

# PROCEEDINGS



The Second International Conference on Science,  
Engineering and Technology

“Sustainable Development in Developing  
Country for Facing Industrial Revolution 4.0”

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Arbi Haza Nasution

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# ICoSET 2019

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# FOREWORD

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In the name of Allah, Most Gracious, Most Merciful  
Assalamu'alaikum Wr. Wb.,

Welcome to the Second International Conference on Science Engineering and Technology (ICoSET 2019). The advancement of today's computing technology, science, engineering and industrial revolution 4.0 play a big role in the sustainable development of social, economic, education, and humanity in developing countries. Institute of higher education is one of many parties that need to be involved in the process. Academicians and researchers should promote the concept of sustainable development. The Second International Conference on Science, Engineering and Technology (ICoSET 2019) is organized to gather researchers to disseminate their relevant work on science, engineering and technology. The conference is co-located with The Second International Conference on Social, Economy, Education, and Humanity (ICoSEEH 2019) at SKA Co-EX Pekanbaru Riau.

I would like to express my hearty gratitude to all participants for coming, sharing, and presenting your research at this joint conference. There is a total of 84 manuscripts submitted to ICoSET 2019. However only high-quality selected papers are accepted to be presented in this event, with the acceptance rates of ICoSET 2019 is 70%. We are very grateful to all steering committees and both international and local reviewers for their valuable work. I would like to give a compliment to all co-organizers, publisher, and sponsors for their incredible supports.

Organizing such prestigious conferences was very challenging and it would be impossible to be held without the hard work of the program committee and organizing committee members. I would like to express my sincere gratitude to all committees and volunteers from Singapore Management University, Kyoto University, Kyushu University, University of Tsukuba, Khon Kaen University, Ho Chi Minh City University of Technology, University of Suffolk, Universiti Teknologi Malaysia, Infrastructure University Kuala Lumpur, Universiti Malaya, Universiti Kebangsaan Malaysia, Universiti Utara Malaysia, Universiti Teknologi Mara, and Universiti Pendidikan Indonesia for providing us with so much support, advice, and assistance on all aspects of the conference. We do hope that this event will encourage collaboration among us now and in the future.

We wish you all find the opportunity to get rewarding technical programs, intellectual inspiration, and extended networking.

Pekanbaru, 27th August 2019  
Dr. Arbi Haza Nasution, M.IT  
Chair of ICoSET 2019



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# PAPERS



# Mobile Application of Religious Activities for the Great Mosque Islamic Center Rokan Hulu with Push Notification

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**Keywords:** The Great Mosque Islamic Center Rokan Hulu, Android Application, Push Notification.

**Abstract:** The Great Mosque Islamic Center Rokan Hulu is the best national mosque in Indonesia and also as an icon of Rokan Hulu Regency which has the nickname of the Country of Thousand Suluk. This mosque is also a religious tourist place. Therefore, this mosque has many religious activity agendas that are in the spotlight of the wider community. The lack of information dissemination on religious activities is a major problem that must be overcome. Communities often get non-updated information and outdated information. Mobile Application of Religious Activities for the Great Mosque Islamic Center Rokan Hulu with Push Notification is the solution to these problems. This application uses the push notification method so that users easily get information on religious activities through automatic notifications on the user's smartphone and also as a reminder of the schedule of religious activities. Users can also set up information on religious activity information they want to get through the notification configuration menu. Besides, this application also has a menu about mosques that contain information on the Great Mosque Islamic Center Rokan Hulu such as prayer schedules, locations, descriptions, and galleries.

## 1 INTRODUCTION

A mosque is the Muslim gathering place for prayer, the building in which Muslims worship God. The function of the mosque is not only a place of prostration but a mosque is the center of Islamic religious activities. During the Prophet Muhammad SAW, the mosque functioned as a center for educational activities, namely a place for fostering and forming the character of the people (Kurniawan, 2014). Activities such as celebrating Islamic holidays, discussions, religious studies, lectures, recitals, and Al-Qur'an learning places are held in the mosque. In addition, the mosque also has a schedule of activities to be carried out both routine activities and other religious activities carried out at a certain time.

Rapid technological development is the solution to several problems to help human work. In this era of globalization, almost everyone has a smartphone to support their activities. One of the operating systems is Android. Android is a Linux-based mobile phone operating system. Open source, the source code is provided free of charge to developers to create their applications to run on Android (Nugroho, 2017). Most smartphone producing companies choose the

Android operating system for their smartphone products. Smartphones with Android-based operating systems are cheaper than smartphones with paid operating systems. Push notification is a service that can provide special notifications instantly on an Android smartphone. The push notification service can help users get short notifications. This service is beneficial in disseminating and providing information in real-time. So, it can overcome problems in the dissemination of information such as information that is difficult to obtain, information that is not up to date and information received is outdated.

The Great Mosque Islamic Center Rokan Hulu is the best national mosque in Indonesia and also as an icon of Rokan Hulu Regency which has the nickname of the Country of Thousand Suluk. This mosque is also a religious tourist place. So, this mosque has many religious activity agendas that are in the spotlight of the wider community. Information about religious activities is needed by some tourists so they can arrange a schedule of visits to the mosque according to these religious activities. The surrounding community also very much wants to take part in the religious activities carried out. Because the Great Mosque Islamic Center Rokan Hulu is a mosque that

is the center of religious activities at the district level. The lack of information in spreading religious activities is a problem that must be overcome. To overcome the lack of information dissemination of religious activities at the Great Mosque Islamic Center Rokan Hulu, then an application for religious activity information is made using the push notification method. So, users immediately get notifications automatically on their smartphone when information on religious activities entered by the admin or administrator of the mosque. The Limitation of the problems in this research is (1) This application is made for smartphones that use the Android operating system; supports Android 4.4 (KitKat) and the latest version. (2) The push notification method in this application uses the Firebase Cloud Messaging (FCM) service. (3) Application management is done through the web by the admin.

## 2 LITERATURE REVIEW

To complete the research process, a theoretical basis is needed as the basis for research work. Fundamental theories are taken from books, theses, previous studies, and scientific journals.

### 2.1 Web

The web is a collection of web pages, usually summarized in a domain that is located on the World Wide Web (WWW) on the internet (Jasmadi, 2004). The web becomes a computer network-based information media that can be accessed anywhere at a relatively low cost. The web is a form of implementation of web programming languages.

### 2.2 Android Operating System

Android is one of the mobile phone operating systems. Other mobile phone operating systems such as Windows Mobile, iPhone, Symbian, and many more. This Android operating system runs by prioritizing core applications without involving third parties even though the potential of third parties is greater. So that third-party applications have distribution limitations in getting original data from mobile phones, communicating between processes and the limitations of application distribution for their platforms (Stephanus, 2011). The Android architecture consists of applications and widgets, application framework, libraries, android run time, and Linux kernel.

### 2.3 Firebase

Firebase is Backend as a Service (BaaS) which is currently owned by Google. Firebase is a web application platform that helps developers build high-quality applications by storing data in the format of JavaScript Object Notation (JSON) that does not use queries to insert, update, delete or add data to it (Khawas and Pritam, 2018). Firebase provides a variety of services, one of which is a push notification feature called Firebase Cloud Messaging (FCM). FCM is a development of Google Cloud Messaging (GCM) that provides services so that developers can send notification messages to Android devices from servers (Nurzam et al., 2017)).

### 2.4 Push Notification

Push notification is a service that is widely used for notification via short messages on smartphones (Siddik and Nasution, 2018). The application that will be designed is an application that can send push notifications which will later be developed in various fields according to user needs. Lack of knowledge in the dissemination and notification of information in real-time, the information obtained is not up-to-date, so that in various situations and conditions the information provided is outdated.

Push notification is one of the services that can overcome these problems so that no more recent information is not delivered. With the use of this service, every updated information will immediately be sent as a notification message, so the latest information will not be missed. Push notification service is generally widely applied to mobile applications such as Android and other operating systems.

### 2.5 The Great Mosque Islamic Center Rokan Hulu

The Great Mosque Islamic Center Rokan Hulu is located at coordinates n 000 53 '44.3 "e. 1000 18 '31.5". The background of the establishment of this mosque was based on the brilliant idea of the Rokan Hulu Regent, which was due to the absence of a representative mosque to be used as a prayer place and district-level religious activities. One district mosque that can be used as a center of activity as well as a symbol of Islam in Rokan Hulu, moreover this area is nicknamed the Country of Thousand Suluk. Thousand Suluk is an area where many people carry out dhikr in a particular place (surau) which is called by bersuluk (Badan Pengelola Masjid Agung Islamic Center Rokan Hulu, 2016).



Figure 1: The great mosque islamic center rokan hulu.

The Great Mosque Islamic Center Rokan Hulu is an icon of Rokan Hulu district, dubbed the Country of Thousand Suluk. The function of the Great Mosque Islamic Center Rokan Hulu is not just a place of worship but has expanded and improved its function in accordance with the motto of the mosque as a means of worship, achieving blessings, and increasing spirit. Equipped with various facilities, infrastructure, and well planned religious activities programs, the Great Mosque of the Islamic Center of Rokan Hulu becomes the center of Islamic studies and the practice of Al-Quran values. This mosque is also a place of formation of the Islamic community in order to build an advanced Islamic society and become a pioneer of the development of Islam in the international world.

### 2.5.1 Religious Activity Schedule of the Great Mosque Islamic Center Rokan Hulu

The schedule of religious activities at the Great Mosque Islamic Center Rokan Hulu is very crowded every day. The schedule of religious activities is as follows: (Badan Pengelola Masjid Agung Islamic Center Rokan Hulu, 2016).

- Organizing Fardhu Prayer Services, which are attended by thousands of worshippers every day.
- Organizing Friday Prayers. The Khatib sermon came from Pekanbaru and the leadership of the pesantren in Rokan Hulu Regency and at least had a Master degree and Lc.
- Organizing Islamic Day Activities. Celebration of Islamic holidays with various activities such as marches to welcome the new year of Hijriah, the splendor of Ramadhan, Tabligh Akbar, various kinds of competitions and so forth.
- Organizing Islamic Da'wah and Tabligh Akbar routinely carried out both weekly and monthly.
- Carrying out routine recitation every once a week.
- Organizing Educational Activities. Carried out through da'wah, also developed in the form of

particular institutions such as Pendidikan Anak Usia Dini (PAUD), Tahfiz High School to ISQ Syekh Ibrahim which blends with the mosque environment.

- Empowerment of Zakat, Infaq, Shodaqoh, and Endowments.
- Carry out the Recitations and Religion Lectures at Fajr and Friday Morning.
- Various Special activities during Ramadan.

## 3 METHODOLOGY

In this research, the first step to be carried out was the identification of problems which later found several issues regarding the dissemination of information on religious activities. The second stage, looking for suitable literature studies. The third stage, data collection, and processing is done through observation and documentation from the Mosque Management Agency. Then do the analysis and design phase. After that, the system will be created and tested. If the system works properly, then the next stage of implementation and if the system does not run as it should then return to the analysis and design phase. The last stage after implementation is the conclusion. The research methodology can be seen in Figure 2.

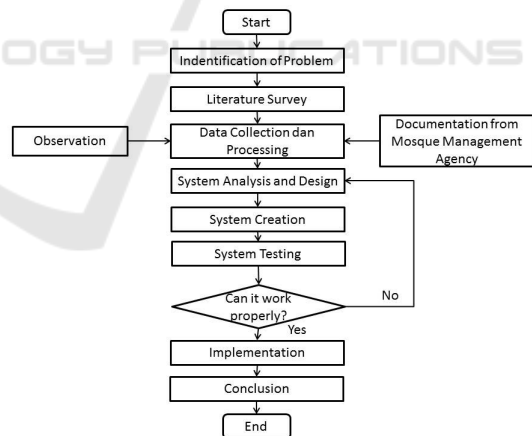


Figure 2: Research methodology diagram.

### 3.1 General Description of the System

The general description of the system can be seen in Figure 3, where the Mobile Application of Religious Activities for the Great Mosque Islamic Center Rokan Hulu with Push Notification will receive input from the admin in the form of the latest, routine, and information about the mosque. The user will set the notification according to the choice of the diverse activities

topic that the information wants to get. If the user has set a notification, then the information on religious activities that you want to follow will be quickly obtained with a notification on the user's smartphone.

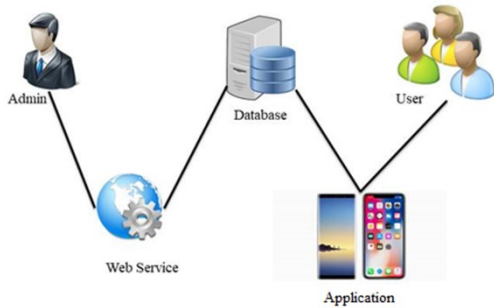


Figure 3: General description of the system.

### 3.2 Use Case Diagram

Use case diagrams are descriptions of a system that is used to make it easy to explain how the system and its components can be related. In the Mobile Application of Religious Activities for the Great Mosque Islamic Center Rokan Hulu there are 2 user sides, namely admin and user. The user is used as an actor in the use case diagram. Admin has full access to manage all applications, managing the latest religious activity information, managing routine religious activity information, sending notifications and also can add another admin. Before performing this task, the admin must log in into the system.

User can view information on the latest religious activities, information on routine religious activities, find the location of the nearest mosque, see information about the mosque such as prayer schedules, mosque locations, descriptions of mosques, and galleries. Users can also configure notifications to select information on any religious activities that their notifications want to get. The use case diagram in this application can be seen in Figure 4.

### 3.3 Display Design

Display design is a drawing process from the appearance of the system created. Display or interface is a communication mechanism between users with the application.

#### 3.3.1 Designing Display of Android Applications for Users

To use this mobile application, the user should install from the Google Play store. Users will get informa-

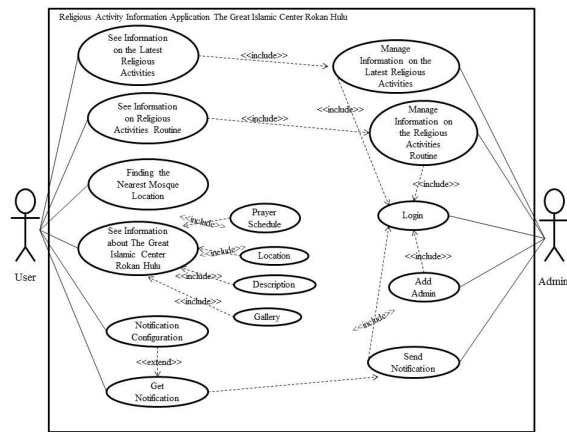


Figure 4: Use case diagram on application.

tion on these mobile apps and can set notifications according to the topic of information on religious activities whose information they wish to obtain. Here is the design of the android application for the user.

- **Splash Screen**  
A splash screen is the first display when the user opens the application. The design of the splash screen display can be seen in Figure 5.

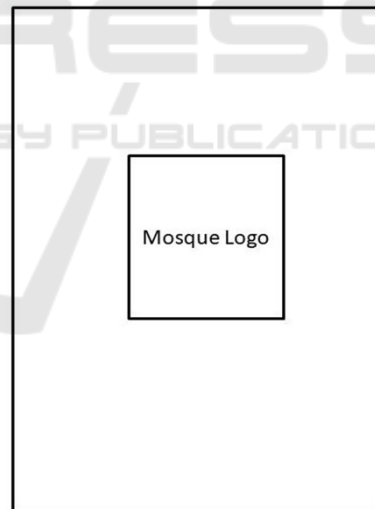


Figure 5: Design of the splash screen application.

- **Application Main Display**  
The main display design of the Mobile Application of Religious Activities for the Great Mosque Islamic Center Rokan Hulu can be seen in Figure 6. In the main view of the application, the user can immediately see the latest religious activity information via the home menu.
- **Notification Configuration Menu**  
This notification configuration menu allows users

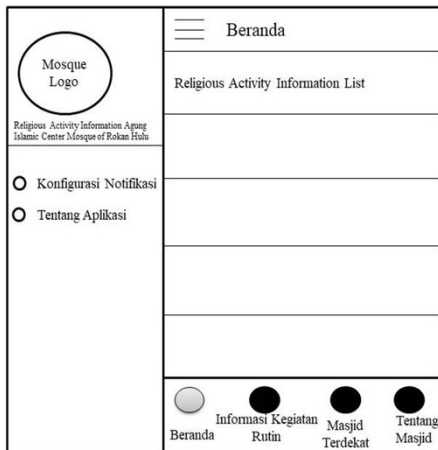


Figure 6: Design of the main display application.

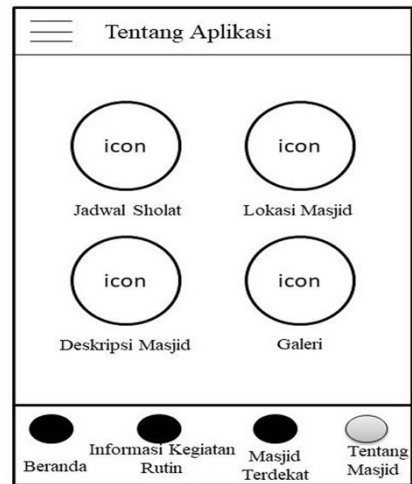


Figure 8: Design of about the mosque.

to choose what religious activity notifications they want to get information through notifications as a reminder of the activity schedule. The design of the notification configuration menu can be seen in Figure 7.



Figure 7: Design of the notification configuration menu.

- About Mosque Menu

The about mosque menu has four submenus, namely prayer schedule, mosque location, mosque description, and gallery. The prayer schedule submenu will display prayer times according to the Great Mosque Islamic Center Rokan Hulu. The sub-menu of the mosque location will display the location of the mosque with the Google Maps API. The submenu of mosque descriptions is information about the mosque. The mosque gallery submenu will display photos of the mosque. The design of the menu display about mosques can be seen in Figure 8.

### 3.3.2 Designing Web Views for Admin

Admin is the manager of the entire system. Next is the web view design for the admin as manager of the system.

- Admin Login Display

The login display is a display used by the admin to be able to enter the system and manage the system. The design of the admin login can be seen in Figure 9.

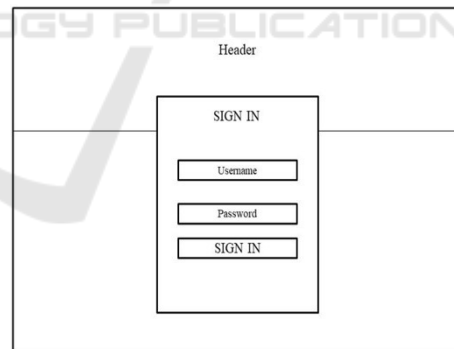


Figure 9: Design of the admin login display.

- Send Notification Menu

Send Notification Menu is a menu used by the admin to send notifications to users on the android application. The design of the send notification menu display can be seen in Figure 10.

## 4 RESULT AND DISCUSSION

Display implementation is the implementation stage and at the same time testing the system based on the

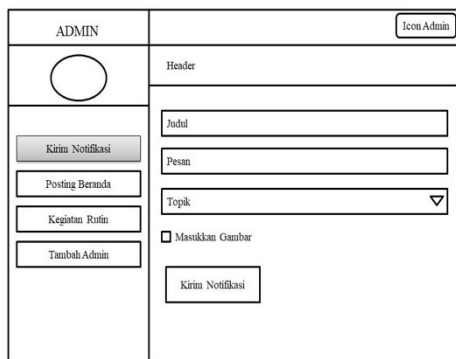


Figure 10: Design of the send notification menu.

results of analysis and design that has been done in the previous chapter.

#### 4.1 Display of Android Applications for Users

This display is a display of android applications used for users accessing information on diversity activities and information about the Great Mosque Islamic Center Rokan.

- **Splash Screen**

A splash screen is the first display when the user opens the application. The appearance of the splash screen can be seen in Figure 11.



Figure 11: Display splash screen.

- **Beranda Menu**

The home menu is a menu that displays a list of

the latest religious activities at the Great Mosque Islamic Center Rokan Hulu. Display of the home menu can be seen in Figure 12.



Figure 12: Display of home menu.

Detailed information on religious activities can be seen in Figure 13.



Figure 13: Detailed information on religious activities.

- **Notification Configuration Menu**

This notification configuration menu allows users to select religious activity notifications that they want to obtain information through notifications as a reminder of the activity schedule. After the user activates the selected notification, the user will automatically get a notification according to the notification that has been activated. For example, the user activates a notification for infor-

Table 1: Likert scale for application display.

No.	Category	Score
1.	Strongly Agree (SA)	5
2.	Agree (A)	4
3.	Neutral (N)	3
4.	Disagree (D)	2
5.	Strongly Disagree (SD)	1

Table 2: Likert scale for plugin convenience.

No.	Category	Score
1.	Very Inconvenient	0%-19.99%
2.	Inconvenient	20%-39.99%
3.	Slightly Convenient	40%-59.99%
4.	Convenient	60%-79.99%
5.	Very Convenient	80%-100%

mation on Islamic Da'wah/Recitation activities as shown in Figure 14.

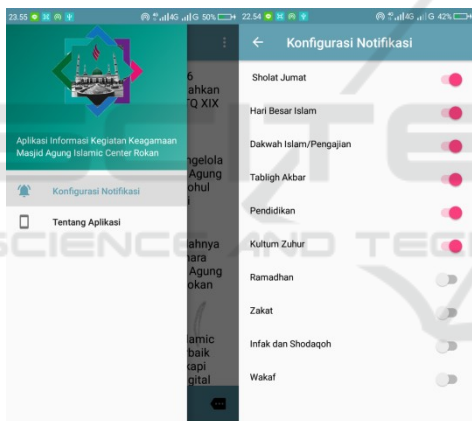


Figure 14: Configuration notification display.

Then, if the admin sends notifications with the category of Islamic Da'wah/Recitation through the web admin. Then the user will immediately get the notification. The push notification test display for the stage of receiving Islamic Da'wah/Recitation notification on the Android application for the user can be seen in Figure 15.

## 4.2 Application Testing Results

Application testing has been done by directly examining the application and also by filling out the testing questionnaire. The number of respondents obtained by researchers amounted to 10 people, six people from Rokan Hulu and four people from outside Rokan

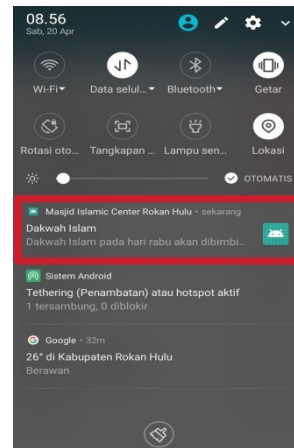


Figure 15: Display of push notification on android applications.

Hulu. The questionnaire is using the 5 Likert-scale with a final score percentage adapted from (Sagi et al., 2015) as shown in Table 1 and Table 2. This questionnaire was conducted to find out how well the design and usefulness of the features in the application. Some questions on this questionnaire were adapted from research conducted by Yasin (Yasin et al., 2013).

### 4.2.1 Application Display Test Results

Application display testing has done by ten respondents, and these results have been collected from the questionnaires filled by each respondent. The results of the application display questionnaire and the results of the application benefit questionnaire are shown in Table 3 and Table 4 respectively.

From the results of the application testing questionnaire it can be concluded that the appearance of the application with an average value of 89% is very convenient and for the benefit of the application with an average value of 89.3% which is very convenient.

## 5 CONCLUSIONS

Mobile Application of Religious Activities for the Great Mosque Islamic Center Rokan Hulu uses the push notification method. This application is running on the Android-based phone. Push notification given in this apps is very useful, the user will get notifications about religious activities at the Great Mosque Islamic Center Rokan Hulu; therefore no information will be missed out. This apps also have a schedule reminder of religious activities which can be configured by the user in the android application. In addition to disseminating information on religious activities,

Table 3: Application display questionnaire results.

No	Statement	Total Answer					Total Score	%
		SD	D	N	A	SA		
1.	Attractive application display.			2	5	3	41	82%
2.	App appearance is easy to understand or user-friendly.				4	6	46	92%
3.	Easy menu navigation.				4	6	46	92%
4.	Color is appropriate or not excessive.				4	6	46	92%
Total							179	
Average							44,75	89%

Table 4: Plugin convenience test result.

No	Question	Total Answer					Total Score	%
		VD	D	N	A	VA		
1.	Menu features in the application are complete and according to user needs.			1	6	3	42	84%
2.	The home menu feature is very informative to add information and insights to application users.			1	5	4	43	86%
3.	The notification configuration menu feature helps users receive notification of religious activity information as desired.			1	3	6	45	90%
4.	Notification as a reminder of the schedule of religious activities.				6	4	44	88%
5.	This application is very easy to use.				4	6	46	92%
6.	This application is very useful for users, especially the Rokan Hulu community.				2	8	48	96%
Total							268	
Average							44,6	89,3%

users can also find out information about the Great Mosque Islamic Center Rokan Hulu. This apps has been tested by ten respondents, the appearance of the application is rated "very convenient" with an average percentage of 89%; meanwhile the benefit of the application is rated "very convenient" with an average percentage of 89.3%.

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