# Identification of Influencing Factors on the Intention to Use QR Code Centered Payment Solutions in the Banking Industry in Sri Lanka

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## Abstract

Emerging technology which is radically novel, disruptive and relatively fast growing, will not only redesign the landscapes in many spheres but also has the potential to exert a considerable impact on several socio-economic domains. Quick Response (QR) code based payments is one such phenomenon. However, empirical evidence reveals that a significant and visible lacuna does exist in this sphere of study, especially from the Sri Lankan perspective. Hence, the purpose of this study is to analyse an individual's intention to use QR code mobile driven payment systems in the banking industry in Sri Lanka. The study has been conducted based on the positivist research paradigm and underpinned by the Theory of Reasoned Action (TRA) and the Innovation Resistance Theory (IRT). The data was collected based on a structured questionnaire given to 352 respondents using an online survey in Sri Lanka. The findings revealed that perceived ease of use and attitude have a significant positive relationship with the intention to use QR Code based payments. Perceived risk has a negative yet significant relationship with the intention to use. However, perceived usefulness has an insignificant relationship with the dependent variable. The study also discusses the theoretical implications from the TRA and IRT perspective, along with the managerial implications for the banking industry. Finally, study highlights the limitations, areas for future research and the conclusion are presented.

**Keywords:** Quick response (QR) code centred payments, Theory of reasoned action, Innovation resistance theory, Intention to use.

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## Introduction

A Quick Response (QR) code is a type of matrix barcode or two – dimensional barcode, invented in 1994 by the Japanese automotive company Denso Wave for labelling purposes (Wu and Wu, 2020). A barcode is a machine – readable optical label that can contain information about the item to which it is attached. In practice, QR codes contain data for a locator, identifier, or tracker that points to a website or application, a QR Code uses four standardised encoding modes, namely, numeric, alphanumeric, binary and Kanji, all of which are logographic Chinese characters still used in Japanese writing to store data efficiently (Rongjun et al., 2019).

While initially the QR was designed for the automotive industry, at present, all segments of businesses have commenced using QR codes for business purposes. The QR code is now most often used for advertising and communication campaigns, such as AI driven Augmented Reality campaigns. Organisations that use these QR codes include textile companies, and mobile communication companies, and they are used for signage in advertising media, product traceability, and also on web sites and many more sites (Nidhi, Neena, & Liébana-Cabanillas, 2020).

These QR codes are generated and used as a payment platform globally, and in the local context as well. As far as the mobile payments are concerned, in Sri Lanka the Lanka QR is used as an interoperable QR for merchant payments. There are 20 + Lanka QR code Financial Issuers and Merchant acquirers in the country (Central Bank of Sri Lanka, 2021). The Lanka QR payment mode is used for bill payments and payments for retail transaction. Web based QR payments for online transactions, are embedded in POS machines for POS transactions. The Lanka QR can be used for all modes of rupee transactions. This Lanka QR can be developed for the acceptance of VISA, MasterCard, and Union Pay as well as to configure other wallet payment modes such as Ali Pay and WeChat Pay (Central Bank of Sri Lanka 2020).

QR code based payment solutions provide an alternative channel for initiating and accepting payments between a customer and a merchant (Central Bank of Sri Lanka, 2021). However, intra–bank transactions are settled within the institution while inter–bank transactions are settled through the CEFTS (Central Bank of Sri Lanka, 2021). Payment and settlement systems, as per the CBSL Circular No 02 of 2019, on establishment of a National Quick Response code standard for local payments, were issued replacing the payment and settlement systems circular No 06 of 2018 (Central Bank of Sri Lanka, 2021).

QR code based payment solutions, initiated using mobile devices, provide an alternative channel for initiating and accepting payments, specifically between a customer and a merchant. The usage of QR Codes for payments eliminates the requirement for customers to carry hard cash or payment cards, and for merchants to invest in costly Point–of–Sale (POS) devices to process transactions. The payment industry will benefit immensely from having a QR Code standard implemented in the payment ecosystem of the country. Accordingly, the Central Bank of Sri Lanka issued a QR Code standard, titled Lanka QR specifications, to promote customers' convenience, and security, and to ensure the interoperability of different payment mechanisms and instruments by adopting a standard QR Code to initiate payments. As a result, financial institutions will be able to provide access to low–cost and secure digital payments to customers and merchants (Central Bank of Sri Lanka, 2020).

Due to globalisation and the increase in internet usage, the distance between consumers and sellers has been virtually shrunk to zero, and has made retail businesses expand their boundaries. This has encouraged business owners to sell more goods and services to locations outside of their locality and territory (Liébana & Cabanillasa, 2017; Liébana-Cabanillas, et al., 2018). However, though mobile based payments were introduced about a decade ago, there are still several issues even in mobile based payments that can be identified as barriers to adoption, such as the lack of information about product usefulness and usage, privacy norms, low awareness, resistance, innovativeness, infrastructural support and interoperability issues (Oliveira, et al, 2016).

From an antithetical perspective, it has been stated that consumers become worried about information and data being held by unauthorised parties. Further, public sharing of such personal information is making consumers nervous, as it leads to a certain hesitation in sharing such information while performing transactions digitally (Hossain, Quaresma, & Rahman, 2019). In order to mitigate such barriers in digital payments, and to enhance usage, research studies proposed several key factors that may influence the intention and continued usage of QR Code and digital payment services (Hossain, Quaresma, & Rahman, 2019). Since such barriers still exist even with mobile based payments (Rana et al., 2014), introduction of QR Code based payments may create more confusion and hesitancy among potential users, especially among Sri Lankan users.

Despite the fact that performing a Lanka QR transaction is very beneficial to the user, the value and volume of transactions are visibly low, as customers still prefer hard cash over digital payments, which system they are more comfortable with at local

retail shops and groceries (CBSL, 2021). Low awareness about digital technology, its benefits, minimum and sometimes a complete lack of consumer awareness about usefulness can be considered as the main challenges to the minimal usage of the Lanka QR payment platform (Central Bank of Sri Lanka, 2021). Even though the Lanka QR Code payment method was launched in an interoperable manner, it is still not at the full scale that is necessary for the usage of local consumers and adoption as a payment platform in Sri Lanka (CBSL, 2022). Another dimension to this argument is that Self Service Technologies (SSTs) such as Automated Teller Machines (ATMs), Internet Banking, Mobile Banking, QR Code Payment Solutions, and Near Field Communication (NFC) enabled payment solutions, have allowed banking customers to carry out their banking transactions around the clock, based on their requirements and conveniences (Manikandan & Chandramohan, 2016). The positive results of QR Code Payment Solutions can be augmented with SSTs to enhance the level of a bank's profitability (Hossain, Quaresma, & Rahman, 2019).

Though many studies have been conducted in other countries under the facets of technical dimensions of the QR code (Jain et al, 2021; Hossain et al, 2019), mobile financial services (Himel et al, 2021), credit cards (Trin et al., 2020), and Internet banking (Marafon et al., 2017), there is a significant lacuna in this area, especially from the Sri Lankan perspective. As per the CBSL (2021), only less than one percent of people use QR code based payments in Sri Lanka. Hence, based on the above arguments, this study focuses on the following research questions related to the banking industry.

1) What are the factors influencing the intention to use QR code based payments?
2) What is the level of the relationship between such factors and the intention to use?

## Literature review

The QR Code (Quick Response Code) and NFC (Near Field Contactless) payment solutions both come under Self Service Technologies (SST), where the customer has the feasibility of performing the transaction via a mobile phone (Saxena, Sinha, & Majra, 2016). The introduction of some latest technologies such as Self Service Technologies (SST's) in the banking sector has been emerging as one of the key business drivers that accommodate customers in operating their bank accounts with increased ease and effectiveness (Saxena, Sinha, & Majra, 2016).

When using a technology, 'user friendliness" or perceived ease of use (PEOU) is a key component. Venkatish et al, (2012), based on Davis et al., (1989), defined perceived ease of use as the extent to which one believes that the technology will be free of effort. However, Taylor and Strutton (2010) stated that perceived ease of use has both direct and indirect effects on the intention to use a particular technology. Jogiyanto (2007) pointed out that when using a technology based system, the user should be able to understand how it works, as it should be user friendly and not being a "bother" when using. Venkatish (2003) stated that an individual's attempt to minimise effort, supports the intention to use. Other studies have also proposed constructs such as "ease of use" (Moore and Benbasat, 1991), and "reduction of complexity' (Thompson et al., 1991), in relation to the intention of using technology. One of the criticisms of ease of use (Trinh et al., 2020), is that both perceived ease of use and usefulness are subjective, and might vary from person to person. For instance, a tech-savvy person might perceive the technology as easy to use, and yet, a tech-illiterate person might have a negative perspective.

Stemming from this argument, and citing Davis et al., (1989), Hewawasam (2022) defined perceived usefulness (PU) as the degree to which an individual believes that using a system would enhance his/her performance. Kantanchanee et al., (2014), stated that PU has both direct and indirect impacts on technology or 'e' related businesses. PEOU and PU are vital components of technology based studies (Hamid et al, 2016; De Nevas et al., 2022). Measurements of these benefits are based on the frequency of usage, diversity of applications and the type of technology (Hong et al., 2021). In addition, PU is the extent to which a person trusts a system. If an individual considers that a system is useful, then, that individual will have the intention to use it (Bregashtian & Herdinata, 2021). Therefore, it is clear that PEOU and PU are heavily used in technology based studies (Venkatish et al., 2003; Trinh et al., 2020; Himel et al., 2021).

Empirical evidence also focuses on perceived risk (PR), especially on technology-based payment modes. PR can be defined as the potential for loss in pursuing a desired outcome while engaged in online shopping. It is a combination of uncertainty with the possibility of serious outcomes (Ko et al., 2010). The perceived risk of using technology such as online shopping should monitor the degree of impact on consumers' attitudes and intention to use, and to avoid disharmony after they use the technology (Hassan, Kunz, Pearson, & Mohamed, 2006). In a study conducted on internet banking, Marafan et al., (2018), stated that there are two dimensions to perceived risk, namely, the acceptance of risk and the self-confidence of the customer. Many empirical studies have found that

consumer perceived risk strongly affects the intention to use e-services, e-commerce (Tandon, Kiran, & Sah, 2018), e-based payments (Cabanillas, Leiva, & Fernandez, 2018) and e-banking (Mutahar, Daud, Ramayah, Isaac, & Aldholay, 2018). Trinh et al., (2021), stated that when consumers perceive uncertainties about a particular system or technology, such as an e-wallet, they will change their mind about that intention, which becomes a decisive factor in whether they actually engage in an action. Maousud (2013) found six areas of perceived risk, namely, financial, time, social, product, delivery and information security risks related to online shopping. Mousaud (2013) stated that the higher the risks, the lower the usage of online shopping by consumers.

A review of empirical studies over a period of time reveals that attitude can be another factor that impacts the intention to use, based on the information quality variable, and the familiarity with the network (Diop et al 2019). Fishbein and Ajzen (1967) defined attitude as the individual's positive or negative feelings towards a particular behaviour. Furthermore, Davis et al., (1989), stated that attitude determines the individual intention to adopt the system, which, in turn, determines actual system use. Hence, attitude towards using a system is vital (Diop et al., 2019). Hussein (2015) and Hussein (2017) stated that university students had a positive attitude towards e-learning technologies. Hussein (2017) further mentions that the study found that university students' intention to use e-learning technology was strongly determined by their attitude. Schierz et al., (2010), also found a positive correlation between attitude and intention to use. Donat, Brandtweiner and Kerschbaum (2009) reported that attitudinal barriers like a lack of interest and a lack of perceived usefulness hinder the use of the internet among people. Although attitude has been used as a moderator in several technology acceptance model (TAM) based studies (Venkatish et al., 2012); Kanchanatanee et al., (2014), Singh et al., (2019), rationalised, based on empirical studies (Abishek and Hemchannd, 2016); (Oliveira et al., 2016), that attitude can be an independent variable instead of a moderator or a mediator.

The intention to use information technology, then, is a predictor of behaviour to use it. Intentions are "the person's motivation in the sense of his or her conscious plan to exert effort to carry out a behaviour" (Spears and Singh, 2004). In the technology acceptance literature, an intention to use reflects a user's desire to use technology in the future. Intention to use technology was used as the outcome variable in this study because it has been found to be a reliable predictor of actual technology usage (Ajzen 1991); (Turnet et a.l, 2010). Stemming from the Theory of Reasoned Action (Fishbein and Ajzen, 1975), any technological information system determines users' attitudes, PEOU and PU, and further amplifies behavioural intention (Davis et al., 1989).

## Theoretical background

### *Theory of Reasoned Action (TRA)*

The TRA explains the relationship between attitudes and behaviours in human beings (Fishbein and Azjen, 1975). The primary purpose of the TRA is to understand an individual's voluntary behaviour by examining the underlying basic motivation to perform an action (Doswell et al., 2011). An individual's attitude towards engaging in a particular behaviour is determined by the outcomes that individual expects will come about as a result of performing that particular behaviour. According to the TRA, attitude is the key determinant of the intention to use technology-based devices (Azjen and Albarracin, 2007). Critics argue that having a positive attitude does not lead to intention to use. Sheppard et al., (1988), stated that TRA does not consider the conditions and the choices. General attitude is sometimes said to be a poor predictor of single behaviour (Azjen et al., 2018). Azjen and Albarracin (2007), stated that the TRA emphasises the 'perceived social pressure" to perform or not to perform a particular behaviour. Perception of that intention to use is important with such perceived components of social pressure. The TRA is derived from previous sociological and attitudinal theories. It has been extensively used to assess the relationship between attitude and intention to use in regard to food tourism Kim et al., (2011), technology innovation adoption (Otieno, 2016), Halal products (Lada et al., 2009), ugly food value and behavioural intentions (Jang and Cho, 2022) and e-sports viewership (Xiao, 2020). However, empirical evidence reveals (Otieno et al, 2016) that the TRA has not been extensively used for QR based studies. Hence, the TRA is used here to underpin this study from a theoretical perspective.

### *Innovation Resistance Theory (IRT)*

The Innovation Resistance Theory introduced by Ram and Sheth (1989) states that inability to understand "innovation' leads to the resistance –oriented behaviour of users. As per Ram and Sheth (1989), IRT has functional and psychological barriers. Hiendenreich and Handrich (2015) found that functional barriers arise when perceived attributes of technology innovation do not meet the expectations of users, attributes such as user friendliness, ease of use and usefulness. Psychological barriers are initiated when the perceived attributes of technology innovation create mental conflicts and confusion for the user. Based on a study in Bangladesh on mobile based financial services, Himel et al., (2021), stated that usage and usefulness are examples of functional

barriers while perceived risks are psychological barriers, as the user is in a dilemma about the risks involved in using that particular technology. Miglier et al., (2021); Kaur et al., (2020), underpinned their study with the IRT to ascertain the intention to use in technology based studies. Closer scrutiny of empirical evidence reveals that the IRT has not been fully explored in QR based studies, especially due to the emergence of the Unified Theory of the Acceptance and Use of Technology (UTAUT) (Venkatish et al., 2003). This is a significant lacuna. Hence, this study has integrated the IRT in an attempt to supplement the traditional TRA to theorise the QR code based payments in Sri Lanka.

## Hypotheses formulation and the conceptual framework

### *Perceived ease of use, perceived usefulness and intention to use*

The IRT states that functional barriers such as usage and perceived usefulness either improve or reduce the intention to use. The TRA (Fishbein and Azjen, 1975) also states that an individual's behaviour provides motivation to perform an action. Empirical evidence reveals that scholars such as (Kanchanatanee et al., 2014; Das Neves et al., 2022; Hamid et al., 2015), have highlighted that both perceived ease of use and perceived usefulness have a direct impact on intention to use in e-based and internet based studies. However, from the Sri Lankan perspective, no study has been conducted to assess the relationship between these dimensions, and the intention to use. Venkatish et al., (2003), based on the technology acceptance model, pointed out that these two constructs are pivotal to intention to use. Hence, based on the above arguments, the following hypotheses are formulated.

*H1: Perceived ease of use has a positive relationship to intention to use QR based payments in Sri Lanka*

*H2: Perceived usefulness has a positive relationship to intention to use QR based payments in Sri Lanka*

### *Perceived risk and intention to use*

The IRT (Ram and Sheth, 1989) posits that psychological barriers such as payment settlement, information security (Himel et al., 2021), and mental agony are hindrances to the use of new technology. Risk is also perceived as a barrier to intention to use, especially in terms of technology based payments (Masoud, 2013). Wang, Zhuo, Tong

and Zhu (2022) also extended the TRA to assess the perceived risk on online health communication. Tham et al., (2019), claimed that perceived risk has a significant impact on intention behaviour in on-line shopping activities. However, Trinh et al., (2021), found that perceived risk has a negative impact on intention behaviour when studying credit card use in Vietnam. Das Neves et al., (2022), also stated the importance of perceived risk in relation to intention to use digital wallets. Lim (2003) stated that researchers need to examine risk perceptions from a fresh perspective, in which the source of perceived risk is helpful for businesses to use resources and platforms in the right places. Zeba and Ganguli (2016) found that perceived risk has a negative, yet significant, impact on intention to use related to online shopping behaviour. This provides adequate rationale to investigate whether perceived risk has an impact on intention to use, in this study. Hence, based on the above, the following hypothesis has been developed

*H3: Perceived risk has a negative relationship with the intention to use QR code based payments in Sri Lanka*

### *Attitude and intention to use*

The core concepts of the TRA are attitude and intention to use. However, this has not been tested for QR code based payments as an independent variable. According to the TRA (Azjen and Fishbein, 1975), one's behavioural intention is a reliable predictor of actual behaviour and one's attitude towards certain behaviours, as well as one's perceived social pressure, which is a subjective norm. These are two of the main factors that directly correlate with one's intention to perform an action. Himel et al., (2021), found that attitude is important to the behavioural intention in mobile financial services. Aswathi and Haneefa (2020) stated that student-attitude is a strong predictor in using new technology. Hussein (2017) also found that students' attitude is a strong predictor of the intention to use e-learning. Saadé, Nebebe, and Tan (2007) suggested that in order for an e-learning system to be successful, it is important to assess university students' participation and involvement. Schiez et al., (2010), also found a positive relationship between attitude and intention to use. Hence, based on the above, the following hypothesis has been formulated.

*H4: One's attitude has a positive relationship with the intention to use QR based payments in Sri Lanka*

Based on the above, the following conceptual framework is designed to describe usage of QR Code based payment modes by local consumers, and also to address the research questions.

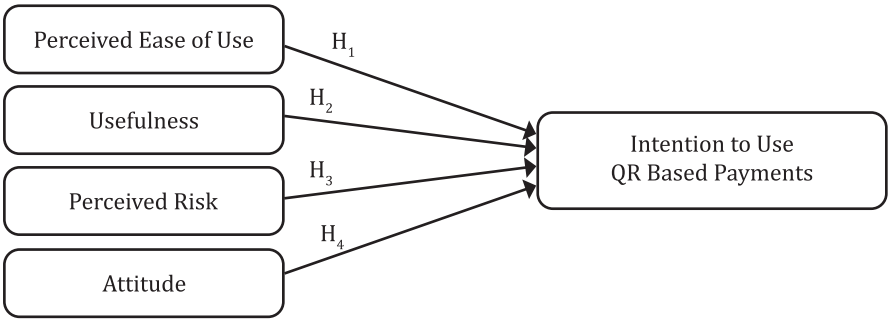


**Figure 1: Conceptual framework**

## Methodotlogy

This study adopts the positivist research philosophy with the deductive approach. Empirical evidence reveals that scholars (Venkatish et al., 2003; Masoud 2013; Hussein 2016: Aswathi and Haneefa, 2020) have adopted a similar approach for their e-related studies. PEOU and PU have been used as independent variables in the framework based on empirical studies (Kanchanatanee et al., 2014; Das Neves et al., 2022; Hamid et al., 2015). Perceived risk has been used as a vital component in separate studies on risk and intention to use (Mausoud, 2013; Tham et al., 2019), and in other studies as well (Marafan et al., 2018; Trinh et al., 2021). Though attitude has been used as a moderator in previous studies (Venkatish et al., 2003); Kantanchanee et al., (2014), subsequent studies conducted by Singh et al., (2019); Abishek and Hemchand, (2016) have used attitude as an independent variable with an adequate rationale. Hence, attitude has been considered as an independent variable in this study.

Since it is a quantitative study, the data was collected through a self-administered questionnaire which was distributed among 400 customers who maintain some form of local banking relationship that has introduced QR code based payments in Sri Lanka. Out of 400, questionnaires, 352 duly completed questionnaires (Sekeram and Bougie, 2013) were collected using the convenience sampling method. Data were collected through an on line survey as the respondents were familiar with this method, and also with the field of this study. The unit of analysis is an individual who has opened an account with the bank.

### *Measurements*

As per the framework, the questionnaire had five sections with four exogenous variables and the endogenous variable. Perceived ease of use (PEOU) had seven items, perceived usefulness (PU) had five items, perceived risk (PR) had four items, attitude (ATD) had six items and the intention to use (INTU) had three items. All items were replicated based on Venketesh et al., (2012),'s study. The replication was based on the method suggested by La Sorte (1972). Replication is repeating a study's procedure and observing whether the prior finding recurs. This definition of replication is easy to apply, intuitive, and correct (Nosek and Errington, 2020). Explaining seven methods of replication in management research, Block and Kuckertz (2018) stated that replication studies serve a pivotal function in academic discourse, as indispensable ingredients required to develop convincing, robust, reliable structured reviews for quantitative analysis. This provides a rationale for the replication used in this study. Data were initially analysed with SPSS to ascertain their validity and reliability and subsequently, were analysed using AMOS.

## Data analysis and findings

Descriptive statistics of the respondents are given below in Table 1.

**Table 1: Descriptive statistics of the respondents**

| Demographics | | Frequency | Percentage |
|---|---|---|---|
| Total Participants | 352 | | |
| Gender | Male | 283 | 80.40 |
| | Female | 69 | 19.60 |
| Age | 20-30 years | 103 | 29.30 |
| | 31-40 years | 142 | 40.30 |
| | 41-50 years | 60 | 17.60 |
| | Above 50 years | 45 | 12.80 |
| Level of Education | O/L | 02 | 0.40 |
| | A/L | 41 | 11.60 |
| | Degree | 134 | 38.10 |
| | Masters | 166 | 47.20 |
| | PhD | 09 | 2.60 |
| Profession | Employed | 308 | 87.50 |
| | Self Employed | 44 | 12.50 |

*Source:* Survey data

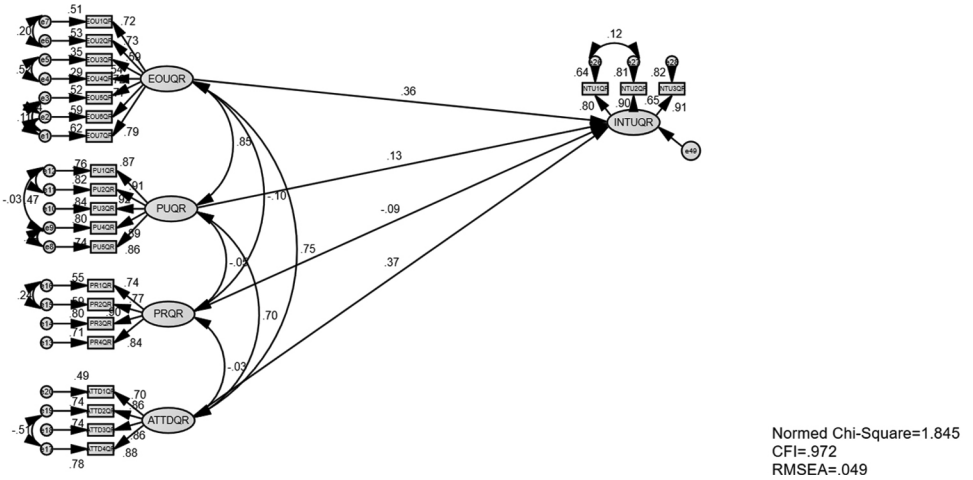


**Figure 2: Structural model with covariance for the independent variables**

*Source:* Survey data

The Structural Equation model was first used to derive the model fit, while considering the model fit indices, P – value is 0.000, where the indices are statistically significant and acceptable as they are ≥ 0.05 (Joreskog & Surbon, (1996). The CMIN/df, which reflects the value of 1.845 on the default model, is statistically significant as it is ≤ 5 (March & Hocevar 1985), and is, therefore, acceptable. GFI are 0.915 which can be considered significant compared to a previous study conducted (Hair et al., 2010). AGFI in the default model is derived as 0.888, and will be taken into consideration as it is ≥ 0.80. In the analysis of the Base Line Comparison, CFI, is 0.972, which is ≥ 0.90, (Hu & Bentler, 1999). While analysing the RMSEA of the default model, a value of 0.049 was obtained, which is acceptable since it is < 0.05. Hence, one can affirm that the overall measurement model, which is depicted above, can be accepted.

Further, while analysing the Regression weights of the overall measurement model, the P – value 0.000 is statistically significant since it is ≥ 0.05, and is therefore, acceptable. Thus, the overall structural model can be accepted and used for further analysis in the research.

**Table 2: Outcome of the hypothesis–analysis using the structural model**

| | Estimate | S.E. | C.R. | P |
|---|---|---|---|---|
| INTUQR ← EOUQR | .384 | .118 | 3.246 | .001 |
| INTUQR ← PUQR | .115 | .081 | 1.421 | .155 |
| INTUQR ← PRQR | -.076 | .033 | -2.277 | .023 |
| INTUQR ← ATTDQR | .328 | .061 | 5.403 | *** |

*Source:* Survey data

The above analysis reveals that PEOU does have a significant effect on user's intention to use QR code based payment solutions. Hence, the hypothesis H1 can be accepted. Having derived the above results, Perceived Ease of Use does have a direct and positive relationship with Intention to Use QR Payment modes during consumers' daily usage.

Perceived Usefulness does positively influence a user's Intention to Use QR Code based payment solutions, and yet, the result is insignificant. This can be concluded as per the above analysis, where ($\beta = 0.115$ & $p = 0.155$, and where the p value should be $< 0.05$). According to the results for (H2), it is clear that Perceived Usefulness does not reflect a direct and positive relationship with Intention to Use QR Payment modes during consumers' daily usage. Hence H2 is rejected.

Perceived Risk does not positively influence the user's intention to use QR Code enabled payment solutions. The statistical evidence showed that ($\beta = - 0.076$ & $p < 0.023$), which is negative, and it can, therefore, be concluded that Perceived Risk has a negative relationship and impact on the intention to use QR Payment modes during consumers' daily usage. This means that if the perceived risk is less, intention to use is high, and vice versa. In the context of this research, perceived risk negatively influences a user's intention to use QR Code enabled payment solutions. Hence, H3 is accepted.

Attitude towards QR Code enabled payment solutions has a positive influence on intention to use QR Code enabled payment solutions. This statement is acceptable as per the above derived results, where ($\beta = 0.328$ & $p < 0.000$), which is significant, and supports the hypothesis. According to the results derived, attitude has a direct and positive relationship with intention to use QR based payment modes during consumers' daily usage. Hence, H4 is accepted.

## Discussion

This study focused on ascertaining the factors influencing QR based payments and the intention to use. The outcome and the analysis found that PU does not support the intention to use. Das Neves (2022); Kantanchanee et al., (2014), also found an insignificant relationship between PU and the intention to use. However, most other studies (Himel et al., 2021); Hamid (2016) found that PEOU and PU related positively to intention to use. Hence, the results related to PEOU and PU and the intention to use were contradictory and inconsistent.

This study revealed that there is a negative relationship between perceived risk (PR) and intention to use QR based payments ($\beta$ = - 0.076 & $p < 0.050$). This is true from the pragmatic perspective as well. When perceived risk is low, people have a greater intention to use QR based payments and vice versa. Tham et al., (2019), stated that product risk, return policy, and convenience risk have a positive and significant impact on intention to use online shopping behaviour. This is consistent with Da Neves (2022). However, Rini and Khasanah (2021) found a positive relationship between personal innovativeness and perceived risk. Rini and Khasanh (2021) stated that this occurs when people feel that personal innovativeness makes them unable to overcome their doubts regarding the risk of using technology based products. This study also proved that attitude has a positive and significant impact on intention to use ($\beta = 0.328$ & $p < 0.000$). This is consistent with Aswathi and Mohamed (2020). Schierz et al., (2010), and Singh et al., (2020), who also found a positive relationship with intention to use by considering ATTU as an independent variable. The outcome of the current study does affirm this result as well.

## Theoretical implications

This study, which was underpinned by the TRA and IRT, provides some theoretical contributions based on the outcomes. Firstly, TRA states that attitude is vital for intention to use technology, and an individual's desire to engage in a particular behaviour is determined on the outcomes that the individual expects will ensure as a result of performing that behaviour. This study, carried out with an adequate rationale, proved that attitude can be considered as an independent variable instead of a moderator, and that there is a positive and significant relationship with the intention to use. The outcome is consistent with Schierz et al., (2010); and Singh et al., (2020)'s studies. Secondly, this proved, despite the emergence of the UTAUT (Venkatish et al., 2003), that

the TRA can be considered as a standalone theory to ascertain the impact of attitude in technology based studies. Since, the UTAUT is a combination of many theories, using the IRT in this study not only supplements the TRA but also proves that the IRT can be used for technology based studies in the future as well. Further, the UTAUT (Venkatesh et al 2003) does not encapsulate the IRT. Hence, based on this research, the IRT can be explored for emerging tech-based studies in the future. Thirdly, using the IRT proved that both functional barriers such as perceived ease of use and psychological barriers such as perceived risk have a significant positive and negative relationship, respectively, with the intention to use. Finally, this study filled a lacuna by being underpinned by the IRT, and applying the same to understand functional and psychological barriers.

## Managerial implications

In an era where technology is emerging at a rapid pace, using research outcomes for practical gains is of paramount importance. Further, the Intention to Use Lanka QR Code Payment modes in the country, is a variable highly important to all Lanka QR Code payment mode service providers, such as Banks, Non–Financial Organisations, Telecommunication service providers, Mobile payment service providers, Marketers and Social media platform service providers. Social networking platforms such as Websites, all social networking platforms and public google forums do provide an added benefit for users to interact, and share their experiences in both positive and negative ways, where these service providers will need to consider this feedback in a positive manner. (Miltgen, Popovic, & Oliveira, 2013). These outcomes will determine the success and failures of the QR Code based payment systems in the country.

From a practical standpoint, this research provides guidance for mobile app developers, and bankers when deciding on the latest technology introductions to consumers, since it is justified that attitude to Lanka QR Code Payment modes will increase consumers' usage of the application. In this respect, software developers must keep in mind that they will need to create a good impression of Lanka QR code usage and the attitude towards intention to use. The degree of attitude can also be upgraded by improving consumers' own perceptions about QR Code based payment platforms. Secondly, it is necessary to design QR code based payments systems with minimal psychological barriers (that are low risk) to enhance the intention to use.

## Limitations and future research

This study was conducted purely in the local context among customers who maintain some form of banking relationship in Sri Lanka, where the Lanka QR code payment platforms are introduced by Sri Lankan banks. However, QR Code based payments are expanding across the world. Hence, similar studies can be carried out for other industries as well, as in other countries. As the outcomes of this study for PR and PU are somewhat inconsistent with those of previous studies, further research needs to be conducted to ascertain whether similar trends can be observed for QR code based payments for other industries and in other countries.

## Conclusion

This research was conducted in Sri Lanka to add to the knowledge base in an emerging arena. It was found that only a few research studies have been conducted in this sphere across the world, and no studies from the Sri Lankan perspective. The identification of dimensions that can be used to assess the intention to use QR code based payments was done, and the relationship between such dimensions was also assessed in this study. As the world is moving towards QR code based payments, carrying out more research within this sphere involving many dimensions and pathways will shed more light on the subject from the theoretical as well as the managerial perspectives.

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