

*A Mobile Application To Guide Hajj Pilgrims*

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**UNIVERSITY UTARA MALAYSIA**

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*A Mobile Application To Guide Hajj Pilgrims*

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fulfillment of the requirements for the degree Master**

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**By**

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## **Abstract**

There are a lot of pilgrims, when they perform the duty, they should face a lot of challenges. With the popularization of mobile, their problems are hoped to be solved by the Mobile Service to Perform Hajj, which is proposed in this study. In this system, the advice and guidance is provided to the pilgrims. The information of Hajj steps, hotels, streets and restaurants can be got from this system by using mobile phones. This study adopts the waterfall methodology to develop this system. With the help from this Mobile service to perform Hajj, it is hoped that pilgrims can find the information they need easily and perform the hajj successfully.

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## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background

Hajj to Mecca is one of the five pillars of Islam. Hajj was made obligatory in the 9th year of Hijra. Hajj is an act of worship just like Salat (five daily prayers) and Sawm (fasting in the month of Ramadan). Muslims from all over the world gather in Mecca in the last month of Muslim calendar and worship Allah. Hajj is a special worship that lasts for several days. This is an occasion that brings Muslims of all countries, colors, and races to one place the Ka'ba. This is a unique opportunity of worshipping Allah collectively in a large gathering at one place (Website of islam, 2009).

On other hand, wireless technology has developed into one of today's hottest topics due to its ability to bring the power of communication and the Internet into the hands of users while overcoming temporal and spatial constraints (Ferrucci, et al, 2008). As the popularity of wireless services grows, manufacturers are enabling wireless devices with an increasing array of features and capabilities. However, a new "buzzword" increasingly

being mentioned in the market place is the Wireless Application Protocol (WAP) (King,et al, 2008).

This research is an attempt to develop a mobile application (by using WAP technology) that provides service to Iraqi citizens in particular and also other nationalities in general for doing the Hajj.

## **1.2 Problem Statement**

According to Hao (2008), more over three million pilgrims Visit the House of God every year to perform the Hajj, most of them do not have enough information on how to do the pilgrimage procedures and how to proceed to the pilgrimage.

In addition they need to know important prayers that need to be recite in each part of the Hajj such as the prayers in Tawaf.

This proposed system is coming as helper to Iraq pilgrims to perform Hajj correctly since their arrival in Saudi Arabia until they return to Iraq, which includes all the steps to be followed (procedure of performing Hajj), check places, reserve hotels and restaurants, help them to visit tourist sites that religious nature, roads, and offices flight bookings, etc.

The goal from this application is to serve the Hajj pilgrims in the finest manner, ensuring satisfaction and peace of mind, leaving more time for Ibadat and relaxation in Mecca, Medina, Mina. It carries the responsibility to take great care and prepare all the service amenities and provides pilgrims with all means of comfort and safety.

### **1.3 Research Questions**

The research questions of this study are:

- I) what are the basic requirements for developing mobile guide application to perform the Hajj?
- II) how to design a mobile guide application prototype using WAP technology?
- III) what is the usability of the prototype?

### **1.4 Research Objectives**

The objectives of this study:

- To identify the basic requirements for developing mobile guide application to perform the Hajj.

- To design a mobile guide application, that can interact with customer by using WAP (Wireless Application Protocol) technology that supports the use of smart phones devices.
- To evaluate the usability of the prototype by using Usability testing.

### **1.5 Scope Of The Study**

This thesis about mobile guide application will cover all aspects of interest to pilgrims.

The following list is our scope:

- Rites of pilgrimage (Hajj) from the first day until the last day of the days of Hajj (Tawaf, seek , prayer, various rites, etc)
- Tours on the areas that religious nature.

This mobile application technology has several limitations as described below:

- 1) This services can be use only for those that owned a mobile phone.
- 2) The user must subscribe a WAP services.
- 3) The users need to ensure that they are located in the phone's signal coverage because WAP services only work with the adequate coverage.
- 4) This project will use mobile emulator and laptop to simulate the application.

## **1.6 Significance Of The Study**

The research aims to propose a mobile guide application to facilitate doing Hajj. From this guide application, the pilgrims will be able to know all the information needed to perform Hajj. The steps of performing Hajj; the tourist sites of religious nature; the prayer need to say during hajj; the information of restaurant, hotel and streets are all included in this system. This system can help the pilgrims to arrange the hajj trip from the beginning until the end. This study involves literature reviews on the existing technologies that have been developed or are being developed around the world. Based on the literature reviews, a prototype based on a Wireless Application Protocol (WAP) is developed. The pilgrims can get all the information they need for the Hajj from their mobile phones. Such convenient service is hoped to boost the pilgrim significantly.

## **1.7 Outline Of The Report**

Chapter two makes literature review on this study. Information about the meaning of Hajj, history of Hajj, mobile application, mobile services, and related works are included.

Chapter three discusses the methodology used in this thesis. The Waterfall Methodology is chosen in this study, it includes four phases: 1) requirements; 2) design; 3) implementation; and 4) verification.

Chapter four describes the process of implementing this prototype. Steps will be listed in this chapter in detail as well as the explanations of them.

Chapter five is the presentation of the findings in this study. Questionnaires are distributed to get feedback of this prototype. The feedback is well analyzed and the suggestion is adopted by us to modify the prototype.

Finally, we look back to the research objectives to see whether this study has reached its goals. At the same time, conclusion will be made as well as the suggestions for further research in Chapter six.

## **1.8 Summary**

This chapter introduced the background of the study; the research problem stated in this chapter is the motivation to carry out this study. The aim of this study is to propose a mobile guide application to facilitate doing Hajj. The research objectives and questions are stated in this chapter as well as its significance and limitation. In the next chapter, the related literature review will be discussed.

## CHAPTER TWO

### LITERATURE REVIEW

The background of this study and brief description were introduced in the previous chapter. This chapter will continue on the discussion and ideas in previous work related to this study. The information of Hajj is introduced here with its brief history and relationship with modern technology, and then the literature review on mobile applications, mobile services and related work are presented.

#### **2.1 What is the Hajj?**

Hajj literally means to travel (i.e., towards God) and it also means an effort to dominate something (the self, in this connection). The pilgrimage (Hajj) is an annual event that takes place in Saudi Arabia. Three major government ministries (Foreign, Internal, and Hajj) create and process Hajj data separately in their systems (Himdi & Sandhu, 1997). Hajj pilgrims need to undergo a proper and comprehensive training before leaving their mother countries in order to perform a successful and rewarding hajj (Shahida, Hasimah, Arshad, Anees & Sarina, 2008).

Conventionally this term is translated as pilgrimage, although this far from gives the exact significance of the word *Hajj*. This is the third of the religious duties of a Muslim. It is obligatory on every adult, man or woman, to go once in his or her life-time to Mecca

in order to perform there the great Effort for annihilating the ego (*fana*), i.e., assimilating one's self with the will of God. Those who do not possess the material means of travel are exempted from it. But which Muslim would not collect, little by little, the necessary amount for being able one day to visit the centre of his religion, the Ka'ba or the House of God? The Qur'an (3:96) does not exaggerate when it says that this is the oldest House in the World dedicated by mankind to God and to the cult of monotheism. If one were to think only of Abraham – who according to the Islamic tradition, was but the restorer of the edifice erected originally by Adam -- it would still be older than the temple of Jerusalem, constructed by Solomon. No other place of worship older than the Ka'ba of Mecca is known to be still functioning (Hamidullah, 1974).

Allah , the Exalted, Said

وَلِلّٰهِ عَلَى النَّاسِ حِجُّ الْبَيْتِ مَنِ اسْتَطَاعَ اِلَيْهِ سَبِيْلًا

This Ayah means:

“Allah obligated people, who are able, to perform pilgrimage(Hajj) to Makkah”

وَلِلّٰهِ عَلَى النَّاسِ حِجُّ الْبَيْتِ مَنِ اسْتَطَاعَ اِلَيْهِ سَبِيْلًا وَمَنْ كَفَرَ فَاِنَّ اللهَ غَنِيٌّ عَنِ الْعَالَمِيْنَ

And whosoever can afford should visit the House on pilgrimage as duty to God.

Whosoever denies should remember that God is above heed of the world.

Hajj occupies a very important position in the various forms of Islamic worship. The Holy Prophet (sws) once, answering a question placed it among the basics of Islam. He defined Islam in the following words:

الإِسْلَامُ أَنْ تَشْهَدَ أَنْ لَا إِلَهَ إِلَّا اللَّهُ وَأَنَّ مُحَمَّدًا رَسُولُ اللَّهِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ وَتَقِيمَ الصَّلَاةَ وَتُؤْتِيَ الزَّكَاةَ

(8: مسلم ، رقم) وَتَصُومَ رَمَضَانَ وَتَحُجَّ الْبَيْتَ إِنْ اسْتَطَعْتَ إِلَيْهِ سَبِيلًا

Islam means that you openly state that there is no god except Allah, and Muhammad (sws) is the Messenger of Allah; establish the prayer, pay Zakah; fast during the month of Ramadan and offer the Hajj of the House of Allah if you are able to afford journey to it. (Muslim, No: 8)

## 2.2 Brief History of HAJJ

Saudi Arabia, the largest country in the Middle East, boasts the Holy City of Mecca as the birthplace of Islam. One of a Muslim's duties, as described in the Five Pillars of Islam, is to go on Hajj at least once during his or her lifetime unless prevented by ill health or a lack of money and to explore the spiritual renaissance by following the walking tour of the prophet Mohammed from Mecca to Mina during the five-day Hajj each year. Hajj is the largest religious ceremony for pilgrimage in the world. During the Hajj each year, over three million people gather within an area of 10km<sup>2</sup> around Mecca and more than two million among them are mobile subscribers. The pilgrims move along a fixed route, resulting in trans normal traffic, such as an enormous number of handovers and heavy traffic (Hao, 2008).

### **2.3 How Modern Technology Has Been Employed to Facilitate the Hajj**

A sophisticated broadcasting network has been installed to cope with the requirements of the Hajj. The safety and comfort of the Hajjis has become a major concern for the authorities, necessitated by their sheer volume in recent years. The newly laid floor tiles were made of specially developed heat-resistant marble, and to further ensure the comfort of worshippers the whole structure is cooled by one of the world's largest air-conditioning units (Official Website of Minister of Saudi Arabia, 2009).

To facilitate the movement of worshippers to the newly developed roof area of the Holy Mosque during the busiest seasons, additional escalators have been incorporated alongside a number of fixed stairways in the northern and southern sides of the building. Moreover, in order to reduce the build-up of traffic around the Holy Mosque, the development project has involved the construction of a new tunnel for vehicles in the vicinity of Alsouk Alsagir. Pedestrian routes and tunnels have also been carefully planned and laid out to ensure the safety of the worshippers (Official Website of Minister of Saudi Arabia, 2009).

### **2.4 Mobile Application**

Mobile Applications are programs which are able to move themselves between hosts on the network (Scott, et al, 2003). It has additional characteristics than wireless applications and stationary applications (Sangwhan, et al, 2009).

These days with massive usage for technology, the mobile devices were used in fields of agriculture, medical (Carlsson, et al, 2005), as well as business (Alahuhta, et al, 2005). Mobile phones have become widely used technology and for many people a daily companion (Gu & Gil, 2003). The main function is to enable communication and information access anywhere and anytime, according to Fogg (1999).

According to Ichikawa (2005), the mobile phones are an interesting platform for the user to see many parts of the world. Mobile phones are used commonly in daily life to communicate, coordinate and to access information. These functions make many people carry a phone with them at most of the time.

Depending on market situation of parallel, mobile application software is developed for each mobile platform, such as the Wireless Internet Platform for Interoperability (Choi, et al, 2008).

Mobile applications can be divided into many types, among all of them, context-aware mobile applications are even more complex than their non-mobile distributed counterparts, since they involve connections between executable software components or objects that can migrate from node to node within a heterogeneous software and networking environment. Such environments can be highly dynamic, changing over time as users and devices roam between networks resulting in CPUs becoming loaded and

unloaded and network hot spots or congestion points being in a constant state of flux (Ryan & Rossi, 2005).

The development of mobile applications uses Integrated Development Environments (IDEs) – such as Eclipse, Visual Studio, NetBeans, JBuilder, etc. The development task is very complex (Samuel & Marsden, 2009), nowadays, mobile applications developed in each specific developing environment provided by platform vendors are executed only on each vendor's platform. The industry needs an open standard to integrate these application models in a device middleware that provides the application' shared components.” (Sangwhan, et al, 2009).

## **2.5 Mobile Service**

Due to the relatively short lifecycle of the mobile devices, rapid change of mobile technology, and extensively competitive market, a great number of mobile services are newly developed and introduced in the market (Bahn, et al, 2007).

Mobile services are different from traditional interpersonal services that are delivered face-to-face, or from other types of e-services such as wireless online services (Yanxiang, et al, 2005), where the service delivery is linked to a specific fixed local area network or specific location (Van & Pawar, 2006). Mobile services can be accessed on the move, where and whenever arises (Jehun, et al, 2004). There is an increasing number of

academic studies are starting to focus on mobile services from management perspective, rather than a technology perspective (Heinonen & Pura , 2006).

The growth of mobile services in Southeast Asia is significant, set India as one example, as illustrated in Figure 1, the mobile subscription in India is witnessing near exponential growth (Sridhar, 2007).

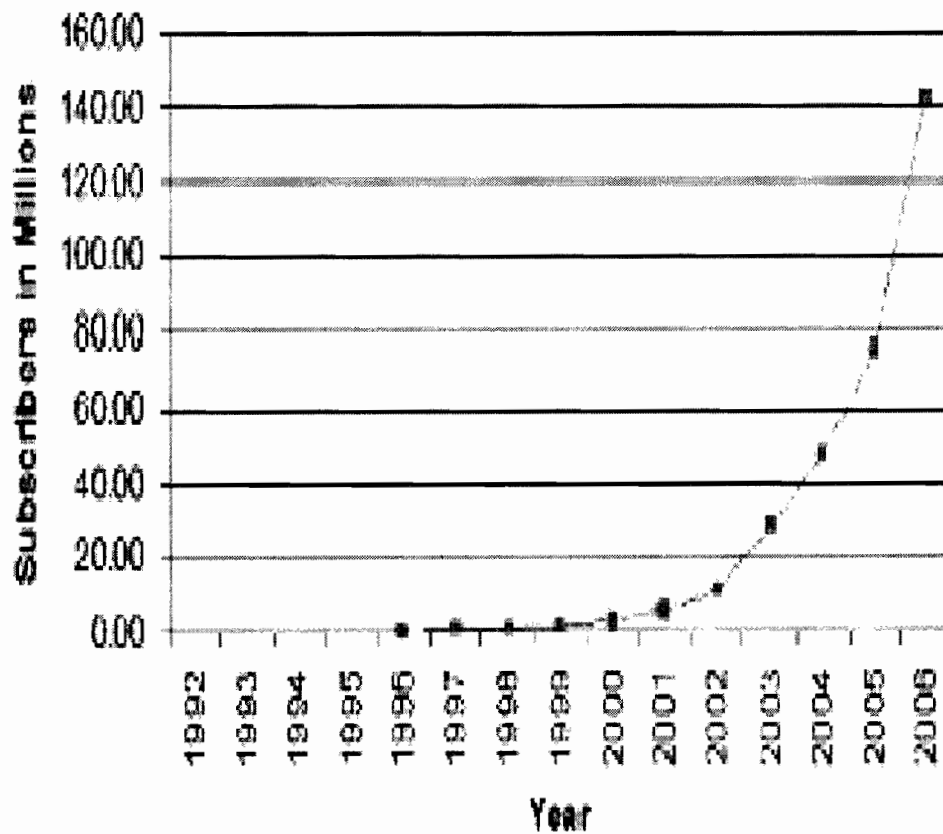


Figure 2.1: Growth of Mobile Subscribers in India (Sridhar, 2007)

In next generation (NG) mobile communication environment, it is expected that mobile services will be user centric and the mobile service platform will play an important role in supporting various future mobile services, not only for service providers to provide services effectively but also for users to use services easily (JungSook, et al, 2007).

Mobile service is increasingly known by most of the users of mobile devices, but individuals' adoption of mobile service is relative slow. Consumers' perceived risk is one of the reasons for that (Yongqing, et al, 2009). At the same time, little or no use of mobile services on the building sites exists (Skattor, 2007).

Mobile services in Global system for Mobile communication consist of components both located on the mobile device and in the network (Kargin & Basogly, 2007). The Mobile Station (MS), or mobile phone, consists of two computing devices; the Mobile Equipment (ME), which is the phone itself and the Subscriber Identity Module (SIM), which is a Smart Card (Kargin & Basogly, 2006). For mobile telephony, the service components located on the Mobile Equipment and the SIM interact with the components on the Mobile services Switching Center (MSC), Home Location Register (HLR) and Visitor Location Register (VLR). While a mobile phone is allocated to a unique HLR, it is communicating with different MSCs and VLRs according to its location (Do & Jorstad, 2005).

## 2.6 Related Works

In 2005, the Web of Mutawef published a mobile service to offer pilgrims the information of HAJJ. In this system, they use the technique of J2ME Mobile application and Java MIDP 2.0. The geographical information is illustrated in 3D graphs for HAJJ rites and places in this system. The information of hotels is also provided by it.

In 2008, a Hajj guideline system is published by Nokia. This system uses four languages: English, Arabic, French and Urdu to provide information of Hajj. It contains multimedia pieces with a flash, consisting of some simple movements synchronized with the narration by voice describing Hajj and Umrah journeys. The information inside this system is very sufficient. In Table 2.1, the feature and technique of the two related work is presented.

In the two related work discussed above, the user need to install the system in the mobile devices and can't get the information until he user install this system. But in our proposed system, users can get online information and no need to install the system. So our system is expected to offer updated information to the user in an easier way.

Table 2.1: Related work (case study)

Publisher	Year	Technique	Feature
<a href="http://www.mutawef.com">http://www.mutawef.com</a>	2005	<ul style="list-style-type: none"><li>J2ME</li></ul> Mobil	<ul style="list-style-type: none"><li>You can see any 'NOSOK' by using Mobile to know rites and supplicatration</li></ul>

		<p>e application.</p> <ul style="list-style-type: none"> <li>• Java MIDP 2.0.</li> </ul>	<p>and Mistakes.</p> <ul style="list-style-type: none"> <li>• You can get on details about HAJJ and UMRAH.</li> <li>• You can get on valuable geographical information plus interesting 3D illustration graphs for HAJJ rites and places.</li> <li>• You can get on unique service enable you to browse more than 500 hotels and Rentals classified by type and degree.</li> </ul>
<a href="http://mea.nokia.com/NOKIA_MEA_ENGLISH_31/Campaigns/Ramadan_2008/Guides/Hajj_Umrah_User_Manual_En.pdf">http://mea.nokia.com/NOKIA_MEA_ENGLISH_31/Campaigns/Ramadan_2008/Guides/Hajj_Umrah_User_Manual_En.pdf</a>	2008	J2ME Mobile application.	<ul style="list-style-type: none"> <li>• Usable and comfortable user interface that gives the Arabic and Islamic look and feel.</li> <li>• Multimedia pieces with a flash, consisting of some simple movements synchronized with the narration by voice describing Hajj and Umrah journeys.</li> <li>• Presenting the pilgrim's work during the Hajj with a possibility to set the alert timing.</li> <li>• A huge selection of supplications and prays for the Holy trip (E.g. Arafat prays, Mena, Entrance of Mecca...).</li> <li>• Presenting the most famous Islamic places with vivid illustrations and</li> </ul>

			<p>pictures.</p> <ul style="list-style-type: none"> <li>• Supporting four UI and content languages (English, Arabic, French and Urdu).</li> <li>• All the application contents are searchable.</li> <li>• Content messaging via MMS and SMS.</li> </ul>
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## 2.7 Summary

This chapter makes a review on related literature of this study. The background of Hajj is introduced with its meaning, its history and how it can be facilitated by modern technology, following is the discussion of mobile application and mobile services which will be used in the development phase, at last, the related work done by other researchers is presented by a table.

In the next chapter, the methodology used in this study will be introduced.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter introduces the methodology used in this study, it is the Waterfall methodology. The four steps of it are discussed with the work done in this study.

#### **3.2 Waterfall Methodology**

In this study, the Waterfall methodology will be used. This methodology consists of four standard phases as below.

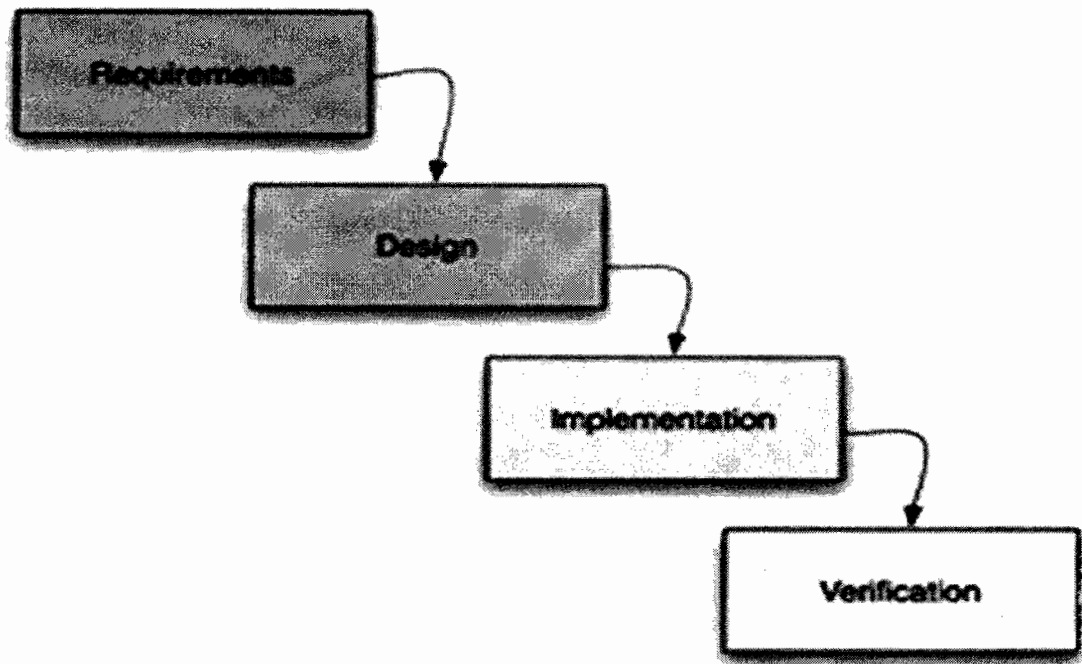


Figure 3.1: The Waterfall methodology (Royce, 1970)

The Waterfall methodology was derived from models used in traditional engineering activities with the objective of establishing an order in the development of large software products. Compared with other software development models, it is more rigid and less manageable (Luciano, 2005).

This study chooses the Waterfall model because it is very suitable for telecommunication software development. The Waterfall model is used extensively for its convenience in schedule and quality control at each completion of process. Since a document will be output upon completion of each development stage, each time with more detailed

document for review and quality evaluation, the structured programming has favorable compatibility with the water fall model and is quite commonly used for the development of telecommunication software (Boehm, 1988).

The methodology has the 4 following phases: Requirements, Design, Implementation and Verification, it is shown in Figure 3.1.

### **3.2.1 Requirements**

The first stage of this method is the understanding of the requirements of the development of mobile application. Objectives and the scope of this study were well understood, as well as the problems which were required to be solved. The literature review is made in this phase, too. According to Saudi press agency (SPA) (2009), the pilgrims require information on how to perform the Hajj. The objective of this study is to develop a prototype to offer the pilgrim the information related to perform the Hajj. By this prototype, pilgrims can get the information related to perform the Hajj from their mobile phones. Through related literature reviews, analysis was made to list out the requirements of the development of application. The information of restaurants, streets and hotels along the way of hajj are necessary to be provided in the prototype. Secondly, the information of hajj steps is also required in this prototype.

### **3.2.2 Design**

Many approaches to the problem of this study were looked into with the view of selecting the best suggestion or approach for the accomplishment of this task. The functionalities were drawn in sequence diagram, class diagram, collaboration diagram and use case diagram. Thus, the proposed prototype was designed to use a mobile service to offer information to the users.

### **3.2.3 Implementation**

In this phase, the prototype is constructed. For this study, a step by step architectural approach is followed in building the prototype. We try to show the main structure of the program by identify the data base and building the prototype, PHP and WML is used to develop the system. The pictures used to design the website such as the header are edited by using Photoshop.

### **3.2.4 Verification**

In the verification stage, the evaluation of the system was conducted. 20 Respondents were chosen to test the system and then fill in the questionnaire which is shown in

Appendix. The usability testing is based on the evaluation components introduced by Whitehead (2006). It is shown in Figure 3.2.

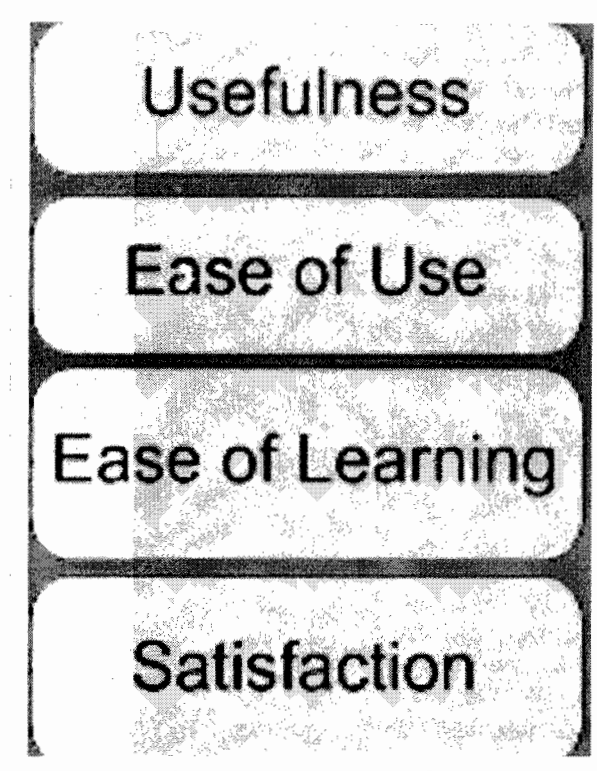


Figure 3.2: Usability Evaluation components (Whitehead, 2006)

After collecting the feedback from the respondents, the researcher analyzed the data and make improvement to the system. Finally, the researcher made a review of the study. Then the limitation of the study and recommendation for further work was presented by this researcher.

### 3.3 Summary

This chapter explains why the Water fall Methodology is chosen to use in the mobile application development. Every step of this methodology is explained. With this methodology, it is expected that this research can carry out smoothly and efficiently. In the following chapter, the analysis of system will be presented.

## **CHAPTER FOUR**

### **SYSTEM ANALYSIS AND DESIGN**

#### **4.1 Introduction**

This chapter will use the use case diagram, sequence diagram, class diagram and the collaboration to make the analysis of the system.

#### **4.2 System Functionality (Conceptual View)**

UML (Unified Modeling Language) enables the developer to depict the design from different aspects by providing different kinds of diagrams. In the domain of software design, it has already become a standard modeling language (Hang, et al, 2008). The UML will be used in this study since it is familiar with the software designer; the representations of UML such as class diagram use case diagram, collaboration diagram and sequence diagram are very useful in the software development.

#### **4.2.1 Use Case Diagram**

Use case diagram can make overview of the usage requirements for a system. In use case diagram, how the user interacts with the system is displayed.

This system has two types of users the first type is the administrator who is responsible to arrange the information in this website such as insert new steps or add new hotel and so on. Another type of the users is the WAP application user. He can be any person interested in this service and possess the desire to be a user of this service.

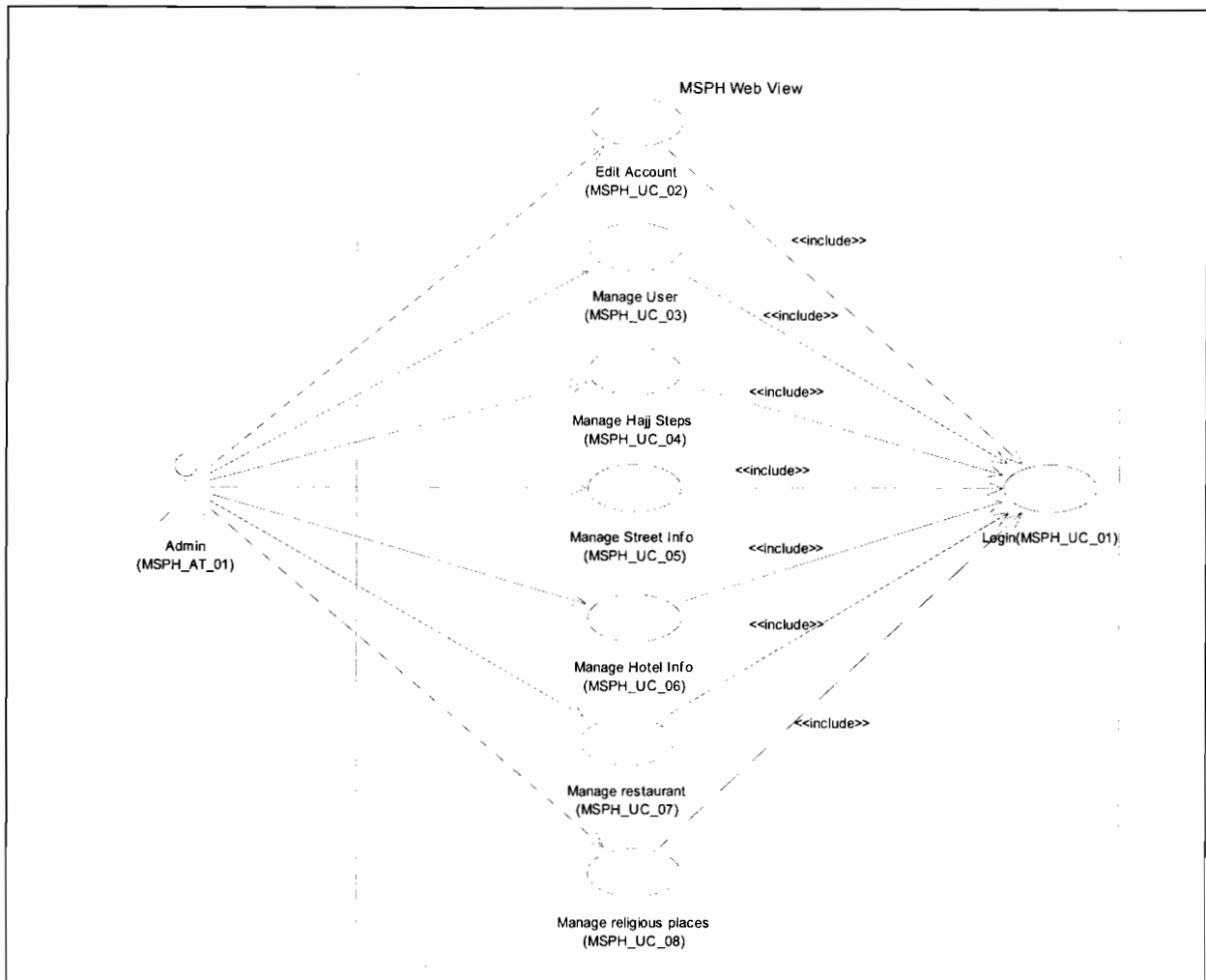


Figure 4.1: Use Case Diagram web view

Figure 4.1 illustrates the functions that the administrator can use, including managing hotels, restaurants, streets, Hajj steps and so on. The detailed explanation of each function is shown in use case specification.

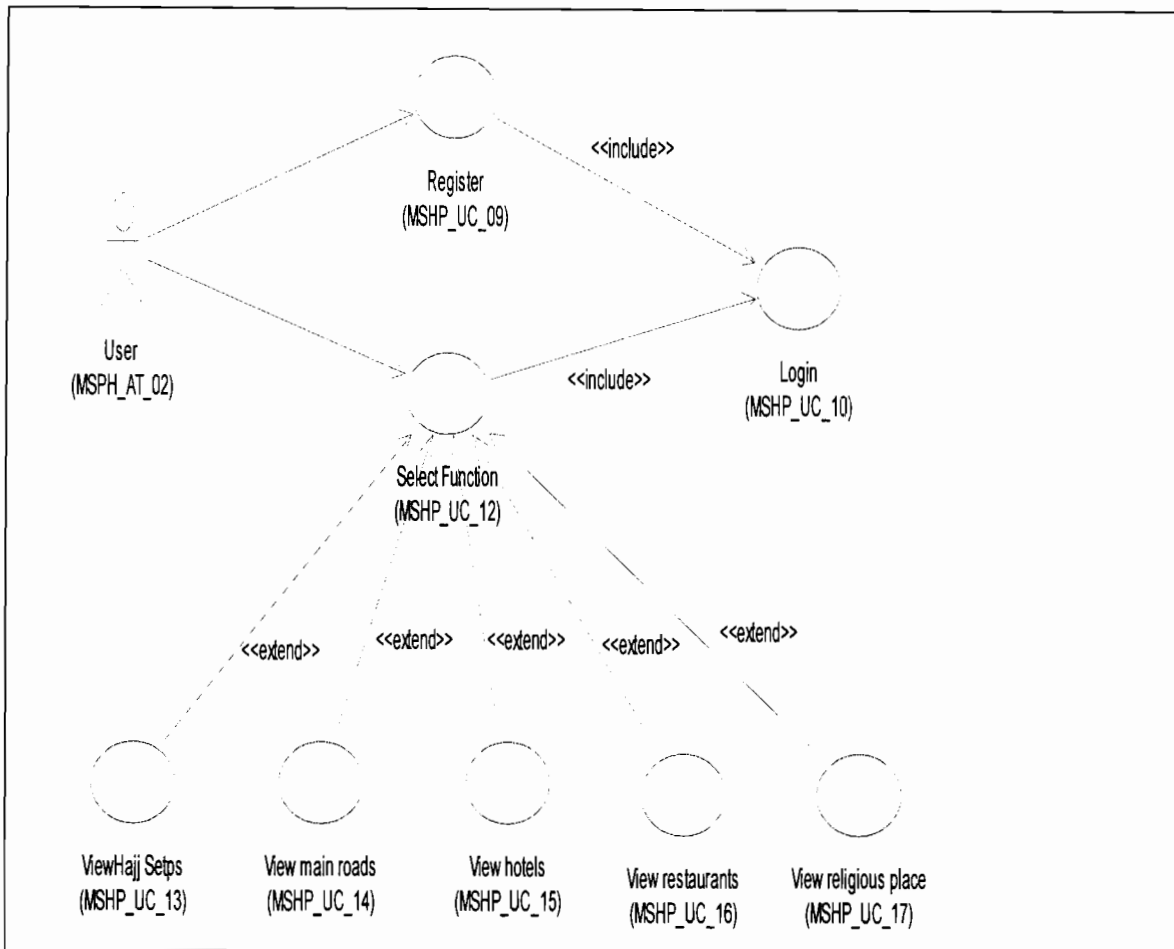


Figure 4.2: Use Case Diagram WAP view

Figure 4.2 illustrates the functions can be used by the user of the mobile service. He can view hajj steps, view main roads, hotels, restaurants and religious places in this system. In all cases, first of all, he should enter the user name and password to login. The detailed explanation of each function is shown in use case specification.

#### 4.2.2 Use Case Specification

The main function of the system will be shown in the specific use case below. Use case specification is helping us to get detailed explanation about each use case.

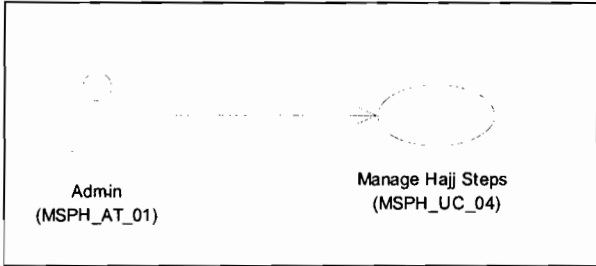
In each use case specification: brief Description gives summary about this use case; pre-Conditions show the condition must occur before this use case; characteristic of Activation explains who is responsible of the implementation of this function (i.e. who will do this use case).

The meaning of flow of event is explained below:

- Basic flow: present the normal scenario of that use case
- Alternative flow: alternative way to do the function
- Exceptional Flow: how this use case behave when any error occur
- Post-Conditions means what will happen after this use case has been done successfully.
- Rules and Constraints illustrate if there is any limitation.

Table 4.1 shows the management of hajj steps which including adding, editing and deleting the hajj steps.

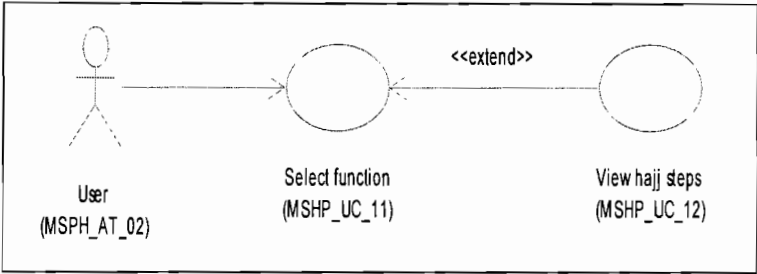
Table 4.1: Use Case Manage HAJJ Steps

Use case Login	 <pre> graph LR     Admin["Admin (MSPH_AT_01)"] --- ManageHajjSteps["Manage Hajj Steps (MSPH_UC_04)"]     </pre>
Brief Description	The use case is initiated by the administrator at the time he/she wants to manage hajj steps.
Pre-Conditions	Successful login.
Characteristic of Activation	Event Driven (on admin's demand).
Flow of Event	<p><b><u>Basic Flow</u></b></p> <ul style="list-style-type: none"> <li>• The use case begin when the administrator want to add or delete on edit one of the hajj steps.</li> <li>• User may click on add hajj step, system shall display for the user table need to be filled with appropriate info.</li> <li>• Admin shall insert the info and click add and this steps will be added.</li> </ul>

	<p><b><u>Alternative Flow</u></b></p> <p>Admin can click on the delete hajj steps, system will display for the admin all the available hajj steps. Admin can choose any one and click delete then system will remove that step.</p> <p>Admin may click on Edit hajj steps and system will display the admin all steps, admin can modify That step and click on edit and changes will be saved in the database.</p> <p><b><u>Exceptional Flow</u></b></p> <p>Not applicable.</p>
Post-Conditions	<ul style="list-style-type: none"> <li>• Admin can manage all the hajj steps.</li> </ul>
Rule(S)	Not applicable.
Constraint(S)	Administrator who has user name and password can have access to login.

Table 4.2 shows the function of the user to select hajj steps to view from the mobile phones.

Table 4.2: Use Case Edit View HAJJ steps

<p>Use case</p> <p>View hajj steps</p>	 <pre> graph LR     User((User MSPH_AT_02)) --&gt; UC11((Select function MSHP_UC_11))     UC12((View hajj steps MSHP_UC_12)) -.-&gt; &lt;&lt;extend&gt;&gt;  UC11     </pre>
<p>Brief</p> <p>Description</p>	<p>The use case is initiated by the user at the time he/she wants to</p> <p>View the available hajj steps.</p>
<p>Pre- Conditions</p>	<p>Successful login.</p>
<p>Characteristic of Activation</p>	<p>Event Driven (on user's demand).</p>
<p>Flow of Event</p>	<p><u>Basic Flow</u></p> <ul style="list-style-type: none"> <li>• The use case begins after the user select view hajj steps.</li> <li>• System will display for the user all the available hajj steps: Ihram, TAWAF and SA'I, GOING TO ARAFAT, GOING TO MUZDALIFAH, ROCEED TO MINA, FAREWELL TAWAF.</li> <li>• User could select one of these steps by clicking at it and system will display for the user complete info about the selected steps.</li> </ul> <p><u>Alternative Flow</u></p>

	<ul style="list-style-type: none"> <li>The admin cans logout any time.</li> </ul> <p><u>Exceptional Flow</u></p> <ul style="list-style-type: none"> <li>Not applicable.</li> </ul>
Post-Conditions	user can see the available info about any step of hajj steps.
Rule(S)	Not applicable.
Constraint(S)	Not applicable.

Table 4.3 illustrates the function for the user to view information of hotels from the mobile service.

Table 4.3: Use Case handle page

Use case handle page	<pre> graph LR     User((User MSPH_AT_02)) -.-&gt; Select((Select function MSHP_UC_11))     Select -.-&gt; &lt;&lt;extend&gt;&gt;  View((View hotels MSHP_UC_15)) </pre>
Brief Description	The use case is initiated by the user at the time he/she wants to View the available hotels.
Pre-Conditions	Successful login.
Characteristic	Event Driven (on user's demand).

of Activation	
Flow of Event	<p><b><u>Basic Flow</u></b></p> <ul style="list-style-type: none"> <li>• This use case begins when the user click on view hotels.</li> <li>• System will display for the user all the available hotels.</li> <li>• User can see info about the selected hotel.</li> <li>• User may click on book and the system will display for the user required info need to be filled from user such as the date and the period.</li> <li>• User could fill in the info and click book and system will retrieve for the user conformation number that emphasis the booking.</li> <li>• System could save the information and update the database.</li> </ul> <p><b><u>Alternative Flow</u></b></p> <p>The admin cans logout any time.</p> <p><b><u>Exceptional Flow</u></b></p> <p>Not applicable.</p>
Post-Conditions	User can get info about available hotel and book in any one.
Rule(S)	Not applicable.
Constraint(S)	Not applicable.

Table 4.4 is the explanation of the use case to see religious place.

Table 4.4: Use Case view religious place

<p>Use case</p> <p>View religious place</p>	<pre> graph LR     User["User (MSPH_AT_02)"] -.-&gt; Select["Select function (MSHP_UC_11)"]     Select -.-&gt; &lt;&lt;extend&gt;&gt;  View["View religious place (MSHP_UC_17)"]             </pre> <p>The diagram shows a user actor (MSPH_AT_02) connected to a use case 'Select function' (MSHP_UC_11). This use case is then connected to another use case 'View religious place' (MSHP_UC_17) via an 'extend' relationship.</p>
<p>Brief Description</p>	<p>The use case is initiated by the user at the time he/she wants to see the religious place that can be visited in Saudi Arabia.</p>
<p>Pre-Conditions</p>	<p>Successful login.</p>
<p>Characteristic of Activation</p>	<p>Event Driven (on user's demand).</p>
<p>Flow of Event</p>	<p><b><u>Basic Flow</u></b></p> <ul style="list-style-type: none"> <li>• The use case begins when the user want to see the available religious place that can be visited.</li> <li>• User may click on view religious place and system will display all the available place and user may click on one and see full info about that place.</li> </ul> <p>• <b><u>Alternative Flow</u></b></p> <p>The user cans logout any time.</p> <p><b><u>Exceptional Flow</u></b></p> <p>Not applicable.</p>

Post-Conditions	User able to see full info about religious place.
Rule(S)	Not applicable.
Constraint(S)	Not applicable.

### 4.2.3 Sequence Diagram

Sequence Diagram is widely used as a tool to model the dynamic aspects of the system.

The use of it is mainly for use case realization (Philip & Joseph, 2008).

- **Add Step**

The first step is to provide user name and password to activate the next use cases. The sequence of this process start from entering the valid user name and password, if they are correct, the next use case can be activated, if it is not valid, the system will ask the user to reenter the user name and password. It is shown in Figure 4.3.

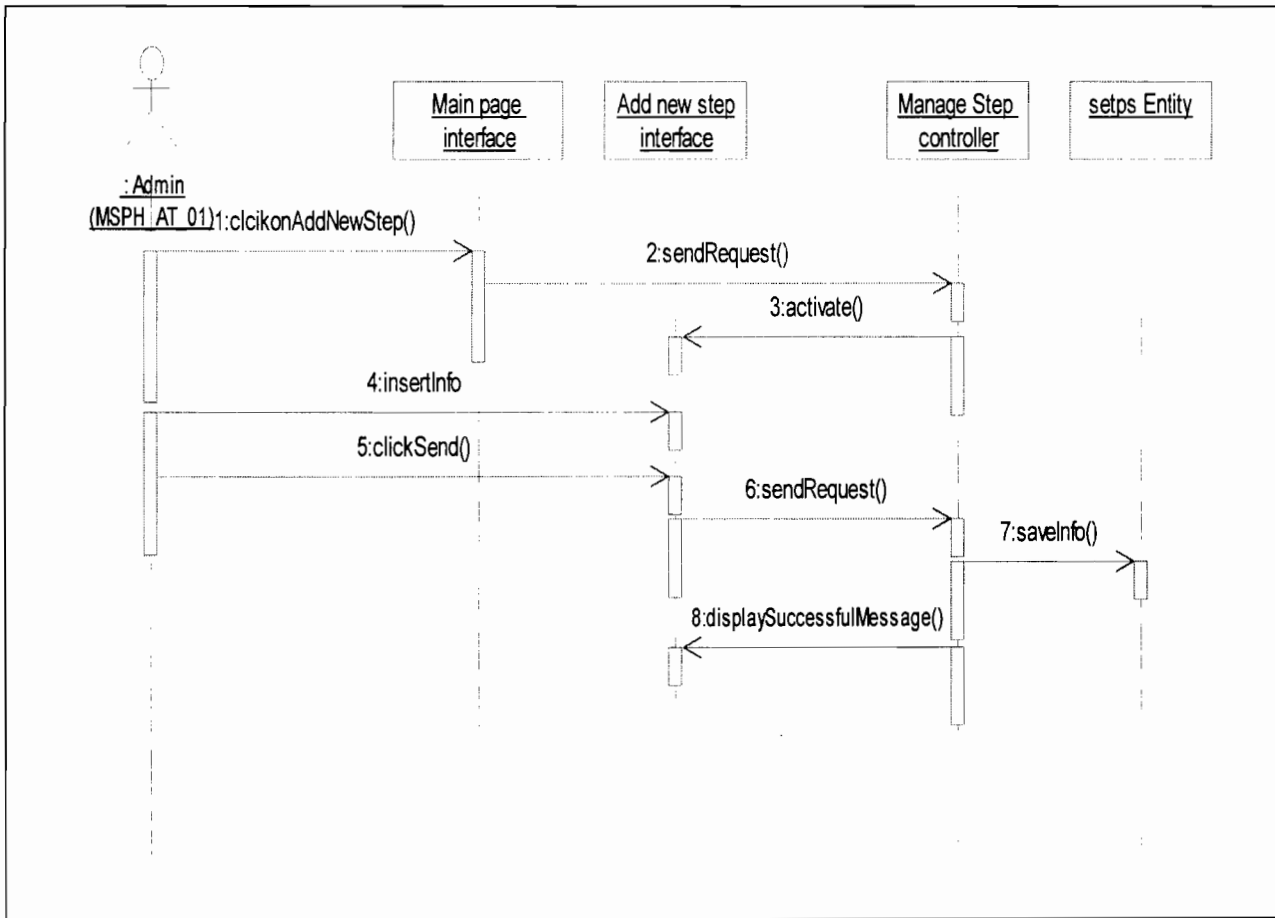


Figure 4.3: Sequence Diagram Add Step

Figure 4.3 illustrate the sequence to add hajj step. He should click on add new step button, then the request is send, this use case is activated, the information can be inserted, then he click send button, the requires is sent, information is saved, finally, successful message is displayed.

- Delete Step

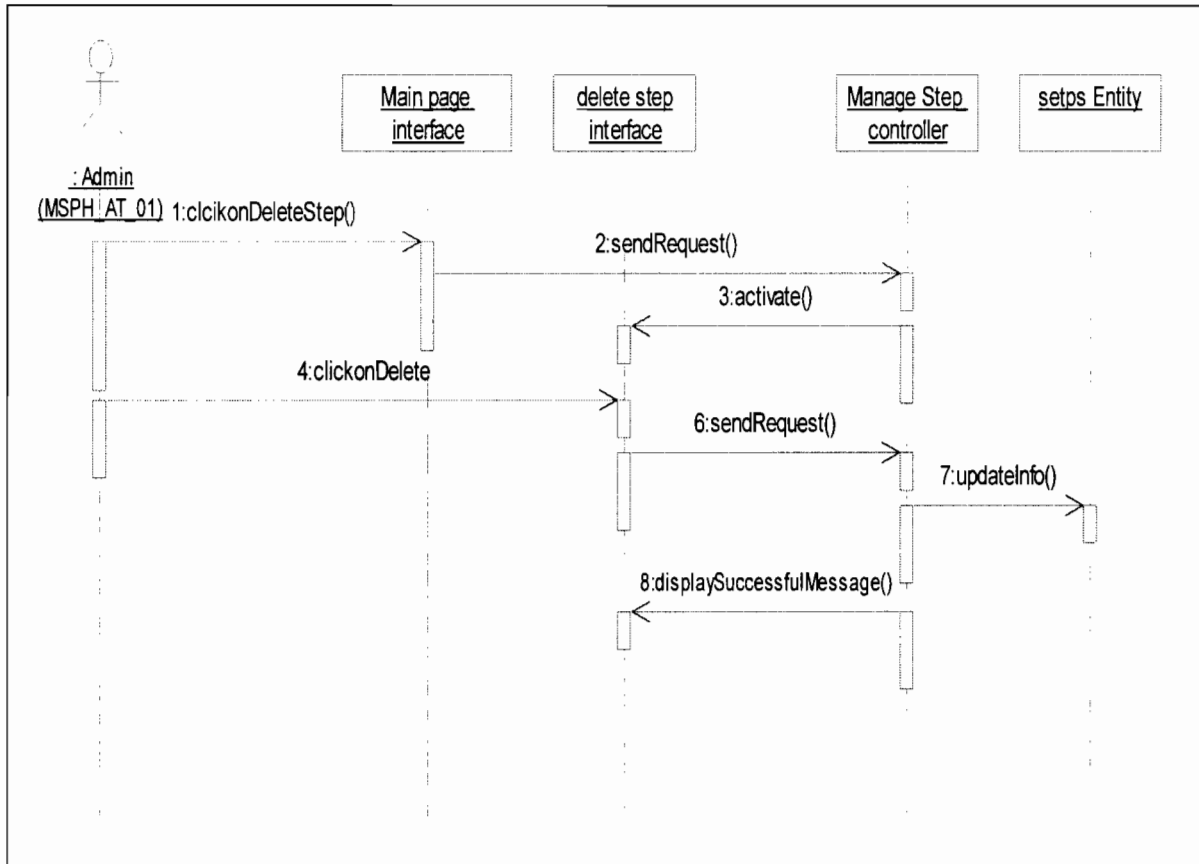


Figure 4.4: Sequence Diagram Delete Step

Figure 4.4 illustrate when the admin want to delete hajj steps that already exist in the system. First, the administrator click on delete step button, the request is sent, this use case is activated, then he should click on delete button of specific step, the request is sent, information is deleted, the successful updated message is presented at last.

- **View Hajj Step**

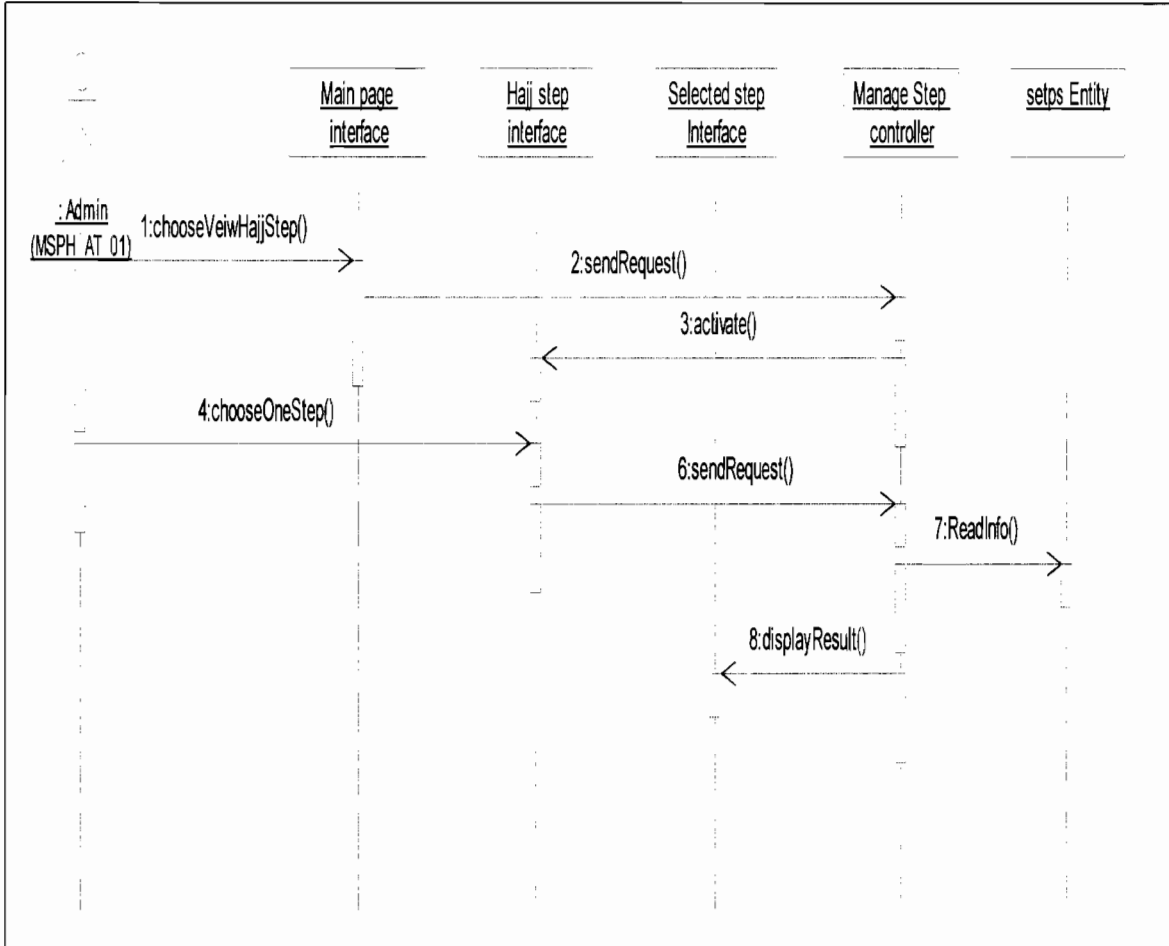


Figure 4.5: Sequence Diagram View Hajj Steps

Figure 4.5 illustrate when the admin want to preview the hajj step available in the system. Administrator should choose view hajj step button first, secondly, this request is sent, so the use case is activated, fourthly, the administrator should choose the specific step to view, the request is send, and information is displayed for him at last.

- **Manage Hotel**

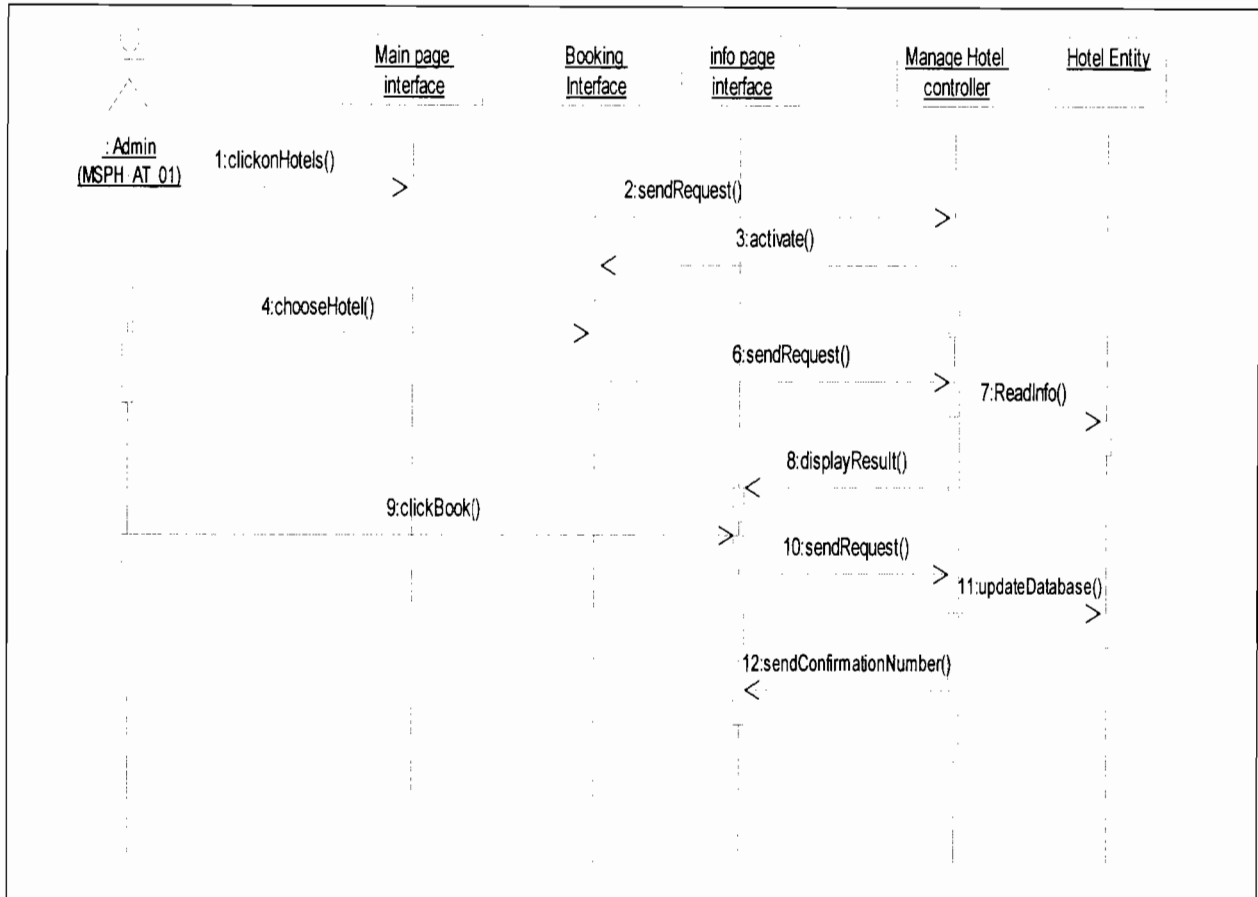


Figure 4.6: Sequence Diagram manage hotel

Figure 4.6 shows when the use case to book a hotel by the mobile phones. User should click the category of hotel first, the request is send, this use case is activated, then the user can choose the hotel, the requires is send to read information, the result is displayed, then the user can click booking, the request is sent to update the database, finally, the information number is send.

### 4.3 Collaboration Diagram

In order to model service interactions, collaboration diagrams are needed to supply a visual formalism, it can specify the choreography in the services participating to a composite service (Bultan, et al, 2009)

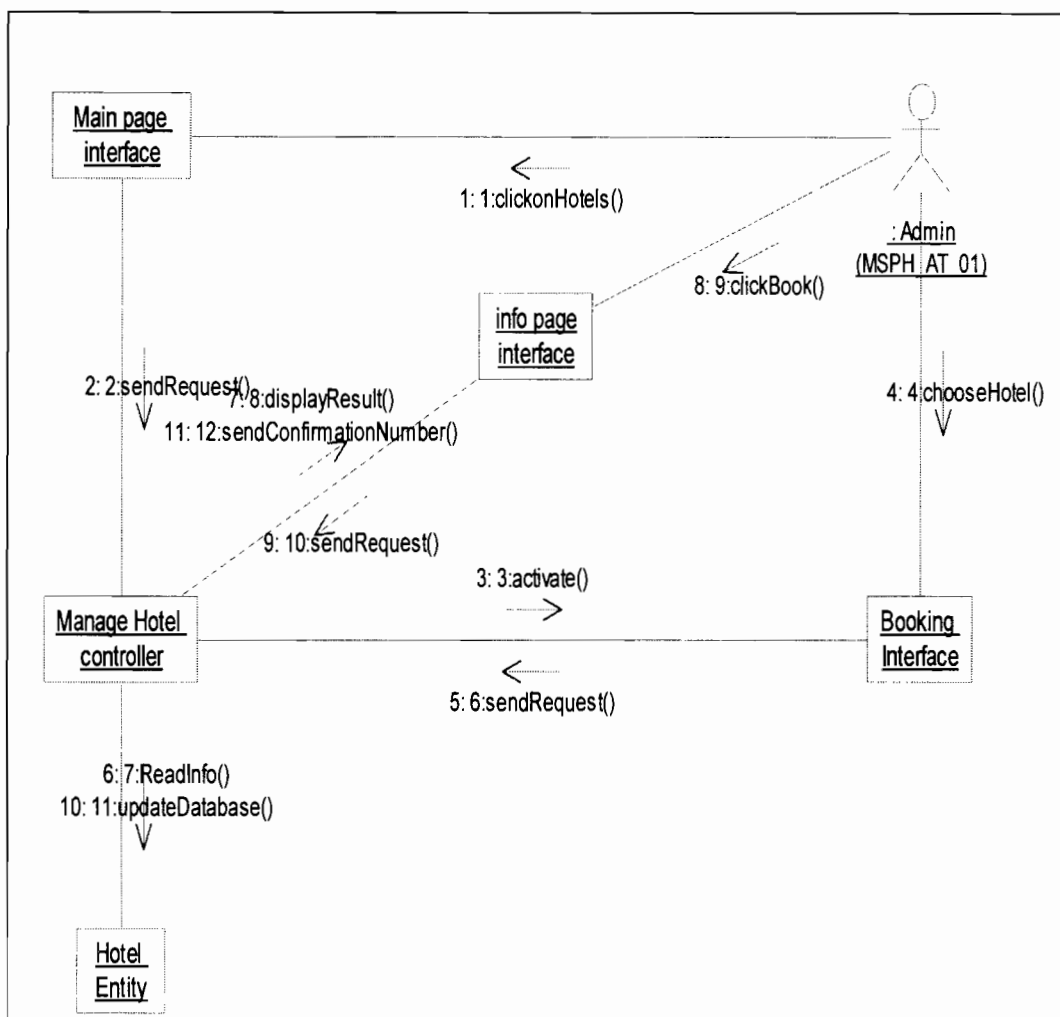


Figure 4.7: Collaboration diagram for manage hotel

Figure 4.7 illustrate the main entities which admin handles, including the booking interface, info page interface, main page inter face and so on.

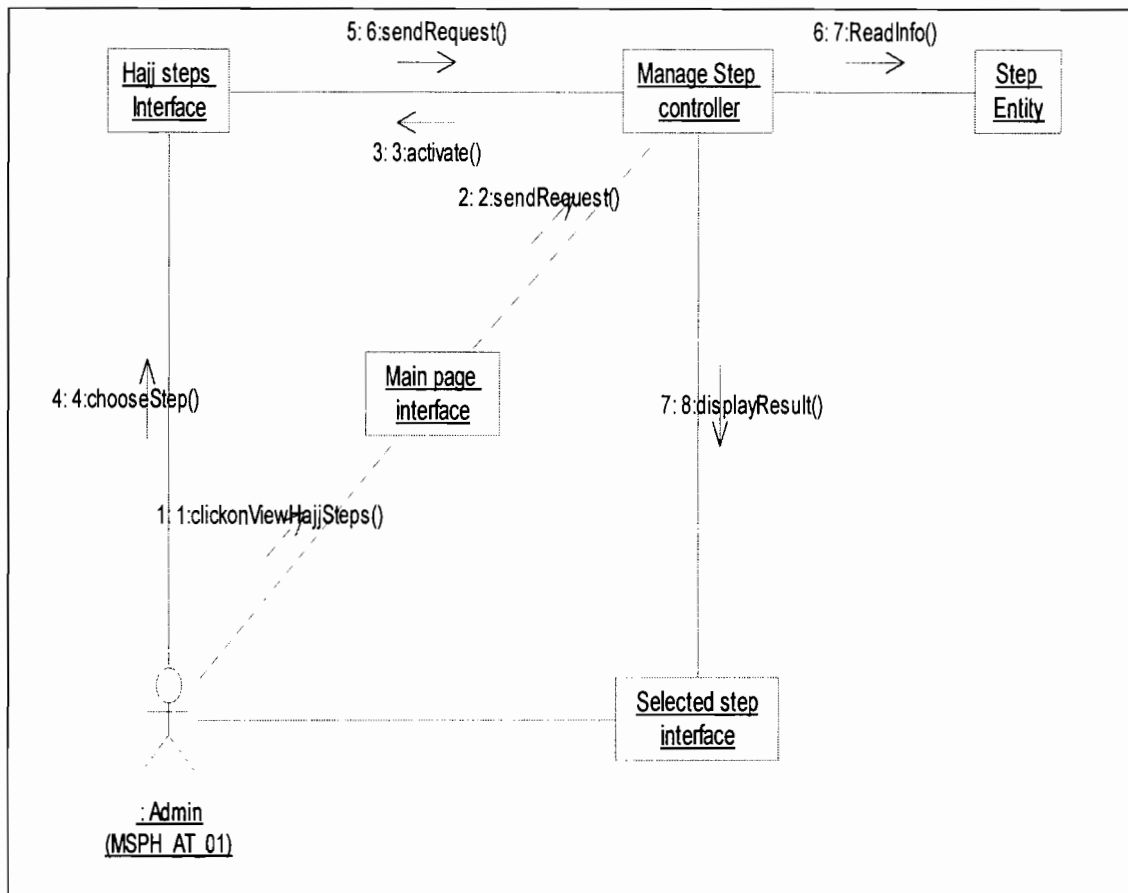


Figure 4.8: Collaboration diagram View Hajj Steps

Figure 4.8 shows the main entities with which admin should deal when he/she wants to view any hajj step available in the system.

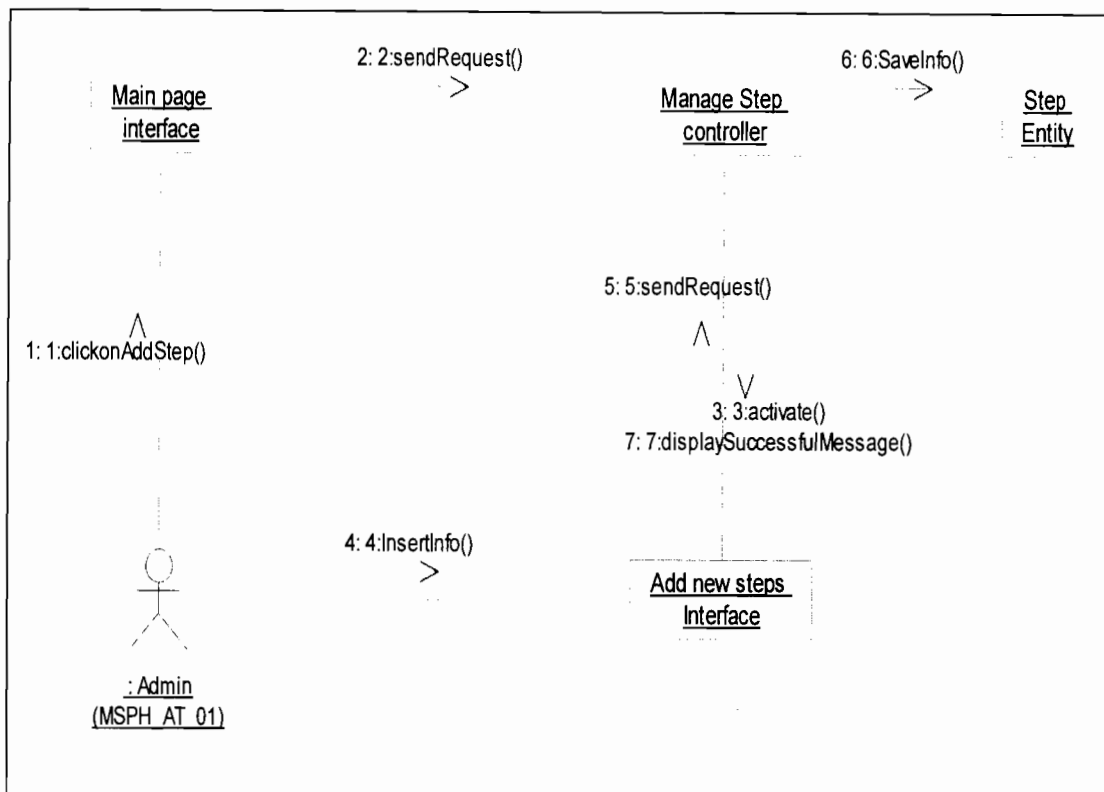


Figure 4.9: Collaboration diagram for Add Hajj step

Figure 4.9 illustrates main entities with which admin deals to add new hajj steps.

#### 4.4 Class Diagram

Class diagram is used to describe the data model from a static view, the interaction of classes are shown in the class diagram (Enjo,et al, 2009). It is a key artifact which is produced in the object-oriented information systems at the early development, its quality is very important to the final software product quality (Genero, et al, 2001)

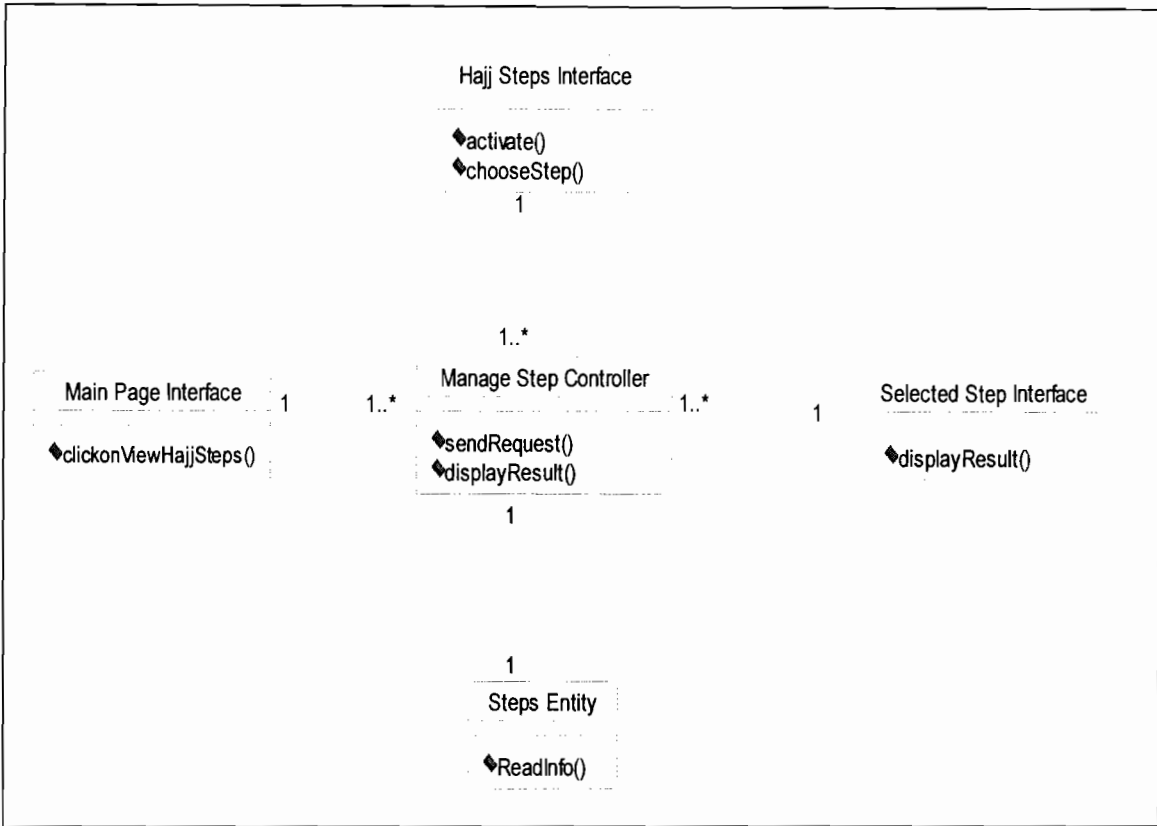


Figure 4.10: Class diagram manage steps

Figure 4.10 shows how the main entities of the system related to each other and the relation of connect between these entities.

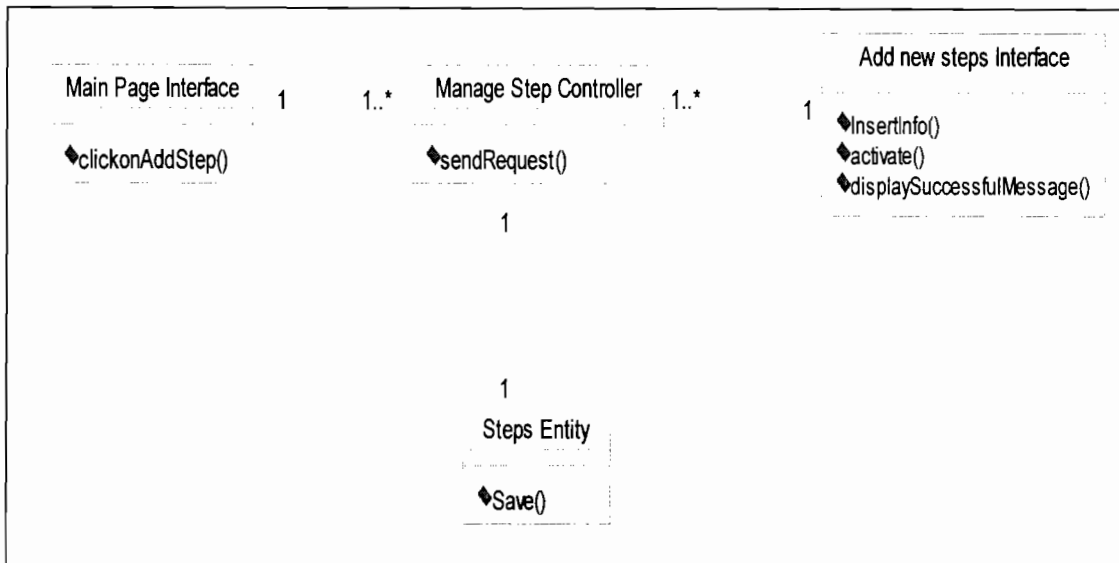


Figure 4.11: Class diagram add step

Figure 4.11 shows the main entities that involve in adding new hajj step process and how this entities is connected to each other as well as the relation of these entities.

## **CHAPTER FIVE**

### **FINDINGS AND RESULTS OF THE SYSTEM**

#### **5.1 Introduction**

This chapter is about the result and findings of this system. Since the proposed system involved two parties: the administrator and the user, the screenshots are presented for both of them to make the explanation. The result of usability evaluation is also included in this chapter.

#### **5.2 The Screenshot of the Web System and Its Explanation**

The screenshots of the web system can be categorized into six types, except the management of the administrator account, there are 6 categories: 1) manage restaurants; 2) manage streets; 3) manage hotels; 4) manage Hajj steps; 5) manage Holy Place and finally 6) manage user accounts.

In each category, its unit can be added, edited and deleted by this system. The examples are shown below.

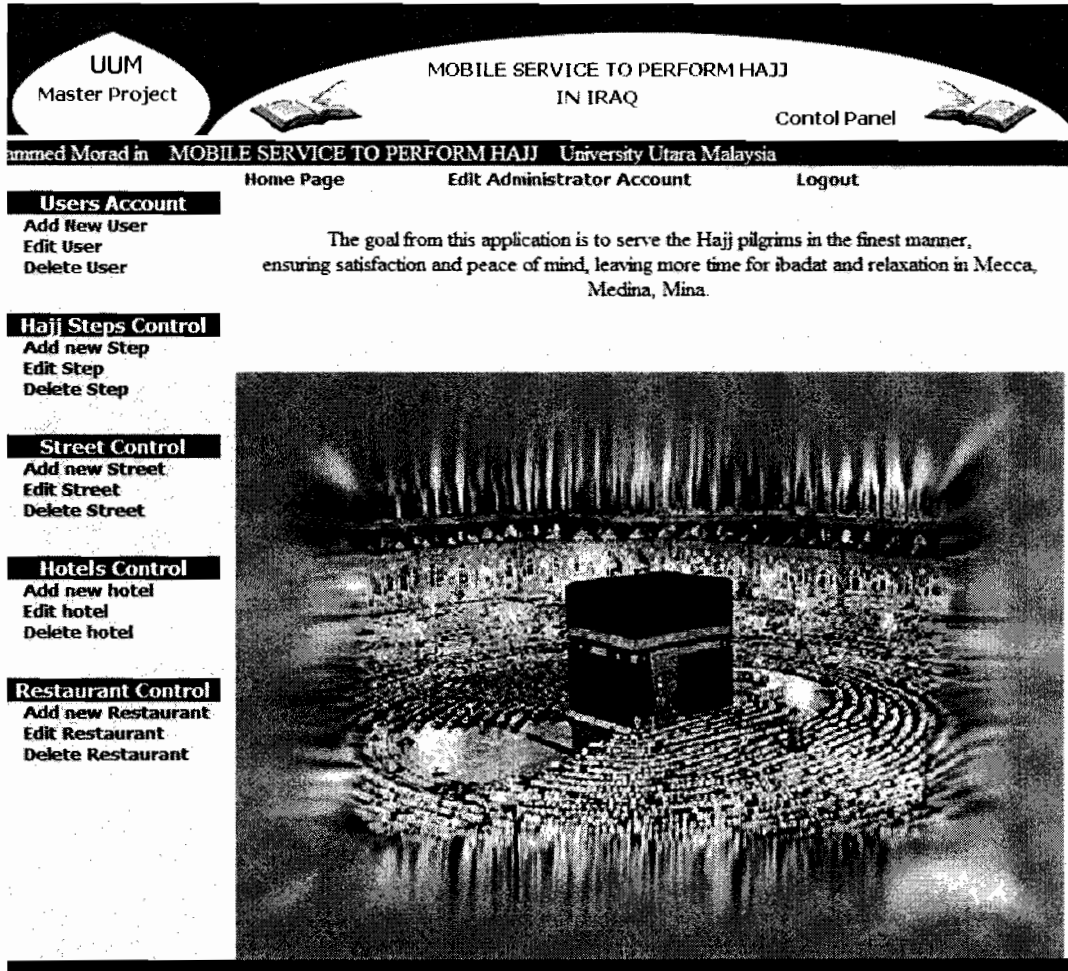


Figure 5.1: Home Pages

In Figure 5.1, the goal from this application is introduced in the home page; the main categories of the functionalities are presented. In above, it is the functionalities to login, log out and edit administrator account. In the left side, the functionalities to manage the system is listed.

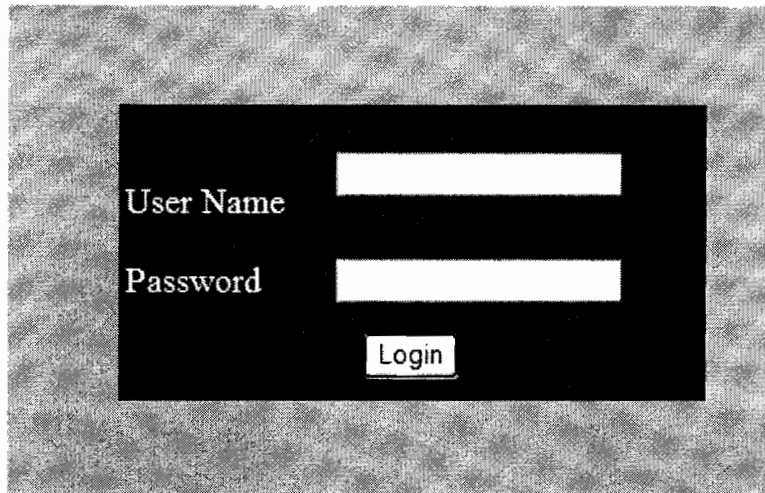



Figure 5.2: Login

In Figure 5.2, the login page of the administrator is shown, in order to login, the administrator need to insert the user name and corrected password.



**UUM**  
Master Project

MOBILE SERVICE TO PERFORM HAJJ  
IN IRAQ

Contol Panel

Welcome Mohammed

Home Page
**Edit Administrator Account**
Logout

**Users Account**

- Add New User
- Edit User
- Delete User

**Hajj Steps Control**

- Add new Step
- Edit Step
- Delete Step

**Street Control**

- Add new Street
- Edit Street
- Delete Street

**Hotels Control**

- Add new hotel
- Edit hotel
- Delete hotel

**Restaurant Control**


- Add new Restaurant
- Edit Restaurant
- Delete Restaurant

**Edite My Account**


Full Name	<input type="text" value="Mohammed Morad"/>	
Login Name	<input type="text" value="admin"/>	*
E- mail	<input type="text" value="Mohumamd@hotmail.com"/>	*
Password	<input type="password"/>	*
Confirm Password	<input type="password"/>	*

Figure 5.3: Edit administrator account

In Figure 5.3, the function to edit administrator account is shown, the information can be edited here includes the full name, login name, e-mail address and password which need to be confirmed.


UUM  
Master Project

**MOBILE SERVICE TO PERFORM HAJJ  
IN IRAQ**


Control Panel

---

tara Malaysia
Home Page
Edit Administrator Account
Logout

**Users Account**

- Add New User
- Edit User
- Delete User

**Hajj Steps Control**

- Add new Step
- Edit Step
- Delete Step

**Street Control**

- Add new Street
- Edit Street
- Delete Street

**Hotels Control**

- Add new hotel
- Edit hotel
- Delete hotel

**Restaurant Control**

- Add new Restaurant
- Edit Restaurant
- Delete Restaurant

**Add New User**

Full Name	Ahmad	
Login Name	Morad	*
Phone	0060134545820	
E-mail		
Password		*
Confirm Password		*

Active  
 Not active

Figure 5.4: Add new user

In Figure 5.4, the function to add new user is displayed. The information should be filled in are full name, login name, phone, email, and password which need to be confirmed again to ensure its validity.

User Accounts		
User Id	User Name	
1	Abo Maher	<a href="#">Delete</a>
6	tftytfy	<a href="#">Delete</a>
7	rrr	<a href="#">Delete</a>
8	Ahmad	<a href="#">Delete</a>

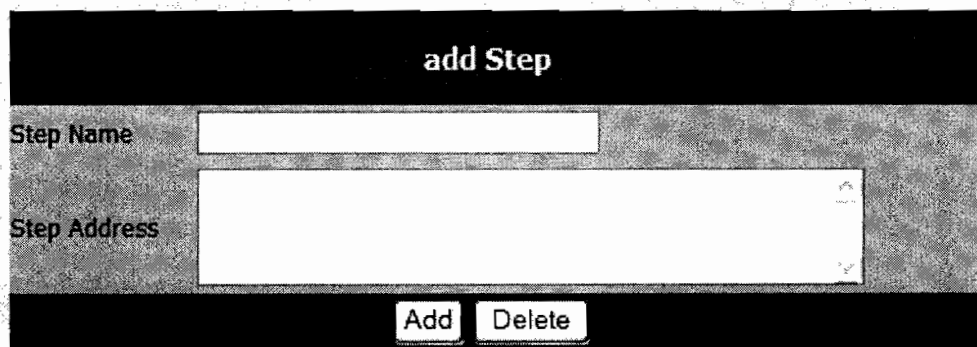
Figure 5.5: Delete user account

In Figure 5.5, the function to delete user is shown, it is quite easy for the administrator since just one click is needed to delete the user account. But firstly, the position of the user must be found according to his User ID.

Edit User account	
Full Name	<input type="text" value="Ahmad"/>
Login Name	<input type="text" value="Morad"/>
Phone	<input type="text" value="0060134545820"/>
Password	<input type="password"/>
Confirm Password	<input type="password"/>
	<input checked="" type="radio"/> Active <input type="radio"/> Not active
	<input type="button" value="Edit"/> <input type="button" value="Default"/>

Figure 5.6: Edit user account

In Figure 5.6, the function to edit user account is shown. All the information inserted in the registration can be updated here.



The image shows a web form titled "add Step". It features a dark header bar with the text "add Step" in white. Below the header, there are two input fields: "Step Name" and "Step Address". The "Step Address" field is a larger text area with a small icon in the top right corner. At the bottom of the form, there are two buttons: "Add" and "Delete".

Figure 5.7: Add step

In Figure 5.7, the function to add step in the Hajj is shown. By filing the blanket, the name of the step and its address can be added easily.

Hajj Steps			
Step ID	Step Name	Step Description	
5	1.IHRAM	*Clean/bathe yourself (Ghusul) *Wear Ihram Garments *Make intention for Hajj *Recite Talbiyah	Delete
6	2.TAWAF & SA'I	*Make Tawaf (circumvolution) around Kaaba, seven times while glorifying God *Walk between Safa and Marwa seven times with occasional trotting, (Sa'i) This completes the "Umrah" portion of the pilgrimage. The state of Ihram can be either broken or maintained at this point and before proceeding to Mountain Arafat. If the state of Ihram is broken, a pilgrim must offer a sacrifice or fast a total of ten days, three of them must be during the pilgrimage	Delete
7	3.GOING TO ARAFAT	*Proceed to Arafat. (Going through or halting at Mena not a mandatory step) *Stay in Arafat from Fajr till sunset *Stay in any part of Arafat *Glorify God, repeat supplication, repent and ask for forgiveness	Delete

Figure 5.8: Delete step

In Figure 5.8, the page in which step can be delete is shown. In the right column, there is a choice to delete the specific step.

Hajj Steps			
Step ID	Step Name	Step Address	
5	1.IHRAM	*Clean/bathe yourself (Ghusul) *Wear Ihram Garments *Make intention for Hajj *Recite Talbiyah	<a href="#">Edite</a>
6	2.TAWAF & SA'I	*Make Tawaf (circumvolution) around Kaaba, seven times while glorifying God *Walk between Safa and Marwa seven times with occasional trotting. (Sa'i) This completes the "Umrah" portion of the pilgrimage. The state of Ihram can be either broken or maintained at this point and before proceeding to Mountain Arafat. If the state of ihram is broken, a pilgrim must offer a sacrifice or fast a total of ten days, three of them must be during the pilgrimage	<a href="#">Edite</a>
7	3.GOING TO ARAFAT	*Proceed to Arafat. (Going through or halting at Mena not a mandatory step) *Stay in Arafat from Fajr till sunset *Stay in any part of Arafat *Glorify God, repeat supplication, repent and ask for forgiveness	<a href="#">Edite</a>
8	4.GOING TO MUZDALIFAH	*Leave for Muzdalifah after sunset *Observe Night prayers as usual *Pick up 21 pebbles *Stay overnight and perform Fajr prayer	<a href="#">Edite</a>
9	5.PROCEED TO MINA	*Leave Muzdalifah for Mena in the morning *Spend at least two days there *On the first morning in Mina, offer an animal sacrifice *Go to the three Jamarat stations and stone each with 7 pebbles while glorifying God	<a href="#">Edite</a>
10	6.FAREWELL TAWAF	*Return to Mecca and observe a farewell circumvolution (Tawaf) seven times around Kaaba *Cut or shorten hair *All Ihram restrictions are now lifted and Hajj is completed	<a href="#">Edite</a>

Figure 5.9: Edit Hajj steps

In Figure 5.9, the function to edit hajj steps is shown. By clicking the edit button at the right side, the administrator will go to his edit page as presented in Figure 5.10.

**Edite Step**

Step Name: 1.IHRAM

Step Description:

- \*Clean/bathe yourself (Ghusul)
- \*Wear Ihram Garments
- \*Make intention for Hajj
- \*Recite Talbiyah

Edite Default

Figure 5.10: Edit step

In Figure 5.10, the function to edit step is shown, the name and description can be easily edited in this interface.

**add Hotel**

Hotel Name:

Hotel Description:

Add Delete

Figure 5.11: Add hotel

In Figure 5.11, it shows the page to add hotel. In this part, the name of the hotel and a brief description is needed.

Hotels			
Hotel ID	Hotel Name	Hotel Description	
5	Makkah Hilton	Situated exclusively in front of the Haram, few steps away from the King Fahad Gate.	<a href="#">Delete</a>
6	Le Meridien	Le Meridien Makkah is ideally located 100 meters from the Holy Mosque in Makkah City on King Abdulaz.	<a href="#">Delete</a>
7	Elaf Kindah	Located in the capital of Islam. Adjacent to the Holy Haram.	<a href="#">Delete</a>
8	Al Shohada	Al Shohada Hotel is located in Al Iyyad district, only 4 minutes walk from the Holy Haram.	<a href="#">Delete</a>
9	Huda Kareem	The hotel is located in the heart of Holy Makkah in the Misfala area	<a href="#">Delete</a>
10	Coral	Located within a walking distance from the Holy Mosque. Situated only 120m away from Al Haram .	<a href="#">Delete</a>
11	Elaf Ajyad	Located in the capital of Islam for which all Muslim hearts reach in their prayers.	<a href="#">Delete</a>
12	Elaf huda	Hotel situated only 140m away from Al Haram.	<a href="#">Delete</a>
13	Al Massa Hotel	Located in the capital of Islam. The hotel is facing the Holy Haram and only few steps away from it.	<a href="#">Delete</a>

Figure 5.12: Delete Hotel

In Figure 5.12, the function to delete hotel is shown. Same as the delete of user and hajj steps, the delete of hotel is quite simple, just click one button in the right column can finish this task.

**add street**

Street Name

Street Description

Figure 5.13: Add Street

In Figure 5.13, the function to add street is shown, the information needed is the street name and its description.

Streets			
Street Id	Street Name	Street Description	
1	King Abdul Aziz Road	From Muzdalifah to the dam, there is a paved dual carriageway 8 km long and 31.2 m wide including five bridges and two tunnels. It is a main road to the south of Mina linked to Makkah's external ring road.	<a href="#">Delete</a>
8	South Al Aziziah road	From Road No. 1 to Mahbas Al Gin, 8 km long dual carriageway including six bridges.	<a href="#">Delete</a>
5	King Fahd Road	From Road No. 8 in northern Muzdalifah to Shi'b Ali near the Holy Mosque, a dual carriageway paved road 8 km long and 31.2 m wide including three double tunnels and four bridges.	<a href="#">Delete</a>

Figure 5.14: Delete Street

In Figure 5.14, the function to delete street is presented, this application can be done by the delete click at the right.

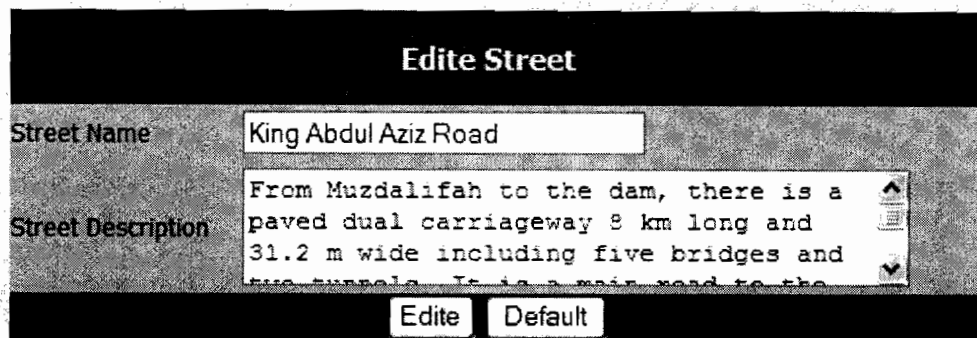


Figure 5.15: Edit Street

In Figure 5.15, the function to edit street is shown. It is same as the edit of other information in this system, needs to put the name and description.

### 5.3 The Screenshot of the Mobile Application and Its Explanation

The screenshots of the mobile system is consisting of five part: 1) register; 2) login; 3) home page; 4) error information; and finally 5) see the information from the mobile application.

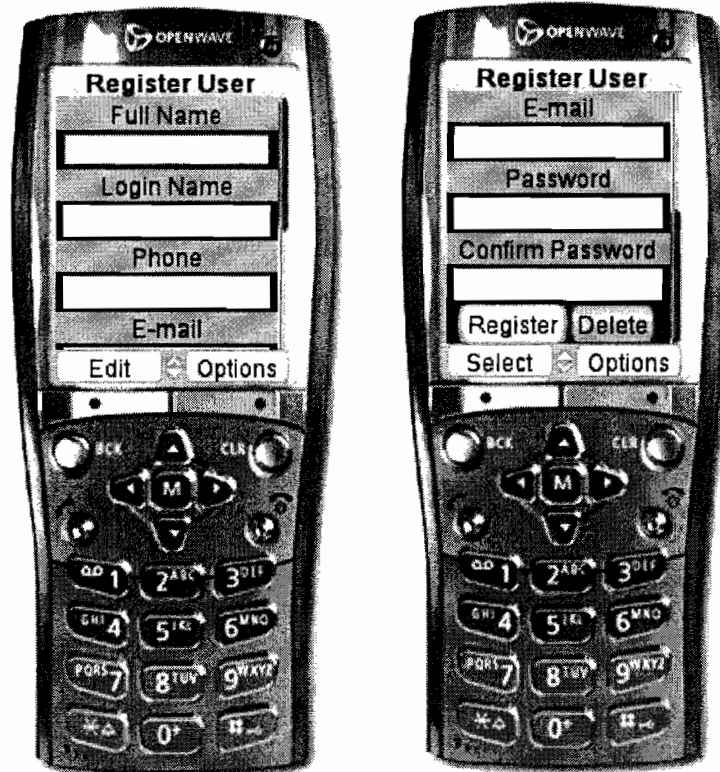


Figure 5.16: Register user.

In Figure 5.16 the function to register by mobile is shown, the full name, email, login name and password should be put first as well as the confirmation of password.

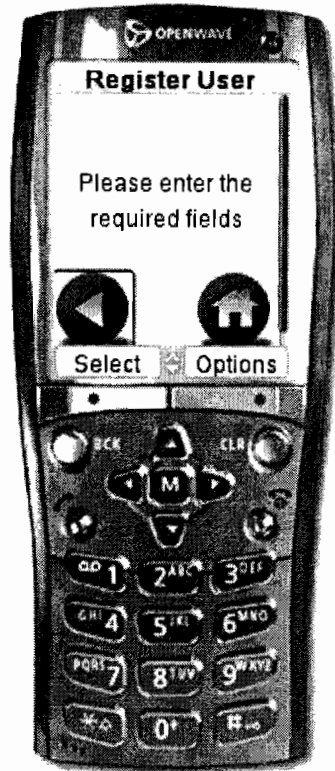


Figure 5.17: Error Information

In Figure 5.17, the error message is displayed when the new user try to register but He/She did not fill all requirement fields.

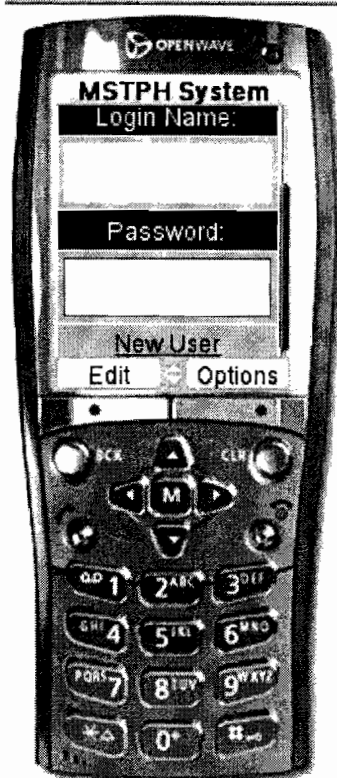


Figure 5.18: Login

In Figure 5.18, the login page is shown. By clicking the Edit in the arrowhead of the mobile phone, user can select the category he needs to fill in.



Figure 5.19: Home page

In Figure 5.19, the home page is displayed, from this page, user can choose what kind of information he wants to know, such as Hajj Steps, Main roads, hotels restaurants and so on. When he chooses one of them, the interface will change to that category automatically.

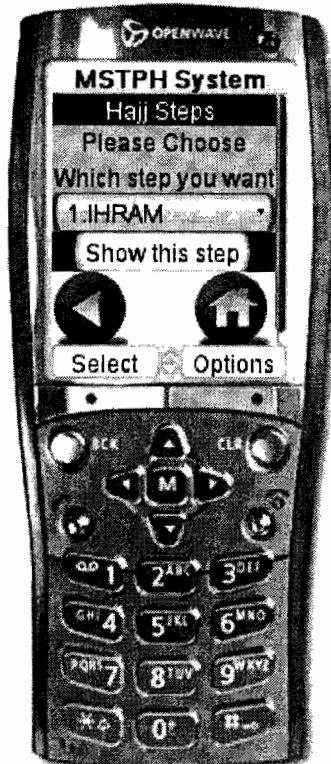


Figure 5.20: Choose sub category

In Figure 5.20, the page after choosing the main categories in the home page has been shown. In this page, the user can select which subtitle he is interested to see the content.

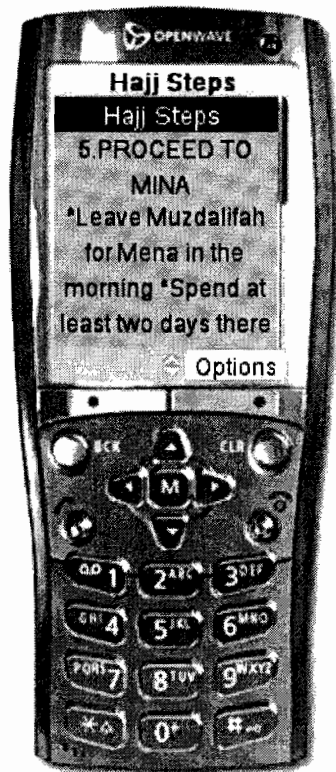


Figure 5.21: The content

In Figure 5.21, the content after the user chooses the subtitle is shown, from this page, the detailed

#### 5.4 The Result of the Testing of System Performance

The testing of this system is done by 20 respondents. They are asked to run this system to test its functionalities. After it, they fill in the questionnaires to give their feedback to the system. The usability components evaluated here is the satisfaction, ease of use, ease of learning and usefulness. The questionnaire is displayed in Appendix. Table 5.1 is the result of the evaluation.

Table 5.1: Result from the questionnaire

USEFULNESS		average	percentage
1	It is easy to view the information's as Hajj steps, hotel information, and others information in this application.	3.9	78%
2	The mobile guide application included the necessary information's to perform the Hajj.	3.85	77%
3	The new user can register through The WAP application successfully.	3.4	68%
4	The information within the MOBILE GUIDE APPLICATION it is clearly exposed.	3.4	68%
5	I could login to the application successfully and brows all	3.45	69%

	the available information.		
		<b>TOTAL</b>	<b>72%</b>
<b>EASE OF USE</b>			
6	The interaction within the system is understandable.	3.95	79%
7	Navigation method is clear	3.8	76%
8	Making errors frequently	3.55	71%
		<b>TOTAL</b>	<b>75.33%</b>
<b>EASE OF LEARNING</b>			
9	I learned to use this application quickly	3.85	77%
10	I easily remember how to use it	3.85	77%
11	I quickly became skilful with it	3.75	75%
		<b>TOTAL</b>	<b>76.33%</b>
<b>SATISFACTION</b>			
12	I am satisfied with it	3.95	79%
13	It works the way I want it to work	3.7	74%
14	It is acceptable to use	3.9	78%

15	It is helpful to use	3.8	76%
		<b>TOTAL</b>	<b>76.75%</b>

The result is displayed in graph as shown in Figure 5.22. After analyzing the data, the researcher found this system get an average mark more than 75%, so the user is satisfied with the this system.

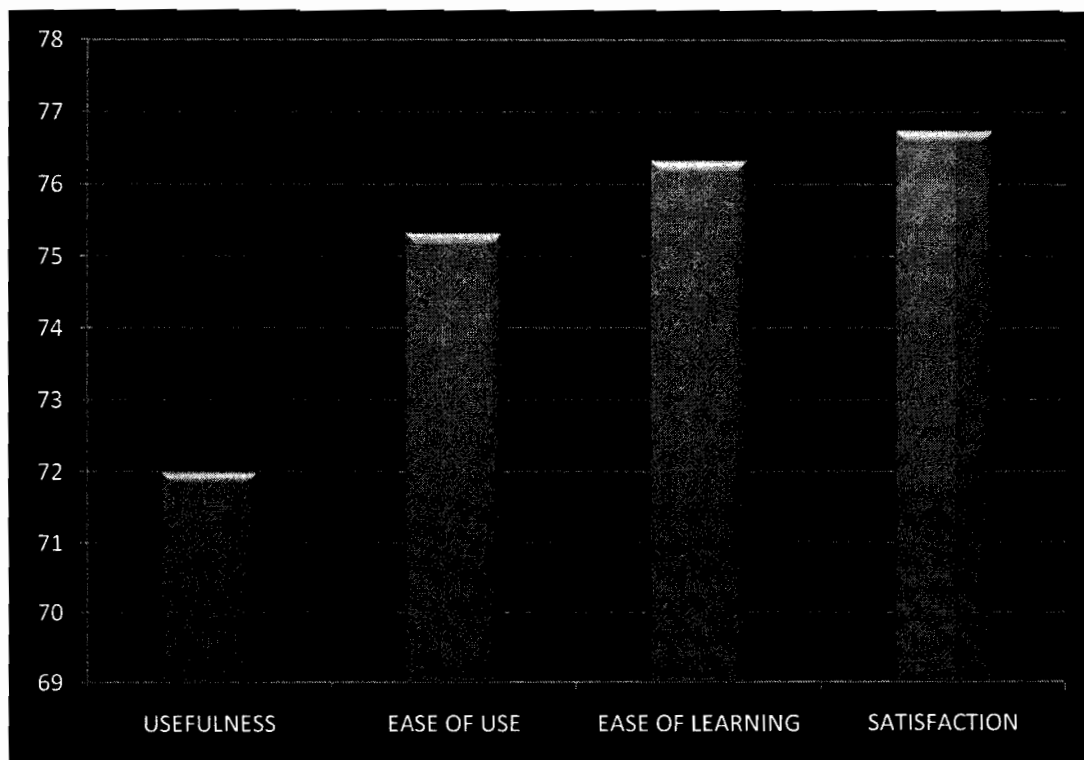


Figure 5.22: Result of the usability evaluation

## **5.5 Summary**

This chapter displays the system functionalities by the screenshots. The functionalities both from the administrator and the user are explained in detail. The evaluation of the system is done by 20 users. The result of the evaluation is also analyzed by the researcher and presented in both table and graph in this chapter.

In the next chapter, the conclusion of the study will be made.

## **CHAPTER SIX**

### **CONCLUSION**

This chapter makes a review of all the findings found in this study based on the research objectives followed by the limitation of the study and recommendations for future works.

#### **6.1 Findings**

As described in this research, the objective of this study is to develop a mobile guide application to perform the Hajj. The specific objectives are:

##### **Research Objective 1:**

To identify the basic requirements for developing mobile guide application to perform the Hajj, the results are discussed in chapter 4.

### **Research Objective 2:**

To design a mobile guide application that can be interacting with customer by using WAP (Wireless Application Protocol) technology that supports the use of Smartphone's devices, the outcome is shown in chapter 4 and 5.

### **Research Objective 3:**

To evaluate the usability of the prototype by using Usability testing, it is discussed in chapter 5.

## **6.2 Research Limitation**

- 1) This services can be use only for those that owned a mobile phone.
- 2) The user must subscribe a WAP services.
- 3) The users need to ensure that they are located in the phone's signal coverage because WAP services only work with the adequate coverage.
- 4) This project will use mobile emulator and laptop to simulate the application.

### **6.3 Recommended Works**

This system is a simple display of the Hajj information, it is recommended to add more functionality to the system. For example, the 3D illustration graph can be added to this system as well as the explanation of hajj information via voice. Besides that, more categories can be added in this system. For example, one category can be set to show the previous pilgrims' experience, and then the current pilgrims can get good suggestion and recommendations from them.

### **6.4 Summary**

This research has three objectives and all of them are achieved in this study. The limitation of the study is also presented in this chapter. Further works can be done to use tools more convenient than mobile phone to help to perform hajj in an easier and more convenient way.

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## APPENDIX

Faculty of Information Technology,  
Universiti Utara Malaysia,

### QUESTIONNAIRE

<b>SECTION A: General Information</b>
---------------------------------------

**1. Status:**

- 1. staff / Employee
- 2. Lecturer
- 4. Administrators
- 5. Studnet
- 6. Other (please mention) \_\_\_\_\_

**2. Gender:**

- 1. Male
- 2. Female

**3. Education background**

- 1. Certificate
- 2. Diploma
- 3. Degree
- 4. Master
- 2. PhD.
- 3. Other (please mention) \_\_\_\_\_

**Section B: Perception on current system**

This part is planned to get your opinion on the system aspects of the MOBILE GUIDE APPLICATION TO PERFORM HAJJ. Please state [√] where is appropriate to your answer.

**1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree**

<b>Attributes of Usefulness</b>		<b>Measurement</b>				
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	It is easy to view the information's as Hajj steps, hotel information, and others information in this application.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	The mobile guide application included the necessary information's to perform the Hajj.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	The new user can register through The WAP application successfully.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	The information within the MOBILE GUIDE APPLICATION it is clearly exposed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	I could login to the application successfully and brows all the available information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Attributes of Ease of Use</b>		<b>Measurement</b>				
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	The interaction within the application is understandable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Navigation method is clear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Making errors frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Attributes of Ease of Learning</b>		<b>Measurement</b>				
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	I learned to use this appication quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.	I easily remember how to use it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	I quickly became skilful with it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Attributes of Satisfaction</b>	<b>Measurement</b>				
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1)	I am satisfied with it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2)	It works the way I want it to work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3)	It is acceptable to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4)	It is helpful to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>