An Analysis of the Determining Factors of Mobile Banking Adoption in Islamic Banks

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Abstract. This research is conducted to investigate the factors that influence the attitudes and perceptions of digital natives in using mobile banking and artificial intelligence (AI)-enabled mobile banking. Partial least squares were applied to examine the differential effects of technology-based (i.e. attitudes toward AI, relative advantage, trust, security in specific mobile banking activities), non-technology based (i.e. the need for service, quality of service) and religiosity. This study utilizes 339 digital native respondents. The questionnaire distributed to Islamic banking customers in three cities in Aceh Province, Indonesia. The study results the perceived trust construct, and the security in specific mobile banking activities is the major determinant of mobile banking adoption intention and also indicates a divide in how digital natives perceive the perceived trust between two dependent variables. Then the relative advantage construct has the most impact on mobile banking usage. However, the relative advantage was not significant for AI-enabled mobile banking. For managerial practices, this study provides guidelines for Islamic bank management to improve the trust, security and relative advantage of their mobile banking services as a strategy for developing the sustainability of the business.

1. Introduction
Islamic banking has adopted technology-based services, including ATM, phone banking, internet banking, and most recently mobile banking. Through the mobile banking service platform, users may get real-time information from their accounts and pay for transactions from anywhere and anytime. Indirectly the application of this technology has been able to increase the number of transactions, efficiency and reduce operating costs and is considered an economical way to obtain a competitive advantage in the financial market. Currently, the banking industry is beginning to offer mobile banking services that use artificial intelligence and algorithmic-based service interactions [1]. Examples of these services include chatbots that are integrated with artificial intelligence systems. Chatbots are designed to interact and assist customers in completing routine transactions by simulating conversations, whether in an auditory or textual format. Other artificial intelligence mobile banking services include bill payments, account management, personalized investment advice, and fraud detection management [2].

The findings and results of previous studies indicate that digital native consumers are more likely to become early adopters of technology and prefer to use mobile banking platforms to meet their banking needs [1]. Therefore, they are almost certainly more likely to use mobile banking than using traditional banking services. Meanwhile, the increasing number of banks offering similar services has created intense competition [2]. Thus, looking for strategies to encourage consumers to adopt them is very important for every bank. More specifically, this problem is very important for Islamic banks, which are newcomers and are considered less experienced than conventional banks [3]. It is not denied that the
banking industry must see from two parties, namely the industry itself and the customers, where the industry has presented technology-based services, while the customer side is still lacking in the adoption of these technology services. Thus, it needs further research on how a technology that has been provided by the industry can be adopted by customers, especially industries that are still rarely studied, namely the use of mobile banking and artificial intelligence-enabled mobile banking service in the sharia banks.

1.1 Need for service (NFS)
The need for services refers to the perception of an individual's need to interact with bank employees at any point along the customer's path to transact. [4] suggests that people with a higher need to interact with bank employees' direct services (not users of SST) are not motivated to use self-service technology (SST), such as mobile banking. In general, it can be seen that the need for services coupled with the perception of independent service technology (SST) attributes (trust, risk, accuracy) is the main determinant of whether consumers will use self-service technology (SST) or not [5].

H1a. The need for service negatively impacts mobile banking usage
H1b. The need for service negatively impacts the usage of AI mobile banking

1.2 Quality of service (QOS)
Quality of service refers to customers’ perceptions about their interpersonal interactions with bank employees. Highly influenced by human interactions. The self-service technology literature (SST) shows that customers who experience heightened social and personal experience may not see the benefit of switching to self-service technology (SST) [6]. However, digital native groups have limited interpersonal interaction with bank employees, so they tend to look for mobile banking services [7]. Also, digital natives groups are accustomed to using smartphones to maintain their relationships.

H2a. Service quality negatively impacts mobile banking usage
H2b. Service quality negatively impacts the usage of AI mobile banking

1.3 Attitudes toward AI (ATA)
The digital natives are accustomed to and expect cloud-based services and who are capable of finding information quickly [8]. The artificial intelligence services can expand digital natives expectations to be able to independently process real-time information related to their financial affairs [8]. Previous research has shown that digital natives enjoy the use of new technologies [9]. As a result, digital natives tend to have a positive attitude toward artificial intelligence.

H3a. Attitudes toward artificial intelligence positively impact mobile banking usage
H3b. Attitudes toward artificial intelligence positively impact the usage of AI mobile banking

1.4 Relative advantage (RA)
The relative advantage is one of the dimensions of diffusion of innovation most widely studied in the mobile banking service literature, because of its ability to predict mobile banking services adoption and usage. The researchers observed that the greater the relative advantage, the greater the potential use of mobile banking services [10]. [11] argues that when customers see or feel excellence and advantages (for example time savings, convenience, and accuracy), then mobile banking services will be the preferred banking method.

H4a. The relative advantage positively impacts mobile banking usage
H4b. The relative advantage positively impacts the usage of AI mobile banking

1.5 Security in specific mobile banking activities (SIM)
The security perception refers to the customer's reaction to perceived online security threats, such as their personal information being hacked. In general, research on mobile banking services has consistently shown that a decrease in security in mobile banking services can lead to lower trust and ultimately, decreased intention to use these banking channels [12]. The digital native may perceive a greater risk when using the application to transfer funds than to check an account balance [13].
H5a. Security in mobile banking positively impacts mobile banking usage
H5b. The relative advantage positively impacts the usage of AI mobile banking

1.6 Perceived trust (TIM)
Concluded that the customer’s assessment of trust in the context of safety and security reduces uncertainty, which in turn promotes mobile banking usage [14]. For example, research indicates that initial trust requires more monitoring of the bank’s actions by customers [15]. However, as customers are increasingly familiar with the mobile banking service application features, trust in bank competencies can increase and customers may be more willing to share personal information, and that is a very important behaviour for e-commerce adoption [16].
H6a. Trust positively impacts mobile banking usage
H6b. Trust positively impacts the usage of AI mobile banking

1.7 Religiosity (REL)
Religiosity is a commitment from someone to their beliefs that can influence attitudes and behaviour [17]. Religiosity-Intention Model assumes that religiosity is an important point of customer satisfaction and behavioural intentions towards a product or service. In Islamic banking services, [18] argue that religiosity is the main determinant of the use of Islamic banking services.
H7a. Religiosity positively impacts mobile banking usage
H7b. Religiosity positively impacts the usage of AI mobile banking

2. Method
Data were collected from 339 digital natives using a questionnaire distributed by using Google's Form to Islamic banks customers in three cities in Aceh Province, Indonesia, namely, Banda Aceh, Langsa and Lhokseumawe. The time used in this study was from December 2019 to January 2020. Then the research process is carried out based on five procedures, which include literature review, questionnaire development, survey, conducting analysis with PLS tools (warp PLS 6.0) and finally producing findings. The sample used was respondents consisting of women (55.8%), and men (44.2%) with the majority (67.8%) at the age of 18-24 years. Then (32.2%) at the age of 25-39 with a majority final education Bachelor/Diploma degree. All independent variables are measured on a 5-point Likert scale, from "strongly disagree" to "strongly agree". Whereas the dependent variable mobile banking usage is measured on a 5-point Likert scale, from "never" to "very often" and AI service measured on a 5-point Likert scale, from "strongly disagree" to "strongly agree".

3. Results and Discussion
Evaluation of measurement models in this study was carried out through three criteria; convergent validity (AVE> 0.5 and Loadings> 0.6) [19], discriminant validity (CR> 0.60) [19] and composite reliability (CR, CA> 60) [19]. This study has values (AVE> 0.5 and Loadings > 0.6), and CR > 0.60), thus indicating that convergent validity, discriminant validity and reliability have been fulfilled. Evaluation of the structural model using the criteria (APC and ARS R² <0.05) and (AVIF <5) [20]. In this study, it was found that the values (APC = 0.138, P = 0.003), (ARS R² = 0.561, P = <0.001) and (AVIF = 3.351, <5). Based on these criteria, the model fit has also been met. Overall all independent variables used have been able to explain both the dependent models by 56% (See table 1).

| Table 1. Loadings factor |
|-------------------------|------------------|
| **Constructs and Items** | **Loadings**     |
| Need for service (NFS)  |                  |
| I hope that Islamic bank employees provide me with personal service | 0.797 |
| I hope that employees of Islamic banks call me by name | 0.789 |
| I hope that the employees of Islamic banks provide me with a friendly service | 0.879 |
| Attitudes | Description                                                                                     | Score |
|-----------|------------------------------------------------------------------------------------------------|-------|
| I hope that the employees of Islamic banks are friendly | 0.833 |
| I hope that I receive personal attention                | 0.806 |
| **Quality of service (QOS)**                            |       |
| Overall, Islamic banks provide good service to me       | 0.758 |
| Employees of Islamic banks provide good service by socializing with me | 0.831 |
| Islamic bank employees provide good service by making personal contact with me | 0.676 |
| Islamic bank employees provide good service by giving me special attention | 0.687 |
| Islamic bank employees provide good service by calling me by name | 0.803 |
| Employees of Islamic banks provide me with a friendly service | 0.860 |
| Sharia bank employees provide fast service              | 0.840 |
| Islamic bank employees give good attention every time there are complaints | 0.830 |
| Islamic banks have used modern equipment in serving customers | 0.783 |
| **Attitudes toward AI (ATA)**                           |       |
| I want to use artificial intelligence service technology | 0.776 |
| I think artificial intelligence service technology is important | 0.803 |
| I am confident that I can use artificial intelligence technology | 0.846 |
| Artificial intelligence service technology does not "intimidate" me | 0.831 |
| I have used artificial intelligence service technology  | 0.811 |
| **Relative advantage (RA)**                             |       |
| With mobile banking, I can access various banking services | 0.792 |
| Mobile banking provides information that customers need  | 0.808 |
| Mobile banking has greater control for managing personal finances | 0.827 |
| Mobile banking provides convenience                      | 0.852 |
| Mobile banking is an important access for my account     | 0.839 |
| I can access mobile banking services from anywhere and anytime | 0.843 |
| **Security in specific mobile banking activities (SIM)**  |       |
| I feel safe checking my account balance                  | 0.836 |
| I feel safe managing my account                           | 0.863 |
| I feel safe transferring                                  | 0.849 |
| I feel safe making a check deposit                        | 0.760 |
| I feel safe paying bills                                  | 0.851 |
| **Perceived trust in mobile banking (TIM)**               |       |
| My financial information in mobile banking is protected  | 0.835 |
| I believe mobile banking is safe                          | 0.879 |
| I believe mobile banking is difficult to hack             | 0.809 |
| I believe financial data in mobile banking is kept confidential | 0.828 |
| Overall, mobile banking can be trusted                    | 0.855 |
| **Religiosity (REL)**                                    |       |
| I always carry out the obligatory prayer 5 times          | 0.696 |
| I always fast during the month of Ramadan                 | 0.776 |
| I always pay zakat                                        | 0.772 |
| I always avoid sin                                        | 0.758 |
| I teach my family members about all the greatness of Allah SWT | 0.823 |
| I always keep myself from ill-gotten income               | 0.755 |
| I always read the Qur’an regularly                        | 0.682 |
| I fought for worldly affairs and the hereafter as suggested by the Prophet Muhammad | 0.815 |
| I avoid behavior that will punish me in the hereafter      | 0.755 |
I must try to be humble, to be following the nature of the Prophet Muhammad

Mobile banking usage (MU)
How often do you use mobile banking services? 0.909
How likely are you to use mobile banking in the future? 0.909

Mobile banking AI usage (MAU)
I feel that artificial intelligence mobile banking service is convenient to pay bills 0.854
I feel the mobile intelligence service is AI-convenient for having conversations about my account 0.833
I feel comfortable using AI for managing my accounts 0.869
I feel comfortable using AI for making deposits 0.898
I feel comfortable using for getting personalized investment advice 0.831
I feel comfortable using AI for getting personalized spending advice 0.863
Overall comfort banking with AI 0.884

Notes: * All are Sig at P< 0.001

Table 2. Hypothesis testing

| Path | Coefficients | P-Values |
|------|--------------|----------|
| H1a Need for service (NFS) → MU (Y1) | -0.063 | 0.122 |
| H1b Need for service (NFS) → MAU (Y2) | 0.031 | 0.282 |
| H2a Quality of service (QOS) → MU (Y1) | 0.030 | 0.288 |
| H2b Quality of service (QOS) → MAU (Y2) | 0.169 | <0.001 |
| H3a Atitudes toward AI (ATA) → MU (Y1) | 0.109 | 0.021 |
| H3b Atitudes toward AI (ATA) → MAU (Y2) | 0.262 | <0.001 |
| H4a Relative advantage (RA) → MU (Y1) | 0.220 | <0.001 |
| H4b Relative advantage (RA) → MAU (Y2) | -0.038 | 0.239 |
| H5a Security in specific... (SIM) → MU (Y1) | 0.137 | 0.005 |
| H5b Security in specific... (SIM) → MAU (Y2) | 0.284 | <0.001 |
| H6a Perceived trust (TIM) → MU (Y1) | 0.158 | 0.002 |
| H6b Perceived trust (TIM) → MAU (Y2) | 0.279 | <0.001 |
| H7a Religiosity (REL) → MU (Y1) | 0.062 | 0.124 |
| H7b Religiosity (REL) → MAU (Y2) | 0.083 | 0.062 |

The relative advantage, perceived trust, security in specific mobile banking activities has significant effect on the mobile banking usage model (coefficient values; H4a = 0.220, H6a 0.158 and H5a 0.137 and P-value <0.5). While the need for service (more personal service needs), quality of service, attitudes toward AI and religiosity has a negative effect on mobile banking usage model (coefficient values; H1a = -0.063, H2a = -0.030, H3a = 0.109, H7a = 0.062 and P-value > 0.5). Thus H1a, H2a, H4a, H5a H6a is are accepted. Then in the model of use AI mobile banking services, it is known that the construct security, perceived trust, attitudes toward AI and quality of service has significant effect (coefficient values; H5b = 0.284, H6b = 0.279, H3b = 0.262 and H2b = 0.169 and P-value <0.5). While the construct of the need for services, relative advantage, religiosity has a negative effect (coefficient values; H1b = 0.031, H4a = -0.038, H7b = 0.083 and H7a = 0.062 and P-value > 0.5). Thus H1b, H3b, H5b and H6b is are accepted (See figure 1).
Conclusion
The dominant factors influencing digital natives to use mobile banking services are relative advantage, perceived trust and security in mobile banking. Variables need for service, quality of service, attitudes toward AI and religiosity have a negative effect. The findings on the need for service and service quality are consistent with previous research [21], which shows that the need for services does not affect digital natives to use mobile banking services, but the findings on attitudes toward AI and religiosity are inversely proportional to the hypotheses we have proposed, research furthermore it seems very necessary to understand the phenomenon. Then move on to the factors that influence digital natives to use AI mobile banking services are construct security in mobile banking, perceived trust, attitudes toward AI and quality of service has a significant effect. But the construct of the need for services, relative advantage, religiosity has a negative effect. The findings on construct, perceived trust, attitudes toward AI and quality of service are consistent with research conducted by [21], but findings on the construct of the need for services, relative advantage and religiosity are contrary to the direction of the hypothesis that we have proposed. From a managerial perspective, customer trust in services in the digital era, today is very closely related to the level of security offered. We suggest that to increase customer confidence, banks need to make periodic security improvements to mobile banking and AI services. In the construct of perceived trust, we found 12 out of 339 respondents disagree with the item "I believe mobile banking is difficult to hack". Although the number seems small, it should not be underestimated. Furthermore, banks must focus on the relative advantage of using mobile banking services (anytime and anywhere). At present, the use of mobile banking is still not optimal. Although the digital natives are quite active in the activities of transferring money between accounts and checking their account balances. Going forward, artificial intelligence technology in mobile banking will be increasingly complex. To use AI services, customers will need a deeper level of understanding of how AI service systems operate.

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