

Factors that Affect Attitude of Apps Developers to Comply with the Islamic Work Ethic in Developing an Islamic Mobile App

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Abstract:- The study empirically revealed the constructs that affect attitude of apps developers to comply with the Islamic Work Ethic in developing an Islamic mobile app. The Islamic Work Ethic (al-birr and Masuliyah) in this study was built based on the Mobile Apps Rating Scale (MARS) criteria, which are Engagement (EN), Functionality (FC), Aesthetics (AE) and Information (IN). This is mainly due to the lack of content authenticity and reliability, ideas in order to create interesting apps and the guidelines to the app's developer in developing mobile Islamic applications that comply with Work Ethics Islam. The experimental research design was deployed to validate the number of items of questions in the questionnaire. In this research, the Exploratory Factor Analysis (EFA) was conducted using SPSS. The empirical results showed four factor such as Engagement, Functionality, Aesthetic and information. Based on the findings of this study, it is hoped that it can attract the attention of apps' developers to practice the Islamic Work Ethic when developing Islamic mobile apps in the future.

Keywords:- Islamic Work Ethic, Mobile Apps Rating Scale, Islamic Mobile Apps, Experimental, Exploratory Factor Analysis.

I. INTRODUCTION

Technology advancement has changed the evolution of gadgets. The mobile device has been introduced in the technology world to make easier for users to access and surf typical stuff with smaller gadgets (i.e., smartphone and tablet), which is provided similar with services run in bigger gadgets (i.e., laptops and desktops) [1]. In mobile devices, like smartphones and tablets, a mobile application has been specifically designed to run on these gadgets with the same function as software, which designed for laptops or computers [2].

One of the most popular religious mobile apps is the Islamic mobile app, which scored the highest downloaded times in Google Play Store [3]. The existence of this religious app will provide users with benefits and opportunities, especially for Muslim communities to get access to religious education easily and quickly. This is intended to facilitate the user's easy access anywhere and anytime [4], [5], [6]. The survey conducted by [7] has

revealed that Islamic mobile apps have the highest rating for religious applications because it is faster to obtain Islamic content than other sources and it is accessible at any time.

A. Problem Statement

Nonetheless, there are several issues about the Islamic mobile app that need attention among the Islamic mobile app developers. The authenticity of Islamic content has always been a concern to the Islamic community, in which people tend to obtain false information, which may slander the purity of Islam. Several studies highlighted the most sensitive issue about Islamic apps contents are the issues of authentication, reliability and credibility [3], [8].

Thus, becoming a developer who involved in the development of Islamic mobile apps requires a great deal of attitude and knowledge about the good quality of mobile apps. An Islamic apps' developer should comply with the Islamic work ethic to ensure that the apps developed have conformed with any rule in Islam. [9] states that there are eight principles of work ethics in Islam according to the al-Quran and al-Sunnah, which can be applied in any job specifications. The principles are Taqwa, Ihsan, 'Amal Saleh, al-Birr, al-Qist, Ma'ruf, Masuliyah, and Itqan. In previous scholarly research, there is extensive research to guide developers in developing good quality mobile apps [10], but it is not clear in most guidelines for Islamic based mobile apps because the existing guidelines do not follow the rules of Islam. Other than that, several types of the research studied the intention of users to use the apps, but there is very little research about the intention of developers to use the good quality app's criteria when developing a certain app [11], [12].

B. Objective of this research

Therefore, this study aims to gain insight from the developers to develop a general guideline for a developer who is involved in developing Islamic mobile apps, which based on the criteria of Mobile Application Rating Scale (MARS) and elements of Islamic work ethic. The MARS criteria are used to evaluate the quality of the apps' content and the Islamic work ethic elements are used to examine the attitude of the apps' developer when developing Islamic based mobile apps. Thus, the objective of this research is to identify the criteria of the app's content and developer's attitude needed when developing an Islamic mobile app.

II. LITERATURE REVIEW

The emergence of mobile technology has brought a positive impact on most aspects of people's lives, like improving mobile users' relationships, interactions, social life, communication and networking. To date, there are about 2.8 million android apps available on Google Play Store and about 2.2 million available apps in Apple [3]. Due to the increasing number of mobile apps users, researchers embrace the opportunities to study a lot more matters related to mobile technology, across the fields of research.

A. Type of Islamic Mobile App

A variety of Islamic apps can be found in Google Store and Apple Apps and they can be classified under several categories according to the app's content, like reading the content of Quran and supplications, time of prayers, teaching tajwid, the direction of the Qibla, geographical location for the searching nearest mosque, Dua and Zikr, Zakat apps and other important features related to the life of a Muslim [3], [13], [14]. Besides, another type of Islamic Mobile Apps that found in previous scholar studies are Hajj and Umrah apps traveler guide [15], location-based services [16], Halal Compliant Mobile app [17] and mobile banking [18], [19].

B. Criteria of Islamic Mobile App

When developing Islamic mobile apps, several criteria need to be considered by the app's developer. Several researchers like [2], [14], [15], [20], [21], [22] and [23] proposed the same criterion required in developing Islamic mobile applications, which is the content/information of the apps. For them, the authenticity of Islamic contents is the most important criterion in developing Islamic mobile apps and the developer needs to seek advice from trusted scholars. [22] stated that all the information in the app must be confirmed by the expert about the accuracy of the app description, goals quality of information, the quantity of information, visual information, credibility, and evidence base.

Besides that, [13], [14], [24], [16] and [22] stated that apps with better functionality are easy for users to get more information where the apps should perform well, provide convenience to users by keeping up to date (ease to use), have a user-friendly navigation system and enable users to navigate across all components of the screen with good gestural design [22]. Other than that, [13] explained that the context-aware of functionality is about time-based notification, location-based notification, voice-based chapter-search, Quran Verse Audio/Text Search Engine, Multi-lingual Interface and user friendly.

[13], [14], [20], [22] and [25] studied about Islamic mobile apps from the criterion of design perspective. Apps that lack in visual aspects of apps' design may fail to attract their apps' users. According to [14] who studied about E-mosque app, they stated that developers need to improve the visual design in order to increase the apps' users. Besides that, [22] pointed out that design should be an aesthetics element in apps where it can be viewed from the perspective of layout, graphics and visual appeal.

Other than that, several researchers, like [14], [16], [22], [23] and [26] found that engagement is also one of the important criteria when developing Islamic Mobile App. According to [23], engagement refers to how users are engaged in the apps, all way through the system. This criterion helps the users to feel comfortable with the developed apps. It can be viewed and measured from the elements of entertainment, interest, customization, interactivity, and target group [22]. It is important to guarantee the essence of the information presented is in line with the target group and achieve the purpose of creating the apps [14].

[27] and [28] suggested four criteria in a Mobile Application Rating Scale (MARS) in assessing the quality of mobile apps, which are Engagement (entertainment, customization, interactivity, target group), Functionality (performance, navigation, gestural design, ease of use), Aesthetics (graphics, layout, visual appeal) and Information (quality, quantity, visual information, credibility, goals, description). The criteria determined in MARS have included all the aforementioned criteria found in the other previous studies.

C. Islamic work ethic elements

For the sake of this study, only two elements of Islamic work ethic have been adopted from [9] study, which is Al-Birr and Masuliyah. Al-birr refers to attitudes of tolerance, innovation, kindness, deliberation, and cooperation. Meanwhile, Masuliyah refers to attitudes of honesty, commitment, time, responsibility and trust, duty based on expertise, and truth [9].

For better understanding, the Islamic Work Ethic is visualized in Figure 1. From Figure 1, for Aesthetics and Engagement, the study embedded the al-Birr element into the criteria. This is because it is often a call to action recorded by Allah SWT in the Quran to warn humanity to perform acts that benefit humanity. This means that work involving social responsibility and social and religious cooperation is considered 'al-Birr' if it adheres to religious guidelines [9]. For Functionality and Information, the study embedded the elements of al-Birr and Masuliyah. This is because all the attributes that lead to 'Birr' or charity are such as helping, cooperating, working together and doing such things, while Masuliyah encompasses all acts and actions that are closely related to one's faith. A believer is a person who is responsible and accepts and fulfills all duties assigned to him properly and properly [9].

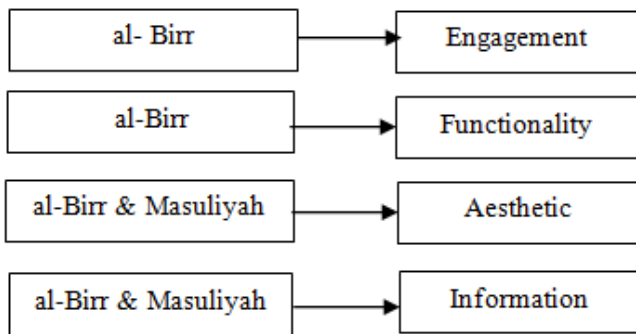


Fig 1:- Islamic work ethic elements

III. METHODOLOGY

The study was conducted quantitatively and there are four phases of the research process involved in this study. Phase 1 involved the process of reviewing relevant literature and articles pertaining to Islamic mobile apps, covering the topics of types and criteria of Islamic Mobile apps. Based on the information gathered, the research focused on identifying criteria of the app's content and developer's attitude needed when developing the Islamic mobile apps, whereby these criteria should comply with the Islamic work ethic.

In Phase 2, this study used the questionnaire as a tool to collect the data for the analysis. The questionnaire was constructed using the seven-digit numeric scale, ranging from "Extremely unimportant" to "Extremely Important". A total of 44 items of questions in three (3) main sections were constructed, covering the respondents' demographic and respondents' opinion on the criteria required. Then, the pilot test was used to evaluate the quality of the questionnaire (i.e. the content validity test and the reliability test). The content validity tests the agreement of the expert whether the items of the questionnaire constructed related to Engagement, Functionality, Aesthetics, and Information. The subject matter experts were identified from the majorly active professional networking website. Based on the expert opinion, the wordings in the questionnaire were revisited and few of the items were reframed according to its applicability to the representative sample. Meanwhile, for the reliability test, a data survey using the questionnaire developed collected from a total of randomly selected 20 experts who are Islamic scholars and have knowledge about mobile apps were tested. The result of the Cronbach's Alpha showed a value of 0.936, which proved that all the items used in these cases have relatively high internal consistency.

Once the questionnaire was ready, the data were collected in Phase 3. Respondents were randomly selected by using the stratified sampling technique. All public universities in peninsular Malaysia with undergraduate degree programs that related to multimedia are divided into different strata, according to the geographical location of the universities (i.e. north, south, east coast, and central of peninsular Malaysia). Then, the universities are randomly selected from different regions and only one university was selected in each region. A total of 207 questionnaires has been distributed to targeted respondent while only 193

responses have been adopted in this analysis. This is because the waiver responses have consisted of outlier and the questionnaires is not complete answer.

In Phase 4, the Exploratory Factor Analysis (EFA) was deployed. The items of the questionnaire were examined whether the items that are thought to measure a construct are answered in the same manner [29]. To validate the content for the questionnaire, the items of questions were examined using the Kaiser-Meyer-Olkin (KMO). After the quality of the respondents' answer has been validated, another verification test is required to determine which items in the questionnaire are among the best to explain each of the independent variables identified in the research conceptual framework (i.e. Engagement, Functionality, Aesthetics, and Information), which was carried out on the 40 items of the four constructs and evaluated based two step in EFA. The scree plot and eigenvalues were used to determine the number of factors that should be considered in this research. Two steps in EFA has been used to ensure the quality of the constructs as follows.

A. Communality

Variance proportions for each of the items within each construct are examined to solve the problem of commonalities. [30] stated that the communality estimation is the estimated proportion of variance of the variable that is free of error variance. Values closer to 1 suggest that extracted factors explain more of the variance of an individual item. It is shared with other variables in the matrix. The researcher has used the variances to produce communalities and it is because the Factor analysis takes into account variance in their method.

B. Factor Loading (Rotation Component Matrix)

Next, [31] said that the extraction used in Factor analysis is to remove common variance as possible. If the variance value of items scored less than 0.3, then the items will be removed from the questionnaire due to taking a better item in the study. The results obtained in this analysis will group the items based on the range in loading factor for each item.

Other than that, the approach to factor rotation used in performing the Factor Analysis was Varimax rotation procedures in order to identify the factor dimension. Principal component factors with four factors to extract have been rotated by the varimax analysis. [32] explained in their research about the factor loading and it should be greater than 0.5 for better results. According to [33], the newly developed question or items, the values factor loading should be 0.5 or higher while for established questions or item, the factor loading should be 0.6 or higher. The results of this test will be discussed in Data Analysis and Findings.

IV. DATA ANALYSIS AND FINDINGS

This section presents and discusses the result of the study and is organized into two sections. First is the demographic of the respondents and the next sections focus on the results of the EFA.

A. Respondent Demographic Analysis

Table 1 presents the demographic respondent of 193 students in this research. Female respondents represented 42.0% of the sample and male accounted for 58.0%. The majority of respondents were between 24 and 25 years old, which represented 39.9% (77 students), while 38.3% (74 students) were aged between 22 and 23, 14.0% (27 students) aged between 20 and 21 and 7.8% (15 students) between 26 and 27 years old. In terms of four chosen universities, approximately 27.5% (53 students) of the respondents were from the university located in South (Uni 3), 24.9% (48 students) of the respondents were from the North university (Uni 4), 24.4% (47 students) of the respondent were from the university East Coast (Uni 2), and the lowest respondent 23.3% (45 students) come from the university located in Central (Uni 1). For course taken by the respondent, 27.5% (53 students) took Information Technology course, 23.3% (45 students) took Computer Science and Multimedia course, 13.5% (25 students) took Technology Creative course and the lowest course was 12.4% (24 students) of the respondent took a Creative Industry course.

Demographic profile	N	%
Gender		
Female	81	42
Male	112	58
Total Gender	193	100
Age		
20-21	27	14
22-23	74	38.3
24-25	77	39.9
26-27	15	7.8
Total Age	193	100
University		
Uni 1	45	23.3
Uni 2	47	24.4
Uni 3	53	27.5
Uni 4	48	24.9
Total University	193	100
Course Taken		
Computer Science	45	23.3
Creative Industry	24	12.4
Information Technology	53	27.5
Multimedia	45	23.3
Technology Creative	26	13.5
Total Course Taken	193	100.0

Table 1:- Respondents Demographic

B. The Exploratory Factor Analysis (EFA)

The KMO and Bartlett's test was examined and the outcome of the test is tabulated in Table 2. The result shows that the KMO value is 0.899 and it means the value is meritorious and good. Thus, all the respondents' answer for each question item to be used for the PLS-SEM is reliable and appropriate. The result from Bartlett's test also shows that the correlation matrix of the constructs in the model is significantly an identifying matrix with P -value =0.000.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.899
Bartlett's Test of Sphericity	Approx. Chi-Square	8296.945
	df	780
	Sig.	.000

Table 2:- KMO and Bartlett's Test

Meanwhile, the result from the scree plot as illustrated in Figure 2 suggested four factors should be used to represent the independent variables in this study due to the way the slope levels off.

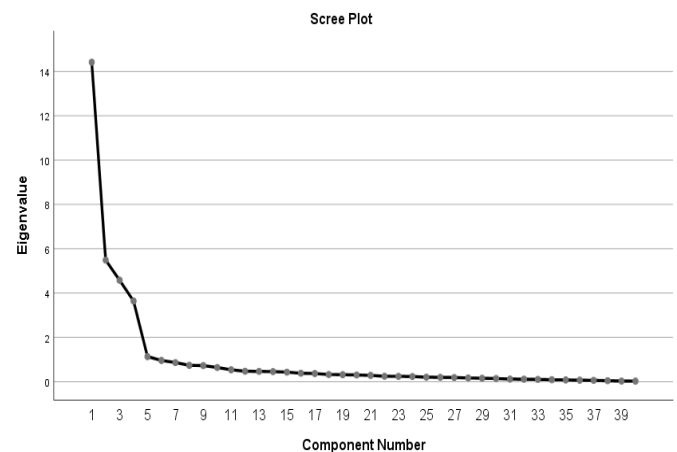


Fig 2:- Scree Plot

The scree plot's result has been supported with the output of eigenvalues, in which four constructs are explained with 70.30% of the variance. At the component of five (5) in Table 3, the value was still greater than 1, but in this research, only four (4) factors were used, which based on the VSP analysis where the number of factors is determined when decreases in successive eigenvalues become less noticeable and this situation is called as an elbow [34]. In this case, the numbers of the factor with an eigenvalue before the elbow is retained, as these factors are considered can represent common variance significantly, better than the other factors after the elbow. The overall results of the total variance explained are presented in Table 3. Hence, using four factors to represent the independent variables is viable.

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Cumulative %
1	14.416	36.04	36.04	32.428
2	5.486	13.715	49.755	45.875
3	4.578	11.444	61.199	58.132
4	3.64	9.099	70.30	70.30
5	1.133	2.832	73.13	

Table 3:- Total Variance Explained (Eigenvalues)

Then, the problem of communalities among the items of questions was also examined. Based on Table 4, the

extraction values of each item are greater than 0.5, which means the items are related among themselves. The relation of an item with the other items can be explained as an example of an item with code EN1 located in the first row of Table 4, whereby 78.9% of the variance is related to item EN1. Other than that, items AE3 and IN12 show the low of the extraction values, with the values of 50.3% and 50.7%, respectively. That means, if the percentage of communality is low, this suggests that the variable has little in common with the other variables and is likely a target for elimination. Nevertheless, [35] stated that the communalities that less than 0.5 need to be cut off for the analysis, hence, it still acceptable for items AE3 and IN12 to be included in this research.

Item	Sub-Criteria	Extraction
EN1	Entertainment	.789
EN2		.624
EN3	Interest	.859
EN4	Customization	.850
EN5	Interactivity	.690
EN6		.797
EN7	Target Group	.712
FC1	Performance	.663
FC2		.656
FC3	Ease of use	.697
FC4	Navigation	.772
FC5		.652
FC6		.677
FC7	Gestural Design	.758
AE1	Layout	.684
AE2		.715
AE3	Graphic	.503
AE4		.861
AE5		.782
AE6	Visual Appeal	.585
AE7		.685
IN1	Accuracy of Application	.708
IN2		.655
IN3		.744
IN4	Goals	.595
IN5		.560
IN6	Quality of Information	.661
IN7		.559
IN8	Quantity of Information	.706
IN9		.917
IN10	Visual Information	.635
IN11		.829
IN12	Sources of Credibility	.507
IN13		.609
IN14	Authority of Credibility	.825
IN15		.756
IN16		.800
IN17	Authenticity of Credibility	.678
IN18		.743
IN19		.623

Table 4:- Communalities (Extraction value)

Table 5 shows that all the factor loading in this research has a value of more than 0.6, which is acceptable and suitable to be used in the PLS-SEM analysis. From table 5, the result also shows the items have been grouped into four (4) factors, which significantly advisable to explain the construct in the proposed conceptual model. The four (4) factors proposed were similar to the construct in the conceptual model, namely, Engagement (EN1- EN7), Functionality (FC1-FC7), Aesthetic (AE1-AE7) and

Information (IN1-IN19). These statistical results support the questionnaires' validity and reliability and signifying the goodness of data for this study. In this part, the researcher not included the dependent variable. It was supported by [35] that stated the researcher does not necessarily include the Dependent variable (DV) and mediator in the EFA. It would not make sense to include and outcome with a series of predictors.

Items	Component
CRITERIA 1: AESTHETICS (AE)	
AE1: Each layout of Islamic content elements according to importance and effective to the user.	0.823
AE2: The content layout has a positive impact on the presentation of developed applications.	0.837
AE3: Application layout is characterized by Islamic concepts in terms of information and delivery.	0.699
AE4: The quality and resolution of the graphics for the selection buttons, icons, menus and content used in the application should be high in making it easier for users to get clear Islamic content.	0.921
AE5: Innovated graphics "NO" should have good quality and resolution so that the content contained in the application can be delivered well.	0.881
AE6: The visual design should be appropriate to the theme and message to be conveyed to bring benefits to the users of the application to understand the message quickly and clearly.	0.751
AE7: In visual design, the main object or item must be displayed in order for the user to see and understand its meaning.	0.825
CRITERIA 2: ENGAGEMENT (EN)	
EN1: The application developed needs to apply an element of entertainment in Islamic context to calm people heart	0.877
EN2: The application uses unique strategies to increase the involvement of Islamic-oriented users	0.778
EN3: Applications built need to have a unique strategy to attract users in the Islamic context	0.92
EN4: The application allows relevant customization according to the user's preferences on the Islamic features of the application (Examples: sound, content, notifications, etc.)	0.919
EN5: Interactivity capabilities are needed to enable users to access information, control and interact with systems that bring benefits to users	0.802
EN6: The keyboard or stylus pen of a mobile device allows the selection and arrangement of objects or words well to obtain Islamic content	0.884
EN7: The design, visual and language used should be appropriate to facilitate the use of the target group.	0.831
CRITERIA 3: FUNCTIONALITY (FC)	
FC1: The application provides accurate and fast response to users.	0.793
FC2: All functions (buttons, menus, etc.) in the application work well and are fast and accurate when reached by the user.	0.801
FC3: The use of this application is easy and achievable as well as following current updates.	0.798
FC4: Menus, icons, labels and instructions that Islamic-Oriented in the application are very clear and easy to understand.	0.841
FC5: Navigation between screens to other screens in the developed application should be affordable and easy to control by the user.	0.773
FC6: The movement of graphical information and the process of interactivity developed to allow users to cross all components of the screen for learning and benefits purposes.	0.798
FC7: Interactions such as (tap, swipe, pinch, scroll) in the application should work well and consistently to facilitate users in obtaining religious knowledge applied in the application.	0.829

CRITERIA 4: INFORMATION (IN)	
IN1: Islamic content in the 'application NO' should be evaluated by a party or individual who is an expert in Islamic scholars.	0.829
IN2: Islamic learning content must be approved by a competent ministry or organization.	0.780
IN3: The content in the application is related to the information, knowledge, or practical skills required in Islam.	0.851
IN4: The application description should state the specific goals to be achieved in delivering authentic Islamic content.	0.762
IN5: The application must meet the important aspects of Islam to achieve the stated goal.	0.720
IN6: The information in the application is accurate and clear about the Islamic context.	0.810
IN7: The information presented is relevant, appropriate to the Islamic context and has a clear quality of the topic to be conveyed.	0.737
IN8: The amount of information in developing an application based on Islam must be comprehensive.	0.826
IN9: The quantity of information must include various elements and have access to information as well as additional resources that meet all Islamic requirements.	0.942
IN10: The use of visual elements such as images, charts, graphs and videos to explain Islamic-oriented information or concepts should be clear to facilitate users.	0.780
IN11: The application developed should have a clear description of the use of the application so that it can facilitate users.	0.906
IN12: The application developed should have a clear title that carries the truth of Islamic content.	0.704
IN13: Detailed descriptions should be provided to facilitate users to learn Islamic content.	0.767
IN14: Reviews for applications for learning Islamic content are positive and good.	0.886
IN15: The application built has Islamic content that has been evaluated by a qualified party or individual. (E.g.: Imam, <i>ustaz</i> , <i>ustazah</i> or any other defined organization)	0.864
IN16: The content of Islamic learning in the applications is approved or endorsed by a competent ministry or organization.	0.875
IN17: The content in the application is related to the information, knowledge, or practical skills required in Islam.	0.805
IN18: The description of the content in the text is reliable and there is no doubt about every Islamic content presented.	0.842
IN19: The use of any verse of the Qur'an and hadith must be true and accurate.	0.776

Table 5:- Rotated Component Matrix^a

In this research, researcher intended to identify that affect attitude of apps developers to comply with the Islamic Work Ethic in developing an Islamic mobile app. A total of 40 items were accounted for analysis in this research. These items were used to develop a numeric semantic scaled questionnaire and distributed to universities in peninsular Malaysia with undergraduate degree programs that related to multimedia are divided into different strata, according to the geographical location of the universities (i.e. north, south, east coast, and central of peninsular Malaysia). A total of 193 students were involved in this survey. The result from EFA showed that all the items were retain and four constructs were identified. These four constructs are namely Engagement (EN), Functionality (FC), Aesthetic (AE) and Information (IN). This has supported by a previous study outlined that the four factors that affect the attitude of apps developers under MARS categories are EN, FC, AE and IN [27], [28].

V. CONCLUSION

This research identifies the criteria based on Mobile Apps Rating Scale criteria (i.e: Engagement, Functionality, Aesthetics, and Information) and Islamic work ethic elements in evaluating the developers' attitude when developing an app. The findings of this research suggested the factor that affect attitude of apps developers to comply with the Islamic Work Ethic in developing an Islamic mobile app were Engagement, Functionality, Aesthetics and Information. This study is expected can provide good directions for the developers in improving the quality of the apps provided for Muslims, which capable to deliver accurate information about Islam. Thus, companies that want to develop Islamic mobile apps are suggested to focus on all the factor that was validate by this research in order to increase their customers' perceptions about the worth of using these technology-based services.

The limitation in this study is on the issue of using cross-sectional data where this method may not allow to consider any change in users' perception due to the distance of the area and the time that the respondent answered was uncertain. For future studies can consider other factors in developing Islamic Mobile Apps, such as the factors in the Technology Acceptance Model (TAM) (i.e., subjective norm, security and others) and the other aspects of the developer's attitude that related to the elements of Islamic Work Ethic.

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