An Evaluation of a Technology Acceptance Model for *Surah Lazim & Hukum Tajwid* Mobile Application

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ABSTRACT

Smartphones are becoming an essential companion for people in a day to day task. Apps for learning Al-Quran Surah and Tajwid now available for download in just a few clicks away in particular apps namely Surah Lazim & Hukum Tajwid which has garnered interest from users in the Google Play Store. However, no empirical evidence of user acceptance on the use of the Surah Lazim & Hukum Tajwid Mobile App to be conducted in any evident research studies. Hence, due to the limited research and evaluation about the acceptance of mobile technology in the area, this research is conducted and implemented to explore the factors in user acceptance of the app directed by the Technology Acceptance Model (TAM). It is suggested that the user satisfaction as the external factor and the casual factor to perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use Surah Lazim & Hukum Tajwid Mobile App. A quantitative survey instrument using modified TAM is used for this research and the data analyzed using SPSS. For future research, a few recommendations can be taken into considerations such as incorporating more than one external factor can be selected and analyzed such as content richness, user satisfaction, perceived playfulness, security and individual mobility. Also a bigger sample can be gathered from students attending the full semester with respondent selected among other programs such as engineering, hospitality and commerce.

Keywords*: Mobile app; Technology Acceptance Model (TAM); Extended Technology Acceptance Model (TAM); Surah Lazim; Hukum Tajwid;*

1. INTRODUCTION

The swift evolution of information technologies especially smartphones have open the door for users to direct access to unlimited information resources and services [18]. Smartphones are becoming an essential companion for people in a day to day task. The exponential growth use of mobile phones by users are contributed by the unlimited of features available that assisted users everyday routine [16].Google Play, a market place for Android smartphone users now have 2 billion monthly active Android devices and 82 billion apps were downloaded from Play Store in 2016 (Richter, 2017). As indicated by a paper composed by the Pew Research Center, an information gathering was directed from June to September 2014, which caught data of around 1,041,336 applications accessible on Google Play store [19].

Apps for learning Al-Quran Surah and Tajwid now available for download in just a few clicks away in particular apps namely Surah Lazim & Hukum Tajwid. Surah Lazim & Hukum Tajwid Mobile App is an Android app currently available for download in Google Play Store. It has garnered interest from users with 40,260 downloads from the past years of its availability in the Google Play Store. With the current positive reception by the reviews and rating on the app Google Play Developer Console analytics, a new study is required to assess the user acceptance for the purpose of future scholarly reference of developing and enhancing the mobile apps for learning Al-Quran and Tajwid.

Education in mobile app promotes mobile learning which employs information technology and offers the users the preference of their desired time, place, and gear to reach the content of the course contrasts with the traditional learning that involves students coming to the physical classroom with administration at a precise time [13]. Meanwhile the nature of the mobile learning depends on using and interacting voluntarily with smartphone and Internet technology, an effective student in a traditional face-to-face class is not necessarily accept the technology in a mobile learning environment. Currently, Surah Lazim & Hukum Tajwid Mobile App has accepted positive review and rating for the Google Play Store reviews and rating. A study of user acceptance of the app can contribute a documented information for the future development and enhancement in learning Al-Quran apps. However, no empirical evidence of user acceptance on the use of the Surah Lazim & Hukum Tajwid Mobile App to be conducted in any evident research studies. Therefore, due to the limited research and evaluation about the acceptance

of mobile technology in the area, this research is conducted and implemented to identify the factors of user acceptance of the app guided by the Technology Acceptance Model (TAM).

The important part of this research project is to contribute to the inadequate literature on the use of mobile technology for learning Al-Quran, especially in Surah Lazim & Hukum Tajwid Mobile App that can help scholars in this field of study. In addition, this research project can give a significant contribution to developers knowing that technology can be used as a supplementary tool for learners to learn Al-Quran by providing users with analysis and evaluation that are essential in order to ensure the success of application. The results of this research project also can be a groundwork for the industry to develop and implement guidelines for evaluating mobile based Al-Quran learning, which significantly affecting the adoption of mobile applications by potential users. The research findings will enable industries to efficiently plan to invest and implement these applications. In addition, profesionals can develop more effective strategies by recognizing the factors affect the acceptance of Al-Quran learning app by users and which application's features are more likely to be used by users.

2. MATERIALS AND METHODS

2.1 Surah Lazim & Hukum Tajwid Mobile App

The Surah Lazim & Hukum Tajwid Mobile App is an educational app containing 22 Surah in Juz Amma which are the favored Surah from the Al-Quran. The app is developed for Android Platform and published on 17 May 2016 currently available in Google Play store. The latest version of the android app is Version 2.0 and supported for Android 2.3 to the latest version Android. The rating classification for the apps is categorized under reference, news, or educational app for the targeting user and the app is available for download distributing to 141 countries and the rest of the world. Figure 1.0 shows the installation menu Google Play for the Surah Lazim & Hukum Tajwid Mobile App including app category, basic information on app and user rating and reviews.

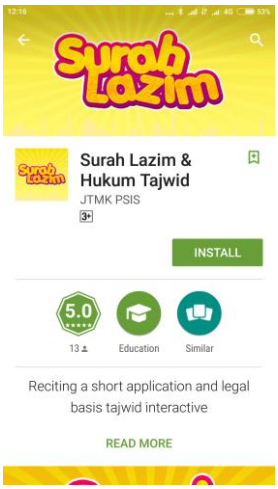

Figure 1.0: Installation Menu Google Play Store

Currently, the app installs recorded is 40,260 installs from the date the app is published until the latest recorded date 20 April 2019. Figure 2.0 shows the Google Play Developer Console Dashboard for the Surah Lazim & Hukum Tajwid Mobile App including the graphical information on user installs over period of time.

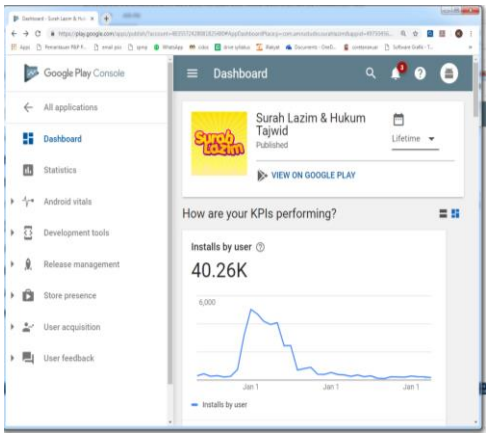

Figure 2.0: Google Play Developer Console Dashboard

Figure 3.0 shows the Google Play Developer Console Rating for the Surah Lazim & Hukum Tajwid Mobile App including the graphical information on user rating over period of time.

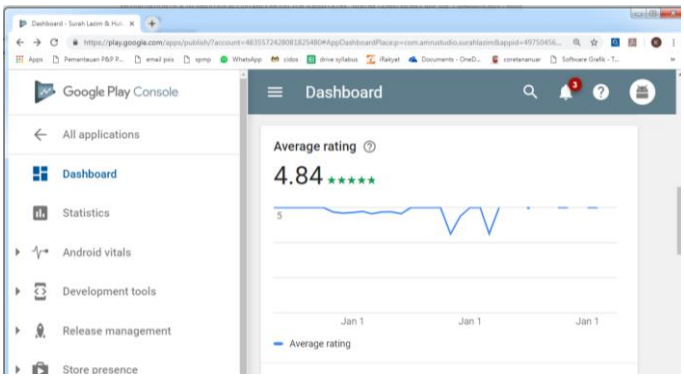

Figure 3.0: Google Play Developer Console Rating

2.2 Literature Review: Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) originally proposed by Davis (1989) as part of his Doctoral thesis which was developed to predict individual adoption and use of new information technologies and describes the factors that motivate users to accept and adopt the technologies [8]. The Technology Acceptance Model (TAM) is one of the most significant, established and preferred theoretical models for evaluating the end-user acceptance of ICT [11] [15] [16].

The Technology Acceptance Model (TAM) consists of two main beliefs known as perceived ease of use and perceived usefulness, which Davis (1989, 1993) defined as ‘‘the degree to which a person believes that using a specific system would be free of mental and physical efforts’’ and ‘‘the degree to which a person believes that using a specific system would enhance his/her job performance,’’ respectively. The Technology Acceptance Model (TAM) was initially developed as a simple model relying on four basic constructs (perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (AT) and behavioral intention to use (BI)). The Technology Acceptance Model (TAM) suggests that two specific beliefs regarding technological innovation – perceived ease of use (PEOU) and perceived usefulness (PU) – are linked to attitudes (AT) and behavioral intentions (BI) towards using the innovation [27].

Many researches have successfully used and replicated The Technology Acceptance Model (TAM) to determine user acceptance of new technologies and systems and have shown that perceived ease of use and perceived usefulness largely determine user attitude toward a specific technology [22]. Among the technologies are e-government services [8], Web 2.0 applications [5], Virtual Reality simulation in medical education [9], mobile technology for health [3], Medical education [2], smart watches (Francis M. Mathooko, - 2015), mobile payment [16]

[20], Application of QR codes in education [14], social mobile games [21], mobile augmented reality [28], Augmented Reality Smart Glasses [26], social media [25], and mobile cloud computing [22].

2.3 Proposed Model: Extended Technology Acceptance Model (TAM)

Many studies has modified the original version of the Technology Acceptance Model (TAM) to extend their research project by incorporating the external variables to the construct of the research project due to the factors of perceived ease of use (PEOU) and perceived usefulness (PU) are insufficient to analyze certain factors [8].

Among the extended factors are social influence and subjective norm [6] compatibility, technical support, affective quality and computer self-efficacy [5], decomposed attitudes, subjective norms, and perceived action controls [4], usability [3], content richness, user satisfaction, and perceived playfulness [24], reliability and recommendation [2].

After a careful consideration from the previous studies done by numerous researchers, this study proposed a conceptual framework and research hypothesis by using the Extended Technology Acceptance Model (TAM). Based on the previous researches evaluation, user satisfaction is among the external variables used in determining the user acceptance in mobile app particularly research by [17] [24]. User satisfaction is therefore included in the model as an additional variable. The satisfaction intention proposes that the higher and lower user satisfaction measured the more or less likely it is that the user will intend to use the system [24].

The current research study amends the Technology Acceptance Model (TAM) by attempting to add user satisfaction into the construct's as suggested by [17] and [24]. Therefore, a modified Technology Acceptance Model (TAM) will be used based on conceptual framework used by previous research. The following hypotheses are suggested in accordance to the above reasoning, and the proposed conceptual framework is shown in Figure 4.0.

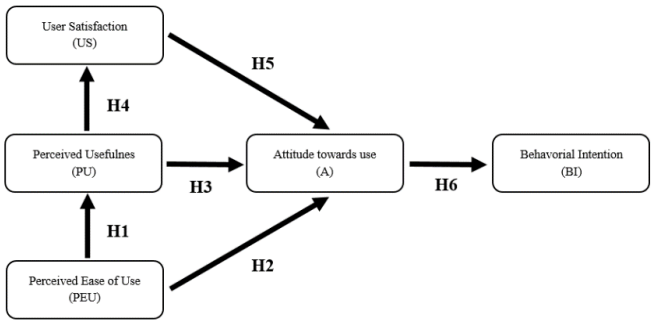

Figure 4.0: Hypothesis Model of Proposed Conceptual Framework

Hypothesis 1 to hypothesis 6 present the effect from user satisfaction to perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use Surah Lazim & Hukum Tajwid Mobile App.

H1: Perceived ease of use of the mobile apps directly influences users' perceived usefulness in learning Surah Lazim & hukum Tajwid.
H2: Perceived ease of use of the mobile apps directly influences users' attitude towards use of learning Surah Lazim & hukum Tajwid.
H3: Perceived usefulness of the mobile apps directly influences users' attitude towards use of learning Surah Lazim & hukum Tajwid.
H4: Perceived usefulness of the mobile apps directly influences users' satisfaction of learning Surah Lazim & hukum Tajwid.
H5: Users' satisfaction of the mobile apps directly influences their attitudes towards use in learning Surah Lazim & hukum Tajwid.
H6: Attitude towards use of the mobile apps directly influences uses' behavioural intention to use Surah Lazim & hukum Tajwid.

This research applied the non-experimental research methodology. The quantitative survey instrument was used to examine and analyze the user satisfaction as the external factor and the causal factor to perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use Surah Lazim & Hukum Tajwid Mobile App using modified Technology Acceptance Model (TAM). From the population 213 Muslim students from the Department of Information and Communication Technology, Politeknik Sultan Idris Shah taking session Jun 2018 short semester, 71 participants were selected for the survey. The users of the Surah Lazim & Hukum Tajwid Mobile App were selected among a group of Muslims using Android based smartphones with an adequately balance respondents among male and female and the participants age ranged from 18–25. Participants were given an instruction to install Surah Lazim & Hukum Tajwid Mobile App during a briefing session at the computer labs to participate in a standardized session to become familiar with the app [9]. Participants were

instructed to use the Surah Lazim & Hukum Tajwid Mobile App for a period of one week. After a sufficient time of use, participants answer the survey distributed through the online survey tool Google Form which investigates the factors in user acceptance of the app guided by the Technology Acceptance Model (TAM) focused on the relationships between the five variables: perceived ease of use (six measurement items), perceived usefulness, user satisfaction, attitude toward using, and behavioral intention to use Surah Lazim & Hukum Tajwid Mobile App.

3. RESULTS AND DISCUSSION

The collected data from the survey for the current research was analyzed using several methods of statistical analysis. The statistical techniques employed in summarizing and description of data accumulated for the current research are Participants' Demographics Analysis, Validity and Reliability Analysis, Correlation Analysis and Regression Analysis that focused on the relationships between the five variables: perceived ease of use, perceived usefulness, user satisfaction, attitude toward using, and behavioral intention to use Surah Lazim & Hukum Tajwid Mobile App.

3.1 Participants' Demographics Analysis

Participants' demographics profile represents adequately balance respondents among male and female whereas 60.6% of respondent are female and 39.4% of respondent are male. The participants' age was between 18 to 25 with age 20 years have the highest percentage with (60.6%) and the lowest frequency is for age 18 and 25 is amounted to 1.4% each.

3.2 Validity and Reliability Analysis

This analysis conducted a data exploration to review the validity, reliability, and normality for the collected data. The mean and standard deviation data exploration conducted in order to validate the constructs in the five sets of measurement items: the perceived ease of use (EOU1, EOU2, EOU3, EOU4, EOU5, EOU6), perceived usefulness (U1, U2, U3, U4), user satisfaction (US1, US2, US3, US4, US5, US6, US7), attitude toward using (A1, A2, A3), and behavioral intention to use (B1, B2, B3, B4).

Table 1.0 shows the mean and standard deviation of the questionnaire measurement item sets generated from Statistical Package for the Social Sciences SPSS® for Windows® Version 21.0 software. A standard deviation of 0.557 to 0.680 which are relatively small compared to the mean indicates that the data points are close to the mean [10].

Table 1.0: Mean and Standard Deviation

	N	Mean	Std. Deviation
Attitude Toward Using (A)			
Surah Lazim & Hukum Tajwid Mobile App is beneficial.	71	4.51	.606
Surah Lazim & Hukum Tajwid Mobile App is positive.	71	4.49	.606
I would find Surah Lazim & Hukum Tajwid Mobile App is good.	71	4.51	.606
Behavioral Intention to Use (B)			
Assuming I have access to Surah Lazim & Hukum Tajwid Mobile App, I intend to use it.	71	4.41	.623
Given that I have access to Surah Lazim & Hukum Tajwid Mobile App, I plan to use it.	71	4.38	.641

It is worth it to use Surah Lazim & Hukum Tajwid Mobile App.	71	4.44	.626
I will frequently use Surah Lazim & Hukum Tajwid Mobile App in the future.	71	4.41	.667
User Satisfaction (US)			
Using Surah Lazim & Hukum Tajwid Mobile App, I am willing to read Surah Lazim.	71	4.46	.581
I like using Surah Lazim & Hukum Tajwid Mobile App to read Surah Lazim.	71	4.38	.641
I will continue to use Surah Lazim & Hukum Tajwid Mobile App to read Surah Lazim.	71	4.35	.657
In general, I think Surah Lazim & Hukum Tajwid Mobile App is a useful tool for reading Surah Lazim.	71	4.41	.575
I like the Tajwid information in Surah Lazim & Hukum Tajwid Mobile App.	71	4.41	.623
I will join in Surah Lazim reading programs similar to Surah Lazim & Hukum Tajwid Mobile App in the future.	71	4.28	.680
In general, I like Surah Lazim reading programs similar to Surah Lazim & Hukum Tajwid Mobile App.	71	4.37	.660
Perceived Usefulness (U)			
Using Surah Lazim & Hukum Tajwid Mobile App in reading Surah Lazim would enable me to accomplish tasks more quickly.	71	4.49	.582
Using Surah Lazim & Hukum Tajwid Mobile App would improve my reading Surah Lazim performance.	71	4.41	.645
Using Surah Lazim & Hukum Tajwid Mobile App in reading Surah Lazim would increase my productivity.	71	4.45	.580
Using Surah Lazim & Hukum Tajwid Mobile App would enhance my effectiveness in reading Surah Lazim.	71	4.48	.582
Using Surah Lazim & Hukum Tajwid Mobile App would make it easier to do my Surah Lazim reading.	71	4.45	.580
Perceived Ease of Use (EOU)			
Learning to use Surah Lazim & Hukum Tajwid Mobile App would be easy for me.	71	4.46	.605
I would find it easy to get Surah Lazim & Hukum Tajwid Mobile App to do what I want it to do.	71	4.41	.575
My interaction with Surah Lazim & Hukum Tajwid Mobile App would be clear.	71	4.42	.601
I would find Surah Lazim & Hukum Tajwid Mobile App to be flexible to interact with.	71	4.39	.621
It would be easy for me to become skillful at using Surah Lazim & Hukum Tajwid Mobile App.	71	4.39	.597
I would find Surah Lazim & Hukum Tajwid Mobile App easy to use.	71	4.49	.557
N = number of Respondents			

Reliability analysis is conducted to validate the questionnaire given that it should consistently reflect the construct that it is measuring [10]. The reliability analysis is conducted to validate the internal consistency on the five sets item of measurements which are perceived ease of use (six measurement items), perceived usefulness (five measurement items), user satisfaction (seven measurement items), attitude toward using (three measurement items), and behavioral intention to use (four measurement items). Table 2.0 shows Cronbach's alpha for the five variables measured.

Table 2.0: Cronbach's Reliability Analysis

Sets of Measurement Items	Cronbach's alpha
Perceived Ease of Use (EOU1-EOU6)	.929
Perceived Usefulness (U1-U5)	.955
User Satisfaction (US1-US7)	.970
Attitude Toward Using (A1-A3)	.937
Behavioral Intention to Use (B1-B4)	.952

Cronbach's alpha over 0.8 is considered acceptable reliability as suggested by Carmines and Zeller (1979). Table 2.0 shows the results from the analysis where all of the measurement item sets were above 0.9 level indicating the test results with good internal consistency. The user satisfaction items set is the highest with .970 level and the perceived ease of use items sets is lowest with .929 level. Therefore, the measurement items of the five variables emerged to be reliable and worthy.

3.3 Correlation Analysis

For this research, Pearson's product-moment correlation coefficient or commonly named Pearson's correlation coefficient is used in order to measure the strength of relationship between two variables [10]. Correlation coefficient analyses the strength and direction of the linear relationship between two variables and the degree of correlation which will provide indication of the strength of an association between the two variables. [1] stated that a perfect correlation coefficient value of 1 or -1 between two variables indicates that a value of one variable can be determine precisely by knowing the value of the other variable. A correlation coefficient value of 0 means there is no relationship between the two variables. Correlation coefficient values can be used to determine the effects of an independent variable on a dependent variable.

Furthermore, to understand the strength of the relationships between the five variables: perceived ease of use, perceived usefulness, user satisfaction, attitude toward using, and behavioral intention to use, a guideline that suggested by [7] is used that a small correlation coefficient (effect size) is around 0.1 in magnitude, a medium-sized correlation coefficient is roughly 0.3, and a large correlation coefficient is about 0.5 or larger. Table 3.0 shows correlation coefficient for the five variables generated from Statistical Package for the Social Sciences SPSS® for Windows® Version 21.0 software depicting that the results are strong correlation coefficient $r > 0.7$ support all the five variables: perceived ease of use, perceived usefulness, user satisfaction, attitude toward using, and behavioral intention to use.

Table 3.0: Correlation Coefficient Analysis

	Attitude	***Behavioral***	***Satisfaction***	***Usefulness***	***Ease of Use***
Attitude	*1*	*.861***	*.844***	*.834***	*.796***
		.000	*.000*	*.000*	*.000*
Behavioral	*.861***	*1*	*.895***	*.856***	*.822***
	.000		*.000*	*.000*	*.000*
Satisfaction	*.844***	*.895***	*1*	*.867***	*.848***
	.000	*.000*		*.000*	*.000*
Usefulness	*.834***	*.856***	*.867***	*1*	*.930***
	.000	*.000*	*.000*		*.000*
Ease of Use	*.796***	*.822***	*.848***	*.930***	*1*
	.000	*.000*	*.000*	*.000*	

***. Correlation is significant at the 0.01 level (2-tailed).*

The double asterisk after the coefficient indicated the significance values are all less than .01 which means that the probability of getting a correlation coefficient if the null hypothesis were true is close to zero which is very low. A statistically significant relationship is concluded

as all of the significance values are below the standard criterion of .05 [10]. The significance tests of the hypotheses of the modified Technology Acceptance Model (TAM) are presented in Table 3.0 which shows significance level for hypotheses where all the P-values are 0.01 which fell in the range ($P < 0.01$) indicating that all the hypotheses significance level is excellent.

3.4 Regression Analysis

Regression analysis is a statistical tool used for relationship between variables investigation. For this research, linear regression analysis is used to measure the path coefficient between variables using SPSS. The standardized coefficient beta (β) and the significant t value were generated to analyze the weight and significance of the research hypotheses [13]. The significance tests of the hypotheses of the modified Technology Acceptance Model (TAM) are presented in Table 4.0 which shows significance level for hypotheses where all the P-values are 0.01 which fell in the range ($P < 0.01$) indicating that all the hypotheses significance level is excellent. The results also show that perceived ease of use was the strongest predictor for the perceived usefulness using the Surah Lazim & Hukum Tajwid app ($\beta = 0.930$, $P < 0.01$) while perceived ease of use was the weakest predictor for the attitude towards using the Surah Lazim & Hukum Tajwid app ($\beta = 0.796$, $P < 0.01$).

Table 4.0: Hypotheses Significance Test of Proposed Technology Acceptance Model (TAM)

Hypotheses Path		**β**
H1: Perceived ease of use of the mobile apps directly influences users' perceived usefulness in learning Surah Lazim & hukum Tajwid.	EOU→U	.930**
H2: Perceived ease of use of the mobile apps directly influences users' attitude towards use of learning Surah Lazim & hukum Tajwid.	EOU→A	.796**
H3: Perceived usefulness of the mobile apps directly influences users' attitude towards use of learning Surah Lazim & hukum Tajwid.	U→A	.834**
H4: Perceived usefulness of the mobile apps directly influences users' satisfaction of learning Surah Lazim & hukum Tajwid.	U→US	.867**
H5: Users' satisfaction of the mobile apps directly influences their attitudes towards use in learning Surah Lazim & hukum Tajwid.	US→A	.844**
H6: Attitude towards use of the mobile apps directly influences uses' behavioural intention to use Surah Lazim & hukum Tajwid.	A→BI	.861**
S: satisfaction; U: perceived usefulness; EOU: perceived ease of use; A: attitude toward Using; BI: behavioral intention to Use; ; β: Correlation Coefficient; **. Correlation is significant at the 0.01 level (2-tailed).		

Figure 5.0 shows path coefficient of proposed Technology Acceptance Model significance level for hypotheses where all the P-values are 0.01 which fell in the range ($P < 0.01$) indicating that all the hypotheses significance level is excellent.

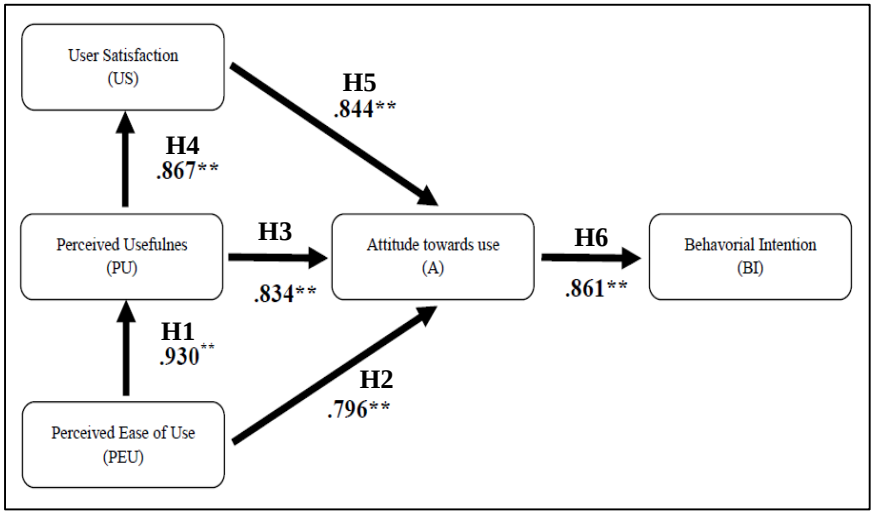

Figure 5.0: Path Coefficient of Proposed Technology Acceptance Model

For H1, simple linear regression was used to assess whether perceived ease of use significantly predicts perceived usefulness. The results of the regression suggested that perceived ease of use explained 87% of the variance. $R^2 = .87$, $F(1,69) = 445.18$, $p < .001$. Perceived ease of use significantly predicts perceived usefulness, $\beta = 1.00$, $t = 21.10$, $p < .001$.

For H2, simple linear regression was used to assess whether perceived ease of use significantly predicts attitude towards use. The results of the regression suggested that perceived ease of use explained 63% of the variance. $R^2 = .63$, $F(1,69) = 119.16$, $p < .001$. Perceived ease of use significantly predicts attitude towards use, $\beta = 0.89$, $t = 10.92$, $p < .001$.

For H3, simple linear regression was used to assess whether perceived usefulness significantly predicts attitude towards use. The results of the regression suggested that perceived usefulness explained 70% of the variance. $R^2 = .70$, $F(1,69) = 157.35$, $p < .001$. Perceived usefulness significantly predicts attitude towards use, $\beta = 0.87$, $t = 12.54$, $p < .001$.

For H4, simple linear regression was used to assess whether perceived usefulness significantly predicts user satisfaction. The results of the regression suggested that perceived usefulness explained 75% of the variance. $R^2 = .75$, $F(1,69) = 208.07$, $p < .001$. Perceived usefulness significantly predicts user satisfaction, $\beta = 0.92$, $t = 14.43$, $p < .001$.

For H5, simple linear regression was used to assess whether user satisfaction significantly predicts attitude towards use. The results of the regression suggested that user satisfaction explained 71% of the variance. $R^2 = .71$, $F(1,69) = 170.52$, $p < .001$. User satisfaction significantly predicts attitude towards use, $\beta = 0.83$, $t = 13.06$, $p < .001$.

For H6, simple linear regression was used to assess whether attitude towards use significantly predicts behavioral intention. The results of the regression suggested that attitude towards use explained 74% of the variance. $R^2 = .74$, $F(1,69) = 197.95$, $p < .001$. Attitude towards use significantly predicts behavioral intention, $\beta = 0.90$, $t = 14.07$, $p < .001$.

4. CONCLUSION

Although Technology Acceptance Model (TAM) has been adapted in assessing user's acceptance behaviors for more than two decades, this current research extended the Technology Acceptance Model by integrating the user satisfaction to address the user's acceptance behaviors on using mobile app in learning. This current research uses satisfaction as the external factor and the causal factor to perceived usefulness, perceived ease of use, attitude toward using, and behavioral intention to use Surah Lazim & Hukum Tajwid Mobile App and verify the influences toward other existing beliefs, attitudes, intentions, and behavior variables. This could provide the additional knowledge in assessing the usage behavior in learning mobile app. Based on the constructs of the Technology Acceptance Model (TAM), this study was successfully replicated the extended Technology Acceptance Model (TAM) and implemented it among a group of Muslims using Android based smartphones at the Department of Information and Communication Technology, Politeknik Sultan Idris Shah. Overall, extended Technology Acceptance Model (TAM) demonstrated a significant fit with the collected data and explained the constructs and causal relationships from the aspects of students' beliefs (perceived ease of use and perceived usefulness), attitude, intention, and behavior.

5. REFERENCES

[1] Abdullah, F. and Ward, R. (2016) 'Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors', *Computers in Human Behavior*. Elsevier Ltd, 56, pp. 238–256.

[2] Briz-Ponce, L. and García-Peñalvo, F. J. (2015) 'An Empirical Assessment of a Technology Acceptance Model for Apps in Medical Education', *Journal of Medical Systems*, 39(11).

[3] Brown, W. *et al.* (2013) 'Assessment of the Health IT Usability Evaluation Model (Health-ITUEM) for evaluating mobile health (mHealth) technology', *Journal of Biomedical Informatics*. Elsevier Inc., 46(6), pp. 1080–1087.

[4] Chang, I. C. *et al.* (2016) 'Factors influencing Chinese tourists' intentions to use the Taiwan Medical Travel App', *Telematics and Informatics*. Elsevier Ltd, 33(2), pp. 401–409.

[5] Cheung, R. and Vogel, D. (2013) 'Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning', *Computers and Education*. Elsevier Ltd, 63, pp. 160–175.

[6] Cho, J. *et al.* (2014) 'Determinants of adoption of smartphone health apps among college students', *American Journal of Health Behavior*, 38(6), pp. 860–870.

[7] Cohen, J. (1992) 'Quantitative Methods in Psychology', *Psychological Bulletin*, 112(1), pp. 155–159.

[8] Dahi, M. and Ezziane, Z. (2015) 'Measuring e-government adoption in Abu Dhabi with technology acceptance model (TAM)', *International Journal of Electronic Governance*, 7(3), p. 206.

[9] Fang, T. Y. *et al.* (2014) 'Evaluation of a haptics-based virtual reality temporal bone simulator for anatomy and surgery training', *Computer Methods and Programs in Biomedicine*. Elsevier Ireland Ltd, 113(2), pp. 674–681.

[10] Field, A. (2013) 'Discovering Statistics Using IBM SPSS', *Discovering Statistics Using SPSS*, pp. 163–212.

[11] Kim, J. (Sunny) (2008) *An extended technology acceptance model in behavioral intention toward hotel tablet apps with moderating effects of gender and age, International Journal of Contemporary Hospitality Management*.

[12] Kothari, C. R. (2004) *Research Methodology: Methods & Techniques, New Age International (P) Ltd*.

[13] KU, C.-H. (2009) 'User Resources in Higher Education Web-Based Online Learning'.

[14] Lai, H.-C. *et al.* (2013) 'The implementation of mobile learning in outdoor education: Application of QR codes', *British Journal of Educational Technology*, 44(2), pp. E57–E62.

[15] Lee, D. Y. and Lehto, M. R. (2013) 'User acceptance of YouTube for procedural learning: An extension of the Technology Acceptance Model', *Computers and Education*. Elsevier Ltd, 61(1), pp. 193–208.

[16] Liébana-Cabanillas, F., Ramos de Luna, I. and Montoro-Ríos, F. J. (2015) 'User behaviour in QR mobile payment system: the QR Payment Acceptance Model', *Technology Analysis and Strategic Management*, 27(9), pp. 1031–1049.

[17] Lin, C. C. (2014) 'Learning English reading in a mobile-assisted extensive reading program', *Computers and Education*. Elsevier Ltd, 78, pp. 48–59.

[18] Ma, Q., Chan, A. H. S. and Chen, K. (2016) 'Personal and other factors affecting acceptance of smartphone technology by older Chinese adults', *Applied Ergonomics*, 54, pp. 62–71.

[19] Olmstead, K. *et al.* (2015) 'Kenneth Olmstead AND Michelle Atkinson', (October). Available at: http://www.pewinternet.org/2015/11/10/apps-permissions-in-the-google-play-store/.

[20] Ooi, K. B. and Tan, G. W. H. (2016) 'Mobile technology acceptance model: An investigation using mobile users to explore smartphone credit card', *Expert Systems with Applications*. Elsevier Ltd, 59, pp. 33–46.

[21] Park, E. *et al.* (2014) 'Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model', *Telematics and Informatics*. Elsevier Ltd, 31(1), pp. 3–15.

[22] Park, E. and Kim, K. J. (2014) 'An integrated adoption model of mobile cloud services: Exploration of key determinants and extension of technology acceptance model', *Telematics and Informatics*. Elsevier Ltd, 31(3), pp. 376–385.

[23] Park, S. Y., Nam, M.-W. and Cha, S.-B. (2012) 'University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model', *British Journal of Educational Technology*, 43(4), pp. 592–605.

[24] Pindeh, N., Suki, N. M. and Suki, N. M. (2016) 'User Acceptance on Mobile Apps as an Effective Medium to Learn Kadazandusun Language', *Procedia Economics and Finance*. Elsevier B.V., 37(16), pp. 372–378.

[25] Rauniar, R. *et al.* (2014) 'Technology acceptance model (TAM) and social media usage: an empirical study on Facebook', *Journal of Enterprise Information Management*, 27(1), pp. 6–30.

[26] Rauschnabel, P. A. and Ro, Y. K. (2015) 'Augmented reality smart glasses : an investigation of technology acceptance drivers', *International Journal of Technology Marketing*, 11(2), pp. 1–26.

[27] Rese, A., Schreiber, S. and Baier, D. (2014) 'Technology acceptance modeling of augmented reality at the point of sale: Can surveys be replaced by an analysis of online reviews?', *Journal of Retailing and Consumer Services*. Elsevier, 21(5), pp. 869–876.

[28] Tom Dieck, M. C. and Jung, T. (2015) 'A theoretical model of mobile augmented reality acceptance in urban heritage tourism', *Current Issues in Tourism*, 3500(December), pp. 1–21.