Analysing Customers' Perception on QR Payment in Kathmandu Valley: An Empirical Study using UTAUT and PLS-SEM

Alina Maharjan[1], Ranjana Kumari Danuwar[1]*, Mijala Kayestha[1], Mahesh Maharjan[1], Deep Kumar Baral[1], Amita Koirala[1] & Dhurba Prasad Timalsina[1]

[1] Kathmandu Model College, Tribhuvan University, Bagbazar, Kathmandu, Nepal
*Corresponding Email: ranjanadanuwar052@gmail.com

How to cite this paper:
Maharjan, A., Danuwar, R. K., Kayestha, M., Maharjan, M., Baral, D. K., Koirala, A., & Timalsina, D. P. (2024) . Analysing Customers' Perception on QR Payment in Kathmandu Valley: An Empirical Study using UTAUT and PLS-SEM. *Quest Journal of Management and Social Sciences, 6*(1), 57-73. https://doi.org/10.3126/qjmss.v6i1.67216

Abstract

Background: The growing use of the Fintech industry significantly impacts the popularity of QR payment. The easy and convenient use of digital payment systems has increased the adoption of QR payments. The study analyses customers' perceptions of QR payment in the Kathmandu Valley.

Methods: The study uses explanatory research design to analyse the connections and causal effects between the determinants that affect the customer perceptions of using the QR payment system in the Kathmandu Valley. Non-probability sampling with convenient sampling is used for the study. Data is collected from 280 customers who have used QR payment services using the Structural Questionnaire through the Kobo Toolbox. Similarly, the Structural Equation Modeling (SEM) using the Partial Least Square (PLS) version 4.0 is adopted for analysis.

Results: The study highlights a growing trend among respondents, with an increasing number habitually using QR payments for 1-3 years. E-sewa, Fone pay, and Connect IPS are popular choices for activities like fund transfers and bill payments. Despite facing challenges such as technical glitches and debited funds from failed transactions, respondents view QR payments as a convenient method. However, these challenges can be addressed through regular maintenance, enhanced internet infrastructure, transaction flexibility, stable connectivity, and improved system performance.

Conclusions: The result shows a significant relationship between the independent variables, such as performance expectation and facilitating conditions and the dependent variable, i.e., customer perception. It indicates that when users perceive higher performance benefits from QR payment, their overall perception improves. Similarly, when users perceive a favourable environment for QR payment adoption, their perception is positively influenced, enforcing the increasing use of QR payment.

Paper Type: Research Type

Keywords: QR Payment, Performance expectations, Social influence, Effort expectancy, Facilitating conditions

Introduction

The rising prevalence of mobile phones and technological advancements have brought a transformative change in the payment landscape (Devkota et al., 2021a; Magar et al., 2023). The widespread adoption of smartphones and internet access exemplifies the advancements in Information and Communication Technologies (ICT), enhancing the flexibility of people's daily activities (Dhungana et al., 2022; Parajuli et al., 2021). According to Alwahaishi and Snásel (2013), the transition from a cash-based economy to a card-based one highlights this dynamic shift. Digital payment transfers value from one payment account to another through digital devices, encompassing, but not restricted to, mobile phones, point-of-sale systems, computers, and digital channels. In Nepal, prevalent forms of digital payment comprise digital wallets, payment gateways, e-banking, mobile banking, plastic cards, automated teller machines, point-of-sale machines, and various other methods (Maharjan et al., 2022). According to the Nepal Telecommunication Authority (2020), 82.79 % of Nepali people have access to internet service (Devkota et al., 2021b), using digital payment methods has become a part of everyone's everyday lives (Dhital, 2021)

In the 1960s, Japan experienced significant economic growth, leading to the establishment of supermarkets that offered a diverse range of products, from food to clothing. Within these retail stores, the manual input of prices into cash registers was an essential step in the operation of checkout counters. Unfortunately, cashiers developed carpal tunnel syndrome and wrist numbness as a result of this process, which made them very motivated to reduce their physical stress. The advent of barcodes provided a tangible solution to this problem (Rainer & Prince, 2022). Nevertheless, as the use of barcodes grew increasingly prevalent, their inherent limits became apparent. According to Muniz et al. (1999), individuals reached out to DENSO WAVE INCORPORATED, a division of DENSO CORPORATION involved in the development of barcode readers, to inquire about the feasibility of enhancing barcodes to accommodate a broader range of information. Specifically, they expressed their interest in encoding not only alphanumeric characters but also Kanji and Kana characters (Muniz et al., 1999). The adoption of QR payments is on the rise, with Quick Response (QR) Codes fueled by the swift advancement of mobile technology; QR codes have gained widespread popularity and are now utilised for various purposes, including mobile marketing. According to Demir et al. (2015) study, individuals can effortlessly scan the code using mobile devices, granting them access to specific sources or online content. QR codes effectively bridge the gap between the physical and digital worlds, providing consumers with an interactive and engaging purchasing experience. A small QR Code was developed to address the demand for more compact codes, officially designated as a JIS standard in 2004. In 2008, the QR Code was introduced, known for its compact size and high data storage capacity, allowing the use of rectangular code modules. Over time, it evolved to include rectangular code modules and became available for usage. Additionally, a QR Code variant has been developed to address evolving consumer needs, particularly regarding privacy concerns (Muniz et al., 1999). Unlike barcodes, QR codes have an additional error-checking element that ensures accurate decoding, even in cases where some code sections are unreadable.

Globally, QR payments have gained popularity, particularly through widely used mobile payment services such as Apple Pay, Google Pay, and Samsung Pay, which utilise QR codes to facilitate transactions on smartphones (Klein, 2020). The adoption of QR payments is evident in the growing retailers and restaurants, often accompanied by discounts to encourage customer adoption. Japan actively promotes QR codes in retail and hospitality, while the UK explores potential benefits through a digital payments task force (Chorzempa, 2021). In Japan, QR payments have been deeply ingrained for decades, and QR codes are gaining popularity, particularly among younger security-conscious consumers in the United States (Lu, 2018). Therefore, QR payments are set to play a pivotal role in future transactions as adoption continues to rise.

In the Nepalese context, QR codes are widely used in big cities and remote areas, and small businesses, social events, and major sectors like department stores and restaurants embrace them. NMB Bank introduced a QR code event for Balkhu's vegetable sellers (Ghimire, 2022). The COVID-19 pandemic has increased digital payment acceptance and usage in Nepal (Maharjan et al., 2022; Magar et al., 2023), particularly QR payments. Likewise, the study on mobile QR payments in Nepal revealed higher satisfaction and enthusiasm among younger consumers. Similarly, social distancing measures have led individuals to prioritise contactless methods due to concerns about infection. QR payments offer flexibility, enhanced security, and time-saving benefits, catering to urban and remote populations. The Scan and Pay sector in Nepal has seen significant growth, with providers like Fonepay, IME Pay, Khalti, Q Pay, and Smart QR actively promoting contactless payments. Nepal Rastra Bank reported 372,176 QR code transactions totalling 1.245 billion Indian Rupees from mid-December 2020 to mid-January 2021, followed by a surge with 535,790 transactions totalling Rs 1.712 billion in the next month. Nine Payment Service Operators (PSOs) and 18 Payment Service Platforms (PSPs) and mobile wallets have received authorisation for QR code services (NRB). Hence, the Nepal Rastra Bank's strategies encouraged more and more retailers across various areas to adopt QR code payments. Therefore, the study aims to identify and analyse the key aspects that contribute to consumers using the QR payment system in Kathmandu Valley. This study used the Unified Theory of Acceptance and Utilize of Technology (UTAUT) model to examine the factors influencing individuals' desire to utilise QR Payment. The UTAUT theory aims to explain the user's intentions to use the technology and subsequent usage behaviour.

The remaining part of the study is divided into four sections. The next section follows the methodology and highlights the conceptual framework, hypothesis formulation, study area, and sample size determination. The third section includes the study's results, and the fourth section deals with the discussion and conclusion.

Research Methods

Conceptual Framework

Various theoretical models have been reviewed to explain the technology adoption process. These include the Theory of Reasoned Action, the Planned Behavior Technology Acceptance Model, the Unified Theory of Acceptance and Use of Technology, and the Health Belief Theory. As per TRA, an individual's behavioural intention is contingent upon their attitude towards the behaviour, specifically whether they would typically engage in such behaviour. According to the TPB, individual intentions are influenced by subjective standards, personal attitudes, and perceived behavioral control. The TPB has been used to determine users' intention to adopt technology (Teo & Lee, 2010). Similarly, The Technology Acceptance Model (TAM) states that the extent to which individuals view technology as easy to use and beneficial influences their likelihood of adopting and using it. At the same time, the Unified Theory of Acceptance and utilise of Technology (UTAUT) is a very effective model for forecasting the likelihood of success in the implementation of new technologies, as well as identifying the factors that impact users' desire to utilise those technologies Lastly, Health Benefit Theory to forecast individuals' behavior suggests that individuals are more inclined to engage in a certain activity if they see it as reducing the likelihood of a serious condition and is widely used in scholarly literature related to the adoption of technology.

In this research, different conceptual reviews and theoretical reviews regarding QR payment adoption are observed. From those theoretical reviews, the Unified Theory of Acceptance and Use of Technology theory is most relevant to the study. The Unified Theory of Acceptance and Use of Technology (UTAUT) is a comprehensive model that explains user intentions to use technology and subsequent usage behavior. It integrates elements from various theoretical frameworks and provides a robust structure for understanding technology acceptance.

The model conducted in the study reviews several Conceptual models, such as factors influencing QR-code payment Adoption (Suo et al., 2022), the Conceptual model for convertibility and user behavior, the conceptual model for behavioral intention to adopt QR-code payment (Witjaksono et al., 2021), conceptual model for exploring health adoption (Lim et al., 2019) and conceptual model influencing factors of e-payment adoption. Among them, the conceptual model of Mat Dawi (2019) is reviewed and adapted as per the research need.

Figure 6: Conceptual Model for Factors Influencing QR-Code Payment Adoption

Figure 1: Conceptual Framework
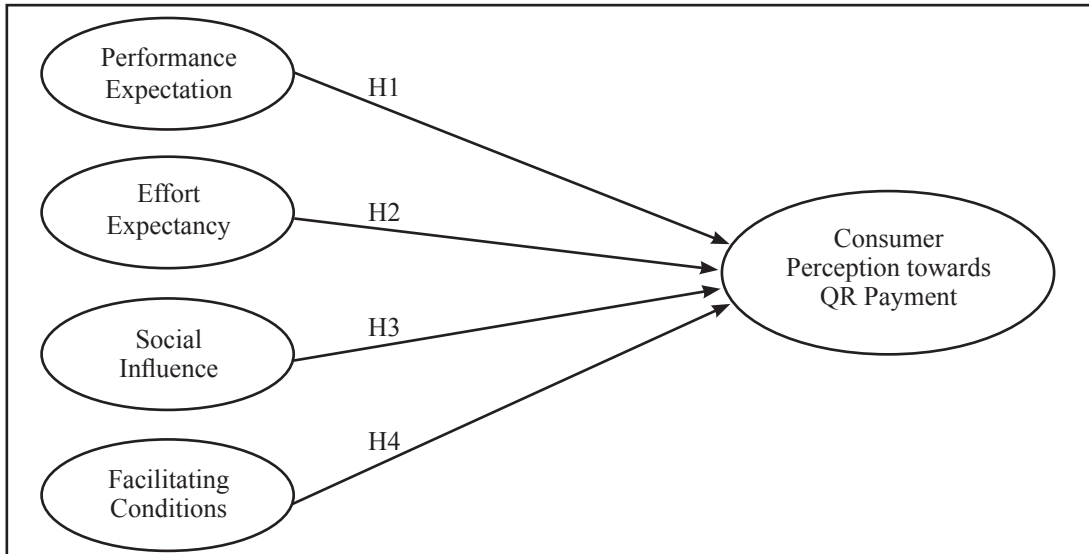
Source: Modified from Mat Dawi (2019)

This framework explains the primary factors that influence a customer's perception of QR payment, which include performance expectations, social influence, effort expectancy, and facilitating conditions for QR payment adoption. As per the model, performance expectations, social influence, effort expectancy, and facilitating conditions are the independent variables, while the customer's perception of QR payment is a dependent variable.

Performance Expectations and Customers' Perception Toward QR Payment

Performance expectation refers to the perceived benefits and usefulness that individuals associate with a particular technology or payment method. In the context of customers' perceptions of QR payment, performance expectation plays a significant role. Research suggests a positive relationship between performance expectations and customer's perception of QR payment. When individuals perceive QR payment as offering advantages such as convenience, efficiency, and security, it enhances their overall perception and acceptance of this payment method. A study by Putera Kosim and Legowo (2020) conducted in Portugal found that customers who perceived QR payment as providing a higher level of performance and benefits were more likely to have a positive perception and intention to adopt QR payment.

H1: *There is a significant relationship between Performance Expectation and Customers Perception toward QR Payment.*

Effort Expectancy and Customers' Perception toward QR Payment

Effort expectancy refers to the perceived ease of use and the level of effort individuals require to adopt

and use a particular technology or payment method. In the context of customers' perception towards QR payment, effort expectancy plays a crucial role. Research suggests a positive relationship between effort expectancy and customer's perception of QR payment. When individuals perceive QR payment as easy to understand, learn, and use with minimal effort, their overall perception of it is enhanced. A study by Prabhakar and Ramesh (2021) in India found that customers who perceived QR payment as effortless and convenient had a more positive perception towards its adoption, highlighting the importance of ease of use in shaping customers' perceptions.

H2: *There is a significant relationship between Effort Expectancy and Customers Perception toward QR Payment*

Social Influence and Customers' Perception toward QR Payment

Social influence is the effect people or collectives exert on an individual's attitudes, beliefs, and behaviors (Matthew et al., 2011). Social influence plays a significant role in customers' perception of QR payment. Research suggests that social influence has a positive relationship with customer's perception of QR payment. When individuals observe their peers, family members, or influential figures using QR payment and expressing positive experiences, their own perceptions tend to be shaped positively. This influence can create a sense of trust and credibility, increasing the likelihood of adopting QR payment methods,

H3: *There is a significant relationship between Social Influence and Customers Perception toward QR Payment*

Facilitating Conditions and Customers' Perception toward QR Payment

Facilitating conditions refer to the availability of resources, support, and infrastructure that enable individuals to adopt and use a particular technology or payment method. In the context of customers' perception towards QR payment, facilitating conditions play a crucial role. Research suggests a positive relationship between facilitating conditions and customer's perception of QR payment. When individuals have access to necessary resources such as smartphones, reliable internet connectivity, and a network of merchants accepting QR payments, it enhances their overall perception and acceptance of this payment method. A study by Shrestha and Shrestha (2021) conducted in Nepal found that customers with access to facilitating conditions, such as widespread merchant acceptance and availability of QR payment infrastructure, had a more positive perception of adopting and using QR payment.

H4: *There is a significant relationship between Facilitating Conditions and Customers Perception toward QR Payment*

The relative items of each construct were developed to test the hypothesis. Five items explain Performance Expectation, Effort Expectation, Social Influence, Facilitating Conditions and Customer Perception towards QR Payments.

Table 1: Variables and their Definition

Construct	Variable	Variable Notation	Items
Performance Expectation (PE)	Perceived Usefulness	PE_1	I think QR Payment would be a helpful tool for my daily tasks.
	Transaction Speed	PE_2	I could complete my financial transactions more rapidly if I used QR Payment.
	Time-Saving	PE_3	It would save me time to accomplish other things in my daily life if I used QR Payments.

Construct	Variable	Variable Notation	Items
	Convenience	PE_4	My convenience would increase with QR Payment.
	Task Efficiency	PE_5	Many everyday tasks will be completed more quickly using a QR payment system.
Effort Expectation (EE)	Clarity of Interaction	EE_1	My use of QR payments would be clear and simple.
	Learning Ease	EE_2	I would have no trouble learning how to utilise QR payments.
	Ease of Use	EE_3	I think using a QR code to pay is simple.
	User-Friendliness	EE_4	QR payment is simple and user-friendly.
Social Influence (SI)	Social Influence Perception	SI_1	People who have behavioral influence on me would advise me to utilise QR payments when available.
	Significance of Others' Opinion	SI_2	People who matter to me would advise me to utilise QR codes for payments when available.
	Social Support	SI_3	I may get help from people I care about while using QR payments. (when available).
	Opinion Appreciation	SI_4	Individuals whose viewpoints I value tend to like the QR payment method.
Facilitating Conditions (FC)	Resource Availability	FC_1	The fast internet and contemporary gadgets required to utilise the QR payment method are available.
	Knowledge and Competence	FC_2	I'm knowledgeable enough to use the QR payment method.
	Availability of Assistance	FC_3	To assist with the challenges of the QR payment system, a dedicated person (or group) is available.
	Customer Support Satisfaction	FC_4	The QR payment system is supported by reliable and accessible customer support services that can aid in case of any issues or challenges.
	Integration and Accessibility	FC_5	The QR payment system is seamlessly integrated into the existing infrastructure, making it easy to access and use across various platforms and devices.
Customer Perception (CP)	Convenience and Time-saving Perception	CP_1	I perceive QR payment services as a convenient and time-saving option for my financial transactions.

Construct	Variable	Variable Notation	Items
	Acceptance and Flexibility Appreciation	CP_2	I appreciate the wide acceptance of QR payments across various merchants and establishments, providing me with flexibility in payment options.
	Transaction Tracking and Monitoring Value	CP_3	I value the ability to track and monitor my transactions easily through QR payment records or digital receipts.
	Image and Innovation Perception	CP_4	I perceive QR payment as a modern and innovative way to make payments, reflecting positively on my personal image and tech-savviness.
	Checkout Experience Enhancement	CP_5	QR payment systems offer a seamless and efficient checkout process, enhancing my overall shopping experience.

Study Area, Population and Sampling Techniques

The study area chosen for the study is the Kathmandu Valley, the districts of Kathmandu, Lalitpur and Bhaktapur in the Bagmati province of Nepal (Devkota et al., 2021c; Bhandari et al., 2021). The Kathmandu Valley is the capital and economic hub of Nepal, making it a significant center for business activities, including the adoption of digital payment methods. As a result, studying customer perceptions towards QR payment in this region provides valuable insights into the dynamics of a rapidly evolving market. By conducting research in this location, one can capture a comprehensive understanding of customer perceptions across various demographic groups, ensuring a more comprehensive analysis of QR payment adoption and usage. Moreover, the Kathmandu Valley has witnessed significant advancements in technology and digital infrastructure in recent years. This technological progress and increasing smartphone penetration present an appropriate environment for adopting QR payment systems. By focusing on Kathmandu Valley, one can explore the impact of these technological developments on customer perceptions and their willingness to adopt QR payment. Lastly, conducting research in the Kathmandu Valley allows access to many businesses implementing QR payment systems, including retail stores, restaurants, and service providers. This access enables us to gather firsthand data and insights from both customers and businesses, offering a comprehensive perspective on the challenges, benefits, and opportunities associated with QR payment adoption.

Non-probability with convenience sampling technique will be used for the study as the data is collected from customers who have faced the merger and acquisition of their banking channel. Following the Parajuli et al. (2021), the given formula to drive the sample size which is given as: $n_0 = Z^2 pq/e^2$, Where n_0 = sample size for study, Standard tabulated value for 5% level of significance (z) = 1.96, prevalence or proportion of an event 50% = 0.50, p = 0.5, q = 1-P, = 0.5, Allowable error that can be tolerated (e) = 6%. This study also undertakes a 5% non-response error. Thus, the sample size taken for the study was 280.

Research Instrument and Data Collection

The structural questionnaire was the primary research instrument used in this study. In this study, close-ended questions are prepared to address the issues. After preparing the questionnaire, the researcher focused on its sequencing and arrangement. The formulated structured questionnaires are administered

in the Kobo Toolbox for data collection. After the questionnaire was administered to the Kobo Toolbox, I administered a pilot survey of 10-15 respondent sample questions to confirm the consistency and accuracy of the instrument. Data was collected from mid-July 2023 to mid-August 2023. Respondents from various occupation backgrounds and age groups were selected for variation in the sample. Several people who frequently use QR payment gateways to make transactions were approached to fill out the questionnaire.

Result and Analysis

Socio-Demographic Analysis

A total of 286 respondents were taken in the survey, where the majority of the respondents are male (62.50%) and the rest 37.50% are female respondents. It reveals that most respondents are under the age group (20-39), represented by 81.43%, while 12/86% of respondents fall in the age group below 19, and the rest fall in other groups. In this study, a majority of the respondents are master's graduates (24.29%), while the lowest percentage are illiterate, which shows that educated people are involved in the survey. The surveyed group encompasses diverse occupations: 15.00% self-employed/business owners, 0.71% government employees, 6.79% in finance/banking, 8.21% health professionals, and 16.79% in IT/tech. Furthermore, 2.50% are in manufacturing, 12.50% in private services, 3.57% are teachers/academicians, 30.71% are students, and 3.21% represent various other sectors. The majority of the respondents have an income level below 25000. Additionally, regarding the frequency of bank visits, 38.81% have visited the bank daily, and 25.17% have visited the bank at least once a week. This comprehensive dataset underscores the rich diversity present across gender, age, education, occupation, and income categories among the respondents.

Table 2: Socio-Demographic Analysis

Title	Category	Number	Percentage (%)
Gender	Male	175	62.50
	Female	105	37.50
Age	Below 19	36	12.86
	20 – 39	228	81.43
	40 – 49	9	3.21
	50 and above	7	2.50
Education	Up to SLC/SEE	16	5.71
	Intermediate/+12	51	18.21
	Bachelors	137	48.93
	Masters	68	24.29
	Above Masters	1	0.36
	Other	7	2.50
Occupation	Self Employed / Business Owner	42	15.00
	Government Employee / Civil Servant	2	0.71
	Financial Sector / Banking	19	6.79
	Health Professional	23	8.21

Title	Category	Number	Percentage (%)
	IT / Tech Professional	47	16.79
	Manufacturing / Industrial Worker	7	2.50
	Service Industry Worker (Private)	35	12.50
	Teacher / Academician	10	3.57
	Student	86	30.71
	Home Maker	0	0.00
	Other	9	3.21
Income	Below 25000	141	50.36
	25000 to 50000	92	32.86
	50000 to 75000	14	5.00
	75000 to 100000	2	0.71
	100000 Above	31	11.07

Source: Survey Data (2023)

Factor determining intention to use QR Payment

The study reveals widespread adoption of QR payment, with 54.29% using it for 1-3 years. E-sewa (68.57%) and Fone pay (63.21%) lead, reflecting their popularity. Other options like Khalti (28.93%) and Connect IPS (27.5%) also see substantial use. In the last year, 28.93% of people used QR payments, indicating a quick uptake and 38.57% use QR payments frequently for day-to-day transactions, indicating a shift toward convenience. QR payments serve diverse purposes: 71.79% for fund transfers and 64.64% for utility bills. 46.43% see QR payments as an alternative, and 55.36% recognise their efficiency. 43.93% express moderate comfort, highlighting the gradual integration of QR payments. In conclusion, QR payment usage is becoming a day-to-day habit of utilising the facilities of the QR system for activities such as fund transfer, bill payment, etc., which they feel is a comfortable medium.

Table 3: Factor determining intention to use QR Payment

Variables	Explanation	Frequency	Percentage (%)
Years of Usages	Below 1 Year	81	28.93
	1 to 3 Years	152	54.29
	4 to 5 Years	30	10.71
	5 Years Above	17	6.07
Mode of Payment	Esewa	192	68.57
	Fonepay	177	63.21
	Khalti	81	28.93
	Connect IPS	77	27.5
	Nepal Pay	31	11.07
	Prabhu Pay	11	3.93
	IME Pay	10	3.57

Variables	Explanation	Frequency	Percentage (%)
Day-to-day transactions	Rarely	33	11.79
	Occasionally	72	25.71
	Frequently	108	38.57
	Very Frequently	67	23.93
Purpose of QR Payment	Utility Bill Payment	181	64.64
	Fund Transfer	201	71.79
	Merchant Payment	86	30.71
	Online Shopping Payment	147	52.5
	Bill Sharing	86	30.71
	Others	41	14.64
Preference of QR Payment	Ease of Use	61.07	171
	Security	4.64	13
	Time-Saving	34.29	96
QR Payment Evaluation	Alternative Choice	130	46.43
	Supportive Instrument	78	27.86
	Substitute	72	25.71
Efficiency of QR Payment	Extremely Efficient	56	20
	Efficient	155	55.36
	Moderately Efficient	42	15
	Less Efficient	0	0
	Extremely Less Efficient	0	0
Comfortability of QR Payment usage	Somewhat Comfortable	61	21.79
	Moderately Comfortable	123	43.93
	Extremely Comfortable	96	34.29

Challenges that the Customers are facing while using QR Payment

The array of challenges associated with QR payment adoption encompasses technical glitches and connectivity issues, which affect 60% of respondents, potentially disrupting smooth transaction processes. Security concerns related to personal and financial information, noted by 21.43% of respondents, underline the importance of addressing user worries about data protection. Transaction limits and restrictions pose an obstacle for 31.43% of participants, possibly indicating the need for more flexible transaction policies. Dependence on stable internet connectivity, cited by 36.43%, emphasises the crucial role of consistent online access for QR payment reliability. Inconvenience from damaged or unreadable QR codes is recognised by 25.36%, underscoring the significance of maintaining easily scanable codes. Lack of user education and awareness (27.86%) signals a need for enhanced user training to maximise the adoption potential. A substantial 40.36% expresses dissatisfaction over funds being debited despite failed transactions, revealing a critical area for improvement. Lastly, miscellaneous challenges, accounting for 2.5%, capture unique issues not captured by the categories above.

In this study, respondent reveals their opinion on solving the problem associated with QR payment adoption. The respondents believed these challenges could be overcome by considering the various factors (See Figure 2).

Figure 2: Factors for Managing Challenges of QR Adoption
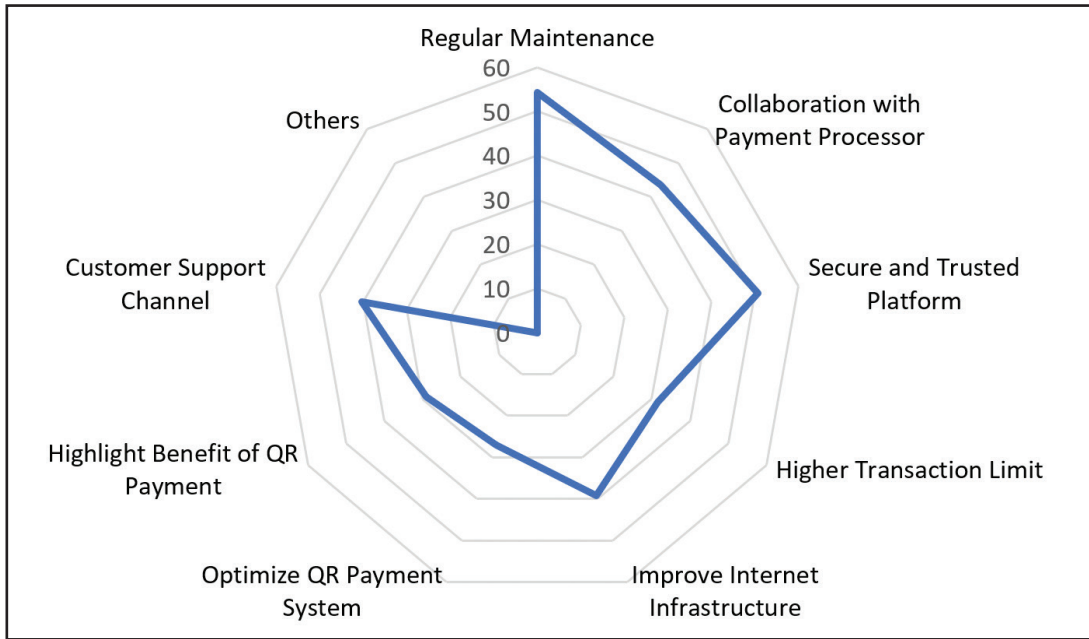
The respondents feel that the challenges can be mitigated through regular maintenance (54.29%), collaboration with payment processors (43.57%), and a secure and trusted platform (50.71%). Additionally, higher transaction limits (31.43%), improved internet infrastructure (39.29%), and optimised QR payment systems (27.14%) focus on vital technological and infrastructure elements for successful QR adoption. These solutions address user concerns about transaction flexibility, stable connectivity, and system performance. Emphasising QR payment benefits (28.93%) and creating a customer support channel (40.36%) prioritise user engagement and education, stressing the importance of communicating advantages and assisting users in overcoming challenges.

Inferential Analysis

Inferential analysis aims to determine the result from the sample data from numerous statistical tests, find the relationship with the variables, evaluate differences, and make forecasts (Chatfield, 1995). This includes the measurement model, structural model, and path analysis.

Measurement Model Results

The measurement model is assessed to measure the reliability and validity of the constructs. The outer model was assessed by evaluating the internal consistency through composite reliability, even though evaluations of Cronbach's alpha have become standard processes in research. It typically provides conservative assessment in PLS-SEM (Tavakol & Dennick, 2011). Previous literature has suggested using "Composite Reliability" as a replacement (Bagozzi and Yi, 1988; Hair et al., 2013). This is considering that all composite reliability values are >0.7, indicating satisfactory internal consistency.

Table 4: Reliability and Validity

Coding	Latent Variables and Items	Factor Loadings	AVE	CR	Cronbach Alpha
PE	**Perception Expectation**				
PE_2	Transaction Speed	0.796	0.72	0.885	0.807
PE_3	Time-Saving	0.836			
PE_5	Task Efficiency	0.91			
EE	**Effort Expectancy**				
EE_2	Learning Ease	0.874	0.76	0.905	0.843
EE_3	Ease of Use	0.885			
EE_4	User-Friendliness	0.857			
SI	**Social Influence**				
SI_1	Social Influence Perception	0.779	0.677	0.893	0.851
SI_2	Significance of Others' Opinion	0.839			
SI_3	Social Support	0.801			
SI_4	Opinion Appreciation	0.87			
FC	**Facilitating Conditions**				
FC_1	Resource Availability	0.915	0.779	0.876	0.721
FC_2	Knowledge and Competence	0.849			
CP	**Customer Perception**				
CP_1	Convenience and Time-saving Perception	0.811	0.747	0.898	0.83
CP_2	Acceptance and Flexibility Appreciation	0.884			
CP_3	Transaction Tracking and Monitoring Value	0.895			

The reliability and validity of the study were met through composite reliability and average variance, which had threshold limits of 0.5 and 0.7, respectively. The convergent validity of the model was assessed using average variance extracted (AVE). It demonstrates how closely the construct's items are related to one another. A good indicator of convergent validity is an AVE value greater than 0.5 (Fornell & Larcker, 1981). All scores were >0.5, and all values were above the recommended threshold. A few items construct were deleted to achieve the minimum acceptance level of AVE (Hair et al., 2013).

Discriminant Validity

The discriminant validity is used to determine the difference of one element from another. The Fornell and Larcker Criterion, Heterotrait -Monotrait Ratio (HTMT), and cross-loading are techniques used to measure test discriminant validity. Fornal and Larcker's criterion was satisfied as the all-AVE square roots were more significant than the corresponding correlation (Hair et al., 2019). HTMT is used to estimate the correlation between the constructs. According to Henseler et al. (2015), the threshold limit for this is 0.85 or less, while Kock (2022) recommends a threshold of 0.90. In this study, all the HTMT and Fornell and Larcker criteria have been met, which confirms the discriminant validity of the study.

Table 5: Discriminant Validity- Fornell and Larcker Criterion

	Heterotrait Monotrait Ratio (HTMT)					Fornell and Larcker Criterion				
	CP	**EE**	**FC**	**PE**	**SI**	**CP**	**EE**	**FC**	**PE**	**SI**
CP						0.864				
EE	0.67					0.564	0.872			
FC	0.891	0.864				0.704	0.673	0.883		
PE	0.648	0.808	0.701			0.55	0.67	0.546	0.848	
SI	0.435	0.673	0.649	0.531		0.406	0.561	0.51	0.435	0.823

Discriminant validity was further verified using cross-loadings. Cross-loading determines if an item strongly loads onto its parent construct rather than the other construct in the study. Additionally, there is no cross-loading problem because the item's cross-loading values with other constructs are less than 0.7. (Hair et al., 2020).

Structural Model Analysis

The structural model and its underlying variables are a reliable and theoretically grounded connection between the observable input and output data. The primary aim of the analysis is to forecast the output layer information by leveraging the input layer data, relying on the framework. (Richter, Nicole Franziska, et.al) In PLS-SEM, When conducting a structural equation model (SEM), it is advised to test the collinearity issue. VIF is used to check the collinearity issue in the study. The VIF value must be in the range of <3.33, <5, <10).

Path Analysis

Path analysis estimates and evaluates the magnitude and significance of hypothesised causal connections among sets of variables using path diagrams, which graphically represent the theoretically based causal relationships among variables (Stage et al., 2004).
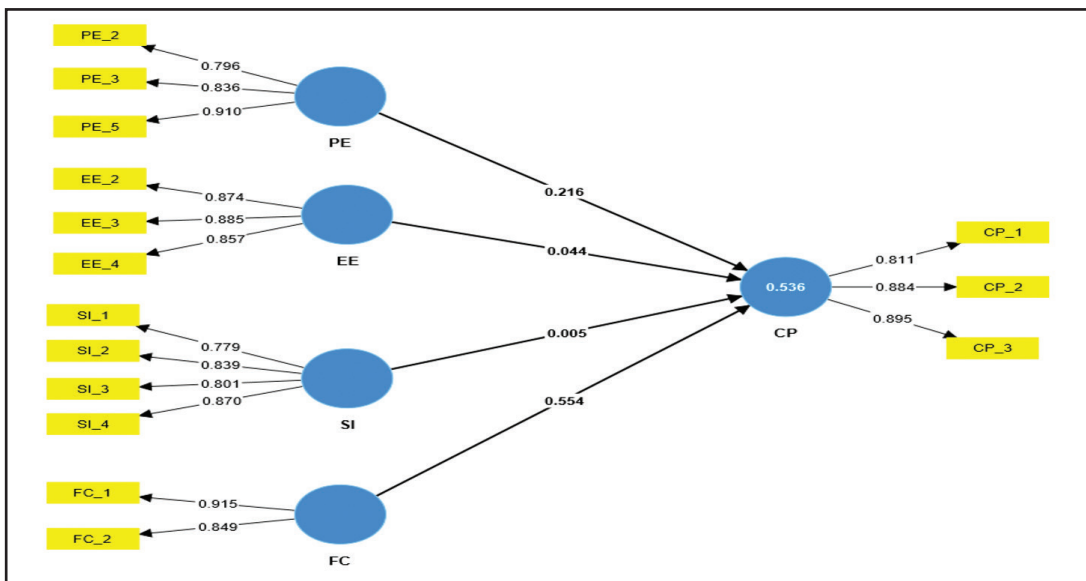
Figure 3: Path Analysis

Figure 3 shows the path coefficient and R2 value of the structural model. The value of R2 depicts the predictive power of the model; it explains the variance in the endogenous variable explained by the exogenous variables (Jr. et al., 2017). Higher values of the R2 denote a stronger explanatory power, which ranges from 0 to 1. The R2 values of 0.75, 0.50, and 0.25 are significant, moderate, and weak, respectively (Henseler et al., 2015).

The model explains 53.6% of the variance, i.e., R2, through the independent variables – Performance Expectation, Effort Expectancy, Social Influence, and Facilitating Conditions. Thus, we considered the model satisfactory in explaining the variation.

Table 6: Hypothesis Testing

Structural Path	Beta Coefficient (β)	SD	T-Value	P values	Confidence Interval (95%)		Conclusion
					LLCI	ULCI	
H1: PE -> CP	0.216	0.083	2.605	0.009	0.053	0.38	Supported
H2: EE -> CP	0.044	0.082	0.537	0.591	-0.11	0.209	Not Supported
H3: SI -> CP	0.005	0.065	0.082	0.935	-0.092	0.164	Not Supported
H4: FC -> CP	0.554	0.076	7.282	0	0.388	0.686	Supported

The study has four hypotheses, among which a p-value less than 0.05 shows a significant relationship. In the study, hypotheses H1 and H4 show a significant relationship as the p-value meets the criteria.

Discussion

The study focuses on factors determining the intention to use QR Payment. The hypothesis was formulated based on the relationship between the independent variable (customer perception toward QR payment) and the dependent variable (performance expectation, social influence, effort expectancy, and facilitating conditions). The study formulated four hypotheses to assess the determinants of perception toward QR payment. Among the hypotheses, H1 and H4 are found to be significant.

The first hypothesis suggests a positive relationship between Performance Expectancy and customer perception, indicating that when users perceive higher performance benefits from QR payment, their overall perception improves. In a similar study, Putera et al. (2021) conducted in Portugal found that customers who perceived QR payment as providing a higher level of performance and benefits were more likely to have a positive perception and intention to adopt QR payment. However, unlike a study conducted by Prabhakar and Ramesh (2021), the second hypothesis shows Effort Expectancy (EE) does not significantly impact Customers' Perception, indicating that the perceived effort required for QR payment adoption does not strongly affect customers' perception. Similarly, the third hypothesis indicates Social Influence (SI) shows that the influence of others does not significantly alter customers' perception of QR payment. On the other hand, the fourth hypothesis reveals that Facilitating Conditions (FC) substantially impact Customers' Perception, indicating that when users perceive a favourable environment for QR payment adoption, their perception is positively influenced. A study by Shrestha and Shrestha (2021) also concluded that customers with access to facilitating conditions, such as widespread merchant acceptance and availability of QR payment infrastructure, had a more positive perception of adopting and using QR payment.

In summary, the study supports the positive influence of Performance Expectancy and Facilitating Conditions on Customers Perception, while Effort Expectancy and Social Influence do not have

significant effects. Nowadays, people are using QR payment due to the ease of use and the facilities provided by financial institutions and retailers, so other factors may not be relevant to the perception of QR payment usage. The theory of UTAUT adjusts with this result as the facilitating condition, Performance expectancy, has impacted the perception of utilising the technology.

The study's limitations suggest further research on customers' perception of QR Payment. The increase in sample size will encompass a more diverse range of individuals across various Nepalese regions, enhancing the findings' generalizability. Additionally, exploring variables such as perceived usefulness, value, service security, health benefits, cultural factors, beliefs, habits, trust, and context-specific variables in Nepal would offer a more comprehensive analysis. A comparative study conducted in Nepal's various cities or regions may reveal differences in customers' opinions. Future studies focusing on these areas will improve our comprehension and offer more precise recommendations for scholars and professionals.

Conclusion

This study explores the perception of QR payment by examining relevant studies that contribute valuable insights into this dynamic field. Specifically, the study focuses on the determinants that enhance the QR payment practices in the Kathmandu Valley.

The study affirms that performance expectancy and facilitating conditions positively impact customers' perception, whereas effort expectancy and social influence have no significant effects. The most adopted platforms are E Sewa and Fonepay, followed by other platforms such as Khalti, Connect IPS, Nepal Pay, IME Pay, Prabhu Pay, etc. Most of them make frequent QR Payments for daily transactions, fund transfers and utility bill payments, shifting to convenient practices. However, the study revealed several challenges in QR payment adoption, such as technical glitches, connectivity disruptions, data security concerns, transaction amount limitations, reliance on stable internet, difficulties with damaged QR codes, inadequate user education, dissatisfaction with fund deductions from failed transactions can be mitigated through measures such as emphasised regular maintenance for glitch-free experiences, collaboration with payment processors enhances system efficiency, establishing a secure platform ensures safe transactions. The study depicts that both performance expectations and facilitating conditions influence a person's intention to use QR payment. Policymakers, developers, banks, and service providers should consider these conclusions. Performance expectation significantly impacts usage intention, urging QR payment providers to surpass customer expectations with enhanced features for quicker transactions. Developers should prioritise applications with user-friendly design and minimal mental effort. Hence, in order to facilitate conditions and guarantee adoption, payment processors must offer easily accessible infrastructures, resources, and assistance.

References

Ab Hamid, M. R., Sami, W., & Mohmad Sidek, M. H. (2017). Discriminant validity assessment: Use of Fornell & Larcker criterion versus HTMT criterion. *Journal of Physics: Conference Series,* 890(1), 1–6. https://doi.org/10.1088/1742- 6596/890/1/012163

Ajzen, I. (2002). Constructing a TPB questionnaire: Conceptual and methodological considerations. Alcohol consumption in corporate employees. *Psychology, Health & Medicine,* 16(4), 375-392.

Alwahaishi, S., & Snásel, V. (2013). Acceptance and use of information and communications technology: a UTAUT and flow based theoretical model. *Journal of technology management & innovation,* 8(2), 61-73.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the academy of marketing science,* 16, 74-94.

Bhandari, U., Devkota, N., Paudel, U. R., Dhungana, S., & Parajuli, S. (2021). Nepalese consumers' perception of online shopping challenges and its managerial solution. *International Research Journal of Science, Technology, Education, and Management,* 1(2), 1-1.

Chatfield, C. (1995). Model uncertainty, data mining and statistical inference. *Journal of the Royal Statistical Society Series A: Statistics in Society,* 158(3), 419-444.

Chorzempa, M. (2021). China, the United States, and central bank digital currencies: how important is it to be first? *China Economic Journal,* 14(1), 102-115.

Demir, S., Kaynak, R., & Alpaslan, K. (2015). Usage Level and Future Intent of Use of Quick Response (QR) Codes for Mobile Marketing among College Students in Turkey 5(11). Retrieved from www.sciencedirect.com: https://www.sciencedirect.com/science/article/pii/S1877042815031961

Devkota, N., Budhathoki, A., Paudel, U. R., Adhikari, D. B., Bhandari, U., & Parajuli, S. (2021a). Online trading effectiveness in Nepal share market: Investors awareness, challenges and managerial solution. *Asian Journal of Economics, Business and Accounting,* 21(5), 90-98.

Devkota, N., Bijukshe, A., Pokhrel, L., Paudel, U. R., & Parajuli, S. (2021b). Factors influencing attitude toward online advertising in Kathmandu Valley. *PYC Nepal Journal of Management,* 14(1), 17-30.

Devkota, N., Dhungana, S., Parajuli, S., Bhandari, U., & Paudel, U. R. (2021c). Nepalese consumers' perception on online shopping challenges and its managerial solution. *International Research Journal of Science, Technology, Education, & Management (IRJSTEM),* 1(2).

Dhital, B. (2021). Adoption of Digital Payment in Nepal: An Overview. Retrieved from https://blog.khalti.com: https://blog.khalti.com/fintech-trends/adoption-of-digital- payment-in-nepal-an-overview/

Dhungana, S., Devkota, N., Paudel, U. R., Parajuli, S., Upretee, S., Dhakal, K., & Mahato, S. (2022). Consumer's Perception towards Use of Mobile Applications for Online Shopping in the Kathmandu Valley. *Quest Journal of Management and Social Sciences,* 4(2), 187-199.

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics.

Ghimire, L. (2022). *Digital Banking Adaptation by Customer of Commercial Banks In Nepal* (Doctoral dissertation).

Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis,* 1(2), 107-123.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long range planning,* 46(1-2), 1-12.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review,* 31(1), 2-24.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science,* 43, 115-135.

Jr., J. F. H., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB- SEM: Updated guidelines on which method to use. *International Journal of Multivariate Data Analysis,* 1(2), 107. https://doi.org/10.1504/ijmda.2017.087624

Klein, A. (2020). China's digital payments revolution. *Brookings Institution, Washington.*

Kock, N. (2022). Testing and controlling for endogeneity in PLS-SEM with stochastic instrumental variables. *Data Analysis Perspectives Journal,* 3(3), 1-6.

Lamichhane, S. (2022). *Contactless payments in the era of COVID-19: Behavioral intentions to use QR code payment in Bagmati State* (Doctoral dissertation).

Lim, F. W., Ahmad, F., & Talib, A. N. B. A. (2019). Behavioural intention towards using electronic wallet: a conceptual framework in the light of the unified theory of acceptance and use of technology (UTAUT). *Imperial Journal of Interdisciplinary Research,* 5(1), 79-86.

Lu, L. (2018). Decoding Alipay: mobile payments, a cashless society and regulatory challenges. *Butterworths Journal of International Banking and Financial Law,* 40- 43.

Magar, S. R., Adhikari, K., Devkota, N., Mahato, S., Mahapatra, S., Parajuli, S., ... & Paudel, U. R. (2023). Users' behavioral intention to use e-payment service in Nepal: Based on SEM analysis. *Journal of Business and Management,* 7(02), 140-160.

Maharjan, P., Devkota, N., Mahapatra, S. K., Padda, I. U. H., Dhakal, K., Mahato, S., ... & Bhattarai, U. (2022). FinTech Adoption among Online Grocery Buyers during COVID-19 Lockdowns in Nepal. *Journal of Private Enterprise,* 37(2), 57-89.

Mat Dawi, N. (2019). Factors influencing consumers intention to use QR code mobile payment: A proposed framework. *International Journal of Recent Technology and Engineering,* 8(2S), 114–120.

Muniz, R., Junco, L., & Otero, A. (1999). A robust software barcode reader using the Hough transform. In *Proceedings 1999 International Conference on Information Intelligence and Systems (Cat. No. PR00446)* 313-319. IEEE.

Parajuli, S., Bijukshe, A., Devkota, N., Bhandari, U., & Poudel, U. (2021). Nepalese Customers' Attitude and Preferences towards Online Marketing: Index Based Analysis. *International Journal of Marketing & Human Resource Research,* 2(4), 211-223

Parajuli, S., Thapa, B., Devkota, N., Raj, U., & Paudel, S. G. (2021). Female Consumers Awareness Level on Purchasing Online Beauty Products in Kathmandu Valley. *Nepalese Journal of Management Science and Research,* 6(1), 161-177.

Prabhakar, G., & Ramesh, K. (2021). Understanding the adoption of QR code payment in India: A qualitative study. *Journal of Payments Strategy & Systems,* 15(1), 65- 81.

Putera Kosim, K., & Legowo, N. (2021). Factors affecting consumer intention on QR payment of mobile banking: A case study in Indonesia. *Journal of Asian Finance,* 8(5), 391–0401. https://doi.org/10.13106/jafeb.2021. vol8.no5.0391

Rainer, R. K., & Prince, B. (2022). *Introduction to information systems: Supporting and transforming business.* John Wiley & Sons.

Richter, N. F., Sinkovics, R. R., Ringle, C. M., & Schlägel, C. (2016). A critical look at the use of SEM in international business research. *International marketing review*, 33(3), 376-404.

Shrestha, S., & Shrestha, P. (2021). Customer perspective on the adoption of QR code payment in Nepal. *Journal of Asian Finance, Economics and Business,* 8(2), 609- 617.

Stage, F. K., Carter, H. C., & Nora, A. (2004). Path analysis: An introduction and analysis of a decade of research. *The journal of educational research,* 98(1), 5-13.

Suo, W. J., Goi, C. L., Goi, M. T., & Sim, A. K. (2022). Factors influencing behavioural intention to adopt the QR-code payment: Extending UTAUT2 model. *International Journal of Asian Business and Information Management (IJABIM),* 13(2), 1-22.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education,* 2, 53.

Witjaksono, R. H. A., Handayani, P. W., Sunarso, F. P., & Hilman, M. (2021, October). Quick Response Code Acceptance on Digital Wallet Mobile Applications in Indonesia. In 2021 *International Conference on Advanced Computer Science and Information Systems (ICACSIS)* (pp. 1-6). IEEE.