The Infographic Umrah Guidebook "Umrah Grafis" Based on Augmented Reality Technology

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Abstract. The augmented reality-based Umrah guidebook "Umrah Grafis" was developed to facilitate Muslim pilgrims in understanding to performs a series of Umrah ritual acts that displayed in 3-dimensional animation. Products are produced in the form of printed guidebooks and android applications "AR Umrah Grafis". Guidebooks are presented in an infographic by presenting a visual concept consisting of text with the addition of interesting illustrations while the android applications assist pilgrims to display 3D animations ritual acts of Tawaf round the Kaaba and Sa'i between Safa and Marwah, based on the marked list in the guidebook. Based on the results of the test, the application can display all 3D animations of all marked list in the guidebook and can assist pilgrims in understanding to perform a series of Umrah ritual acts, with the score 80% indicating good on a functionality aspect.

Keywords: augmented reality, umrah, guidebook, 3d animation, infographic

1 Introduction

Umrah (Arabic: عُمرَة) means the 'minor pilgrimage' of Hajj which the pilgrims perform a series of Umrah ritual acts from Ihram, Tawaf around Kaaba, Sa'i between Safa to Marwah and Tahallul[1]. Indonesian Umrah pilgrims are one of the largest in the world [2]. According to the Saudi Arabia Ministry of Hajj and Umrah, the number of Umrah visas that have been issued to Indonesia in 2016 reached 699.6 thousand worshipers, on the increase of 7.2 percent from the previous year. This figure shows that Indonesia as the third largest number of Umrah pilgrims country in the world. The largest umrah visa issued by the Government of Saudi Arabia in 2016 goes to Egypt with 1.3 million worshipers which are upturn 17 percent from the previous year of 1.1 million worshipers. Moreover, Pakistan is in the second place with a total of 991 thousand visas, it also rose 29 percent from the previous year of 703.85 thousand worshipers. The total Umrah visa issued in 2016 reached 6.39 million worshipers, in which increasing 7.5 percent from the previous year of 5.9 million worshipers. Indonesian's interest to perform umrah is quite large. The main reason for this phenomenon is to be able to realize the fifth pillar of Islam, that is Hajj where Muslims need a line for decades. The increasing waiting period for Hajj queues triggers some people choosing to perform Umrah[3]. Umrah pilgrims are directly proportional to the increasing needs of pilgrims preparing everything such as spiritually, morally and physically. Umrah guidebook is one of the basic needs of the pilgrims. Through the book, the pilgrims get a clear concept of how the provisions and procedures for the implementation of a series of Umrah activities.

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Augmented Reality Technology (AR) is a technique of combining two-dimensional or three-dimensional virtual objects into a real three-dimensional scope, and then it is projected to virtual objects in real time[4]–[7]. In everyday life, AR begins to dominate in the world market. AR technology connects brands with consumers, and the technology experience has proven to win consumers effectively. AR technology can be used as a learning media and specific product promotion media. For instance, a car company uses AR that displays three-dimensional objects in the form of their cars to be shown to consumers without having to present the car directly in front of consumers. Salesman only needs to bring a smartphone and brochure to be scanned in front of consumers, and consumers can see clearly the shapes and details of the car in three dimensions [8]. Based on the background of the above problems, the researchers are interested in utilizing the advantages of AR technology to meet the needs of Umrah pilgrims through the design of umrah guidebooks[9], [10].

2 Research Methods

2.1 Stages of Research

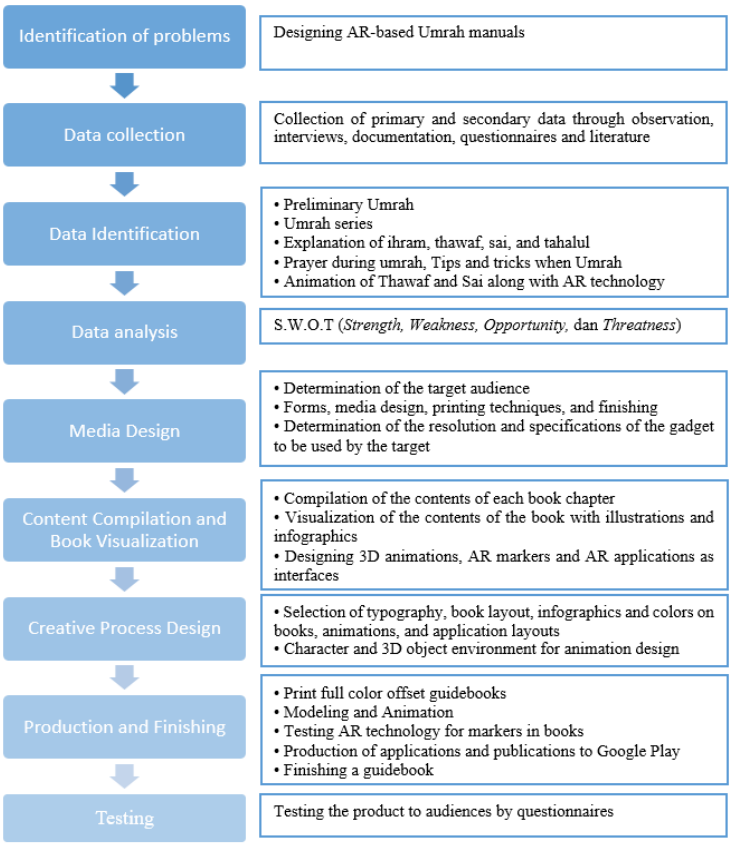


Fig. 1. Stages of Research

2.2 Data Collection Technique

The following data collection methods are used in the study, such as (a) Observation, Observations were made to obtain materials that support the design of this book. Some of the things that are done include observing umrah guidebooks that are circulating both commercially on the market, online, and also those who are given umrah travel to their congregations; (b) Interview, in connection with the design of this book, interviews were conducted with Umrah pilgrims to find out what expectations and experiences they had in relation to the Umrah manual as information support in preparing themselves for Umrah; and (c) Documentation, the sources used as material for designing this book include a series of circulating Umrah programs, both free on YouTube and commercial VCDs. Some photos that support book content are sourced from researchers' personal sources and websites.

2.3 Data Analysis Technique

Table 1. S.W.O.T Analysis

No	Analysis Criteria	Explanations
1	*Strength*	a. Presentation of books with infographic and 3D animation visualization so the explanations are more interesting, communicative and realistic. b. Target and broad targets in terms of age, economic and social groups.
2	*Weakness*	IT literacy is needed on the target when using the application.
3	*Opportunity*	a. There is no umrah guidebook that is wrapped in the AR-based infographic and 3D animation formats. b. Increasing ability of the gadget's purchasing power. c. The trend of AR technology that dominates the world market in its use as a product promotion media. d. Application of smartphone-based umrah in the Indonesian language is minor.
4	*Threatens*	a) Reading interest and purchasing power of books in the community that are not evenly distributed. b) The level of IT literacy is not evenly distributed.

The data analysis technique used is the S.W.O.T analysis. In this design, the results of the analysis are used as references in determining the appropriate visual and media strategies. Based on the results, it can be concluded that this design uses Strength - Opportunity (S - O) strategies, the absence of competitors that carry similar concepts and the higher purchasing power of the gadget and also maximizes the power of this book include the presented books with a different concept with the help of IT sophistication with targets that are not limited to age, economic, and social groups. Whereas to minimize Weakness and Threatens, several efforts can be done such as providing clear instructions for using AR in the guide and free Android-based AR applications accessed from Play store.

2.4 Synthesis

The following synthesis results are used as a reference for designing this guidebook:

2.4.1. Designing Umrah guidebooks with the infographic concept.

2.4.2. Paying books with a clear division between chapters and arrangement of images and texts that are easy to understand.
2.4.3. Producing the size of the book based on the needs of the target who can carry it anywhere and anytime.
2.4.4. Placing of AR markers in this book accompanied by clear using instructions.
2.4.5. Designing by using characters and environments that refer to the original object.

2.5 Design Troubleshooting

Table 2. Communication and Design Strategies

No	Strategies and Aspects	Explanations	
1	*Communication Strategies*		
	The communication purpose	Assist Muslims, especially umrah worshipers, from various ages, genders, and educational backgrounds understand better with realistic visualization of Umrah activities.	
	Key facts	The majority of umrah manuals are in full text and lack visual illustrations; application of smartphone-based umrah worship in Indonesian is minor; and trend of AR technology that dominates the world market in its use as a product promotion media.	
	Problems that will be communicated	Providing a clearer and more realistic understanding through infographic visualization and 3D tawaf animation and sa'i with AR technology.	
	Communication target profile	Muslims, especially umrah pilgrims.	a. *Demographics*: age: no limit (age above approximately 60 years with assistance), gender: male and female, education: all degree. b. *Geography and Psychography*: all society and active using a smartphone
	Positioning	The position of this product is an innovation of the strategy of delivering material regarding the procedures for Umrah through visualization of the guidebook which is balanced with the current technological advances.	
2	*Design Strategies*		
	Tone & mood	clear, realistic and interesting.	
	Verbal strategy	The language style used is formal Indonesian language	
	Visual strategy	a. The layout is displayed with the infographic concept. b. The color used is a bright color with vector illustration. c. The type of font used is serif and san serif. Serif type font for long narration / text sections. While the font type is san serif otherwise, such as title, subtitle, etc. d. The illustration used is a manual image that is processed with Adobe Photoshop and CorelDraw / Adobe Illustrator. Illustrations about a series of Umrah services start from ihram, miqat, tawaf, sa'i, until tahalul. In addition, markers are made to be scanned by the user's smartphone which will display a 3D visualization of each explanation contained in the manual.	

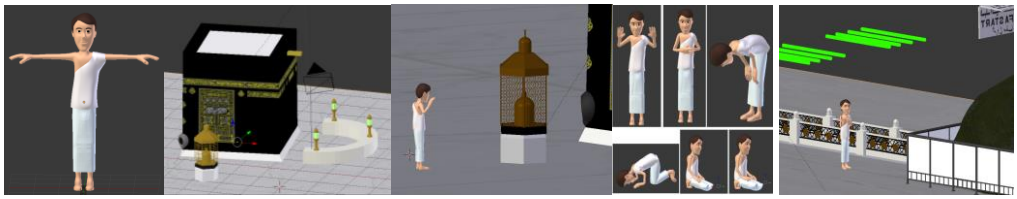
2.6 Creation Stage

2.6.1. Pre-production

This stage describes the distribution of chapters in the book and animation, such as Table of contents, Map and Plan, Umrah Introduction, Procedures of Umrah Activities, Explanation of Umrah, Prayers during Umrah, Tips during Umrah, and Bibliography. While animation is divided into Tawaf marker and Sa'i marker.

2.6.2. Production

The guidebooks are produced starting from making illustrations, layouts, and material content. Illustration adapted from material content. Layouts are made by the concept of the infographic and the use of bright colors. Animation and application are started from creating 3D assets include human character objects and environmental objects during tawaf and sa'i (the Ka'bah, Safa, and Marwah hill). The 3D character object is modified from the model and rigging of 11secondclub.com which is adapted to the worshipers who wear Ihram clothes.



(a) (b) (c) (d)

Fig. 2. 3D characters of ihram clothed worshipers (a); Kaaba (b); Tawaf Animation: sunnah prayer behind Maqam Ibrahim (c); and Sa'i' animation (d)

After all, 3D assets are finished, and then the 3D animation is created according to the scenario. There are 2 parts of animations, namely tawaf animation and sa'i animation. The next procedure is creating the Marker that is used as target images that will be detected by AR camera. There seven markers will be included in the guidebook. That animations and markers are integrated by AR using Unity software. The 3D assets that have been created are imported into a unity which to is integrated and arranged in the Unity scene[11]–[13]. In this step, we place the target image. In the AR Camera setting, Vuforia Configuration for max simultaneous is loaded with a number of markers that will be used and have been uploaded to the target marker. After the 3D assets have been imported successfully into Unity, then the process of placing 3D objects on the target image. The final step is to compile the project into the .apk format after the project is finished so that it can run on the Android operating system.

2.6.3. Post Production

Guidebooks will be reproduced as many as respondents. The application will be tested to know how high the audience accepts the application from functionality aspect by questionnaires.

3 Result and Discussion

4.1. Umrah Guidebook

4.1.1. Layout Elements

The font used for the book cover logo on the Graphic Umrah sentence is the 68,516pt Kozuka Mincho Pro B and 14,548pt Kozuka Gothic Pro on the main deck/topic. The description on the back cover also uses the same font as the deck. The font was chosen

because it is a Serif type, remembering that the book is a type of religion; the serif character is more suitable for this type of book. The selected character letters appear to be a bit modern and have lighter properties and are easy to read. Fonts in the title are white which represent clean and holy symbols while black on decks.

Fig. 3. Logogram on the book cover

The page size in this guide uses a size of 14.8 x 21.0 cm (portrait). Margin distance on book design is not the same between each side because it is asymmetric. So, it is narrative, and illustration follows the form of layout provided which will be explained in the layout strategy. In each page, the position of the illustration and narration can alternate each page and not always the same. This is intended to provide variations for the reader so as not to be monotonous to see each page.

4.1.2. Final Design

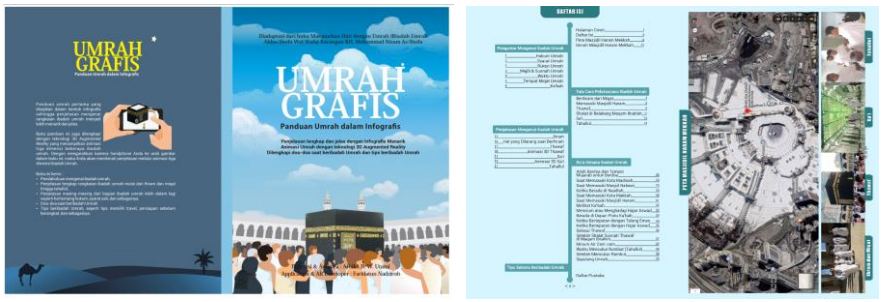


Fig. 4. Cover design with 14,8 x 21,0 cm size, Ivory 260 gr / m^2 paper, and glossy laminate finishing (left) and Contains table of contents page, masjidil haram maps and floor plan with 14,8 x 21,0 cm size and Book paper (right)

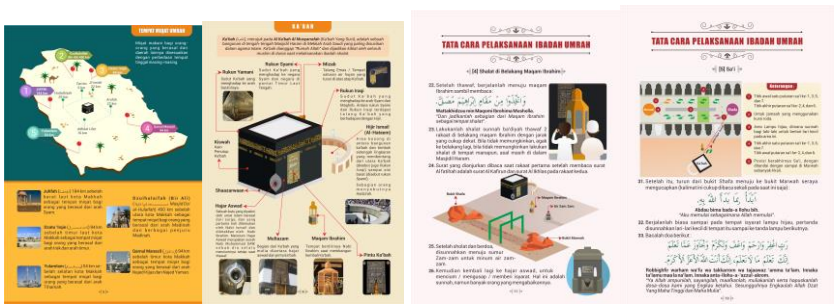


Fig. 5. Contain Umrah basis, the law of Umrah, the pillars of Umrah, the conditions of Umrah, the time of Umrah, obligatory Umrah, Sunnah Umrah, Miqat, and Kaaba with 14,8 x 21,0 cm size and book paper (left) and Contains the steps of umrah start from the intention of ihram to tahallul with 14,8 x 21,0 cm size and Book paper (right)

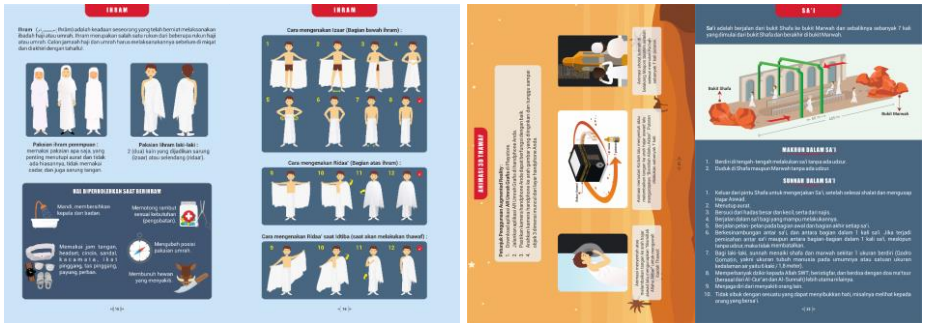


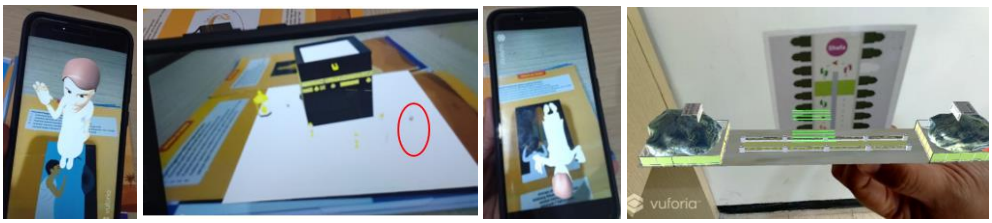
Fig. 6. Contains explanation of ihram, Sunnah and conditions, how to berihram, which is permissible and not permissible when berihram, an explanation of tawaf, AR tawaf marker, an explanation of sa'i, AR sa'i marker, explanation of tahallul.with 14,8 x 21,0 cm size and Book paper (right)

Fig. 7. Contains adab of praying, a place to pray in Makkah and Medina, and prayers during Umrah with 14,8 x 21,0 cm size and book paper (left) and Contains tips on choosing travel, a checklist of luggage, physical preparation, how to tayammum, and bibliography with 14,8 x 21,0 cm size and book paper (right).

4.1.3. Animations and AR Umrah Grafis Application

When the marker on the book is scanned by the camera through the AR Umrah Grafis application, the 3D animation will appear. On tawaf animation marker when scanned will display tawaf animation containing 3 kinds of movements while the sa'i animation marker will display the animation sa'i containing 4 kinds of movements.

In accordance with the research methodology, where the AR Umrah Grafis application interface consists of the main menu page containing three menus. When this page is accessed, the mobile camera will be active and ready to detect markers in the manual. On the AR Camera menu, the camera will only capture markers that match the one being registered when making and developing the application so that 3D animation will be displayed. It contains profiles that include photos, names and job desk from the developer. On the exit, menu contains a button that directly points out of the application.



(a) (b) (c) (d)

Fig. 8. Animation waving to Hajar Aswad (a) and Animations do tawaf around the Ka'bah (b), Animations pray behind Maqam Ibrahim (c), and AR Camera menu display when it has detected a marker (d).

4.1.4. Testing

The application of AR Umrah Grafis represented two of umrah that is tawaf and sa'i. To know how this application work, we need to test functionality aspects. The following are the criteria for aspects of functionality :

1. The smoothness of reading the marker
2. The smoothness of running the animation
3. This application provides information about how to start tawaf by waving hand to Hajar Aswad of Ka'bah.
4. This application provides information about how to perform tawaf by circling Kaaba 7 times.
5. This application provides information about how to do sunnah prayer behind maqom Ibrahim.
6. This application provides information about how to start sa'i by walking toward from Shafa hill and then prayer.
7. This application provides information about how to perform sa'i from Shafa hill to Marwah hill.
8. This application provides information about how to praying when you arrive at Marwah hill.
9. This application provides information about how to perform sa'i from Marwah to Shafa hill.

Results of testing done by questionnaire for 30 respondents. With a rating assessment divided into three parts with their respective values, namely Poor (2 points); Good (3 points); and Excellent (4 points). The result of the values obtained are then processed using a formula:

$$\frac{\sum total\ value\ of\ respondents}{\sum respondents\ x\ maximum\ value\ of\ the\ questionnaire} x\ 100\% \quad (1)$$

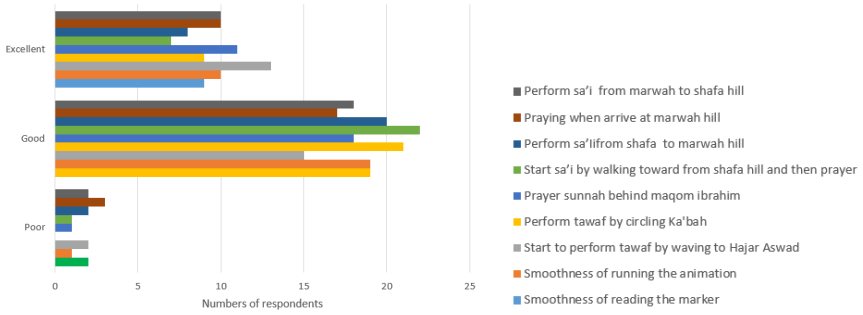


Fig. 9. Aspects of Functionality

Based on the figure above, first criteria shows 63% respondents indicating good in the smoothness of reading the marker; the second criteria shows 63% respondents indicating good in the smoothness of running the animation. Furthermore, the third criteria show 50% respondents indicating good when the application provides information about how to start tawaf by waving hand to Hajar Aswad of Kaaba; the fourth criteria shows 70% respondents indicating good when the application provides information about how to perform tawaf by circling Kaaba 7 times. Moreover, the fifth criteria show 60% respondents indicating good when the application provides information about how to do sunnah prayer behind maqom Ibrahim; the sixth criteria shows 73% respondents indicating good when the application provides information about how to start sa'i by walking toward from Shafa hill and then prayer. Next, the seventh criteria shows 67% respondents indicating good when the application provides information about how to perform sa'i from Shafa hill to Marwah hill; the eight criteria shows 57% respondents indicating good when the application provides information about how to praying when you arrive at Marwah hill. Eventually, the last criteria shows 60% respondents indicating good when the application provides information about how to perform sa'i from Marwah to Shafa hill. For the whole criteria of functionality aspect show 80% respondents indicating good, 17% indicating excellent and 3% respondents indicating poor when the application is running.

4.1.5. Conclusion

Based on the results of the test, for an aspect of functionality which has 9 criteria, shows 80% respondents indicating good, 17% respondents indicating excellent and 3% respondents indicating poor when the application is running. The AR Umrah Grafis application can display all 3D animations of all markers listed in the guidebook and can help the people, especially Umrah pilgrims, get a visualization of Umrah worship through 3D animations.

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