



## Measuring Central Bank's Policy Effectiveness in Affecting Intention to Use New Payment Platform During The COVID-19 Pandemic

WISHNU BADRAWANI<sup>a\*</sup>

<sup>a</sup>*Department of Economics, University of Birmingham, United Kingdom*

### ABSTRACT

This study evaluates the effectiveness of central bank policy in influencing intention to use a new payment platform, QRIS (Quick Response code Indonesian Standard). The evaluation is hindered by the contemporaneous emergence of the COVID-19 pandemic, which acts as a confounding factor in adopting the new payment instrument. To disentangle the effect of those variables, we collected data from 617 respondents consisting of customers and merchants, employed a structural equation model with SmartPLS, asses fourteen hypotheses with demographic factors included as moderating factors. The result of the study successfully disentangles the policy impact from the pandemic impact and separates the risk of a pandemic from common risks. We verify that the pandemic and government intervention had significant direct and indirect effects on the intention to use QRIS, with the habit being the most influential component, outperforming other technology adoption determinants. This study, therefore, contributes to the advancement of the literature on the topic of technology adoption and government intervention and suggests that this measuring approach can be used as a complementary instrument to assess the impact of central bank policy on the public.

**JEL Classification:** E58, M38, H10

**Keywords:** Payment instrument; Central bank's policy; COVID-19 pandemic; Behaviour analysis; Policy impact, QRIS (Quick Response code Indonesian Standard)

---

*Article history:*

Received: 27 June 2022

Accepted: 8 December 2022

---

---

\* Corresponding author: Email: [wx829@bham.ac.uk](mailto:wx829@bham.ac.uk)

DOI: <http://doi.org/10.47836/ijeam.16.3.04>

© International Journal of Economics and Management. ISSN 1823-836X. e-ISSN 2600-9390.

## INTRODUCTION

Measuring policy impact is critical for an organisation; it helps increase stakeholder and public awareness of its relevance (OECD, 2015). Furthermore, policy impact evaluation helps an organisation determine whether or not it is accomplishing its long-term objectives and goals, as well as identify and utilise its most valuable resources. One way of studying the impact of regulatory policy is by examining behavioural changes in the audience; see, for example, Coglianese (2012). In addition to its primary role as a monetary authority, Bank Indonesia is mandated by the Indonesian constitution to implement macroprudential and payment system policies. The impact of a macroprudential policy has been studied extensively; for example, see Tressel and Zhang (2016). However, research on payment system policies is surprisingly limited, in terms of understanding their transmission channels and evaluating their effectiveness, as Gogoski (2012) mentioned.

In late 2019, Bank Indonesia introduced the QRIS, a nationwide standard for quick response codes in the payment system. QRIS refers to an advanced QR pattern for payments that allows contactless transactions and interoperability among electronic money and mobile banking providers. Previously, consumers had to subscribe to multiple payment service providers and platforms to settle their online transactions; merchants had to apply multiple QR codes from various service providers and install multiple cashless payment infrastructures, such as an electronic data capture (EDC) machine or an electronic funds transfer at the point of sale (EFTPOS) terminal, to be able to accept cashless payments. QRIS aimed to integrate various distinct payment instruments into a single and efficient platform that allows the settlement of all online transactions.

Therefore, evaluation of the QRIS policy's impact on people's behaviour in adopting this new platform which subsequently will increase non-cash transactions, is vital. However, policy impact evaluation is a challenging task as, concurrently with the introduction of QRIS, the COVID-19 pandemic emerged and brought containments and restricted economic activities; therefore, it is difficult to separate the effect of central bank policy from the impact of the pandemic. People were encouraged to spend more time at home during the pandemic due to government-enforced lockdowns, avoiding shopping and dining in crowded spaces. Cashless payments were promoted to limit the risk of infection (WHO, 2020), despite the fact that these payment instruments are still not widely available in many countries (Auer et al., 2020). As a result, the usage of fintech products and services, such as digital payments and remittances, increased significantly during the COVID-19 pandemic (Rowan et al., 2021) and is often higher in countries with more stringent COVID-19 containment measures.

The effect of the Covid-19 pandemic on people's intention to adopt new technology, such as the digital wallet and mobile payment, has been studied, e.g. Aji et al. (2020) and Zhao and Bacao (2021). Previous research has emphasised the impact of government policies on people's intentions to use new technologies. For example, Chong et al. (2010) discovered that government endorsement, such as a clear regulation, substantially influences the intention to use internet banking; and government support significantly impacts farmers to adopt new technology initiated by the government (Mandari et al., 2017). However, to the best of our knowledge, no previous study has evaluated and distinguished the influence of government (central bank) policy and the Covid-19 pandemic on people's behavioural intention in using a new payment instrument, particularly in the Asian country region.

Accordingly, this research aims to conduct an empirical examination of the effectiveness of Bank Indonesia's policy in influencing people's behaviour intention toward the adoption of QRIS in the context of the COVID-19 pandemic. Policy effectiveness refers to the degree to which QRIS impacted the targeted behaviour, as in Coglianese (2012), and is measured using a novel model of the Unified Theory of Acceptance and Use of Technology (UTAUT2) proposed by Venkatesh et al. (2012).

The novelty in this paper is that new additional latent variables are introduced, namely force majeure (FM), perceived government intervention or law enforcement (LE) and perceived risk (PR), which allow the model to disentangle central bank policy effect from the impact of the pandemic. Second, the extension of the UTAUT2 model and the specific interest of the study will be considered the novel contribution of this research. Therefore, this study provides an alternative method for policy evaluation for central banks or government institutions, as well as input for players in the payment system industry to focus on the elements that will increase the adoption of new payment instruments.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### QRIS (Quick Response Code Indonesian Standard)

As part of the Indonesian payment system blueprint, Bank Indonesia and the payment system association developed a standardised QR code for all payment service providers in Indonesia called QRIS. It aims to promote interoperability and enhance efficiency by allowing individuals to transfer funds to their counterparts who use different payment services (Bank Indonesia, 2019). In addition, QRIS enables contactless payment among server-based e-money or digital wallets and mobile banking from diverse providers. Accordingly, QRIS refers to a QR code payment standard for Indonesian payment instruments that allows a user of one payment service to transfer funds to their counterpart who uses a different payment service provider. The central bank also implemented a stringent licensing procedure for QRIS membership, requiring a recommendation from the standard agency, followed by surveillance and sanction imposition. Despite a few cases of the ineffectiveness of QRIS implementation among merchants, six million subscribers were registered in 2020 throughout 34 provinces and 480 districts, connecting users of 50 digital wallets and more than 20 mobile banking brands throughout the country (Indonesia, 2020).

According to Donovan (2012), mobile banking or digital wallets have a number of advantages over card payment (debit and credit cards or electronic money) and cash, including being significantly more cost-effective, safer, and convenient and increasing financial access for the underprivileged. Regardless of its merits, Camner (2013) argued that a segregated and isolated payment environment is unlikely to sustain significant usage and may even result in a monopolistic market. This finding is corroborated by Banda et al. (2015), who reveals that high concentration levels in a specific industry may lessen the incentive to innovate and lead to high prices. Consequently, the authority must promote fair competition that stimulates innovation and examine the likelihood of anticompetitive conduct that results in economic inefficiency (Macmillan et al., 2016), which supports the QRIS initiative. Additionally, this type of initiation is often included in the responsibilities of a central bank; for example, see, Khiaonarong (2003).

### COVID-19 and Transaction Behaviour

Since the World Health Organization (WHO) declared COVID-19 a worldwide pandemic in March 2020, it has had a devastating impact on people's lives, livelihoods, and the global economy, as it can be transmitted directly or indirectly through contact with infected individuals or contaminated objects or surfaces (WHO, 2020). As a result, many governments have responded by introducing social distancing regulations, temporary workplace and school closures, and social lockdowns to combat COVID-19's harmful health consequences.

These containment policies severely impacted society and shifted consumer behaviour. People were consequently forced to spend more time at home, could not directly contact coworkers, and do more online. As a result, demand for digital financial services and mobile money surged (Agur et al., 2020), whereas demand for conventional currency decreased (Cevik, 2020). In this regard, the shifting of consumer behaviour in response to COVID-19 has boosted the growth of contactless instruments like mobile payment and digital wallets while limiting COVID-19 transmission (Pal and Bhadada, 2020).

In Indonesia, the government has encouraged businesses, food vendors, transportation providers, and traditional marketplaces to use non-cash transactions (Bank Indonesia, 2021). Additionally, the central bank has initiated a programme to accelerate the transition to a cashless economy and to foster interoperability of contactless payment instruments (i.e., e-wallet and mobile payment) between the fintech industry and banking by establishing the QRIS, as recommended by the Bank for International, see Borio et al. (2020).

Several econometric techniques have been used to study policy impact analysis in economics utilising secondary data, such as the time series analysis (Sharma et al., 2018; Gortz et al., 2020) or difference-in-differences method (Lechner et al., 2011; Fredriksson and Oliveira, 2019). However, the emergence of the pandemic has made it difficult for researchers to evaluate the impact of policies that were introduced contemporaneously near the starting period of the pandemic. Therefore, to avoid this difficulty, we examine people's behaviour in adopting QRIS considering the central bank's intervention and the Covid-19 pandemic using the UTAUT2 model developed by Venkatesh et al. (2012), which is capable of separating policy from the pandemic.

## Research framework

The objective of the study is to examine the perception of users towards the use of QRIS, especially during the Covid-19 pandemic period with the involvement of the central bank. Considering the initiation and introduction of the QRIS are closely related to technology and innovation, this study adopts the Extended Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2012), one of the most popular theories of information technology acceptance with vigorous empirical validation in many countries; for example, see Taherdoost (2018) and Williams et al. (2015).

We broaden the UTAUT2 model to account for the impact of the COVID-19 pandemic and the central bank policy on people's behaviour towards adopting the new payment platform QRIS. We also include variable perceived risk (PR) to distinguish risks associated with the COVID-19 pandemic from common risks related to the introduction of new technology. The conventional UTAUT2 constructs were combined with new latent variables, including perceived risks (PR), the COVID-19 pandemic or other unprecedented events referred to as force majeure (FM), and perceived government (central bank) policy referred to as law enforcement (LE).

### Performance Expectation (PE)

The term Performance Expectation refers to the extent to which users anticipate that adopting new technology would enable them to perform their jobs more effectively (Venkatesh et al., 2003). PE has been shown empirically to be a significant predictor of behavioural intention to adopt new mobile payment technologies (Morosan and DeFranco, 2016; de Sena Abrahão et al., 2016), particularly for organisational users (Venkatesh et al., 2012).

Additionally, its significance in influencing the intention to adopt new technology, such as a digital wallet or mobile payment, also appeared during the COVID-19 pandemic, e.g., Aji et al. (2020) and Zhao and Bacao (2021). A rise in PE influences users' behaviour intention, ultimately increasing the new technology's acceptability; therefore, the following hypotheses were formed:

*H1: Performance expectancy (PE) positively affects behavioural intention (BI) to use QRIS.*

### Effort Expectancy (EE)

Effort Expectancy refers to the easiness level associated with individuals operating the new technology (Venkatesh et al., 2003). EE approximates the perceived ease of use in the technology acceptance model (TAM) proposed by Davis (1989) or the adverse value of complexity in innovation diffusion theory (IDT) proposed by Rogers (1983), which both explain people's belief that using a given technology will be effortless. This variable has been consistently publicised as a critical predictor in explaining intention behaviour, see Venkatesh et al. (2016). According to Aydin and Burnaz (2016), ease of use appears to be the most significant predictor of consumers' mobile wallet usage. This variable is moderated by age so that the effects were significantly different between all generations except GenX and GenY (Magsamen-Conrad et al., 2015). As a result, we hypothesised as follows:

*H2: Effort expectancy (EE) positively affects behavioural intention (BI) to use QRIS.*

### Social Influence (SI)

Venkatesh et al. (2003) defined Social Influence as the extent to which users believe that people surrounding them think they should use new technology. According to the theory of reasoned action (TRA) (Fishbein et al., 1980) and the theory of planned behaviour (TPB) proposed by Ajzen (1985), it is represented as a Subjective Norm (SN) and has been empirically shown to have a direct influence on behavioural intention (Venkatesh et al., 2012). Social influence or subjective norms were also found to have a direct effect in affecting people's intention to use near-field communication mobile payments (NFC-MP) and internet banking; see, for example, Morosan and DeFranco (2016) and Lee (2009).

According to Lin et al. (2019) in their comparative study, SI has a greater impact on the behavioural intention to use mobile payment in Korea than in China due to the differences in demographic characteristics and payment patterns between the two countries; whereas Sun et al. (2012) confirm the effect of SN on the intention to adopt new technology in relation to religious affiliation. Therefore, the hypothesis is proposed as follows:

*H3: Social influence (SI) positively affects behavioural intention (BI) in using QRIS.*

### **Facilitating Condition (FC)**

Facilitating Condition refers to the stage at which a person has confidence in the resources and technical assistance available to support them using the new technology (Venkatesh et al., 2003). Using mobile banking or a digital wallet properly, for example, requires a number of apparatus and supporting ecosystems, such as a server, legal aspects or licences, a network of agents and merchants, easy access for user assistance, payment protocol, and security, among others (Gupta, 2013, Sikri et al., 2019).

Numerous studies have established that the FC plays a significant role in the behavioural intention to use new technology; see, for example, Morosan and DeFranco (2016) in the case of NFC mobile payment in hotels and Widodo et al. (2019) for the adoption of the digital wallet, among other studies. The greater the number of facilities made available by the service provider, the higher the likelihood of adopting new technology. Therefore, the following hypothesis is proposed:

*H4: Facilitating condition (FC) has a positive relationship with the behavioural intention (BI) in using QRIS.*

### **Hedonic Motivation (HM)**

Hedonic Motivation, which denotes perceived enjoyment, is defined as the extent to which users believe that using a particular technology is entertaining or gives them pleasure (Venkatesh et al., 2012). Tamilmani et al. (2019) found that 58% of UTAUT2 empirical studies had included hedonic motivation in their model. It is revealed that HM significantly influences the intention to use such technology, despite his advice not to use the HM construct to study utilitarian purposes technology. Morosan and DeFranco (2016) explicate that the HM construct is the most significant variable influencing the use intention of Mobile Payment, which confirms his previous finding for hotel reservation websites (Morosan and Jeong, 2008) and smart-phone base technology usage (Oluwajana et al., 2019, Shaw and Sergueeva, 2019).

Hedonic motivation has also been proven to significantly affect the intention to use internet banking (Alalwan et al., 2015). Accordingly, this indicates that when individuals perceive using such technology as entertaining and enjoyable, the likelihood of adopting the appointed technology will increase. Therefore, the following hypothesis is proposed:

*H5: There is a positive relationship between hedonic motivation (HM) and the intentions to use QRIS.*

### **Price value (PV) or Perceived value**

According to Venkatesh et al. (2012), Price Value (PV) is defined as the cognitive trade-off of users between the perceived added benefits of the technology and the monetary cost of using them, following Dodds et al. (1991). The PV is also described as a perceived value in other studies (Shaw and Sergueeva, 2019, Liébana-Cabanillas et al., 2020). The PV is empirically documented to be a critical predictor that affects the behavioural intention to use technology. According to the study of farmer behaviour in using peer-to-peer landing by Septiani et al. (2020), PV is a pivotal factor influencing the behavioural intention to use technology as well as in the study of telebanking customers in Jordania (Alalwan et al., 2016).

Despite the contradictory result in the study of mobile payment in Indonesia (Widodo et al., 2019), many authors see PV as an essential determinant of technology adoption; for example, Liébana-Cabanillas et al. (2020) in the study of Apple Pay, Zhang et al. (2021) in their study of peer-to-peer (P2P) accommodation service, and Shaw and Sergueeva (2019), in the case of mobile commerce usage in Canada, who pointed out that users are motivated by the value of a product and will continue to adopt it as long as it has good value.

When the benefits of using new technology are perceived to be higher than its monetary cost, the willingness to accept such technology will tend to increase. Therefore, the following hypotheses were formed:

*H6: Price value (PV) positively influences behavioural intentions to use QRIS.*

### **Habit (Hb)**

Venkatesh et al. (2012) define Habit (Hb) as self-reported beliefs regarding the extent to which individuals tend to perform responses automatically based on a repetition process, following Limayem et al. (2007). A study conducted by Morosan and DeFranco (2016) demonstrates that habit has a positive effect on the use intention of mobile payment. This finding follows other researchers who point out that habit is a critical factor in influencing behavioural intention to use a peer-to-peer lending platform (Septiani et al., 2020), public transportation (Chen and Chao, 2011), and health information system technology (Alsharo et al., 2020).

According to Widodo et al. (2019), habit is the most relevant element in determining the intention to use a digital wallet in Indonesia. This finding follows Riza (2021) and Raza et al. (2019), who pointed out that customers' habit is the most substantial variable in predicting the intention to use mobile banking for an Islamic bank customer. Therefore, the hypothesis is proposed as follows:

*H7: There is a positive relationship between habit (Hb) and behavioural intention (BI) in using QRIS.*

### **Perceived Risks (PR)**

Perceived Risk (PR) refers to an individual's perceptions of potential losses associated with pursuing the desired outcome through the use of technology, following Featherman and Pavlou (2003). They classified PR into seven dimensions: performance, financial, time, psychological, and social, as well as privacy and overall risk. For the purposes of this study, we measure PR in accordance with Lee (2009), who pointed out that the amount of intention to use mobile banking is mostly driven by security or privacy risk as well as financial risk.

Financial risk, or the possibility of losing money, is a critical matter to consider in the payment sector. Concern about the possibility of losing money when conducting transactions using mobile banking remains a major concern in developing countries, particularly in Africa and Asia; see, for example, Achieng and Ingari (2015) and Bansal and Bagadia (2018). Concerns about *privacy security* have been raised as a result of the development of mobile money and its rapid adoption (Harris et al., 2012), which should be of concern to issuers and regulators. This statement is consistent with Hoffman's (1999) assertion that the elevation of negative perceptions concerning privacy threats emerges with the increase in online users' competence. In general, PR has an adverse influence on the intention to use mobile banking (Bansal and Bagadia, 2018), online travel platform (Balouchi et al., 2018), digital payment (Yang et al., 2015; Liébana-Cabanillas et al., 2020), among other financial services. As a result, we proposed the following hypotheses:

*H8: Perceived risk (PR) negatively influences behavioural intentions to use QRIS.*

### **Force Majeure (FM)**

In this study, the role of the COVID-19 pandemic is captured by adding a new external factor representing the pandemic, namely, Force Majeure (FM). Various studies on technology acceptance were conducted during the COVID-19 pandemic in numerous fields, such as Riza (2021) in Islamic mobile banking and Sukendro et al. (2020) in e-learning platforms among students of sports science education, both of which have been published recently. However, it is arduous to find discourses that explain the impact of the COVID-19 pandemic on the behavioural intention to use technology. In the study of e-wallet usage conducted by Aji et al. (2020), the COVID-19 pandemic is represented as a perceived risk factor that positively affects the intention to use an e-wallet, both directly and indirectly. However, this finding contradicts other studies that indicate that perceived risk had no effect on people's intention to adopt FinTech applications during the COVID-19 epidemic, see Nawayseh (2020).

This study draws from the previous literature and attempts to differentiate common risks factor associated with the acceptance of new technology, as represented by the perceived risk (PR), and risks associated with the COVID-19 pandemic, by treating the COVID-19 pandemic as an exogenous latent variable, namely force majeure (FM). Thus, force majeure is defined as the user's belief about the possibility

of avoiding the negative impact of unprecedented events, namely the COVID-19 pandemic (or any disaster), through the application of new technology. Hence, the hypothesis is proposed as follows:

*H9: There is a positive relationship between force majeure (FM) and behavioural intention (BI) in using QRIS.*

### **Law Enforcement or Perceived Government Policy (LE)**

In this study, law enforcement is defined as the public's belief and trust in the government or central bank's new policy, in this case, the introduction of QRIS with any regulations attached to it. A study by Chong et al. (2010) found that government support significantly influences the intention to use internet banking, while the lack of government involvement in such policy contributed to a low degree of public awareness (Sanusi et al., 2021). In the case of Fintech services, this finding is verified by Chen et al. (2019), who stated that government endorsement of legitimacy and reliability would help to increase public awareness of their new technology. Carter and Bélanger (2005) found that, in the case of new technology introduced by the government, such as e-government, the perceived trustworthiness has a considerable impact on the user's intention to adopt e-government, which is consistent with the findings of the study of Islamic banking by Suhartanto et al. (2018). Janssen et al. (2018) considered it to be the ultimate predictor, particularly faith in the government, rather than the technology under observation, namely e-government. This finding is consistent with Teo et al. (2008), who argue that individuals' impressions of the quality of an e-government website are influenced by their trust in the government, not its technology. In the context of the Covid-19 response, types of government intervention can be interpreted as a communication strategy, prevention and control policy, and act of rescue (Duan et al., 2020); the less involvement of government also resulted in low level of public awareness in such policy (Sanusi et al, 2021).

In the study conducted by Mandari et al. (2017) regarding farmers' behavioural intention towards using m-government services, government support was discovered as a significant factor influencing the intention to use such new technology. Farmers are more likely to accept m-government if they believe the government would deliver benefits related to the latest technology being used. The findings were corroborated by Aji et al. (2020), who iterates that government support indirectly influences the intention to use e-wallets and that the perceived usefulness factor fully mediates this relationship. Thus, without the sense of benefits, government assistance will have no effect on the intention to utilise such technologies. As a result, we propose the following hypothesis:

*H11: There is a positive relationship between perceived government's (central bank) policy or law enforcement (LE) and behavioural intention (BI) in using QRIS.*

### **Habit as moderating variables**

Considering our aim to evaluate the role of the Covid-19 Pandemic and government intervention on people's intention to use new technology QRIS, there is evidence of a relationship between individual habits and unprecedented events such as natural disasters or crises. For example, Sheth (2020) pointed out that consumer habits had shifted drastically due to the COVID-19 pandemic and its containment measures. Unprecedented condition, such as natural disaster, causes significant psychological impact, including changing their previous habits, e.g., Shultz et al. (2013) and Liu (2020). Hence, we also proposed a hypothesis as follows:

*H10: There is a positive relationship between perceived force majeure (FM) and habit (Hb).*

According to Walters and Simons (2020), effortful control, or a response behaviour associated with good behavioural regulation, is positively associated with habits and measures of self-automaticity. According to Verplanken and Wood (2006), policy interventions may modify an established habit, and its success rate is higher in a tailored disrupted environment. However, a policy proposed by untrustworthy, incompetent and illegitimate institutions is likely to be rejected and fail to persuade the intended audience (Collins, 2015). As a result of the mediating role of habit, we proposed an additional hypothesis as follows:

*H12: There is a positive relationship between law enforcement (LE) and habit.*

Following this, we iterate that habit (Hb) mediates the relationship between force majeure (FM), law enforcement (LE) and behavioural intention (BI) in using QRIS.

*H13: Habit (Hb) mediates the relationship between force majeure and behavioural intention in using QRIS.*

*H14: Habit (Hb) mediates the relationship between law enforcement and behavioural intention in using QRIS.*

According to Venkatesh et al. (2003) and Venkatesh et al. (2012), demographic factors, namely age, gender, and experience, played a significant role as mediators of the exogenous variables in influencing behaviour intention to use new technology; it was confirmed by Teo et al. (2012) for education and household income factors. Chauhan et al. (2016) also iterate that occupation and marital status significantly affect the intention to use mobile banking; however, the location is not a significant variable (Martinho et al., 2017). Following this, we expect that demographic factors, namely age, gender, education, experience, location, and user type, will moderate the effect of exogenous variables on behavioural intention to use QRIS. Following the preceding discussion, the recommended research model is presented in Figure 1.

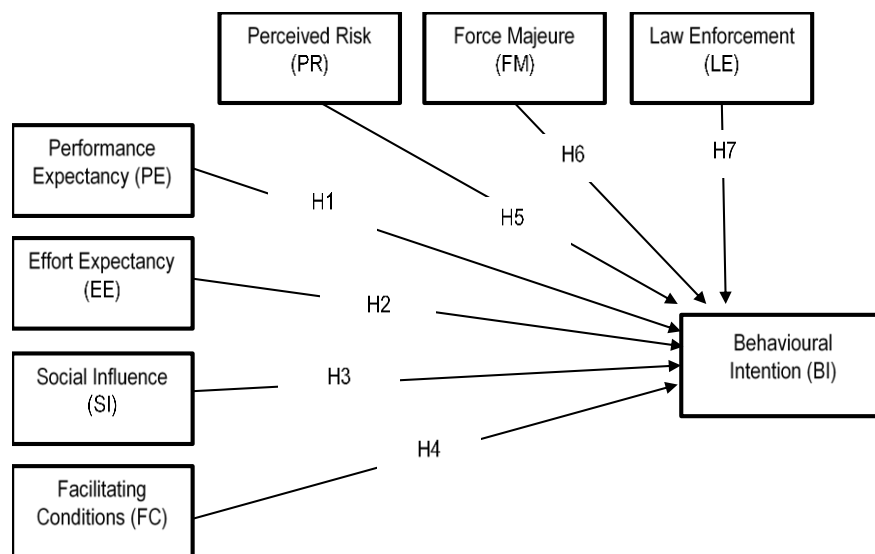


Figure 1 Research Model

## RESEARCH METHOD

### Data collection and sampling technique

Our research is a cross-sectional study conducted in Indonesia from February to April 2021 using an online survey with self-administered questions. The online survey method was chosen to minimise measurement errors caused by the interviewers and to avoid the risk of coronavirus infection. A non-probability sampling method applying the purposive sampling was applied in this study to ensure that only relevant respondents with prior experience using QRIS participated in the research (Saunders et al., 2009). Regarding ethical considerations, the research was approved by the Humanities and Social Sciences Ethical Review Committee at the University of Birmingham.

Prior to the primary data collection, a pilot test was conducted to ascertain the questionnaire's clarity, as Pickard (2013) suggested. It is to ensure that the questionnaire was accurately translated from its original source and did not cause misinterpretation, all questions were easily answered by respondents, and the results were comfortably recorded.



### **Items measurement**

The questionnaire was structured in three sections. The first section informed the respondent about the research's topic and purpose, followed by request for electronic consent. The second segment begins with a screening question to determine respondents' relevance, followed by closed-ended questions concerning respondents' sociodemographic factors, such as gender, age, education, and QRIS experience. The third section contains close questions representing indicators of latent variables developed by Venkatesh et al. (2003, 2012) and the aforementioned extended factors to address the research objectives. It consists of 37 measurement items that serve as an indicator for twelve latent variables. All questions use a five-point Likert scale (from 1 to 5, representing "strongly disagree" to "strongly agree"). Appendix shows a description of variable operationalisation.

### **Partial Least Squares (PLS)**

For various reasons, a partial least squares (PLS) method to structural equation modelling (SEM) is used with SmartPLS 3.3 to conduct data analysis in this study. To begin, the PLS-SEM is an appropriate approach to address the primary objective of this research. According to Hair Jr et al. (2016), the variance-based PLS approach to the structural equation model (SEM) offers an alternative to covariance-based SEM that is mainly used for exploratory research and theory development, and it is also suggested for a confirmatory study, see, e.g. Afthanorhan (2013). Second, the causal-predictive aspect of PLS-SEM imposes minimal requirements on distribution normality and sample size Ali et al. (2018). Hair Jr et al. (2017) also affirms that PLS prediction-oriented approach to SEM provides a prominent predictive accuracy that validates the proposed model and verifies a well-developed causal relationship, even when the data is not normally distributed. In short, PLS-SEM estimates coefficients that maximise the R Square values and minimise the error terms of the endogenous constructs (Hair Jr et al., 2016).

## **RESULTS**

### **Respondent's Demographic Profile**

The survey obtained 1090 responses via a web-based online Qualtrics survey; nevertheless, some respondents failed the screening question (198 respondents), eight did not consent, and a significant number of respondents did not complete the survey (267 participants). As a result, this study can analyse only 617 valid data points, consisting of 577 consumers and 40 merchants representing 31 provinces in Indonesia. The participants' average age is between 26 to 35 years old, and most of the respondents (310 or 50.24%) had used QRIS for more than a year. Respondents primarily dwell in provincial capital cities (226 or 36.63%), followed by district areas and Jakarta and adjacent areas (33.55% and 29.82%, respectively). Using Smart PLS, the research model and the relationship among variables were then examined using the PLS-SEM method. The demographics of the participants in this study are shown in Table 1.

### **Measurement model examination**

The first stage in evaluating PLS-SEM results is testing the measurement models that consist of reliability (or internal consistency), convergence and discriminant validity (Hair Jr et al., 2016). The reliability test examines the consistency of research measurements or the likelihood that the study results are similar to the assumption of a constant environment, see Taherdoost (2016) and Hair et al. (2019). The model reliability will be tested by Cronbach's alpha (CA) and composite reliability (CR) with a minimum threshold value of 0.7, following Kline (2015). Our study's result confirms the reliability of the model's construct, with all CA and CR exceeding the minimum threshold.

Convergent validity, which represents the extent to which the assessments under each construct actually measure the same attribute (Hair et al., 2019), will be evaluated by the size of the outer loadings in the constructs (indicator reliability) with a minimum threshold of 0.708, and convergent validity at the construct level using the average variance extracted (AVE) with a minimum threshold of 0.5%. All questionnaire indicators of latent variables exhibited loading factors higher than 0.40, showing indicator reliability, except for FC4, which will be eliminated from the model analysis as suggested by Acock (2013). We found that the

average variance extracted (AVE) for each construct was above the 0.5 thresholds, indicating the convergent validity of each construct. Therefore, we suggest that the reliability and validity of the constructs and indicators used in this study comply with all the suggested thresholds. Table 2 shows detail of Cronbach's alpha and composite reliability, outer loadings and average variance extracted (AVE).

Table 1 Respondent's Demographic Profile

Variable	Description	N	(%)
Gender	Male	239	41.78%
	Female	333	58.22%
Age	18 – 25	165	28.85%
	26 – 35	171	29.90%
	36 – 45	150	26.22%
	46 – 55	81	14.16%
	>55	5	0.87%
Educational Level	Junior High school/Primary Edu	4	0.70%
	High school/equivalent	105	18.36%
	Diploma	35	6.12%
	S1	364	63.64%
	S2/S3	64	11.19%
Marital status	single (unmarried)	226	39.51%
	married	335	58.57%
	divorced	9	1.57%
	widowed	2	0.35%
Location	Jakarta capital city and surrounding (Jabodetabek)	168	29.37%
	Province Capital City	207	36.19%
	Outside province cap.city	197	34.44%
Internet access	Available	475	83.04%
	Not available	97	16.96%
Duration of Use QRIS	< 3 Months	87	15.21%
	3 – 6 Months	84	14.69%
	6 Months – 1 Year	111	19.41%
	>1 Years	290	50.70%

Source: Data processing

Table 2 The Result of Reliability and Convergence Validity

Factors	Items	Loadings	CA	CR	AVE
Performance expectation	PE1	0.876	0.842	0.905	0.760
	PE2	0.887			
	PE3	0.853			
Effort Expectancy	EE1	0.888	0.933	0.952	0.833
	EE2	0.928			
	EE3	0.930			
	EE4	0.905			
Social Influence	SI1	0.938	0.922	0.951	0.866
	SI2	0.950			
	SI3	0.903			
Facilitating Condition	FC1	0.870	0.876	0.924	0.801
	FC2	0.914			
	FC3	0.901			
Perceived Risk	PR1	0.884	0.900	0.957	0.881
	PR2	0.924			
	PR3	0.927			
Force Majeure	FM1	0.922	0.813	0.915	0.843
	FM2	0.914			
Law Enforcement	LE1	0.887	0.794	0.905	0.827
	LE2	0.932			
Behavioural Intention	BI1	0.931	0.932	0.957	0.881
	BI2	0.937			
	BI3	0.947			

Note: CA, Cronbach's alpha; CR, composite reliability; AVE, average variance extracted.

Following Hair Jr et al. (2016), we then examine the discriminant validity of the construct by two measures, namely the Fornell-Larcker criterion (1981) that compares the square root of the AVE of each construct with the correlations of the latent variables and the Heterotrait–Monotrait (HTMT) ratio of the correlations. The discriminant validity represents the extent to which a proposed construct differs empirically from other constructs in the given model (Henseler et al., 2015). The result shows that all constructs in the model satisfied discriminant validity, as evidenced by the square roots of all AVE were much higher than correlations among constructs, as shown in Table 3, and the HTMT successfully met the threshold of 0.9. In addition, the Standardised Root Mean Residual (SRMR) of the proposed model was reported to be 0.043,

providing additional evidence that the proposed composite factor model fits the obtained data well (Henseler et al., 2014).

Table 3 Discriminant Validity, Fornell and Larcker (1981) Criterion

	BI	EE	FC	FM	LE	PR	PE	SI
<b>BI</b>	0.938							
<b>EE</b>	0.632	0.913						
<b>FC</b>	0.614	0.729	0.895					
<b>FM</b>	0.661	0.593	0.527	0.918				
<b>LE</b>	0.656	0.509	0.498	0.589	0.910			
<b>PR</b>	-0.285	-0.274	-0.241	-0.266	-0.212	0.912		
<b>PE</b>	0.632	0.634	0.536	0.613	0.569	-0.222	0.872	
<b>SI</b>	0.628	0.519	0.461	0.547	0.581	-0.178	0.623	0.930

Table 4 Validity testing, Heterotrait-Monotrait Ratio (HTMT) Criterion

	BI	EE	FC	FM	LE	PR	PE	SI
<b>BI</b>								
<b>EE</b>	0.677							
<b>FC</b>	0.679	0.805						
<b>FM</b>	0.758	0.680	0.624					
<b>LE</b>	0.753	0.580	0.588	0.723				
<b>PR</b>	0.305	0.293	0.265	0.305	0.236			
<b>PE</b>	0.713	0.715	0.623	0.740	0.682	0.253		
<b>SI</b>	0.678	0.559	0.511	0.632	0.674	0.193	0.706	

### Structural Model Assessment

According to Hair Jr et al. (2016), PLS-SEM is different from CB-SEM; it estimates coefficients that maximise the R Square values and minimise the error terms of the endogenous constructs. It maximises the endogenous latent variable's explained variance by estimating partial model relationships among their associated indicators rather than only explaining the correlation between manifest variables (Sarstedt et al., 2016). As a result, instead of focusing on the model's fit, the structural model is examined using heuristic criteria that are influenced by the model's predictive powers (Hair Jr et al., 2016).

This research employed a bootstrapping procedure with 5,000 resamples for significance testing and examined the relationship between variables, and the result indicated that the parameter's sign did not change. The statistical test results show that the value of  $R^2_{adj.}$ , coefficient of determination adjusted, is 0.705 for BI and 0.432 for Hb, which indicates that the variance of exogenous latent variables can explain the variance of the behavioural intention in using QRIS by 70.5%; while habit is influenced by its exogenous variables by 43.2%. The value of  $Q^2$ , predictive relevance, is 0.618 for BI and 0.352 for Hb, which suggests that the exogenous constructs have considerable predictive relevance in explaining the appointed endogenous variable, namely BI and Hb. As part of the structural model evaluation, the effect sizes ( $f^2$ ) that refer to the relative impact of an omitted exogenous variable on the endogenous variable were reported. Following the standards of (Cohen, 2013), the values 0.02, 0.15, and 0.35 represent small, moderate, and large  $f^2$  effect sizes, respectively. This metric is also applied for analysing the relative effect of predictive relevance or the  $Q^2$  effect size.

Table 5 Structural Model Hypothesis Testing

Hypothesis	Relationship	Path Coeff	t-value	Decision	f2	Q2	95% CILL	95% CI UL
H1	Performance Expectation -> Behavioural Intention	0.096	2.401*	Supported	0.012	0.008	0.019	0.175
H2	Effort Expectancy -> Behavioural Intention	0.096	2.081*	Supported	0.009	0.008	0.004	0.186
H3	Social Influence -> Behavioural Intention	0.185	3.556**	Supported	0.049	0.035	0.088	0.289
H4	Facilitating Condition -> Behavioural Intention	0.173	4.217**	Supported	0.037	0.026	0.092	0.254
H5	Perceived Risk -> Behavioural Intention	-0.060	2.614**	Supported	0.009	0.005	-0.108	-0.016
H6	Force Majeure -> Behavioural Intention	<b>0.203</b>	4.363**	Supported	0.057	0.040	0.113	0.295
H7	Law Enforcement -> Behavioural Intention	<b>0.227</b>	4.465**	Supported	0.074	0.053	0.126	0.325

Note: \*\*Significant at p-value < 0.01, \*significant at p-value < 0.05.

The results of hypothesis testing indicate that FC was shown to have a significant positive influence on behavioural intention to use QRIS ( $\beta = 0.138$ ;  $p < 0.01$ ;  $f^2 = 0.027$ ,  $q^2 = 0.016$ ), while PR has a negative influence with no effect size ( $\beta = -0.061$ ;  $p < 0.01$ ;  $f^2 = 0.013$ ,  $q^2 = 0.008$ ), thereby supporting H4 and H8. However, not all hypotheses are supported. The behavioural intention of adopting QRIS during the COVID-19 pandemic is most significantly influenced by habit with a positive sign ( $\beta = 0.406$ ;  $p < 0.01$ ;  $f^2 = 0.227$ ,  $q^2 = 0.145$ ), followed by LE ( $\beta = 0.184$ ;  $p < 0.01$ ;  $f^2 = 0.059$ ,  $q^2 = 0.034$ ), and FM ( $\beta = 1.42$ ;  $p < 0.01$ ;  $f^2 = 0.031$ ,  $q^2 = 0.018$ ). Thus, Hypotheses H7, H9, and H11 are validated, respectively. Moreover, FM ( $\beta = 0.346$ ;  $p < 0.01$ ;  $f^2 = 0.134$ ,  $q^2 = 0.093$ ) and LE ( $\beta = 0.391$ ;  $p < 0.01$ ;  $f^2 = 0.171$ ,  $q^2 = 0.119$ ) was seen to gain a significant positive influence on habit, which was in support H10 and H12. Following this, the mediating effect of habit in the relationship between FM and LE with behavioural intention was assessed by finding the indirect effect.

This study shows that habit significantly affects BI, direct and indirect, and mediates FM and BI with significant value ( $\beta = 0.140$ ;  $p < 0.01$ ). Additionally, we observed that the habit mediates the LE and BI; and that this effect is positively significant ( $\beta = 0.159$ ;  $p < 0.01$ ); hence, H13 and H14 were supported. The study exhibits that demographic factor is found to mediate FC in affecting BI of adopting QRIS during the pandemic, namely Age ( $\beta = -0.099$ ;  $p < 0.01$ ), Gender ( $\beta = -0.098$ ;  $p < 0.01$ ), Education ( $\beta = -0.097$ ;  $p < 0.01$ ), Experience ( $\beta = -0.098$ ;  $p < 0.01$ ), and Location ( $\beta = -0.098$ ;  $p < 0.01$ ); while this effect is not occurred for user type or in other latent variables, as shown in Appendix B.

In the tested model, however, the results show that PE, EE, SI, HM, and PV have no significant impact on the BI to adopt QRIS during the COVID-19 pandemic; therefore, H1, H2, and H3, H5 and H6 were rejected. The result of Structural Model Hypothesis Testing is shown in Table 5.

## DISCUSSION

Our research, which extends UTAUT2 to account for new latent variables including "law enforcement (LE)," "force majeure (FM)," and "perceived risk (PR)," confirms that government involvement and the COVID-19 pandemic significantly affect people's behaviour to adopt the new payment platform, QRIS. The intention to adopt QRIS was directly influenced by perception regarding the Covid-19 pandemic, which corroborates previous studies; for example, in the e-learning platform (Zhao and Bacao, 2021; Sukendro et al., 2020; Horgan et al., 2020), in the use of e-health platform (Strielkowski, 2020), and digital payment (Aji et al., 2020; Sutarsa et al., 2020). This study also found that perceptions of central bank intervention (LE) in initiating and promoting new payment instruments had a positive and direct effect on public intentions to adopt QRIS, corroborating the findings of Carter and Bélanger (2005) and Duan et al. (2020), who found that government intervention significantly affects the likelihood of new product adoption behaviour by the audience. The influence of FM and LE on the intention to use QRIS is also mediated by habit.

It was also discovered that perceived risk (PR) has a substantial negative impact on the intention to use QRIS but has no effect size. Comparing QRIS to other digital payment instruments such as mobile banking, e-wallet, and card payment may explain the near-zero effect size of perceived risks seen in our study. Because QRIS is prudentially regulated by the central bank and enables all types of retail payment services (King, 2020); as a result, the risk perception may decrease, and the central bank's credibility may be strengthened.

As expected, the research findings show that habit (Hb) plays the most significant role in shaping behaviour intention to use QRIS, which is consistent with previous studies. For example, Widodo et al. (2019) revealed that habit is the primary predictor of user acceptance of digital wallets in Indonesia, whereas Riza (2021) and Raza et al. (2019) indicated the importance of habit in the adoption of mobile banking by customers of Islamic banks. Nevertheless, behavioural intention is not only solely impacted by habit but also to a substantial degree by FM and LE. Thus, habit mediates the effects of LE and FM on the intention to use QRIS. This finding corroborates the study of Yuan et al. (2021) on green products and Griffith and O'Connell (2010) on food consumption, in addition to Collins (2015), who asserted that government initiative could influence an individual's behaviour if a legitimate and credible institution conducts the intervention. Another piece of evidence shows that the unprecedented condition, namely the Covid-19 pandemic (LE), had shifted consumers' habits of settling their transactions and eventually persuaded them to use QRIS. These findings corroborate Liu (2020) in the study of natural disaster impact in China, and Sheth (2020), who explains that

existing habits have been modified by the ubiquity of digital technology products and services, especially during the pandemic.

Unexpectedly, our research found that five out of seven determinants of UTAUT2 do not significantly impact the behavioural intention to use QRIS during the pandemic, namely PE, EE, SI, HM, and PV. There are several plausible explanations for these findings. First, the addition of the new constructs in the model may have affected the significance of the original latent variables of UTAUT2 and their path. Specifically, the two factors of the Covid-19 pandemic and government intervention have predominately affected the intention to adopt QRIS, therefore outperforming other factors of UTAUT2 that were previously significant under normal conditions. Another possibility may have come from the QRIS's distinct characteristics compared to other new technologies examined in the previous studies, such as digital payment; hence, our study results differently.

The performance expectation (PE) of QRIS features was not a concern of participants in this study, possibly because QRIS has been proven to successfully mediate and settle transactions between consumers and merchants with a low percentage of recorded complaints relative to other payment instruments, see *Mediakonsumen* (2022). The result also applies to effort expectations (EE). QRIS does not require a sophisticated application (or new hardware); it is automatically added to the existing mobile payment software and only needs one step (touch) to pay, validate, and authorise a transaction. As a result, effort expectations do not become a concern of users. Regarding detail of QRIS's ease of use, see *DOKU* (2022). The QRIS feature that facilitates all payment providers and treats other digital payment instruments as non-competitive products may also explain the insignificance of the hedonic motive (HM) in our model. According to *Tamilmani et al.* (2019), hedonic motivation is not a relevant factor in explaining technology products for utilitarian purposes with no enjoyment objective, following *Widodo et al.* (2019) for the study of digital wallet adoption.

With its role as a payment channel that facilitates all providers with the lowest transaction costs in a more convenient contactless feature, QRIS outperforms other conventional payment methods, such as mobile banking, debit cards, credit cards, and cash payments, in terms of price value. In addition, the consumer does not need to pay any fees to settle their transaction using QRIS, and micro-business merchants and social organisations were excluded from merchant discount rate obligations during the pandemic. Therefore, neither the consumer nor small-scale retailers are financially affected by the implementation of QRIS. This advantage may be the reason why in our study, the intention to adopt QRIS is not affected by price value (PV) and has resulted in an adverse outcome of *Liébana-Cabanillas et al.* (2020), but following *Widodo et al.* (2019).

Lastly, we discovered that demographic variables do not significantly moderate the effect of most of the exogenous variables on the intention to use QRIS. However, the influence of facilitating condition (FC) on behaviour is moderated by age, gender, education, experience, and location, except by user type (consumers or merchants).

## **THEORETICAL CONTRIBUTION**

Overall, our work adds to the existing literature on technology adoption, especially the UTAUT2 model and the study of the regulatory policy impact on people's behaviour. Our study modifies the UTAUT2 model in three essential aspects. First, the empirical results successfully differentiate the pandemic and common risks related to new technology embedded in the UTAUT2 model. We found that FM significantly influences, directly and indirectly, the intention to use QRIS. Second, our empirical findings demonstrate that central bank intervention significantly impacts people's intentions to use QRIS, which is captured in our extended UTAUT2 model. Our result corroborates previous studies, for example, *Mandari et al.* (2017) and *Duan et al.* (2020). Our third improvement is the alteration of the path for the habit that mediates other exogenous latent variables, which corroborates *Verplanken and Wood* (2006) and *Sutarsa et al.* (2020).

This study demonstrates that habit did, in fact, mediate the effect of the pandemic and government intervention on behavioural intention, suggesting that both variables disrupted the current payment system environment and significantly influenced the modification of people's habits, which subsequently affected their intention to utilise QRIS. As a result, our theoretical contribution is the modified technology adoption model that is able to capture and differentiate the effect of government intervention, pandemic risks, and typical risks of new technology on the intention to adopt QRIS by individuals, both users and merchants.

## IMPLICATION FOR PRACTICE

This study indicates that habit, force majeure, and perceived central bank intervention are the most influential determinants of QRIS adoption in Indonesia, direct and indirect. Therefore, we suggest that the central bank could improve the QRIS policy success rate by optimising these three factors, i.e., by expanding public campaigns to promote QRIS as a new contactless payment instrument in conjunction with government publicity programmes to increase public awareness of the pandemic protocols and by fostering a supportive environment, as suggested by Verplanken and Wood (2006).

We believe that this measurement approach can be appropriately used as a complementary tool to examine the effectiveness of the central bank's policy in influencing people's behaviour as their intermediate outcome. Examining the audience's behaviour after policy implementation is crucial for measuring the performance of a regulatory institution, as suggested by Coglianese (2012), due to the ultimate goals of the public institution being significantly influenced by people's behavioural change. It also follows Kowalkiewicz and Dootson (2019) who iterate that understanding people's behaviour has become more vital for public organisations in the digital era.

In addition to strengthening QRIS facilitating conditions, such as expanding its coverage area, further initiatives should include promoting a credible policy that can foster a conducive environment for secure contactless payments, as the central bank's credibility and trustworthiness are more important than the technology used (Woodford, 2005, Janssen et al., 2018).

## CONCLUSION

This study examines the effect of central bank policy on people's behaviour toward adopting new technology during the COVID-19 pandemic by incorporating new variables into the UTAUT2 model (Venkatesh et al., 2012). Our study concludes that the central bank's policies considerably impact people's intention to use a new payment platform; the policy impact can be isolated from the effect of the COVID-19 pandemic (FM).

Government intervention (LE) and the COVID-19 pandemic (FM) were confirmed to significantly influence people's behaviour toward using QRIS, directly and indirectly, mediated by habit (Hb). With the addition of the new variables, our research found that five out of seven determinants of UTAUT2 do not have a notable impact on the behavioural intention to use QRIS during the pandemic, namely performance expectation, effort expectancy, social influence, hedonic motivation, and price value. Our empirical result also concludes that the facilitating condition (FC) directly influences the intention to use QRIS; however, its impact was mediated by demographic factors such as age, gender, education, experience, and location, except for user type. Hence, our study brought several theoretical and practical implications.

Despite the significant result of this study, there are several limitations that need to be considered. First, Indonesia's definition of QR standard may differ from other countries; thus, future research that aims to replicate this model should consider its specification. Second, for a greater generalisation of the study, expanding the sample sizes, especially for merchant participants, is suggested; and studying user behaviour over time is impossible due to the data collection approach being a cross-sectional study. Finally, it is suggested that future research investigate data from payment systems using more contemporary techniques, such as a machine learning methodology that analyse both structured and unstructured data, to investigate people's behaviour and policy-related issues in greater depth.

## ACKNOWLEDGEMENTS

The author is grateful to thank Prof. John Fender, Prof. Christoph Gortz, DR. Ioannis Karavias, and the reviewers for their helpful comments. This work is supported by Indonesia Endowment Fund for Education (LPDP).

## REFERENCES

- Achieng, B. M. and Ingari, B. K., 2015. Factors influencing the adoption of mobile banking in kenya's commercial banks: A case of kenya commercial bank (kcb) kilindini branch. *International Journal of Scientific and Research Publications*, 5(10), pp. 1–14.
- Acock, A. C., 2013. *Discovering structural equation modeling using stata*. Stata Press Books.
- Afthanorhan, W., 2013. A comparison of partial least square structural equation modeling (pls-sem) and covariance based structural equation modeling (cb-sem) for confirmatory factor analysis. *International Journal of Engineering Science and Innovative Technology*, 2(5), pp. 198–205.
- Agur, I., Peria, S. M. and Rochon, C., 2020. Digital financial services and the pandemic: Opportunities and risks for emerging and developing economies. *International Monetary Fund Special Series on COVID-19, Transactions*, 1, p. 2–1.
- Aji, H. M., Berakon, I. and Md Husin, M., 2020. Covid-19 and e-wallet usage intention: A multigroup analysis between indonesia and malaysia. *Cogent Business & Management*, 7(1), p.1804181.
- Ajzen, I. (1985). *From intentions to actions: A theory of planned behavior*, pp. 11–39. Springer.
- Alalwan, A. A., Dwivedi, Y. K. and Williams, M. D., 2016. Customers' intention and adoption of telebanking in Jordan. *Information Systems Management*, 33(2), pp. 154–178.
- Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., Lal, B. and Williams, M. D., 2015. Consumer adoption of internet banking in jordan: Examining the role of hedonic motivation, habit, self-efficacy and trust. *Journal of Financial Services Marketing*, 20(2), pp. 145–157.
- Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M. and Ryu, K., 2018. An assessment of the use of partial least squares structural equation modeling (pls-sem) in hospitality research. *International Journal of Contemporary Hospitality Management*.
- Alsharo, M., Alnsour Y. and Alabdallah, M., 2020. How habit affects continuous use: evidence from jordan's national health information system. *Informatics for Health and Social Care*, 45(1), pp. 43–56.
- Auer, R., Cornelli, G., J. Frost G., 2020. Covid-19, cash, and the future of payments. *Technical report, Bank for International Settlements*.
- Aydin, G. and Burnaz, S., 2016. Adoption of mobile payment systems: a study on mobile wallets. *Journal of Business Economics and Finance*, 5(1), pp. 73–92.
- Balouchi, M., Aziz, Y. A., Rahman, A. A. and Yusof, R. N. R., 2018. Impact of Perceived Risk and Source Credibility on Intention to Use of Consumer Generated Contents for Travel Planning. *International Journal of Economics and Management*, 12(S2), pp. 661-672.
- Banda, F., Robb, G., Roberts, S. and Vilakazi, T., 2015. Review paper one: Key debates in competition, capabilities development and related policies-drawing the link between barriers to entry and inclusive growth.
- Bansal, A. and Bagadia, P., 2018. The effect of financial risk tolerance on adoption of mobile banking in india: A study of mobile banking users. *IUP Journal of Bank Management*, 17(1), pp. 50–76.
- Borio, C., Claessens, S., Clement, P., McCauley, R. N. and Shin, H. S., 2020. *Promoting Global Monetary and Financial Stability: The Bank for International Settlements after Bretton Woods, 1973–2020*. Cambridge University Press.
- Camner, G., 2013. Snapshot: implementing mobile money interoperability in indonesia. Mobile money for the unbanked case studies: Insights, best practices and lessons from across the globe, pp. 11–19.
- Carter, L. and B'elanger, F., 2005. The utilization of e-government services: citizen trust, innovation and acceptance factors. *Information Systems Journal*, 15(1), pp. 5–25.
- Cevik, S., 2020. Dirty money: Does the risk of infectious disease lower demand for cash?. *International Finance*, 23(3), pp. 460–471.
- Chauhan, V., Choudhary, V. and Mathur S., 2016. Demographic influences on technology adoption behavior: A study of e-banking services in India. *Prabandhan: Indian Journal of Management*, 9(5), pp. 45–59.
- Chen, C.-F. and Chao, W.-H., 2011. Habitual or reasoned? using the theory of planned behavior, technology acceptance model, and habit to examine switching intentions toward public transit. *Transportation research part F: traffic psychology and behaviour*, 14(2), pp. 128–137.
- Chong, A. Y.-L., Ooi, K.-B., Lin, B. and Tan, B.-I., 2010. Online banking adoption: an empirical analysis. *International Journal of bank marketing*.

- Coglianesi, C., 2012. Measuring regulatory performance. Evaluating the impact of regulation and regulatory policy. *Expert paper 1*.
- Cohen, J., 2013. *Statistical power analysis for the behavioral sciences*. Routledge.
- Collins, D., 2015. The oxford handbook of behavioral economics and the law by eyal zamir and doron teichman. *European Journal of Risk Regulation*, pp. 470–472.
- Davis, F. D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, pp. 319–340.
- de Sena Abrahão, R., Moriguchi, S. N. and Andrade, D. F., 2016. Intention of adoption of mobile payment: An analysis in the light of the unified theory of acceptance and use of technology (utaut). *RAI Revista de Administrac, ão e Inovac, ão*, 13(3), pp. 221–230.
- Dodds, W. B., Monroe, K. B. and Grewal, D., 1991. Effects of price, brand, and store information on buyers' product evaluations. *Journal of Marketing Research*, 28(3), pp. 307–319.
- DOKU, 9 June 2022. Qris doku universal interface for non-cash trans-actions. Available at: <https://www.doku.com/en/qris> (Accessed: 9 June 2022).
- Donovan, K., 2012. Mobile money for financial inclusion. *Information and Communications for development*, 61(1), pp. 61–73.
- Duan, T., Jiang, H., Deng, X., Zhang, Q. and Wang, F., 2020. Government intervention, risk perception, and the adoption of protective action recommendations: Evidence from the covid-19 prevention and control experience of china. *International journal of environmental research and public health*, 17(10), p. 3387.
- Featherman, M. S. and Pavlou, P. A., 2003. Predicting e-services adoption: a perceived risk facets perspective. *International journal of human-computer studies*, 59(4), pp. 451–474.
- Fishbein, M., Jaccard, J., Davidson, A. R., Ajzen, I. and Loken, B., 1980. *Predicting and understanding family planning behaviors*. In Understanding attitudes and predicting social behavior. Prentice Hall.
- Fornell, C. and Larcker, D. F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), pp. 39–50.
- Fredriksson, A. and Oliveira, G. M. D., 2019. Impact evaluation using difference-in-differences. *RAUSP Management Journal*, 54, pp. 519–532.
- Gogoski, R., 2012. Payment systems in economy-present end future tendencies. *Procedia-Social and Behavioral Sciences*, 44, pp. 436–445.
- Gortz, C., Tsoukalas, J., Li, W. and Zanetti, F., 2020. The effect of monetary policy shocks in the United Kingdom. *Macroeconomic Dynamics*.
- Griffith, R. and O'Connell, M., 2010. Public policy towards food consumption. *Fiscal Studies*, 31(4), pp. 481–507.
- Gupta, S., 2013. The mobile banking and payment revolution. *European Financial Review*, 2(36), p. 215254.
- Hair Jr, J. F., Hult, G. T. M., Ringle, C. and Sarstedt, M., 2016. *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.
- Hair Jr, J. F., Matthews, L. M., Matthews, R. L. and Sarstedt, M., 2017. Pls-sem or cb-sem: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*, 1(2), pp. 107–123.
- Hair, J. F., Risher, J. J., Sarstedt, M. and Ringle, C. M., 2019. When to use and how to report the results of pls-sem. *European business review*.
- Harris, A., Goodman, S. and Traynor, P., 2012. Privacy and security concerns associated with mobile money applications in Africa. *Wash. JL Tech. & Arts*, 8, p. 245.
- Henseler, J., Ringle, C. M. and Sarstedt, M., 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, 43(1), pp. 115–135.
- Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen Jr, D. J., Hair, J. F., Hult, G. T. M. and Calantone, R. J., 2014. Common beliefs and reality about pls: Comments on rönkkö and evermann (2013). *Organizational research methods*, 17(2), pp. 182–209.
- Hoffman, D. L., Novak, T. P. and Peralta, M., 1999. Building consumer trust online. *Communications of the ACM*, 42(4), pp. 80–85.
- Horgan, D., Hackett, J., Westphalen, C. B., Kalra, D., Richer, E., Romao, M., Andreu, A. L., Lal, C. Bernini, Tumiene, B., 2020. Digitalisation and covid-19: the perfect storm. *Biomedicine J. A., Hub*, 5(3), pp. 1–23.



- Indonesia, B., 2019. Board of governors' regulation (PADG) No. 21/18/padg/2019 concerning the national implementation standards of the quick response code for payments.
- Indonesia, B., 2020. *Bersinergi membangun optimisme pemulihan ekonomi*. Laporan Perekonomian Indonesia Tahun 2020.
- Janssen, M., Rana, N. P., Slade, E. L. and Dwivedi, Y. K., 2018. Trustworthiness of digital government services: deriving a comprehensive theory through interpretive structural modelling. *Public Management Review*, 20(5), pp. 647–671.
- Khiaonarong, T., 2003. Payment systems efficiency, policy approaches, and the role of the central bank.
- Kline, R. B., 2015. *Principles and practice of structural equation modeling*. Guilford publications.
- Kowalkiewicz, M. and Dootson, P., 2019. *Government 5.0: the future of public services*. The Chair in Digital Economy.
- Lechner, M., 2011. The estimation of causal effects by difference-in-difference methods. *Foundations and Trends® in Econometrics*, 4(3), pp. 165–224.
- Lee, M.-C., 2009. Factors influencing the adoption of internet banking: An integration of tam and tpb with perceived risk and perceived benefit. *Electronic commerce research and applications*, 8(3), pp. 130–141.
- Liébana-Cabanillas, F., García-Maroto, I., Muñoz-Leiva, F. and Ramos-de Luna, I., 2020. Mobile payment adoption in the age of digital transformation: The case of apple pay. *Sustainability*, 12(13), 5443.
- Limayem, M., Hirt, S. G. and Cheung, C. M., 2007. How habit limits the predictive power of intention: The case of information systems continuance. *MIS quarterly*, pp. 705–737.
- Lin, X., Wu, R., Lim, Y.-T., Han, J. and Chen, S.-C., 2019. Understanding the sustainable usage intention of mobile payment technology in korea: Cross-countries comparison of chinese and korean users. *Sustainability*, 11(19), p. 5532.
- Liu, G., 2020. The impact of natural disasters on consumption habits of senior population in china based on did model. In 2020 Management Science Informatization and Economic Innovation Development Conference (MSIED), pp. 201–209. IEEE.
- Macmillan, R., Paelo, A. and Paremoer, T., 2016. The “evolution” of regulation in uganda's mobile money sector1. *The African Journal of Information and Communication*, 2016(17), pp. 89–110.
- Magsamen-Conrad, K., Upadhyaya, S., Joa, C. Y. and Dowd, J., 2015. Bridging the divide: Using utaut to predict multigenerational tablet adoption practices. *Computers in human behavior*, 50, pp. 186–196.
- Mandari, H. E., Chong, Y.-L. and Wye, C.-K., 2017. The influence of government support and awareness on rural farmers' intention to adopt mobile government services in tanzania. *Journal of Systems and Information Technology*.
- Martinho, G., Magalhães, D. and Pires, A., 2017. Consumer behavior with respect to the consumption and recycling of smartphones and tablets: An exploratory study in portugal. *Journal of Cleaner Production*, 156, pp. 147–158.
- Mediakonsumen, 31 October 2020. Transaksi qris dana berhasil, saldo tidak masuk. Available at: <https://mediakonsumen.com/2020/10/31/surat-pembaca/transaksi-qris-dana-berhasil-saldo-tidak-masuk> (Accessed: 3 June 2021).
- Morosan, C. and DeFranco, A. 2016. It's about time: Revisiting UTAUT2 to examine consumers' intentions to use nfc mobile payments in hotels. *International Journal of Hospitality Management*, 53, pp. 17–29.
- Morosan, C. and Jeong, M., 2008. Users' perceptions of two types of hotel reservation web sites. *International Journal of Hospitality Management*, 27(2), pp. 284–292.
- Nawayseh, M. K. A., 2020. Fintech in covid-19 and beyond: What factors are affecting customers' choice of fintech applications?. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), pp. 1–15.
- OECD, K. E., 2015. *Policy brief on social impact measurement for social enterprises*. Policies for Social Entrepreneurship. Paris, Luxemburg. Pozyskano z: [www.oecd.org/social/PB-SIM-Web\\_FINAL.Pdf](http://www.oecd.org/social/PB-SIM-Web_FINAL.Pdf)
- Oluwajana, D., Idowu, A., Nat, M., Vanduhe, V. and Fadiya, S., 2019. The adoption of students' hedonic motivation system model to gamified learning environment. *Journal of theoretical and applied electronic commerce research*, 14(3), pp. 156–167.
- Pal, R. and Bhadada, S. K., 2020. Cash, currency and covid-19. *Postgraduate medical journal*, 96(1137), pp. 427–428.
- Pickard, A. J., 2013. *Research methods in information*. Facet publishing.

- Raza, S. A., Shah, N. and Ali, M., 2018. Acceptance of mobile banking in islamic banks: evidence from modified utaut model. *Journal of Islamic marketing*.
- Riza, A. F., 2021. The potential of digital banking to handle the covid-19 pandemic crisis: Modification of utaut model for islamic finance industry. *Jurnal Ekonomi dan Keuangan Islam*, 7(1), pp. 1–16.
- Rogers, E. M., 1983. *Diffusion of innovations (third ed.)*. New York: Free Press.
- Rowan, P., Miller, M., Zhang, B. Z., Appaya, S., Ombija, S., Markova, D. and Papiasse, D., 2020. *2020 global covid-19 fintech regulatory rapid assessment study*. World Bank and CCAF (2020) The Global Covid-19 FinTech Regulatory Rapid Assessment Report, World Bank Group and the University of Cambridge.
- Sanusi, S., Abdullah, N. H. N., Chin, L., Rastam, F. and Rozzani, N., 2021. Tax Awareness Among Students from Higher Learning Institutions in Malaysia: Education Area as A Moderator. *International Journal of Economics and Management*, 15(1), pp. 89-102
- Sarstedt, M., Hair, J. F., Ringle, C. M., Thiele, K. O. and Gudergan, S. P., 2016. Estimation issues with pls and cbsem: Where the bias lies!. *Journal of Business Research*, 69(10), pp. 3998–4010.
- Saunders, M., Lewis, P. and Thornhill, A., 2009. *Research methods for business students*. Pearson education.
- Septiani, H. L. D., Sumarwan, U. and Yuliati, L. N., 2020. Farmers' behavioral intention to adopt peer-to-peer lending using utaut2 approach. *Jurnal Manajemen and Agribisnis*, 17(2), pp. 107–107.
- Sharma, S. S., Tobing, L. and Azwar, P., 2018. Understanding indonesia's macroeconomic data: what do we know and what are the implications?. *Bulletin of Monetary Economics and Banking*, 21(2), pp. 217–250.
- Shaw, N. and Sergueeva, K., 2019. The non-monetary benefits of mobile commerce: Extending utaut2 with perceived value. *International Journal of Information Management*, 45, pp. 44–55.
- Sheth, J., 2020. Impact of covid-19 on consumer behavior: Will the old habits return or die?. *Journal of Business Research*, 117, pp. 280–283.
- Shultz, J., Neria, Y., Allen, A. and Espinel, Z., 2013. *Psychological impacts of natural disasters*. Encyclopedia of Natural Hazards. Dordrecht, Heidelberg, London, New York: Springer Publishing, pp. 779–791.
- Sikri, A., Dalal, S., Singh, N. and Le, D., 2019. Mapping of e-wallets with features. *Cyber Security in Parallel and Distributed Computing: Concepts, Techniques, Applications and Case Studies*, pp. 245–261.
- Strielkowski, W., 2020. Covid-19 pandemic and the digital revolution in academia and higher education. *Preprints*, 1, pp. 1–6.
- Suhartanto, D., Farhani, N. H. and Muflih, M., 2018. Loyalty Intention towards Islamic Bank: The Role of Religiosity, Image, and Trust. *International Journal of Economics & Management*, 12(1).
- Sukendro, S., Habibi, A., Khaeruddin, K., Indrayana, B., Syahrudin, S., Makadada, F. A. and Hakim, H., 2020. Using an extended technology acceptance model to understand students' use of e-learning during covid-19: Indonesian sport science education context. *Heliyon*, 6(11), p. e05410.
- Sun, S., Goh, T., Fam, K.-S. and Xue, Y., 2012. The influence of religion on islamic mobile phone banking services adoption. *Journal of Islamic marketing*.
- Sutarsa, N., Astuti, P. A. S., Choy, M. and Moore, M., 2020. Covid-19 pandemic: Opportunity to accelerate e-health in indonesia. *Public Health and Preventive Medicine Archive*, 8(1).
- Taherdoost, H., 2016. Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. How to test the validation of a questionnaire/survey in research (August 10, 2016).
- Taherdoost, H., 2018. A review of technology acceptance and adoption models and theories. *Procedia manufacturing*, 22, pp. 960–967.
- Tamilmani, K., Rana, N. P., Prakasam, N. and Dwivedi, Y. K., 2019. The battle of brain vs. heart: A literature review and meta-analysis of "hedonic motivation" use in utaut2. *International Journal of Information Management*, 46, pp. 222–235.
- Teo, A., Tan, G. W., Cheah, C., Ooi, K. and Yew, K., 2012. Can the demographic and subjective norms influence the adoption of mobile banking?. *International Journal of Mobile Communications*, 10(6), pp. 578–597.
- Teo, T. S., Srivastava, S. C. and Jiang, L., 2008. Trust and electronic government success: An empirical study. *Journal of management information systems*, 25(3), pp. 99–132.
- Tressel, M. T. and Zhang, M. Y. S., 2016. *Effectiveness and channels of macroprudential instruments: Lessons from the Euro Area*. International Monetary Fund.

- Venkatesh, V., Thong, J. Y. and Xu, X., 2012. Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, pp. 157–178.
- Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D., 2003. User acceptance of information technology: Toward a unified view. *MIS quarterly*, pp. 425–478.
- Verplanken, B. and Wood, W., 2006. Interventions to break and create consumer habits. *Journal of public policy & marketing*, 25(1), pp. 90–103.
- Walters, K. J. and Simons, J. S., 2020. Force of habit: the role of routinized, automatic behaviors along the path of self-regulation and alcohol-related problems. *International journal of behavioral medicine*, 27(1), pp. 52–64.
- WHO, 2020. *Transmission of sars-cov-2: implications for infection prevention precautions: scientific brief, 09 july 2020*. Report, World Health Organization.
- Widodo, M., Irawan, M. I. and Sukmono, R. A., 2019. *Extending utaut2 to explore digital wallet adoption in Indonesia*. In 2019 International Conference on Information and Communications Technology (ICOIACT), pp. 878–883. IEEE.
- Williams, M. D., N. P. Rana, R. A. and Dwivedi, Y. K., 2015. The unified theory of acceptance and use of technology (utaut): A literature review. *Journal of enterprise information management*.
- Woodford, M., 2005. Central bank communication and policy effectiveness.
- Yuan, P., Dong, X., Xu, J. and Lin, X., 2021. *How government regulations and consumer behavior influence manufacturers' product green degree decision-making: An agent-based model*. Wireless Communications and Mobile Computing 2021.
- Zhang, N., Liu, R., Zhang, X.-Y. and Pang, Z.-L., 2021. The impact of consumer perceived value on repeat purchase intention based on online reviews: by the method of text mining. *Data Science and Management*, 3, pp. 22–32.
- Zhao, Y. and Bacao, F., 2021. How does the pandemic facilitate mobile payment? an investigation on users' perspective under the covid-19 pandemic. *International journal of environmental research and public health*, 18(3), p. 1016.

## Appendix

### Question of indicators and latent variables

Factors	Indicators
<b>Performance Expectancy (PE)</b>	<ul style="list-style-type: none"> <li>– I find QRIS (QR code Indonesian Standard) useful in my daily life.</li> <li>– Using QRIS (QR code Indonesian Standard) helps me accomplish things more quickly.</li> <li>– Using QRIS (QR code Indonesian Standard) increases my productivity.</li> </ul>
<b>Effort Expectancy (EE)</b>	<ul style="list-style-type: none"> <li>– Learning how to use QRIS (QR code Indonesian Standard) is easy for me.</li> <li>– My interaction with QRIS (QR code Indonesian Standard) is clear and understandable.</li> <li>– I find QRIS (QR code Indonesian Standard) easy to use.</li> <li>– It easy for me to become skilful at using QRIS (QR code Indonesian Standard).</li> </ul>
<b>Social Influence (SI)</b>	<ul style="list-style-type: none"> <li>– People who influence my behaviour think that I should use QRIS (QR code Indonesian Standard).</li> <li>– People who are important to me think that I should use QRIS (QR code Indonesian Standard).</li> <li>– People whose opinions that I value prefer that I use QRIS (QR code Indonesian Standard).</li> </ul>
<b>Facilitating Conditions (FC)</b>	<ul style="list-style-type: none"> <li>– I have the resources necessary to use QRIS (QR code Indonesian Standard).</li> <li>– I have the knowledge necessary to use QRIS (QR code Indonesian Standard).</li> <li>– QRIS (QR code Indonesian Standard) is compatible with other technologies I use.</li> <li>– I can get help from others when I have difficulties using QRIS (QR code Indonesian Standard).</li> </ul>
<b>Perceived Risk (PR)</b>	<ul style="list-style-type: none"> <li>– I am worried that my personal information can be stolen in the transaction using QRIS (QR code Indonesian Standard).</li> <li>– I think using QRIS (QR code Indonesian Standard) can cause me to lose money, or my transaction might be altered by someone else.</li> <li>– Overall, I believe that the overall risks of QRIS (QR code Indonesian Standard) are high.</li> </ul>
<b>Force Majeure (FM)</b>	<ul style="list-style-type: none"> <li>– I think using QRIS (QR code Indonesian Standard) is safer (in this pandemic period).</li> <li>– I think using QRIS (QR code Indonesian Standard) is necessary to avoid jeopardy.</li> </ul>
<b>Law Enforcement (LE)</b>	<ul style="list-style-type: none"> <li>– I was suggested by the authority to use QRIS (QR code Indonesian Standard) for the particular transaction.</li> <li>– I think the authority's suggestion to use QRIS (QR code Indonesian Standard) was beneficial to me.</li> </ul>
<b>Behavioural Intention (BI)</b>	<ul style="list-style-type: none"> <li>– I intend to continue using electronic money in the future.</li> <li>– I will always try to use QRIS (QR code Indonesian Standard) in my daily life.</li> <li>– I plan to continue to use QRIS (QR code Indonesian Standard) frequently.</li> </ul>