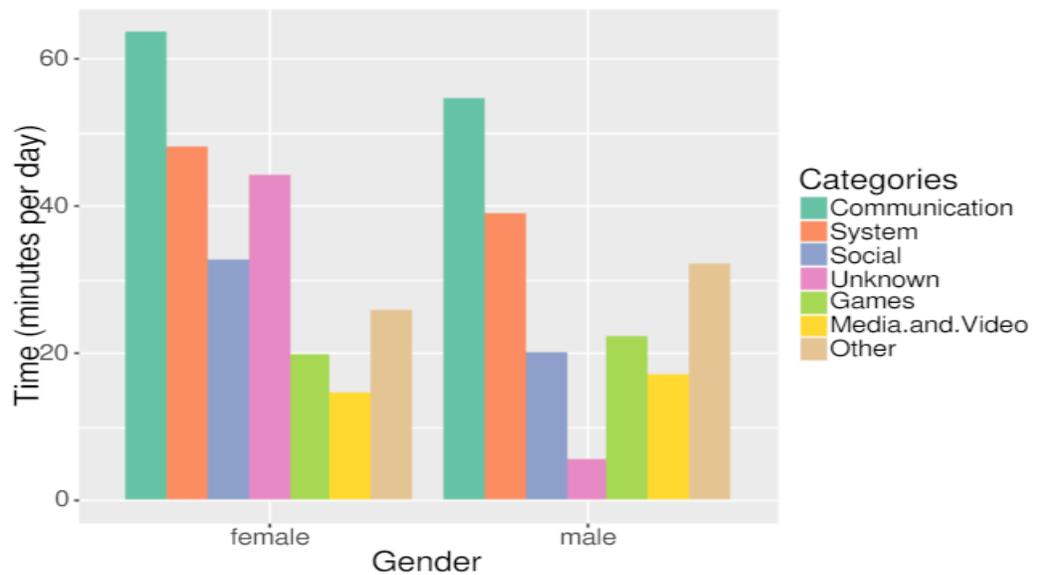
Figure 25 : Daily Usage Duration of Male and Females