

Article History

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Abstract

Utilization of QR Codes on Trust and Security in Nepalese Context

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This study aims to analyze the use of QR codes for trust and security in the Nepalese context. Koshi, Madhesh, Bagmati, Gandaki, Lumbini, Karnali, and Sudurpaschim are among the seven province clusters into which the study's population is divided using the cluster sampling probability sample technique. A standardized questionnaire was utilized in physical and online surveys to collect data from 208 respondents. The study's findings indicated that employing QR codes made participants feel completely trusted and safe. The study notes that despite the progress, there are still enduring security and trust issues that could prevent QR codes from being widely used if they are not addressed. They feel better at ease utilizing technology in various sectors, such as banking, education, marketing, travel and tourism, hotel and dining, and health. This also helps explain the differences in the monthly percentage of mobile payments made using QR codes by province, gender, age, job, and educational attainment. The study will concentrate on preserving security, building trust, and enhancing user education in several areas before the widespread adoption of QR code services for long-term use.

QR CODE FOR commercial transactions are becoming increasingly common in the market, and many organizations use them (Demir et al., 2015; Dhamala, 2024). As the usage of QR payments has grown recently in Nepalese economic practice, Nepal Rastra Bank is getting ready to standardize and streamline the process. As more transactions are being made utilizing QR codes, NRB has announced that it will allocate its

Keywords

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resources and staff to preserve greater regularity and order (NRB, 2023).

A QR code is a two-dimensional or matrix bar code that can hold data and is made to be readable by tablets, laptops, and smartphones (Hossain et al., 2018; Ifada & Abidin, 2023; Liébana-Cabanillas et al., 2015). Quick Response (QR) means that the contents of the code should be decoded rapidly. The code is composed of square-shaped black modules set on a white backdrop. Text, a URL, or other data may constitute the encoded information. In 1994, the Toyota subsidiary Denso Wave invented QR codes, which were first applied to inventory management in the auto parts industry (Amarullah et al., 2021; Demir et al., 2015; Eren, 2024; Maharjan et al., 2024; Suo, 2022). One- or two-dimensional QR codes are commonly used because of their low cost and small size (Karniawati et al., 2021).

Globally, QR codes are becoming increasingly popular. These days, many people read QR codes using smartphones with built-in cameras (Luitel, 2023; Mookerjee et al., 2022). QR codes are employed in supermarkets, hotels, restaurants, educational institutions, the financial and health sectors, insurance, travel and tours, entertainment, and more. Small supermarkets, pharmacies, meat markets, stationery stores, and snack shops also use them (Kim & Yoon, 2014; Ozkaya et al., 2015). They are currently used in various areas throughout Nepalese society (Luitel, 2023; Maharjan et al., 2024).

In Nepal, QR codes are extensively utilized in metropolitan regions and big cities. In the context of Nepal, the COVID-19 epidemic has expanded the digital realm. Online learning (Sah, 2021b, 2024), online banking (Gautam & Sah, 2023), internet banking (Sah, 2023), online shopping (Sah, 2021a), mobile banking (Sah & Gautam, 2025), acceptance of QR code payments (Maharjan et al., 2024), and the majority of digital transactions in Nepal.

The intention to use a QR code is greatly influenced by security and enabling factors (Luitel, 2023). This realization is crucial for all parties involved in the mobile payment and online banking system ecosystem since it emphasizes how important it is to put trust-building and security maintenance first in order to promote the broad adoption of QR code technology for payments (Gautam & Sah, 2023; Sehat et al. 2024). Security and trust (TR) has been shown to be a crucial component of digital media and new technologies since it significantly influences people's views, acceptance, and intent to utilize the digital banking system.

This pioneering technology improves the shopping experience by enabling customers to easily and conveniently make payments by only scanning the QR code (Eren, 2024; Shin et al., 2012). The adoption of QR codes affected the utilization of QR codes. So, the research problems are as follows:

RQ1: What is the status of the QR code utilization in the Nepalese context?

RQ2: Which factors influence the adoption of QR codes for utilization?

According to the study problems the research aims are mentioned as follows:

RO1: To explore the status of the QR code utilization in the Nepalese context.

RO2: To examine the influencing factors of the adoption of QR codes for utilization.

Review of Literature

This section examines the usage and application of QR codes through several literature assessments conducted in various nations.

Table 1

Review of Emperical Works

Studies	Countries	Objectives	Methodology	Findings
Kim & Yoon, (2014)	Korea	Aimed to compare differences in the perceptions of QR code attributes between shopping tasks for apparel and general merchandise at the QR code virtual stores.	A total of 122 usable responses were obtained from smartphone users	The findings indicated that, in the context of smart shopping, there were notable distinctions between clothing and general products in terms of three QR code technology factors: location-based information, ubiquity, and wireless infrastructure.
Ozkaya et al., (2015)	USA	Aims to present findings regarding college students' knowledge of and usage of QR codes.	Data was collected from 174 respondents with an electronic survey conducted at a large university in the western United States.	The results show a substantial relationship between QR code usage rate and purpose of use.
Liébana-Cabanillas et al. (2015)	Spain	Examined how well-liked Quick Response (QR) code mobile payment methods are among users, taking into account how many people use mobile devices	After thoroughly analyzing the scientific literature, a behavioral model explaining the intention to use a QR code for mobile payment was developed.	The findings demonstrate that the intention to utilize this technology in the future is determined by attitude, innovation, and subjective traditions.

Amarullah et al., (2021)	Indonesia	Investigated the elements that affect consumers' inclinations to adopt QR code-based mobile payments.	The data were supplied by 120 Jabodetabek customers who use mobile payments with QR codes.	The findings indicated that while hedonic motivation and company expectations have no bearing on customers' intent to utilize QR code-based payments, performance expectations, habits, and beliefs appear to be important determinants.
Suebtimrat & Vonguai (2021)	Thailand	Explored the elements that influence users' behavioural intentions towards QR code payment.	Data were gathered from 1,800 people in Bangkok were given a self-administered questionnaire.	The results showed that opinions about QR code payments are influenced by compatibility.
Zhong & Moon, (2022)	China	Studied how Chinese customers used mobile QR-Code and facial recognition technology during the COVID-19 outbreak.	Data were obtained from 457 responses to an online questionnaire.	The study found that three factors significantly influenced customers' intention to use QR Code payment: attitude stated usefulness, and ease of use.
Nepali & Tamang, (2022)	Nepal	Aimed to provide a broad awareness of new trends and technological	The literature on new library developments was gathered from connected online articles and projects.	The analysis revealed several additional trends and technologies that have surfaced in libraries but aren't utilized.

Hewawa sam et al., (2022)	Sri Lanka	Examined consumer acceptance of mobile payment solutions incorporating Quick Response (QR) codes.	Information gathered from 457 responses to an online survey.	The study discovered that Ease of Use, reported Usefulness, and Attitude all substantially impacted users' desire to use QR Code payment.
Sehat et al., (2024)	Malaysia	Investigated the deliberate use of QR code applications.	The research included a random sample of 215 respondents.	The results showed that the behavioral intention to use QR code applications was positively and significantly correlated with performance expectancy, effort expectancy, hedonic motivation, habit, and trust.
Luitel, (2023)	Nepal	Examined the variables that influence users' intentions to use QR technology.	Examined service security, perceived utility, perceived ease of use, personal innovativeness, and facilitating conditions.	The research explained the various innovations and techniques that were emerging in libraries.
Eren, (2024)	Thailand	Explored the elements that influence Thai commercial bank users' behavioral intentions toward	Both qualitative and quantitative research methodologies were used.	The findings revealed that compatibility has an impact on attitudes regarding QR code payment.

Maharjan et al., (2024)	Nepal	Examined the opinions of Kathmandu Valley customers on QR payments.	The study used an explanatory research approach	E-sewa, Fone Pay, and Connect IPS are well-liked options for chores including bill payment and money transfers.
Sah & Gautam (2025)	Nepal	Investigated how consumers' opinions about the usefulness of mobile banking apps impact their behavioral intention to utilize services.	Surveys on the TAM model and structural equation modeling were conducted with a sample of 415 commercial bank customers who used mobile applications.	The strong positive correlation between behavioral intention to use, perceived utility, and ease of use is mediated by attitudes about mobile banking.

This section contains the majority of studies from both domestic and foreign contexts. Since QR code technology is new, not much research has been done on it. Early studies on QR codes focused on using the technology in various contexts. However, many studies avoid employing QR codes in Nepal's provincial context. Thus, the goal of this study was to look into how QR codes are used in different provinces in Nepal.

Methodology

The research was based on a descriptive research design. A structured questionnaire was used to gather data from QR code users, who were frequently considered a sample for the study. The questionnaire was based on the users' demographic profiles and also considered questions about using QR services.

A structured questionnaire utilized for survey research was used to gather data from the 208 respondents using purposive sample procedures (Cooper & Schindler, 2014; Greener, 2008). The study's population is split into seven province clusters using the cluster sampling probability sample technique: Koshi, Madhesh, Bagmati, Gandaki, Lumbini, Karnali, and Sudurpaschim. The structured questionnaires were prepared to obtain demographic information regarding gender, age, occupation, education, province, areas, and purpose of using the QR code. It also focused on gathering information about QR code usage per month. Data were driven into SPSS software for analysis. Frequency and cross-tabulation were used to analyze the data. Bar diagrams and pie charts presented demographic information and summarized the results with several references on national and international context in the discussion section.

Results and Discussion

Respondents Status

The demographic statuses of the respondents were discussed in terms of sex, age group, provincial areas, professional status, and academic level. Most respondents were male, 58.2%, and the remaining were females. According to age group, most respondents were 20 to 24 at 52.7%, 25 to 29 at 12.7%, and 30 to 34 with 11.8% of Bagmati at 49.1%, Madhesh with 19.1%, and 10.9% of Gandaki and remaining from other provinces.

Most respondents were bachelor's degree holders, with 69.7%, and master's degree holders, with 14.9%. It also shows that 8.7% of the total respondents were higher secondary level, and 2.4% were PhD. Degree and MPhil Degree educated. The majority of respondents were students, followed by employees; 10.1% were self-employed, 5.8% were housekeepers, 3.4% were retired, and 2.4% were jobless.

QR Code Using Status

The following analysis illustrates the areas where QR is most commonly used, and the consumers' perceptions of security and trust in QR services to comprehend usage trends.

Figure 1

Percentage of Area Using QR Code

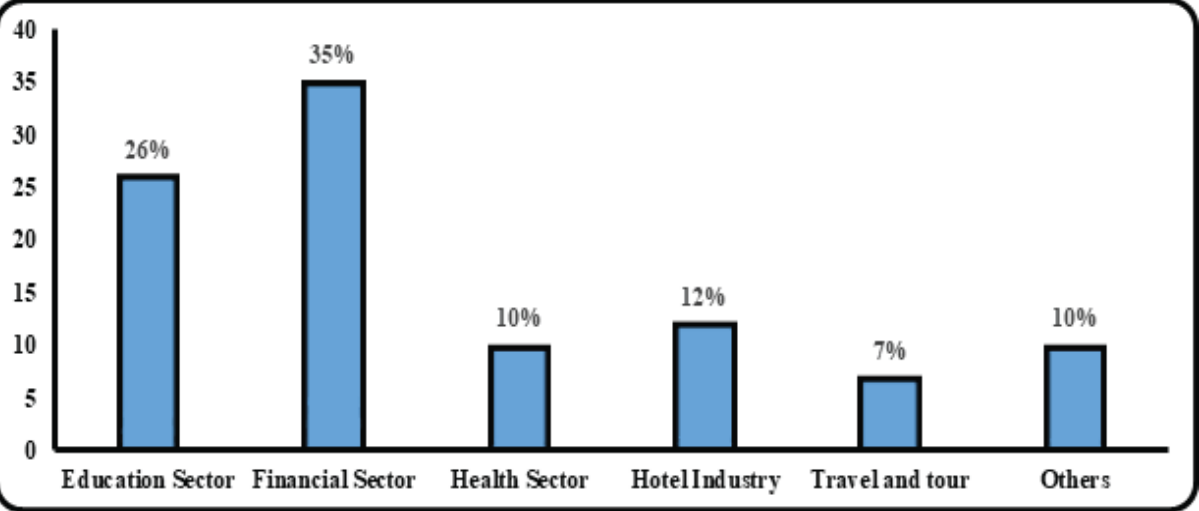


Figure 1 shows that most of the respondents 35% used QR codes in financial sectors, 26% in education areas, 12% in the hotel industry, and 10% in health and other sectors such as travel and tour, shopping, marketing, tracking, and so on. Thus, the research on QR codes revealed that most of Nepalese people utilized QR codes for financial areas for financial transactions.

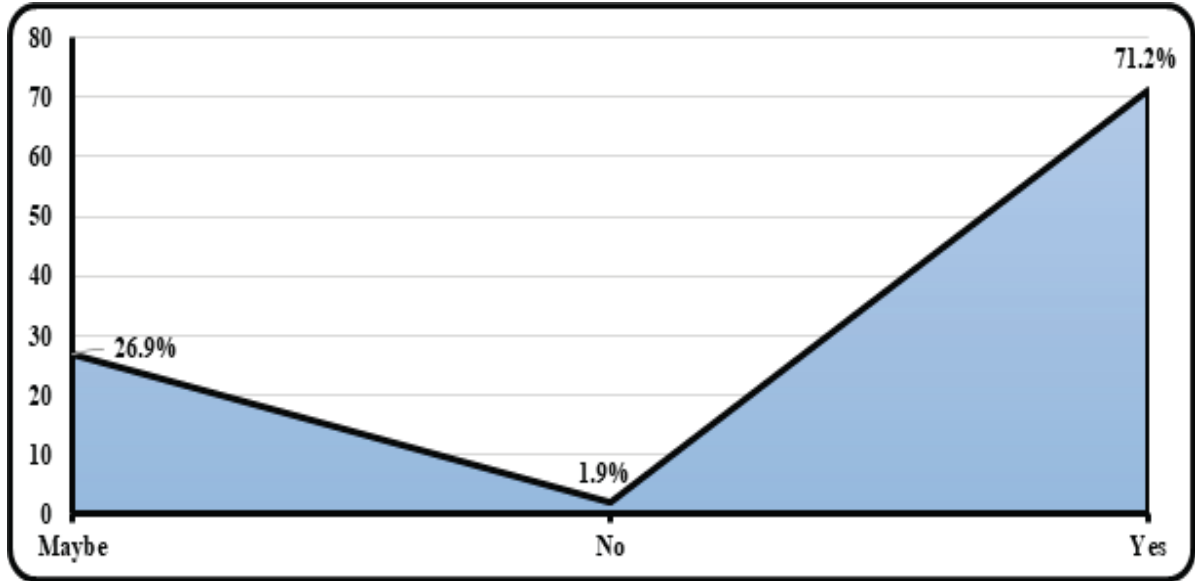
Figure 2*Percentage of Security of Using QR Code*

Figure 2 indicates that 71.2% of respondents believed QR codes to be secure, 1.9% felt insecure, and 26.9% were unsure whether to utilize secure or insecure codes.

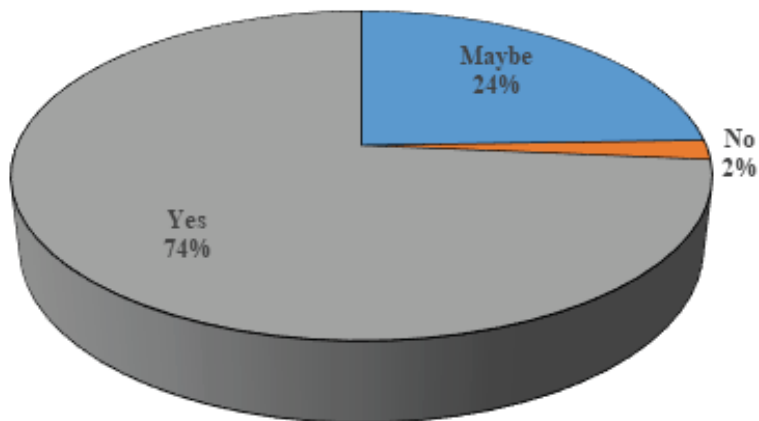
Figure 3*Percentage of Trustworthiness of Using QR Code*

Figure 3 shows that 74% of participants fully trusted QR codes, while 2% did not. 24%, however, were not clear if they should be trusted or mistrusted when using QR codes. Cross-tabulation analysis was then performed according to monthly QR Code usage, and demo-

graphic status such as gender, age, occupation, province, and education.

Cross-Tabulation Analysis

Cross tabulation is a quantitative research technique used to examine the relationship between two or more variables. Furthermore, this study used chi-square tests to investigate differences in the distribution of categorical responses between groups (Black, 2010). The chi-square test was used to identify whether gender, age, province, education, and job status affected the monthly frequency of using QR code mobile payments. In the table below, several updated UTAUT viewpoint variables are descriptively analyzed.

Table 1

Cross-tabulation between Gender and QR Code Usage Per Month

Gender		Frequency of QR code payment usage per month				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
Female	Count	11	55	16	5	87
	% within	12.60%	63.20%	18.40%	5.70%	100.00%
Male	Count	39	40	13	29	121
	% within	32.20%	33.10%	10.70%	24.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Pearson Chi-square value 30.559, P = 0.000

The majority of people use quick response (QR) codes for mobile payments 10–20 times a month, as shown in Table 1. This also explains the 10–20 times per month that both men and women use QR code mobile payments.

In contrast, 18.40% of women use it 10–20 times per month, while 24% of men use it more than 40 times. Thus, men and women alike showed interest in utilizing the QR code service. P = 0.000, the Pearson Chi-square value of 30.559, was below the significance level of 0.01 (1%).

Therefore, there was a significant correlation between monthly QR code mobile payment usage and gender. This indicated some variation in the monthly proportion of mobile payments using QR codes by gender.

Table 2 shows that 10 to 20 times a month, most age groups use quick response (QR) codes to conduct mobile payments. People of all ages utilize QR code mobile payments 10–20 times a month, which is also explained by this. But 22% of people in the 20–24 age group and 21.4% of people in the 25–29 age group use it more than 40 times a month, compared to 34.6% of people in the 30–34 age group, 44.4% of people in the 45–50 age group, and 33.3% of those over 50 who use it less than ten times.

Table 2*Cross-tabulation between Age and QR Code Usage Per Month*

Age Group		Frequency of QR code mobile payment usage per month				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
20-24	Count	28	52	16	27	123
	% within	22.80%	42.30%	13.00%	22.00%	100.00%
25-29	Count	1	9	1	3	14
	% within	7.10%	64.30%	7.10%	21.40%	100.00%
30-34	Count	9	12	3	2	26
	% within	34.60%	46.20%	11.50%	7.70%	100.00%
35-39	Count	4	9	0	1	14
	% within	28.60%	64.30%	0.00%	7.10%	100.00%
40-44	Count	0	4	6	0	10
	% within	0.00%	40.00%	60.00%	0.00%	100.00%
45-50	Count	4	3	1	1	9
	% within	44.40%	33.30%	11.10%	11.10%	100.00%
Above 50	Count	4	6	2	0	12
	% within	33.30%	50.00%	16.70%	0.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 36.505, $P = 0.006$

Table 2 shows that 10 to 20 times a month, most age groups use quick response (QR) codes to conduct mobile payments. People of all ages utilize QR code mobile payments 10–20 times a month, which is also explained by this. But 22% of people in the 20–24 age group and 21.4% of people in the 25–29 age group use it more than 40 times a month, compared to 34.6% of people in the 30–34 age group, 44.4% of people in the 45–50 age group, and 33.3% of those over 50 who use it less than ten times.

The result was a desire to use the QR code service across all age groups. The chi-squared Pearson value of 36.505, $P = 0.006$, fell below the 0.05 (5%) significance level. The monthly utilization of QR code mobile payments was thus significantly correlated with age group. This indicated some variance in the proportion of each age group using QR codes for mobile payments each month.

Table 3 shows that, with the exception of Karnali and Sudurpaschim, most people in all provinces use quick response (QR) codes to make mobile payments 10–20 times a month. This also explains why 50% of Karnali residents and 75% of Sudurpaschim use it more than 40 times a month, compared to 45.70% of Koshi residents, 52.80% of Madhesh residents, 76.90% of Gandaki residents, and 64.30% of Lumbini Province residents. Accordingly, all provinces' respondents said they would like to employ the QR code service.

Table 3*Cross-tabulation between Provinces and QR Code Usage Per Month*

Province		Frequency of QR code payment usage per month.				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
Koshi	Count	12	16	3	4	35
	% within	34.30%	45.70%	8.60%	11.40%	100.00%
Madhesh	Count	12	19	2	3	36
	% within	33.30%	52.80%	5.60%	8.30%	100.00%
Bagmati	Count	23	41	16	16	96
	% within	24.00%	42.70%	16.70%	16.70%	100.00%
Gandaki	Count	0	10	2	1	13
	% within	0.00%	76.90%	15.40%	7.70%	100.00%
Lumbini	Count	3	9	2	0	14
	% within	21.40%	64.30%	14.30%	0.00%	100.00%
Karnali	Count	0	0	1	1	2
	% within	0.00%	0.00%	50.00%	50.00%	100.00%
Sudurrrpaschim	Count	0	0	3	9	12
	% within	0.00%	0.00%	25.00%	75.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 57.624, P = 0.000

The chi-squared Pearson value of 57.624, P = 0.000, was below the 1% cutoff of 0.01. Therefore, there was a high correlation between the province and the monthly use of mobile QR code payments. The percentage of monthly mobile payments using QR codes therefore differed from province to province.

Table 4 shows that with the exception of SLC/SEE, most people at all educational levels use rapid response (QR) codes between 10 and 20 times a month, which also explains why 100% of SLC/SEE-educated people use the QR code service less than ten times a month. The Pearson Chi-square score was 27.714 (P = 0.023), which was below the 5% threshold. There was a strong correlation between educational status and monthly QR code mobile payment usage, meaning

that the percentage of monthly QR code mobile payment usage varied by education level.

Table 4

Cross-tabulation between Education and QR Code Usage Per Month

Education Status		Frequency of QR code mobile payment usage per month				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
SLC/SEE	Count	5	0	0	0	5
	% within	100.00%	0.00%	0.00%	0.00%	100.00%
Intermediate/+2	Count	4	12	1	1	18
	% within	22.20%	66.70%	5.60%	5.60%	100.00%
Bachelor Degree	Count	30	63	23	29	145
	% within	20.70%	43.40%	15.90%	20.00%	100.00%
Master Degree	Count	8	14	5	4	31
	% within	25.80%	45.20%	16.10%	12.90%	100.00%
MPhil Degree	Count	1	4	0	0	5
	% within	20.00%	80.00%	0.00%	0.00%	100.00%
PhD Degree	Count	2	2	0	0	4
	% within	50.00%	50.00%	0.00%	0.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 27.714, $P = 0.023$

Table 4 shows that with the exception of SLC/SEE, most people at all educational levels use rapid response (QR) codes between 10 and 20 times a month, which also explains why 100% of SLC/SEE-educated people use the QR code service less than ten times a month. The Pearson Chi-square score was 27.714 ($P = 0.023$), which was below the 5% threshold. There was a strong correlation between educational status and monthly QR code mobile payment usage, meaning that the percentage of monthly QR code mobile payment usage varied by education level.

Table 5 shows that except for self-employed and retired individuals, most people across all job levels use quick response (QR) codes to make 10 to 20 mobile payments each month. This also explains why 57.10% of independent contractors and 42.90% of retirees use it less frequently than ten times a month. Respondents from various educational backgrounds thus wished to utilize the QR code service.

Table 5*Cross-tabulation between Employment and QR Code Usage Per Month*

Employment Status		Frequency of QR code mobile payment usage per month				Total
		Less than 10 times	10-20 times	21-40 times	More than 40 times	
Employee	Count	8	23	8	6	45
	% within	17.80%	51.10%	17.80%	13.30%	100.00%
Homemaker	Count	2	6	3	1	12
	% within	16.70%	50.00%	25.00%	8.30%	100.00%
Retired	Count	3	2	2	0	7
	% within	42.90%	28.60%	28.60%	0.00%	100.00%
Self-Employed	Count	12	7	1	1	21
	% within	57.10%	33.30%	4.80%	4.80%	100.00%
Student	Count	24	53	15	26	118
	% within	20.30%	44.90%	12.70%	22.00%	100.00%
Unemployed	Count	1	4	0	0	5
	% within	20.00%	80.00%	0.00%	0.00%	100.00%
Total	Count	50	95	29	34	208
	% within	24.00%	45.70%	13.90%	16.30%	100.00%

Note. Pearson Chi-square value 26.548, $P = 0.033$

The Pearson Chi-square value was below the 5% cutoff at 26.548 ($P = 0.033$). Monthly utilization of mobile payments using QR codes was strongly correlated with educational status. Accordingly, the percentage of monthly mobile payments using QR codes varied by educational attainment.

Discussion

The importance of security and trust has been highlighted by the study on the adoption of QR code applications. The majority of respondents utilized QR codes in the banking sector, followed by the education sector, the hotel business, the health sector, and other industries like marketing, tracking, travel and tour, and shopping (Kim & Yoon, 2014; Ozkaya et al., 2015). According to this research work the proportion of monthly mobile payments made via QR codes varied somewhat by gender and age. Therefore, each province had a different percentage of monthly mobile payments made with QR codes. The use of QR codes for mobile payments each month was highly associated with educational attainment (Luitel, 2023; Mookerjee et al., 2022). The report also indicated that most respondents viewed QR codes to be secure and trusted (Gautam & Sah, 2023; Luitel, 2023).

Conclusion

The report offers a thorough grasp of how QR codes are being adopted and used in various regions for various purposes in the Nepalese context. The study concludes that the majority of Nepalese consumers use QR codes for financial transactions. The study's participants reported feeling secure when using QR codes. Although there have been improvements, the study also finds enduring security and trust issues that could prevent QR codes from being widely used if left unchecked. They are more comfortable using it in a variety of industries, including banking, education, travel and tourism, marketing, hotels and restaurants, and health. The Pearson Chi-square and cross-tabulation also stated that there was a significant correlation between the monthly use of QR code mobile payments and gender, age, occupation, province, and education. This indicated some variation in the monthly proportion of mobile payments using QR codes by province, gender, age, occupation, and level of education. The study comes to the conclusion that although QR codes have the potential to completely transform payment systems in developing nations, it will take focused efforts to maintain security, foster trust, and improve user education in several areas before they can be widely adopted and grow sustainably. So, the study is intriguing since it concentrates on a developing country and provides valuable perspectives for similar economies directing the transition to digital payment methods.

Limitations and Future Implications

The sample size for this study was small, and it only represents a portion of Nepal's population. The results show the realities of growing markets with a young population and a relatively sensitive QR code, even though they might not apply to Nepali people. Thus, a larger sample size for this research could be more broadly applicable to the investigation of QR codes in Nepal.

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