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Examining The Acceptance of Tarannum Smart Learning Application Using Diffusion of Innovation Model

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Abstract

This paper presents a study aimed at developing a realistic model for understanding users' intention to use Smart Learning Application (SLA). SLA provides users with an intelligent learning platform that enables effective learning management, user-centered networking of intelligent devices, and rapid learning from any location. However, despite the advantages of SLA, its use is not widely accepted. The study used a quantitative approach, and data was collected from 229 respondents using a survey. SmartPLS (v. 3.2.8) was used to examine the relationships between the variables in the proposed model. The study developed a comprehensive model based on DOI that addressed users' intention to use SLA. The findings indicated that the direct influence of Relative Advantage, Compatibility, and Complexity on users' intention to use Tarannum Smart Learning Application (TSLA) was not significant, and hypotheses H1, H2, and H3 were not supported. However, hypothesis H4, which postulated a significant relationship between Observability and Intention to Use, was supported. The proposed model can be used as a basis for improving the learning of various types of tarannum by teachers teaching the holy Quran. The study can be expanded to other Smart Learning Applications to validate the findings and identify more opportunities. TSLA, by design, promotes human-oriented networking of smart devices and applications, making it a suitable tool for encouraging active users. Longitudinal data may be necessary to investigate the variables that impact people's acceptance level of TSLA. The technical implementation of TSLA from a policy maker's viewpoint can be explored in future studies.

Keywords: *Tarannum, Smart Learning Application, Acceptance, Diffusion of Innovation Model*

INTRODUCTION

Al-Qur'ān (in Arabic القرآن)is the holy book from Allah and revealed incrementally (mutawātir) to Prophet Muhammad ﷺto be spread to all mankind through Jibrīl a.s over a period of 23 years. Terminologically, Al-Qur'ān means the miracle words of Allah that was revealed to Prophet Muhammad ﷺ through the mediator of angel Jibril, narrated in mutawātir and reading each of its letters is worship and it starts from Sūrah Al-Fātihah and ends with Sūrah An-Nās. Al-Qur'ān is comprised of 114 chapters (sūrah) which consist of verses (āyāt). The divine text of Al-Qur'ān is the greatest miracle to the Prophet Muhammad ﷺand all Muslims all over the world as guidance to live with a better life and to seek for Allah's grace.

Meaning: This is the Book of Allah, there is no doubt in it; it is a guidance for the pious. According to Syakhrani (2020), explained that in Islam, education is everyone's responsibility to obtain the information that the divine commandment has made necessary. In Islam, education balances and links humankind's physical and spiritual growth. Islam would also address universal education that promotes moral principles and practical life skills. Therefore, al-Qur'ān education is very important to build the Muslims generation in the future. Reciting the Qur'ān is a part of worship in Islam and beautifying it is one of the branches in an art sound in Islamic society that is called *Tarannum* (Qur'ānic chanting). *Tarannum* al-Qur'ān is the art of reciting the Qur'ān and it is believed to have emerged since the time of Prophet Muhammad ﷺ (Nik Ismail, 2012). There are numbers of hadiths that encourage Muslims to recite the Qur'ān with a beautiful voice without ignoring the rules of Tajwid. Below

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is the hadith from Imam Ahmad, Abu Daud, Ibn Majah, Ad-Daarimi, An-Nisa'i, and Al-Hakim; from Rasulullah ﷺ, he claimed in which to recite the Qur'ān with a beautiful voice. The hadith said:

حسّنوا القرءان بأصواتكم فإنّ الصّوت الحسن يزيد القرءان حسنا

(Ṣaḥiḥ Al-Jāme'. Juz' 3145)

Meaning: Beautifying the Qur'ān' reading with your voice, indeed the beautiful voice would only enhance the beauty of the readings. Nowadays, Information and Communication Technology (ICT) are becoming vital in our daily lives (Fahm et al., 2022). In the educational environment today, teachers and education practitioners from various field and background are thrilled when it comes to using technology and ICT to deliver the knowledge and increase students' understanding (Lawrence, 2021). In this 21st century, teaching and learning process becomes more interesting with the existing of various of sophisticated technology and gadgets being utilised as the teaching and learning aids (Novriadi & Firmasari, 2022). The technology nowadays gives benefits to the teachers and also students to learn anywhere and anytime (Al-Bashayreh et al., 2022). Chiu et al. (2015) in their study states that the technologies and devices may offer many possibilities in education. As mobile communication devices, such as laptops and smart phones, have become a need rather than a want, and with the more matured wireless network technology, mobile learning also is becoming a new learning trend that has gradually being valued, following distance learning and digital learning (Tran & Nguyen, 2022). Kabir (2021) demonstrates how nearly all of our daily activities are moving away from the conventional method and toward the innovative environment in today's society. Instead of reading or reciting religious texts from a traditional paper-printed book, people are increasingly using electronic or intelligent gadgets. The Quran and other sacred texts are freely accessible through websites, and millions of Muslims use intelligent gadgets to recite, applications or other digital means (Kepkowski et al., 2022). The holy book of Qur'ān delivers right guidance and is indisputable as it is written in sūrah Al-Baqarah in second verse that is;

ذَٰلِكَ ٱلْكِتَٰبُ لَا رَيْبَ ۛ فِيهِ ۛ هُدًى لِّلْمُتَّقِينَ

(Sūrah Al-Baqarah 2:2)

a. The Origin of Tarannum Al-Qur'ān

Tarannum Al-Qur'ān had emerged for centuries in the Arabs country. It is believed that the art of *Tarannum* Al-Qur'ān has been practices since the time of the Holy Prophet Muhammad ﷺ (Nik Ismail, 2012). According to historians, *Tarannum*'s origin was inspired from few elements of environmental sound that are from wood friction, wind blowing, bird chirping, and water flowing. All the inspired sounds have then been composed and include melodies by the poet to make variation of *Tarannum* rhythms according to the respective cultures. The modernization of *Tarannum* (Arabic music) is believed to be originally influenced by Yunani civilisation. It was started by a music professor who was from Greek people and then extended to music experts in the Arab lands. It is believed from few hadith sohih that the history of *Tarannum* commencement is from the history of Nuzul Qur'ān in Hira' cave in 610M where the Prophet Muhammad ﷺ himself recited the Qur'ān well, nice and in a beautiful way. He also urged the community to recite the Qur'ān with *Tarannum*, Tazyin, and Tahsin (Ali, 2013). The history of *Tarannum* and Qur'ān learning in Malay Archipelago expands in line with the development of Islam itself through Arabic traders and missionaries especially in the tenth century until fifteenth century of Masihi; that is before the arrival of the western colonist (Nik Ismail, 2012).

b. Tarannum Al-Qur'ān Definitions

Tarannum refers to a rhythmic recitation of the Qur'ān. In Malaysia, the term of *Taranum* has become synonym which refers to the *Taranum* Qur'an, rhythmic song of Qur'anic recitation or the art song in reciting the Qur'an. For the Middle East countries, the term *Taranum* is unpopular among them, they normally use the term *al-Nagham* (النغم) and *al-maqamat* (المقامات) that indicate of Qur'ānic *Taranum* and it was also being used by Indonesia (Isa et al., 2016). The meaning of *Tarannum* (الترنم) linguistically comes from the word (تَرَنَّمَ) which means singing

and beautifying voice against something. While the meaning of *Tarannum* terminologically means knowledge or method discussed on variation of sound according to certain tone, rhythm and melody and it is intended to augment artistic beauty in the recitation especially for Qur'ān recitation (Hasbullah et al., 2020; Zakaria et al., 2021). Nik Ismail (2012) in his book entitled Methods of *Tarannum* defines *Tarannum* as knowledge or methods for diversified voice through these three processes of tone, rhythm, and melody. According to Ali (2013), *Tarannum* means 'taḥsin al-ṣhaut'. Qur'ānic song i.e taḥsin al-ṣhaut has three main components which are al-Tajwīd, al-Tartīl and al-Ghinā. If one of those components is not included, it is not classified as taḥsin al-ṣhaut or *Tarannum*. Above all, the most used definition that defines *Tarannum* is the knowledge on the art of diversifying the sound of voice by the process of combining the tone, rhythm and melody that are intended to augment the artistic beauty in recitation especially for Qur'ān recitation.

c. Issues and Problems in Teaching and Learning Tarannum

When using Tarannum to recite the Qur'an, one must do so in a melodic voice and accordance with the correct rules of Tajwid, or Arabic elocution. While observing the meaning of the Qur'an with the recitation, the whole process itself can effectively embrace both the body and the soul. Therefore, it is appropriate for Qur'anic teachers to produce pupils who are not only Qur'anic scholars but also adept at performing Tarannum (Awang et al., 2022). There are some issues and problems pertaining to *Tarannum* teaching and learning. A research done by Awang et al. (2022), there are few difficulties instructors encounter when teaching Qur'anic Tarannum which are the problem with administrative and management, *Tarannum* knowledge, *Tarannum* competency, lack of understanding in *Tarannum* pedagogy, teachers incapability in *Tarannum* chanting, lack of training for teachers and teacher's attitude. In this paper, administration and management, lack of understanding of pedagogy, and teachers' attitude issues had resulted with high level of problems. Problem in regard to administrative and management, we concluded that Qur'anic Tarannum as a subject is not very interesting to school administrators and governmental officials.

The problem particularly concerning when there needs to be more pedagogical knowledge concerning the strategy or approach used in instruction. Adoption of outmoded teaching materials, usage of traditional methods, a lack of activities that can increase student involvement, weaknesses in the teaching methods, a lack of variation in teaching techniques, and a lack of creativity in management and teaching practises are a few causes of this issue. The problems on teachers' attitude in teaching *Tarannum* were identified too which include the unwillingness of the teachers to be open to changes in teaching techniques, teachers' tendency to speak in their tongue when instructing, and activities that lack focus.

d. Problem Statement

A number of researchers have explored various determinants of acceptance of technology using innovative theories to understand what motivate the acceptance behavior of people using various technology to learn and recite Quran. The Qur'anic Arabic alphabets consist of 28 letters, from alif until ya (Alsharbi et al., 2021; Mohamad et al., 2022). In the context of Malaysian, the learning of Qur'anic recitation is usually learned and specialized in specific learning institutions. There are some weaknesses in the recitation of the Qur'anic verses by the Malaysian students and teachers. It was noted that there are numerous chances for innovation, acceleration, enrichment, and depth of learning when ICTs are used in learning. Furthermore, the use of ICT in educating students can also motivate and engage the students that obviously will create a fun learning as well as strengthening the teaching and learning process (Fahm et al., 2022).

However, when focusing on the problem of acceptance behaviors of the use of technology in reciting and learning the verses in the Quran, many weaknesses have been identified via scientific studies. In learning *Tarannum* al-Qur'an, they are insufficient materials in teaching the students and the teachers tend to use traditional approaches. This had causes a dull atmosphere and inactive students while learning the *Tarannum* subject. Mohamad et al. (2021) had suggested in his study that the teachers should always have to improvise their pedagogical skills by using a diversity of teaching strategies and teaching aids in teaching *Tarannum* subject. While, based on Sameri (2020) this study had found that over half of the students did not have knowledge on *Tarannum* al- Qur'ān and unable to recite al-Qur'ān with *Tarannum*. In this study, the findings had showed that only 6.3% students are able to recite the Qur'ān with *Tarannum* well, 20% students were at the moderate level

while, over half of the students' which is 63.8% of the students are weak in reciting the Qur'ān with *Tarannum*. The study shows that teachers who use teaching and learning aids in their *Tarannum* teaching are very little. Thereby, the study suggested that teachers require adequate training, specifically in the aspect of ICT and the use of teaching and learning aids. The study's findings concur with those of one done by Salleh et al. (2020) whereby the analysis of *Tarannum* recitation proficiency according to KPM's grade is conducted. The result shows that 15 students (22.7%) achieve A grade, while over half of the students which is 44 students (66.7%) get the D grade. It shows that there is a low proficiency of the students in reciting the Qur'ān with *Tarannum*. Another study that had been done by Hasbullah et al. (2022), this study finds that, students in overall are very weak in practicing the techniques that were found in the teaching and learning of *Tarannum* al-Qur'ān and the study also showed that the students' achievement towards the goals of teaching and learning *Tarannum* al-Qur'ān is somewhat unsatisfactory. Apart from that, Kabir (2021) had discovered that today's Qur'anic online Islamic publications and applications lag in the use of organized digital material. Therefore, this paper examines the acceptance of Tarannum Smart Learning Application by Using Diffusion of Innovation Model to increase the usage of ICT in the *Tarannum* learning.

LITERATURE REVIEW

Different studies have been conducted to investigate the effects of definite teaching or learning methods on the teaching and based on the application of numerous learning strategies and tools, Tarannum's learning performance (Supriadi et al., 2022; Almarzouqi et al., 2022). For example, Zakaria et al. (2021) analyze the suitability of alternative Tarannum learning method for beginners and identify the appropriate content to be incorporated in the audiobook. They acknowledged the fact that there are existing studies on the use of audiobooks for the teaching and learning process but not in the context of Tarannum. They proposed and developed an audiobook model that will be used as the main reference to guide the development of the actual Tarannum Interactive Audiobook, which can further facilitate student beginners in learning Tarannum al-Quran more effectively.

Another study was conducted by Mohamad et al. (2022) the researcher studied on implementation of *Kelas Khas Kemahiran Membaca dan Menghafaz Al-Qu'an (KKQ)* in Malaysia. One of the subjects that was taught in KKQ classes is Tarannum al-Qur'an. In this research, the researcher found a few problems faced by students and teachers regarding the Tarannum subject. The issues and problems raised are teachers' propensity in using traditional approach in teaching which had caused a boring environment and inactive students. Other than that, learning time in the evening decreased the interest of students to concentrate on teaching and learning in the KKQ class. A research on Al-Qur'an teaching method in Sekolah Menengah Kebangsaan Negeri Perak by Sameri (2020) shows in high percentage of result for item, rhythm and voice in reciting Al-Qur'an are 67.5% (weak), 27.5% (moderate), and only 5% (good) and for item, ability to read Al-Qur'an with rhythm are 63.8% (weak), 20% (moderate) and 6.3% (good). From the result, it can be concluded that over half of the student did not have knowledge on Tarannum al-Qur'an and were unable to recite al-Qur'an with Tarannum.

Hanum et al. (2021) explains a programme that records the pattern of Tarannum melodies (derived from Quranic recitations) and gives the user feedback. The application uses a shape-based contour similarity algorithm to determine whether two verse outlines are comparable. First, however, a professional reciting Bayati tarannum records quranic words. Next, pitch sequences are used to pre-process the samples into segmented tarannum verse contours. Finally, the melodic patterns are trained using the k-Nearest Neighbor (kNN) classifier using 20 samples. The computation of the melodic verse-contour representation using mean, standard deviation, and slope data, together with the addition of a labelled Tilt-based contour, results in input vectors. The overall shape-based weighted score for the existing samples is 66%. A similarity score of up to 80% is used to classify some samples correctly. The research offers an alternate interactive learning experience for Tarannum learners and a first step toward comprehending the melodic patterns of Tarannum. The findings show that the programme offers a monotonous training experience and motivates users to polish their recitations to receive the most incredible score.

Latif et al. (2021) find out how young Malaysian qari and qariah improve their tarannum al-Quran technique through vocal training. The study employed semi-structured interviews to collect data for qualitative analysis.

The study included two volunteers from the Tangkak District of Johor. The collected data were transcribed, examined, and themes, subthemes, and a matrix table were created. The results demonstrated that the participants engaged in six different types of vocal training: (i) Self-consistency training, (ii) Vocal warm-up training, (iii) Tone training, (iv) Burdah training, (v) Vocal control method, and (vii) Choosing the appropriate taranum. The study creates a Young Qari Basic Vocal Training Method Model based on six components. The results showed that the participants had used various integrated voice training techniques to enhance the calibre of their recitation of the Quran. The outcome offers a preliminary assessment of the vocal strategies used by the young qari.

Mohamed Hefny et al. (2022) explore the roots and semantic differences of Quranic words with similar meanings and ascertain the role of derivation in teaching Quranic vocabulary. The research employed the descriptive-analytical approach to trace Quranic words with similar connotations and determine their derivation methods. The findings showed that the etymological origins of Quranic vocabulary with similar meanings can help greatly in clarifying the semantic features of the words. Similarly, the findings revealed that the morphological structures of words help to discover the meanings of Quranic words with similarity in linguistic origin and difference in structure. Therefore, derivation can be an effective means of determining the connotations of Quranic words, which can be useful in teaching Quranic vocabulary.

Novriadi and & Firmasari (2022) discuss the design and development process of a multimedia tool created to promote engagement in the study of tajweed by active learners. The introduction of Izhar Halqi of the Tajweed is the sole topic of this application. The study that was conducted with students ages 10 years old found that learners are able to recognize the izhar halqi's letter. The study found that the active interaction between learner and the application make the learning process more appealing and fun. Rosmani et al. (2022) to educate kids to recite the Al-Quran accurately and quickly, create the interactive multimedia application (i-IQRA). During the design and development of this interactive multimedia application, the principles of persuasive technology and multimedia design were modified. The learning process is supported by three different modules that make up I- IQRA: (i) Introduction to Arabic Characters, (ii) Reading Arabic Characters, and (iii) Quiz. The study offers an alternate method for convincing kids to learn Arabic characters utilising the Iqra Technique, according to the study's findings. Children can enhance their Al-Quran recitation skills with the help of this interactive multimedia application.

There is, however, no study conducted to explore the determinant of acceptance of Tarannum smart based learning application for teaching Qur'anic sentences (recitation) using innovation model, which this paper proposes to address.

a. ICT role in Teaching and Learning of al-Qur'an

As mentioned earlier, ICT plays a vital role in today's daily lives including in teaching and learning. People communicate in seconds with the use of mobile devices and other online of any digital means. The information is accessible over the internet to anyone, anywhere and at any time. As discovered by Kabir (2021), in addition to drastically changing billions of people's society, economy, and private lives, the digital era has also changed the communications industry. The internet, mobile phones, and other connected, innovative technology have spread quickly over the entire world. A study done by Zakaria et al. (2021)**,** the model of *Tarannum* Interactive Audiobook were developed as a new platform for learning *Tarannum*. This study had investigated the effectiveness of the audiobook among Muslims beginners that had no basis in *Tarannum* field. Meanwhile, a study from Alsharbi et al. (2021), this study had use the technology which is a simulator in reinforcing the learning system for non-native Arabic children. This study had improved the teaching experience that were meant for Quranic and Islamic education generally and specifically for the Non-Native Arabic speakers.

Whereby in The usage of ICT in Almajiri education in Nigeria appears to have an impact on students' ability to learn the Qur'an. The Arabic word "Almajiri" is the source of the name "Al muhajirun," which denotes a person who migrates from home in search of Islamic knowledge. Almajiri is a method of Islamic education that is implemented in northern Nigeria. This educational system is an integration of western education with the traditional Quranic School system that aims at strengthening the ability of the learners to read, write, and memorise the Qur'an in a conducive learning environment (Fahm et al., 2022)**.** The study from Lukman (2020)

and Kabir (2021) had found out that ICT and digitalization of the Qur'anic references plays a greater role as sources of knowledge as opposed to the traditional function of libraries or paper-based printed publications. The primary sources of delivering books, references, and reading materials. It can be concluded that in the previous studies, ICT plays an important role in the teaching and learning of the Qur'an education.

b. Research Model

The research design is shown in Figure 1, which was created using a modified Diffusion of Innovation Model (DOI) (Duan et al., 2010). The original DOI by Rogers et al. (2014) proposed five indicators, namely Relative Advantage, Compatibility, Complexity, Trialability, and Observability, which would forecast the acceptance of a specific innovation. The original DOI by Rogers et al. (2014) posited five predictors, namely Relative Advantage, Compatibility, Complexity, Trialability and Observability would predict the adoption of a certain innovation. Tribality is related the degree in which in innovation can be experimented. However, in the context of this study, the respondents only tested the Tarannum-SLA once, which might limit them from experimenting the application. Thus, this study discarded the predictor as it is less related to the context of this study.

DeLone & McLean (DM) model by Jeyaraj (2020), which consists of eight interconnected success factors, postulates that the ITU and the US will be significantly impacted by the Quality Dimensions (IQ, SQ, and SeQ). Personal Characteristics (Age, Gender, and VLE Experience) may also be a moderator in the link between the Quality Dimensions and ITU. The second level should see higher utilisation (U) of VLE as ITU rises. Similar to how the original U may impact future ITU, the US is a mediating factor. These U and US will cause some NB, further contributing to the rise of ITU (moderated by WL) and the US. Additionally, it is anticipated that the WL will moderate the interaction between ITU and U of VLE.

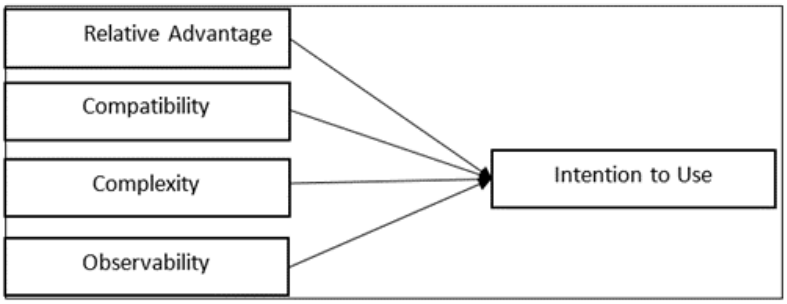


Figure 1: Research Model

c. Hypotheses

H1: Relative Advantage has a significant on Intention to Use Tarannum Smart Learning Application.

H2: Compatibility has a significant on Intention to Use Tarannum Smart Learning Application.

H3: Complexity has a significant on Intention to Use Tarannum Smart Learning Application.

H4: Observability has a significant on Intention to Use Tarannum Smart Learning Application.

RESEARCH METHODOLOGY

This study uses a cross-sectional quantitative design to examine the relationships between relative advantage, compatibility, complexity, observability and intention to use. A technology diffusion of technology questionnaire instrument adapted Omar and Ismail (2020) was used to collect study data. A total of 229 respondents among Quran instructors in Malaysia, were selected at simple random to answer the questionnaire administered online. The respondents of the study consisted of 82 (35.9%) male instructors and 147 female instructors (64.1%). The data of this study were analyzed using SmartPLS Statistical Package version 3.2.8 to obtain the descriptive and inferential analysis. The descriptive analysis in this study is to determine the level of technological constructs and intention to use. Inferential statistical analysis is also to obtain the value of the relationship between technology constructs and intention to use.

Data Analysis

The analysis began with the data preparation procedures. During the data collection period, 229 data were gathered. The data cleaning starts by examining outliers. Both univariate and multivariate outliers are possible. The current study detects uni-variate outliers based on replies from non-participants (Gaskin, 2017) and a z-score with a cutoff value of 3.29 Tabachnick et al. (2019). As a result, eight instances where the z-score was above the cutoff value and 20 inactive responses with a standard deviation (SD) of 0.00 were removed from the dataset. The Mahalanobis Distance approach, on the other hand, was used to analyse the multivariate outliers. It is a measure of the multivariate distance that can be assessed for each case using the chi-square (X2) distribution. When Mahalanobis Distance is used, the most frequent probability estimates for a case being an outlier are p 0.001 for the X2 value (Tabachnick et al., 2019). As seen in Table 1, 2 deletions were consequently done during the process. The distribution normality of the dataset was then checked.

For the distribution normality test in the current study, Skewness and Kurtosis, Kolmogorov-Smirnov, and Shapiro-Wilk were used. Data were initially analyzed with Skewness and Kurtosis, which revealed that they are roughly regularly distributed or fall within the range of ±2 (Verma & Abdel-Salam, 2019). However, Kolmogorov-Smirnov and Shapiro-further Wilk's investigation revealed that most of the significant values are below 0.05, indicating a breach of the normality assumption (Table 3). Because PLS-SEM can handle the standard error generated by the non-normality of the distribution, the non-normality of the data obtained for the study necessitates its use. The total data preparation process resulted in 199 reliable and valid cases for additional investigation.

Table 1: Test of Normality

Variable	Skewness	Kurtosis	Kolmogorov-Smirnov	Shapiro- Wilk
Relative Advantage	-0.205	-0.812	0.05	0.00
Compatibility	-0.204	-0.945	0.00	0.00
Complexity	-0.522	0.151	0.00	0.00
Observability	-0.381	-0.442	0.00	0.00
Intention to Use	-0.340	-0.694	0.00	0.00

Measurement Model Assessment

PLS-SEM analysis consists of two main stages. The first stage involves an investigation of measurement model. This procedure aims to assess construct reliability and validity. In this study, the construct reliability was assessed based Cronbach's Alpha (CA) and Composite Reliability (CR) values, with the suggested threshold value of 0.70 (Hair et al., 2021). In this study, the lowest construct reliability value is 0.896 each for CA and CR. This indicates a high level of internal consistency of all constructs in the proposed model. Next, the construct validity was assessed based on convergent and discriminant validity. The convergent validity is indicated by two indicators, namely outer loading and Average Variance Extracted (AVE). Initial consistent PLS-Algorithm analysis indicated that three indictors for Complexity: (CLEX2, 0.573), (CLEX3, 0.655), and (CLEX4, -0.154) demonstrated the factor loading values below the threshold. To solve the issue, all three indicators were removed, leaving the Complexity as a single item construct. The other constructs achieved as all the factor loadings and AVE values exceeded 0.708 and 0.500 respectively. In this study, these criteria are achieved as all the outer loadings and AVE values exceeded 0.708 and 0.50 respectively (Hair et al., 2021). Table 2 summarize the study's convergent validity and construct reliability analysis.

Table 2: The Summary of Construct Reliability and Convergent Validity Analyses

Construct	Indicator	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE	Construct Reliability	Convergent Validity
Relative Advantage	ADV1	0.795	0.879	0.880	0.648	Achieved	Achieved
	ADV2	0.869					
	ADV3	0.823					
	ADV4	0.728					
Compatibility	COMP1	0.858	0.904	0.904	0.703	Achieved	Achieved
	COMP2	0.826					
	COMP3	0.762					
	COMP4	0.901					
Complexity	CLEX1	1.000	1.000	1.000	1.000	Achieved	Achieved
Observability	OBSR1	0.814	0.876	0.877	0.703	Achieved	Achieved

	OBSR2	0.840					
	OBSR3	0.862					
Intention to Use	ITA1	0.886	0.89	0.89	0.73	Achieved	Achieved
	ITA2	0.808					
	ITA3	0.868					

The discriminant validity evaluation, which was analysed based on cross-loading, is a step to demonstrate construct validity and is distinct from the others. Examining the cross-loading, Fornell-Larker criterion, and Heterotrait Monotrait Ratio (HTMT) can be used to perform this approach. Since all indicator loadings are more significant than the corresponding cross-loading values, this study met the first criterion (Hair et al., 2021). With the square root of AVE (AVE), which is somewhat lower than the values of the related constructs, the Fornell-Larker criterion showed that the constructs of intention to use and observability failed to meet the prerequisites, as shown in Table 3.

Table 3: Fornell-Larker Criterion

	Compatibility	Complexity	Intention to Use	Observability	Relative Advantage
Compatibility	0.838				
Complexity	0.287	1			
Intention to Use	0.728	0.207	0.855		
Observability	0.759	0.278	0.907	0.839	
Relative Advantage	0.824	0.323	0.805	0.846	0.805

The third and last step to achieve discriminant validity is via HTMT analysis. As shown by Table 4, all the constructs in this study attained the value below the cut-off of 1.0 as suggested by (Sharma et al., 2021). Therefore, overall, it can be assumed the discriminant validity is accomplished. This has wrap up the measurement model analysis, and the entire constructs as well as their items are appropriate for structural model analysis.

Table 4: Heterotrait Monotrait Ratio

	Compatibility	**Complexity**	**Intention to Use**	**Observability**
Compatibility				
Complexity	0.287			
Intention to Use	0.729	0.208		
Observability	0.758	0.278	0.907	
Relative Advantage	0.825	0.323	0.807	0.847

c. Structural Model

The structural model analysis started by examining the existence of multicollinearity issue. This is done by acquiring the Variance Inflation Factor (VIF) from the PLS algorithm. The threshold for this analysis is 10 (Sharma et al., 2017), and the VIF values in this investigation (min=1.000; max=3.902) are acceptable. There is no multicollinearity, and it can therefore be assumed (Barbosa de Sousa, 2020; Sharma et al., 2021). Additionally, using 5,000 samples and 199 instances, this study performed the conventional bootstrapping approach to determine the relevance of the path coefficient (Hair et al., 2021). The outcomes of the direct relationship-ship hypothesis testing are shown in Table 5 and Figure 2.

Table 5: The Summary of Construct Reliability and Convergent Validity Analyses

	Hypotheses	**Path Coefficient**	**t Value**	**p Value**	**Sig.**	**f^2**
H1	Relative Advantage >> Intention to Use	0.116	0.709	0.479	NS	0.016
H2	Compatibility >> Intention to Use	0.057	0.576	0.565	NS	0.006
H3	Complexity >> Intention to Use	-0.065	1.323	0.186	NS	0.023
H4	Observability >> Intention to Use	0.784	5.648	0.000	***	1.001

**p < 0.05, ***p< 0.01, NS=Not Significant

Based on the path analysis, it was discovered that the Intention to Use Tarannum Smart Learning Application is not influenced by its Relative Advantage (β=0.116, t=0.709, p=0.479), Compatibility (β=0.057, t=0.576, p=0.565), and Complexity (β=-0.065, t=1.323, p=0.186). Thus, hypotheses H1, H2 and H3 are returned. On the contrary, only hypothesis H4 is supported as the postulated relationship between Observability and Intention to Use is significant (β=0.784, t=5.648, p=0.000).

Next, the Coefficient of Determination (R^2) was examined based on the threshold values of 0.25 as weak, 0.50 as moderate, and 0.75 as high (Hair et al., 2021; Sharma et al., 2021). As shown by Fig 2, the combination of Relative Advantage, Compatibility, Complexity, and Observability explains 83.3% of variance in Intention to Use. Therefore, the research model is assumed to have a very good predictive accuracy as the endogenous variable; Intention to Use (0.833) achieved high R^2 value. Moreover, the f^2 effect size was assessed, guided by the following guideline; 0.02 (small), 0.15 (medium) and 0.35 (large) (Frey, 2022). In results, it can be seen in Table VI that all the non-significant factors have small f^2 effect sizes: Compatibility (0.006), Complexity (0.023), and Relative Advantage (0.016). On the contrary, the only significant factor: Observability (1.001) demonstrates the large f^2 effect size.

Later, this study proceeded the analysis by investigating the Stone-Geisser's Q^2, which is related the model's predictive relevance. Any Q^2 value that is above zero is considered as having certain extent of exogenous variable's capability to predict endogenous variable (Sarstedt et al., 2021). Accordingly, the guideline for interpretation is 0.25, 0.50 and 0.75 respectively for small, medium and large (Hair et al., 2021). This study achieved a substantial quality predictive relevance as Intention (0.525) attained moderate yet close to high Q^2 values. Lastly, the q^2 effect sizes were manually calculated. As can be seen in Table 5, the entire non-significant factors (Relative Advantage, Compatibility, and Complexity) demonstrate the small and weak q^2 effect sizes in producing Q^2 of Intention to Use compared to the Observability, which is relatively large.

Table 6: The Model's Predictive Relevance Result

	qin	qex	q2	Effect size
Relative Advantage	0.525	0.514	0.023158	small
Compatibility	0.525	0.52	0.010526	small
Complexity	0.525	0.524	0.002105	small
Observability	0.525	0.42	0.221053	large

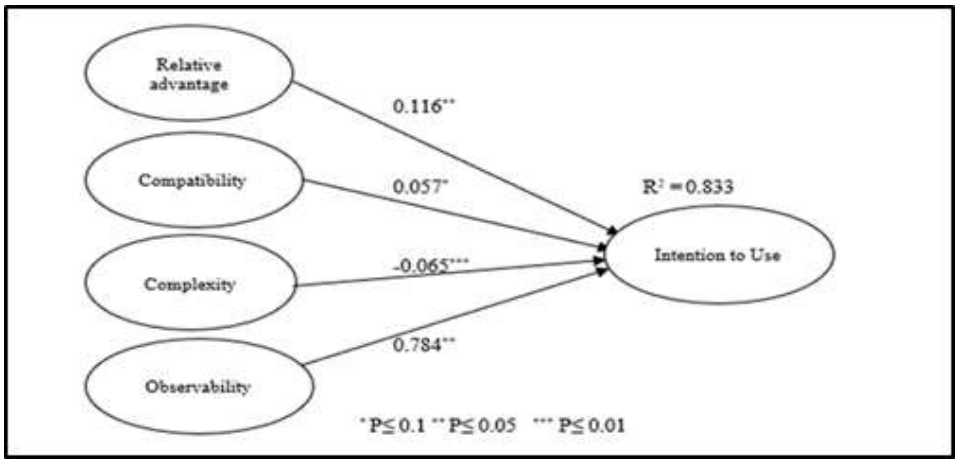


Figure 2: The Structural Model

CONCLUSION

The researchers encountered a few significant limitations when conducting their investigation. First off, the results of the survey detailed in the current study cannot be directly generalized to other countries because it was only done in the Kuala Krai area of Kelantan. Second, the model is limited to specific theoretical-founded components of the invention diffusion model. Finally, when examining the research model for future studies, effects (such as gender, age, dialect, regions, availability of the Internet, and awareness) will be taken into account, given that numerous studies have shown that user adoption of innovative and recent technologies is significantly related to their unique characteristics (Al-Husamiyah & Al-Bashayreh, 2022). This concept might also be explored with individuals from different nations. Previous studies have demonstrated that based on cultural similarities and differences, user adoption patterns may be highly related. This methodology might also be used to analyse user acceptance in other IT applications, such as smart buildings and smart cities, allowing it to be more broadly applicable in the IT industry. This model can also be explored with additional variables influencing how well Tarannum's smart-based learning programme is received. In conclusion, understanding the acceptance of Tarannum Smart Learning Application by using Diffusion of Innovation Model in order to enhance the use of ICT in the Tarannum learning is not a trivial task. Religious texts typically contain a great deal of hidden knowledge and have an odd, occasionally perplexing manner of narrative. Many non-Arab natives, including those in Malaysia, have trouble using innovative technology-based learning applications to memorize Quranic verses. This is primarily because they must know the applications' respective advantages and difficulties. So, to assist primary school teachers in Malaysia in teaching and learning Qur'anic recitation, this study has developed a new pedagogical approach. While learning to recite the Quran, the suggested model would aid in improving learners' abilities, attitudes, motivation, grades, and knowledge.

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