

Modeling the Psychological Process of Retail Vendors on QR-Code Payment Adoption in Nepal

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ABSTRACT

The purpose of this study is to examine the psychological process of retail vendors while adopting QR-code payment system in Nepal. By using behavioral reasoning theory (BRT) as the theoretical model, this study hypothesizes relationships between values, reasons constructs, attitude, and intention towards QR-code payment adoption among Nepalese retail vendors. The hypothesized relationships have been assessed by collecting 300 samples and applying partial least squares structural equation modeling (PLS-SEM) to analyze the data. The finding of this study is congruent with the main premise of BRT which states that reasons serve as important linkages between people's values, their attitude, and their intention. The study shows reasons for adoption (convenience, speed, simplicity) account for most of the variance in attitude towards adoption of QR-code payment. However, the findings show no direct linkages between the reasons constructs and the intention to adopt QR-code payment. The finding of this study stresses the importance for marketers to continue providing benefits that form the reasons for adoption of QR-code payment for the vendors to ensure continued adoption.

Keywords: Behavioral reasoning theory, QR-Code payment system, Retail vendors, Structural equation modeling.

1 Introduction

Mobile payment was first tried out in Finland in 1997 A.D when Coca-Cola Company experimented with vending machines that accepted SMS payments (Dahlberg et al., 2015). Furthermore, the payment service was provided was Danske Bank which is headquartered in Copenhagen, Sweden (Danske Bank, 2023). However, the payment method did not become popular until 2000 A.D (Pal et al., 2019). The popularity of the internet and growing e-commerce market gradually fueled the usage of mobile payment (Jahanshahi, Mirzaie, Asadollahi, 2011). Moreover, the introduction of smart phones and payment services like PayPal made mobile payments easy and convenient (Bezhovski, 2016).

In Nepal, mobile payments have gained a significant impetus after the onset of COVID-19 (NRB, 2021). Nepal Rastra Bank, the central bank of Nepal has been putting emphasis to promote mobile payments with the objective to encourage cashless transactions in the economy (Nepal Rastra Bank [NRB], 2014) and has been supervising the mobile banking industry to build public trust in the system (NRB,2018) . This has facilitated in regulated growth of the number of payment system providers (PSP) and payment system operators (PSO) in the country.

Extant literature classifies mobile payments into two types: remote mobile payments and proximity-based mobile payments (Shin and Lee, 2014). Quick response (QR) code payment system is a proximity-based system where the payers - with their mobile device - scan the unique QR-code of the receiver to initiate the payment procedure which consequently results in contactless transaction. QR-code is a dot matrix (two-dimensional) bar code developed by Masahiro Hara and his team in DENSO Corporation in 1994 (Seta, 2023) . It was developed with the objective to facilitate the rapidly changing automotive manufacturing with a tracking system that could store a large volume of

information (Denso, 2023). Over time, this technology has been adopted by various industries including the mobile banking industry because of its simplicity and versatility (Luna, Cabanillas, and Montoro-Rios, 2015). Due to its advantages, this system is becoming increasingly popular among the Nepalese people. Ironically, even though QR-code payment system has seen a marked increase in number of transactions in recent years, cash transactions are still the predominant method of transaction (NRB, 2022). The adoption of mobile payments in general has been studied by using various adoption models (Yang et al., 2012; Bailey et al., 2017). Among them, technology acceptance model (TAM) (Davis, 1989) and diffusion of innovations (DOI) (Rogers, 1962), and unified theory of adoption and use of technology (UTAUT)(Venkatesh, 2007) are the widely used models. These models provide the determinants of adoption which include perceived usefulness, perceived ease of use, compatibility, trialability, safety, and relative advantage. Resistance models have been used to understand the resistance to adopt mobile payments (Kaur et al., 2020) . Of these models, innovation resistance theory (Ram and Sheth, 1989) is the most widely used one. This theory states that resistance to innovation broadly results from functional and psychological barriers. These broad set of barriers can be further subdivided into usage barrier, value barrier, risk barrier, tradition barrier, and image barrier.

Other studies have used qualitative approach to explain the contextual determinants and barriers of mobile payment adoption in various parts of the world (Boateng et al., 2019; pal et al., 2020). Because determinants and barriers are context dependent, these studies have identified numerous factors that are not explained by the models presented above (Westaby, 2005).

To examine the role of determinants and barriers of adoption in the adoption process, studies have also attempted the integration of adoption and resistance models into a single framework (Migliore, 2022). However, a comprehensive theory that ingrains both the facilitators and barriers of adoption along with the psychological process behind the adoption decision should be able to explain the adoption process even further (Sahu et al., 2020).

The overall principle of BRT is that “reasons for” and “reasons against” serve as important linkages between people’s beliefs, global motives (attitude, subjective norms, perceived control), intentions, and behavior (Westaby,2005) . It is an extension of the theory of reasoned action (TRA) and theory of planned behavior (TPB) (Fishbein & Ajzen, 1975; Ajzen, 1991).

Reasons are defined as the specific subjective factors people use to explain their anticipated behavior (Westaby, 2005). The investigation into reasons has been conducted in numerous psychological studies and they have dichotomously classified reasons into “reasons for” and “reasons against” (Roe et al., 2001). These reasons have been studied as pros/cons, facilitators/barriers using various models and methods. BRT assimilates these reasons constructs into TRA and TPB to analyze the effect of reasons on decision.

The application of BRT in adoption of innovation study was conducted in Ireland for both product innovation and service innovation (Claudy et al., 2015). The finding of this study identified reasons for adoption as convenience, flexibility, and reasons against adoption as usage barrier, risk barrier. BRT has also been applied in one research to study mobile payment adoption in India (Gupta & Arora, 2017). The intrepid growth of the volume of mobile payment transactions, the pervasive marketing efforts of the industry and the gradually increasing competition present a challenge to the mobile payment industry: the need to maintain industry growth. This study uses behavioral reasoning theory (BRT) to examine the reasons behind which retail vendors adopt and do not adopt QR-code payment. There have been few studies related to determinants of QR-code payment adoption in Nepal (Tamang, Bhaskar and Chatterjee, 2021).However; most of these studies have focused only on consumers’ adoption and the facilitators of adoption. This study brings both facilitators and barriers of adoption of retail vendors in Nepal under a single framework.

In line with previous studies conducted on mobile payment adoption (Gupta & Arora, 2017), this study measures the value construct of openness to change. Openness to change is referred to the value that motivates people to follow their own emotional and intellectual interest in unpredictable and uncertain directions (Schwartz, 1992). Past research has shown that people who are high on openness to change measure appreciate and adopt new products (Wang et al., 2008). Consequently, it follows that retail vendors who are high on openness to change are more likely to adopt QR-code payment system.

This study considers the following hypothesis. Like TRA and TPB, BRT hypothesizes that intentions are powerful predictors of behavior, and global motives influence the intentions. However, it deviates slightly from those theories to postulate that reasons predict global motives through justifications and defense mechanisms. Furthermore, these reasons are also hypothesized to have direct influence on intentions. It is important to note that reasons do not exist in isolation; they are hypothesized to be strongly influenced by values and beliefs (Westaby, 2005). Values and beliefs are also predicted to influence attitudes directly.

Attitude → Adoption Intention

There is strong evidence through numerous studies that adoption intention strongly influences adoption behavior (Ajzen, 2001; Wanberg et al., 2005). Therefore, studies related to behavioral decision-making attempt to predict

intention (Gupta & Arora, 2005). This study hypothesizes that attitudes – defined as a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor (Eagly & Chaiken, 1993) – have a strong influence on the intention to adopt QR-code payment.

H1: Retail vendors' attitude towards QR-code payment will influence their adoption intentions.

Reasons → Attitudes

Context specific reasons comprise the most important aspect of BRT. Reasons are unique cognitions that individuals rely on to explain their behavior (Gupta & Arora, 2005). More specifically, they are specific cognitions and represent the subjective probability that a specific factor is part of an individual's explanation set (Westaby, 2005). Reasons are classified into two broad sub-dimensions: "reasons for" and "reasons against" performing a behavior. These broad dimensions are studied under numerous theories namely: cost-benefit models (Thaler, 1999), reasons theory (Westaby & Fishbein, 1996) and health-belief model (Janz & Becker, 1984). Reasons also need to be distinguished from beliefs. In relation to behavioral intention models, beliefs represent an individual's assessment of subjective probability that his or her behavior could cause a wide variety of outcomes in the future (Westaby, 2005).Reasons represent the individual's subjective probability that a specific factor is part of his or her explanation set. Studies have shown that reasons demonstrated an incremental predictive validity compared to traditional belief concept (Westaby, 2005; Westaby et al., 2010). Therefore, this study hypothesizes that:

H2a: Retail vendors' reasons for adopting QR-code payment will positively influence their attitude towards adoption.

H2b: Retail vendors' reasons against adopting QR-code payment will negatively influence their attitude towards adoption.

Reasons → Adoption intention

As a departure from past theories, BRT hypothesizes that reasons will explain the additional variance in intentions beyond that explained by attitudes (Westaby, 2005).Reasons can lead to intentions because people tend to feel more comfortable with them when they have justifications and defenses for their actions, and this psychological mechanism can provide powerful resources to engage in behavior and maintain self-worth (Steele et al., 1993). Furthermore, past studies have shown that contextual factors provide unique insights into intention beyond that explained by global constructs (Venkatesh et al., 2003).

H3a: Retail vendors' reasons for adopting QR-code payment will positively influence their adoption intentions.

H3b: Retail vendors' reasons against adopting QR-code payment will negatively influence their adoption intentions.

Values → Reasons

Expectancy value theory states that beliefs individuals hold about future outcomes, and the expected value of those outcomes have significant effect on the motivational process (Fishbein & Ajzen, 1975). Theoretical support for the influence of values on reasons can be found on explanation-based decision making and reasons theory. These theories state that individual's first collect then evaluate information for the value it generates when formulating reasons to justify decision alternatives (Westaby, 2005).

H4a: Retail vendors' values will positively influence their reasons for adoption.

H4b: Retail vendors' values will negatively influence their reasons against adoption.

Values → Attitude

BRT argues that individuals can directly form attitude towards an object without forming deep justifications for anticipated behavior (Westaby, 2005).This argument complies with the various psychological models which postulate that automatic cognitive processes can circumvent deeper levels of thought activation (Tversky & Kahneman,1974). These heuristics or rules of thumb can cause individuals to form attitudes without fully processing the available information to form concrete reasons for their anticipated behavior.

H5: Retail vendors' values will positively/negatively influence their attitude towards QR-code payment.

2 Methodology

This study was conducted among retail vendors (n=300) with a cross-sectional survey in Kathmandu, Nepal. An in-depth structured interview with retail vendors was conducted to identify the context-specific reasons for and against adoption. The total number of participants in the reasons elicitation interview was 10 and consisted of equal number of males and females. The interview questionnaire consisted of ten questions. The data collected from the interview was then analyzed using content analysis (Lindgren et al., 2020) for similarities and differences. From the interview, the authors identified context-specific reasons for adoption as "convenience", "speed", "simplicity" and reasons against adoption as "usage barrier", "risk barrier", "tradition barrier". After identifying the context-specific reasons for and

reasons against adoption of QR-code payment, items were constructed according to (Westaby, 2005; Claudy et al., 2015; Gupta & Arora, 2017) measure this reason constructs in the survey. Accordingly, reasons for adoption were measured as the second-order construct of “convenience”, “speed”, and “simplicity” and reasons against adoption were measured as a second-order construct for “usage barrier”, “risk barrier” and “tradition barrier”.

The measures for this study were derived from previous studies conducted in the domain of behavioral decision making (Migliore et al., 2022; Gupta Arora, 2017; Ajzen, 2001). These studies have provided tested scales to measure the main constructs. To facilitate comprehension, these measures were translated into Nepali language by the authors before conducting the survey. The main constructs were measured using a seven-point Likert scale (1 = “Strongly Disagree”, 7 = “Strongly Agree”). To collect the data, translated questionnaires were distributed manually to the retail vendors.

The data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) (Gerbig & Anderson, 1988) in R v4.2.2. Gerbig & Anderson (1988) used two-step approach to test the hypothesis. In the first step, reliability and validity of the measurement model was tested. In the second step, the structural relationships between the constructs were examined.

3 Results

The demographic profile of the sample is presented in table I.

TABLE I. Demographic Profile of Respondents

Profile	Measures	Percentage
Gender	Male	82
	Female	18
Education	Master	4
	Bachelor	33
	Intermediate	39
	Less than intermediate	24
Age	Less than 40 years	75
	More than 40 years	25

First, the measurement properties (reliability, convergent validity, and discriminant validity) were tested for all the first-order constructs. The results are presented in table II and table III.

The results show that all measures have high reliability and convergent validity, with composite reliability (CR) exceeding 0.70 and Average Variance Extracted (AVE) exceeding 0.50 (Hair Jr. et al., 2017). In PLS-SEM, reliability and convergent validity are established when the Cronbach’s alpha and CR are greater than 0.60 and AVE is greater than 0.50 (Hair Jr. et al., 2021).

The discriminant validity of the measures has also been established. The study tested the Hetero-trait Mono-trait Ratios (HTMT) of the measurement constructs and found them to be below the maximum threshold level of 0.90 (Hair Jr. et al., 2017). HTMT is defined as the mean value of indicator correlations across constructs relative to the geometric mean of the average correlations measuring the same construct (Hair Jr. et al., 2021). Discriminant validity problems arise when HTMTs are higher than 0.90.

TABLE II. Reliability and Convergent Validity

Constructs	Cronbach’s Alpha	AVE	CR
Intention	0.86	0.78	0.86
Attitude	0.82	0.58	0.83
Convenience	0.71	0.52	0.74
Speed	0.81	0.64	0.82
Simplicity	0.71	0.63	0.71
Usage Barrier	0.85	0.77	0.87
Risk Barrier	0.74	0.65	0.74
Tradition Barrier	0.83	0.75	0.84
Value	0.73	0.64	0.76

TABLE III. Discriminant Validity (HTMT Ratios)

Constructs	1	2	3	4	5	6	7	8	9
Intention	-	-	-	-	-	-	-	-	-
Attitude	0.87	-	-	-	-	-	-	-	-
Convenience	0.55	0.64	-	-	-	-	-	-	-
Speed	0.56	0.70	0.74	-	-	-	-	-	-
Simplicity	0.64	0.71	0.59	0.67	-	-	-	-	-
Usage Barrier	0.34	0.42	0.31	0.41	0.44	-	-	-	-
Risk Barrier	0.55	0.61	0.49	0.59	0.57	0.65	-	-	-
Tradition Barrier	0.50	0.58	0.46	0.48	0.56	0.69	0.88	-	-
Value	0.33	0.37	0.21	0.24	0.22	0.16	0.25	0.28	-

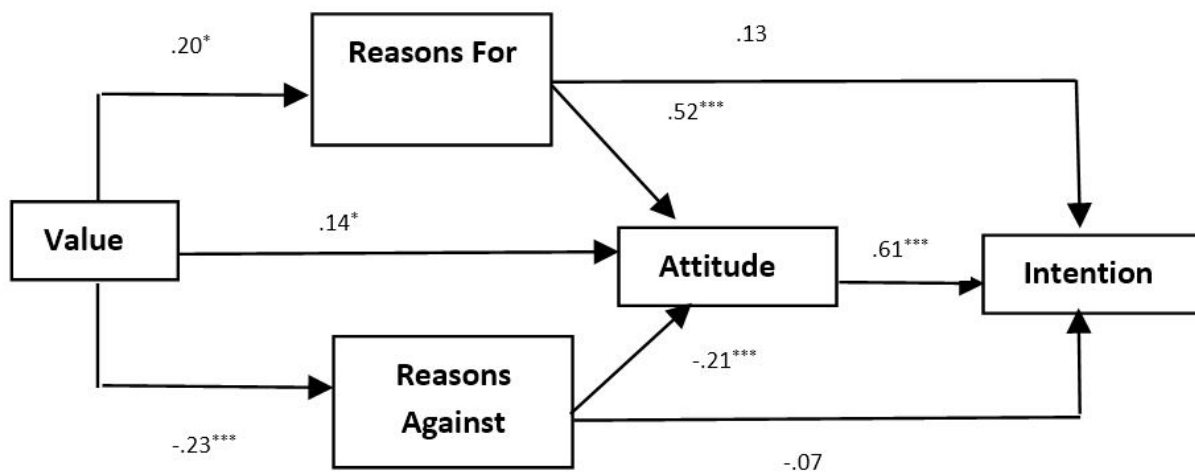
Second-Order Constructs

Individual's reasons are often expected to have considerable variability on how they rate the different reasons predicting behavior (Westaby, 2005). This implies that one reason could potentially account for most of the variance in attitudes or intentions (Claudy et al., 2015). Thus, instead of bundling all the reasons directly into reasons constructs, this study measures all the reasons as separate constructs and develops a second-order construct for the reasons for and reasons against constructs. An advantage of this approach is that it can allow the measurement of influence of specific reason in the overall adoption decision and will also assist in examining constituents of those reasons in different contexts (Claudy et al., 2015). Table 4 shows that second-order path coefficients are all significant.

Structural Model

In the second step of two-step analysis, the hypothesized relationships between constructs (values, reasons constructs, attitude, and intention) were tested using the structural model. To examine the hypothesized relationship through PLS-SEM, bootstrapping using 10,000 sub-samples was conducted at 95

The findings show that the data supported six of the eight hypotheses and did not support two. The results demonstrate that reasons significantly influence attitude towards adoption but do not influence adoption intentions of retail vendors towards QR-code payment system. The vendors' reasons for adoption (H2a: = 0.52, $p < 0.01$) and reasons against adoption (H2b: = -0.21, $p < 0.01$) are strong predictors of attitude towards QR-code payment. Attitude towards QR-code payment (H1: = 0.61, $p < 0.01$) is shown to be strong predictor of intention to adopt. Furthermore, the value of openness to change influences reasons for (H4a: = 0.20, $p < 0.05$), reasons against (H4b: = -0.23, $p < 0.01$), and attitude towards QR-code payment (H5: = 0.14, $p < 0.05$).



*Significant at 0.05 ***Significant at 0.01

FIGURE 1. Structural Model with Path Coefficients

4 Discussion

This study contributes to the DOI literature by applying BRT to test the influence of disparate reasons on retail vendors' cognitive processing of innovation adoption decisions. This study has examined the role of reasons for and reasons against adoption on the decision-making process of retail vendors in Nepal. Past studies of adoption of QR-code payment have focused primarily on consumers' adoption (Herath et al., 2020; Gupta & Arora, 2017). The studies on vendors' adoption of innovation are especially lacking in Nepal. By focusing on retail vendors, this study has examined reasons for (convenience, speed, simplicity) construct's strong influence on attitude towards QR-code payment. Moreover, the second-order construct shows that speed is the greatest facilitator of adoption of QR-code payment among retail vendors and tradition barrier as the greatest barrier of adoption. The value of openness to change also negatively influences reasons against adoption. This implies that people with low openness to change may find themselves more influenced by reasons against adoption when presented with the opportunity to adopt QR-code payments.

There is a strong positive influence of attitude on intention to adopt QR-code payment. This finding implies that to maintain adoption among the retail vendors, marketing efforts directed towards them must focus on generating positive attitude towards the system by improving convenience, speed, and simplicity rather than trying to change the behavior of the vendors directly.

BRT postulates that reasons predict intentions because it facilitates behavior by maximizing the utility (minimizing the disutility) of the consequence of the behavior (Westaby, 2005) by providing justifications of defenses for the behavior. Past theories like TAM and UTAUT have also directly tested the influence of subjective factors of innovations on behavioral intentions and found significant relationships among them. However, the finding of this study does not support this hypothesis because the influence of reasons on intention to adopt is insignificant.

This discrepancy between previous findings and the findings of this study can be potentially explained by examining the differences between the characteristics of the population under study. Adoption of innovation studies are primarily focused on consumers' adoption. In this study, the shift to retail vendors (who play the role of suppliers in the economy) may have generated differences in results because the behavioral decision-making process of consumers and vendors in the context of innovation adoption may be different.

There may exist a few more explanations for the insignificant relationship between reasons for and intentions to adopt. One of them would be the perceived switching cost to the vendors which can make them skeptical in adopting QR-code payment even though they may have reasons for adopting it (Chulkov, 2017). This would mean that vendors take a lot of time forming judgments towards the object of adoption before engaging in the behavior to adopt.

Endowment effect and status-quo bias may also explain the insignificant relationship between reasons for and intention to adopt (Kahneman et al., 1990). The propensity of an individual to prefer the status-quo when faced with uncertain outcomes because of a psychological phenomenon called "loss-aversion" implies that retail vendors may not intend to adopt QR-code payment even though they may have reasons for adopting it.

5 Conclusion

This study has used BRT to understand the influence of reasons on behavioral decision-making process of retail vendors of Nepal and have identified unique relationships among the constructs. However, this study is based on a cross-sectional survey. Future studies can incorporate longitudinal data collection to examine the influence of reasons on actual behavior. Another limitation is that this research has not integrated the influence of switching cost and endowment effects. Future studies can use perceived switching costs and endowment effects as moderating variables to further understand the relationships between reasons and behavioral decision-making process.

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