Determinants of QR Code Usage and Pakistani Consumers' Perspective on Its Reapplication During COVID-19

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Abstract

This study examines the effects of QR code application on consumer intentions to reuse, specifically over the COVID-19 pandemic. It also explores the role of consumer fulfillment as an important mediator. An analytical model was used to explore how the use of QR codes affected consumers' intention to reuse them. The study sample was obtained from 300 returned and usable participants who employed QR codes during the pandemic era using an online self-administered questionnaire. A majority of the respondents are in the age group of 18 to 25 years (55. 7%), and 76% of the respondents are female. Most (54. 7%) have a master's degree and use QR codes occasionally (62. 0 %), mainly for linking to websites (77. 7 %). Quantitative data collection, median analysis, regression analysis, and correlation methods were utilized to investigate QR code usage, customer satisfaction, and reuse intention.

The results reveal that QR code usage during the pandemic significantly affected consumer satisfaction, which in turn played a crucial role in shaping their intention to reuse QR codes. Customer satisfaction emerged as a key mediator, highlighting the importance of positive experiences with technology in promoting repeat usage. This research provides valuable insights into consumer behavior during a time of increased digital reliance, offering guidance for businesses seeking to enhance customer loyalty and retention through QR codes. By understanding the role of customer satisfaction in influencing reuse intentions, companies can better tailor their digital strategies to meet evolving consumer needs in a post-pandemic world.

Keywords: QR Code Usage, Pakistani Consumers, Reuse Intention, Customer Satisfaction, COVID-19, Digital Solutions

Introduction

Smartphones have the feature of reading encoded codes such as QR codes, matrix bar codes, and two-dimensional bar codes encoded. Denso Wave created machine-readable QR codes in 1994, and they respond quickly to information and speed. In contrast to one-dimensional bar codes, QR codes carry information in two dimensions: vertically and horizontally. This enables them to store more data. A QR code is capable of holding an email address, site address, or any other information that can be accessed by scanning it with the camera on a smartphone. (Speed et al., 2013).

QR codes have gained popularity throughout the world; however, in underdeveloped countries like Pakistan, the adoption of modern technologies—including QR codes—remains lower in comparison to advanced countries. For instance, in countries like Japan and Korea, 96% of people use QR codes to access online accounts, whereas the adoption rate in Pakistan is significantly lower. QR codes can store a wealth of information on various topics, including websites, articles, and advertisements, making them a valuable tool for connecting users to commercial websites (Jin & Du, 2014).

QR codes are a cutting-edge application that seamlessly transports users into virtual environments for entertainment and learning. By allowing immediate data transfer to mobile phones, regardless of location, QR codes enhance user experiences (Winter, 2011). They also transform advertising methods, serving as a link across the virtual and real worlds. Through QR codes, customers can interact with brands more frequently, contributing to customer retention and brand recognition, which are vital components of an effective marketing strategy.

QR codes are widely used across various sectors, including business cards, pharmaceuticals, smartphones, and machinery. During the COVID-19 pandemic, their application expanded significantly, encompassing online gaming, e-banking, online shopping, medical record management, and interactive university courses. Many companies leveraged QR codes to ensure timely delivery of goods and services, fostering customer loyalty. Additionally, QR codes enhanced patient care through their integration into telemedicine processes.

During the pandemic, QR codes emerged as a vital tool in maintaining consumer satisfaction and facilitating daily activities amid lockdowns and social distancing. These codes enabled patients to manage their health and perform routine tasks efficiently, contributing significantly to their quality of life (Pretty et al., 2018). Beyond healthcare, QR codes have become vital for various functions, including online reservations and mobile transactions (Gao et al., 2028). Asare et al. (2015) highlight that QR codes have gained significant importance in marketing, prompting extensive research on their evolution, features, and applications (Wave Denso, 2014). Additionally,

studies have examined consumer interactions with QR codes, particularly in magazine advertising, and patterns of reuse (Ertekin et al., 2014).

Hossain and Zhou (2028) investigated the impact of QR codes on client devotion and the likelihood of customers initiating subsequent purchases. Nevertheless, more research is needed to comprehend the relationship between consumer loyalty and QR code use, including the factors that influence their usage and the motivations behind their repeated use.

In order to close this gap, this research looks at the connections between client contentment, reuse intentions, and the key determinants of QR code usage. It will specifically examine the influence of customer satisfaction on reuse intentions, as well as how factors such as utility, feasibility, and acceptability affect both satisfaction and reuse intentions.

The research aims to address the following questions:

- RQ1: How do the factors (usefulness, feasibility, and acceptability) that determine the
- Use of QR codes affect user/consumer satisfaction?
- RQ2: How does user/customer satisfaction influence their intention to reuse QR codes?
- RQ3: How do users' intentions to reuse QR codes depend on the variables (utility, acceptability, and feasibility) that determine their use?
- RQ4: How do factors influencing the utilization of QR codes and user intent to reuse them interact with customer/user satisfaction?

This study establishes a foundation for future research by investigating the factors that influence the adoption of QR codes, particularly in underdeveloped regions such as Pakistan, where technological adoption tends to be slower than in other emerging markets. The main emphasis is on empirical research conducted in Pakistan, which examines the relationship between reuse intentions and QR code usage. It also identifies important variables that affect QR code adoption, like acceptability, utility, and feasibility. Given that QR codes are not widely used in Pakistan, this study focuses on individuals aged 18 to 45, a demographic most likely to adopt new technologies due to the increasing prevalence of smartphones. When clients are satisfied with both hedonic and practical applications, they feel better off. Customer loyalty improves when they seek time-saving solutions, which eventually increases their desire for QR code usage.

Review of Literature

QR Code Determinants and Usage

Hossain et al. (2018) used the S-O-R (Stimulus-Organism-Response) paradigm to inspect the association among QR codes and customer satisfaction. QR codes function as a **Stimulus (S)** by providing quick access to information and enhancing customer engagement. The **Organism (O)** represents the internal states of customers, influenced by the utility, feasibility, and acceptability of QR codes. These factors contribute to the

perceived flow, or immersion, in the activity, ultimately affecting customer satisfaction and repurchase intentions (Hossain et al., 2018).

1. **Usefulness:** According to Shackle (1991), "the consumers' internal measurement of the capacity of a product or service to fulfill their needs."
2. **Feasibility:** According to Shackle (1991), feasibility can be defined as "the degree of practical involvement with an object or situation, considering logistics, resources, and the psychosocial and physical contexts that influence execution."
3. **Acceptability:** Ayala and Elder (2011) describe acceptability as "the evaluation of an object's performance by the target population, determining its ability to meet their needs."

Machado and Nantes (2019) investigated the use of QR codes in the packaging of agricultural products as the first application of the technology as a means of communication between businesses and customers. They found that QR codes provide detailed product and process information but noted that not all data is readily accessible to consumers.

Alhafi et al. (2019) investigated the swift development of e-commerce and the widespread acceptance of QR codes at the international level. Their study emphasized the importance of QR codes in online shopping and e-ticketing, noting security concerns such as data theft during transactions. They suggested that QR codes could mitigate these issues.

During the 2020 pandemic, Pakistan, like other countries, extensively used QR codes for e-commerce, e-ticketing, online education, and online shopping. QR codes were also utilized in e-wallets, social networking platforms, and telemedicine, facilitating patient monitoring and remote consultations. QR codes became essential for tracking medical records, and during the pandemic, they were used in various sectors, including government identification systems (e.g., licenses and visas).

QR Code Reuse Intention

According to Hellier et al. (2003), reuse intention is "the individual's judgment about repurchasing a service from the same company, considering their current situation and potential future circumstances." In the context of mobile applications, reuse intention predicts behavior outcomes, such as increased brand loyalty through repeated use (Mitchell & Berger, year). Customer satisfaction often stems from a positive exchange experience, where products and services meet or exceed consumer expectations (Zeithmal & Bitner, 2003).

According to ISO 9001:2015, customer satisfaction is a key performance metric that reflects whether a company understands and meets customer requirements. Denso Wave introduced the QR code in 1994 with the objective of enhancing customer satisfaction through a range of applications. User satisfaction with mobile apps is determined by their experience, which is influenced by aspects such as ease of use, social networking abilities, and

the overall efficiency of the app. Moliner et al. (2007) define customer satisfaction as "the consumer's evaluation of a product's ability to meet their expectations and provide pleasure."

QR Codes and Customer Satisfaction

Hossain et al. (2018) employed the S-O-R model to investigate the influence of QR codes on customer satisfaction. QR codes function as a stimulus by facilitating rapid access to information, hence enhancing engagement. The Organism (O) is impacted by the utility, feasibility, and acceptability of QR codes, which determine the perceived flow or immersion in the experience. This positive flow experience increases customer satisfaction, driving loyalty and repurchase intentions. Additionally, QR codes allow advertisers to target customers effectively, leveraging consumer networks to enhance marketing efforts (Hossain et al., 2018).

Wang, Ou, and Chen (2019) investigated mobile contact software retailers' efforts to strengthen design and retain customers. Despite numerous studies on mobile services, little research has focused on the effects of inertia and satisfaction on the reuse of individual mobile apps. The researchers established a theoretical framework that establishes a connection between reuse intentions, inertia, service quality, and user satisfaction. A comprehensive examination of multiple service characteristics, including efficiency, satisfaction, inertia, and reuse intention, revealed that managers must have a profound comprehension of mobile networks in order to enhance customer happiness, cultivate inertia, and encourage sustained service engagement. Based on this data, the following hypothesis about QR codes and customer satisfaction has been made:

Hypothesis 1: Customer satisfaction is positively correlated with the factors that influence QR code usage.

Customer Satisfaction and Reuse Intention

Wu et al. (2016) constructed a model that combines the Service Quality Index (SQI) with the Expectation-Confirmation Model (ECM) to examine the factors that affect people's intentions to revisit mobile value-added services (MVAS). Their research revealed that the quality of service has a substantial impact on customer loyalty and continuing usage. Additionally, the perception of usefulness plays an important role in determining consumer satisfaction and intent to reuse the service. The model highlights the significance of utility in affecting both satisfaction and reuse intentions. Additionally, the perceived playfulness of the service also has an impact on both decisions.

In a similar vein, Loan and Hung (2018) examined the determinants of customer satisfaction and reuse intentions, proposing a five-factor model for satisfaction and a two-factor model for reuse intention. Their findings provide important insights for improving the efficacy of online services by highlighting the significance of satisfaction and habitual behavior in influencing reuse intentions. These findings led to the formulation of the

following hypothesis on the link between consumer satisfaction and the reuse of QR codes:

Hypothesis 2 (H2): Customer satisfaction is positively associated with the intention to reuse QR codes.

QR Code Usage and Reuse Intention

Gao et al. (2018) examined the influences that effect purchasers' inclination to reuse mobile QR code payments in China. They developed a model that combines perceived risk and intervention research to uncover the main factors that drive consumers' intent to reuse. Their research found that enactment anticipation, effort expectancy, and social influence strongly predict the continuing usage of mobile payment services that utilize QR codes.

Prodanova et al. (2019) constructed a model for mobile banking services that focused on how perceived benefits affect consumers' intentions of continuing to use the service. Their research emphasized the important protagonist of apparent value in shaping customers' choices to persist in using mobile banking services.

Based on these observations, a hypothesis was developed to explain how customers' intentions to reuse products and the use of QR codes relate to one another:

Hypothesis 3 (H3): QR code usage is positively associated with reuse intention.

This review provides a comprehensive analysis of the relationship between QR codes, consumer satisfaction, and the intention to reuse, specifically in the context of Pakistan. The objective is to provide significant insights on how to improve the adoption and effectiveness of QR codes in impoverished regions, considering criteria such as feasibility, utility, and acceptability.

Conceptual Framework

After conducting a thorough review of the available literature, the conceptual framework was constructed. It incorporates three significant study areas: the factors that determine the utilization of QR codes, the level of user satisfaction, and the intentions to reuse. Despite the fact that prior research, such as that conducted by Hossain et al. (2018), has mostly concentrated on the relationship between those variables that determine the usage of QR codes and the intention to repurchase them, there is still a significant knowledge gap about the factors that promote user retention of codes. It is particularly important to note that the role of customer satisfaction as a mediating variable in this connection needs to be better understood, and additional research is needed in order to fully comprehend the impact that it has on user retention and intentions to reuse its services.

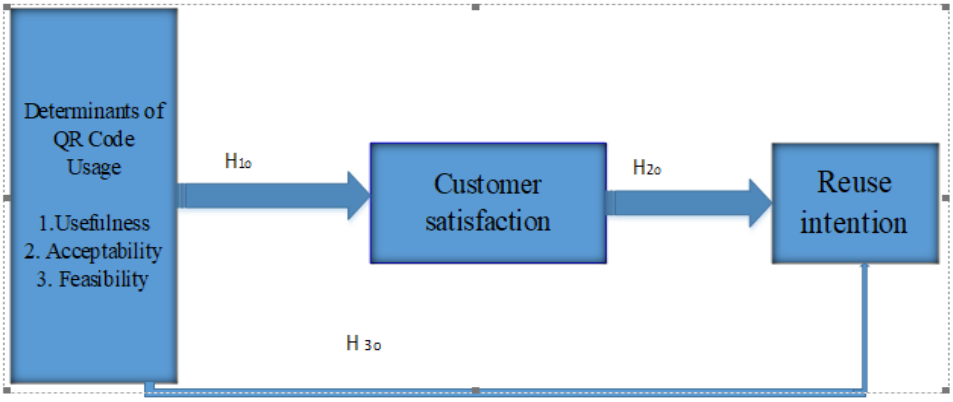

Figure 1. THE CONCEPTUAL FRAME WORK

As a result of the inclusion of customer satisfaction as a mediating factor, the suggested model attempts to fill this gap, which has led to the formulation of the following hypotheses within the revised framework:

Hypothesis 1: Customer satisfaction is positively correlated with the factors that influence the use of QR codes.

Hypothesis 2: Reusability intentions are positively correlated with customer satisfaction.

Hypothesis 3 (H3): There is a positive relationship between QR code usage and reuse intention.

Hypothesis 4 (H4): Customer satisfaction mediates the relationship between QR code usage determinants and user reuse intention.

Research Methodology

An empirical study was undertaken from July to November 2020 during the COVID-19 epidemic to assess the influence of customer satisfaction-mediated QR code usage variables on reuse intention. Data were gathered from Pakistani QR code users using an online survey and a non-probability convenience sample technique. After filtering incomplete responses, the final sample comprised 300 participants.

The survey was conducted using Google Forms and integrated with the Statistical Package for Social Sciences (SPSS) Version 23 for the purpose of storing and analyzing the data. A structured questionnaire, consisting of four sections, was created utilizing tools from Choi & Sun and Hossain et al. The survey utilized a five-point Likert scale, with options ranging from 1 (indicating "strongly disagree") to 5 (indicating "strongly agree"), in order to evaluate different aspects. In addition, demographic factors were assessed using a categorical scale. The data collected was examined in order to figure out the ways in which hedonic, utilitarian, and epistemic consumption values influence consumers' intent to reuse QR codes along with the overall perceived value of the codes.

Results and Discussion

Table 1: Demographic characteristics of the Participants & General Question

Demographic Profile N=300	F	%
Age		
18-25	167	55.7
26-35	92	30.7
36-45	38	12.7
Above 45	3	1.0
Gender		
Female	228	76.0
Male	72	24.0
Educational Status		
College	7	2.3
Graduate	164	54.7
high school	1	.3
Post Graduate	128	42.7
How often do you use QR codes?	27	9.0
I use QR codes regularly.	186	62.0
I use QR codes sometimes.	87	29.0
I used it only once		
Use QR codes mostly for		
connecting to websites (what is app, we chat)	233	77.7
offline purchasing	14	4.7
online purchasing	53	17.7

Table 1 presents the demographic profile of the study sample, which includes 300 respondents, offering insights into their age, gender, educational background, and QR code usage patterns.

Regarding **age**, 167 respondents (majority), or 55.7% of the total, are primarily between the ages of 18 and 25. Those aged 26 to 35 constitute 30.7% (92 respondents), while 12.7% (38 respondents) fall into the 36 to 45 age range. Only 1.0% (3 respondents) are above 45 years old, indicating a predominantly younger sample.

In terms of **gender**, the sample is largely female, with 228 women (76.0%) compared to 72 men (24.0%), reflecting a significant gender disparity.

For **educational status**, most respondents are graduates, with 164 individuals (54.7%) holding a graduate degree. Postgraduates make up 42.7% (128 respondents), while only 2.3% (7 respondents) have completed college, and 0.3% (1 respondent) have a high school education.

When it comes to **QR code usage frequency**, a significant proportion of respondents, 62.0% (186 individuals), use QR codes sometimes. About

29.0% (87 respondents) have used QR codes only once, and 9.0% (27 respondents) use them regularly.

Regarding the **primary use of QR codes**, the majority, 77.7% (233 respondents), use QR codes primarily for connecting to websites, including platforms like WhatsApp and WeChat. In contrast, 17.7% (53 respondents) use QR codes for online purchasing, and only 4.7% (14 respondents) use them for offline purchasing.

Overall, the demographic data indicate a youthful, predominantly female sample with a high level of education, showing varied frequencies and primary uses of QR codes.

Table 2: Statistical description and Test of Normality

Variables	No of items	Mean	SD	Variance	Skewness	Kurtosis	Kolmogorov Smirnov		Cronbach alpha
							Statistic (df =300)	Sig	
Customer Satisfaction	**3**	**3.7522**	**.70546**	**0.498**	**-.562**	**.432**	**3.706**	**.000**	**.850**
Re -use intention	**4**	**3.4467**	**.76618**	**0.587**	**-.138**	**-.449**	**1.586**	**.013**	**.781**
Determinants of QR code	**13**	**3.6126**	**.63257**	**0.400**	**-.306**	**-.201**	**1.200**	**.112**	**.908**

The findings of the descriptive statistics and normality tests for the study's variables are shown in Table 2. Customer satisfaction scores range from 3.7522 (mean) to 0.70546 (standard deviation). The level of satisfaction among the responders seems to be modest, according to this. A little leaning toward higher satisfaction ratings is shown by the skewness value of -0.562. The distribution is also quite near to normal, according to the kurtosis value of 0.432. In spite of this, a statistically significant non-normality is shown by the Kolmogorov-Smirnov test (p = 0.000). A high degree of internal consistency is indicated by the Cronbach Alpha rating of 0.850 for this scale.

A standard deviation of 0.76618 indicates that Reuse Intention has an average of 3.4467. The degree of agreement with the reuse goals is modest. With a skewness of -0.138, the distribution is almost symmetrical. When compared to a normal distribution, the kurtosis of -0.449 indicates that the distribution is flatter. A p-value of 0.013 reveals a statistically significant deviation from normalcy, according to the Kolmogorov-Smirnov test. The reliability of the reuse intention scale is well-established, with a Cronbach Alpha of 0.781.

A mean score of 3.6126 and a standard deviation of 0.63257 were recorded for the determinants of QR code use. This suggests that there is a considerable amount of consensus about the elements that impact the use of QR codes. With a kurtosis value of -0.201 and a skewness value of -0.306, we can see that the distribution is rather flat and has a little negative skewness trend. There seems to be no significant deviation from normalcy, according to the Kolmogorov-Smirnov test (p = 0.112). An very high degree of internal consistency is shown by the scale used to assess the variables

impacting QR code use, with a Cronbach Alpha value of 0.908. Despite a few outliers on the customer happiness and reuse intention scales, the determinants of the QR code use scale show good internal consistency and follow a somewhat normal distribution.

Table 3: Influence of Determinants of QR Code usage on Reuse intention, the influence of Determinants of QR code usage on Customer Satisfaction, Influence of Customer Satisfaction on Reuse intention

Dependent Variable	Independent Variable	No of scales	F-value (significance)	R	R^2	Adjusted R2	Standard error of estimate	b	t-value	Significance
Reuse Intention	Customer satisfaction	2	166.648 (0.000)	0.599	0.359	0.357	0.6142	0.60	12.91	0.00
Reuse Intention	Determinant of QR code usage	2	1697.887 (0.000)	0.922	0.851	0.85	0.2965	0.92	41.21	0.00
Customer satisfaction	Determinant of QR code usage	2	201.657 (0.000)	0.635	0.404	0.402	0.5457	0.63	14.20	0.00

Table 3 shows the outcomes of the regression analysis that looked at how various factors influencing QR code usage affected customer satisfaction, how customer satisfaction affected the intention to reuse QR codes, and which factors influencing QR code usage affected the idea to reuse them.

Customer satisfaction significantly affects the likelihood of reuse, according to the study. The results of the regression model, which showed an F-value of 166.648 ($p < 0.001$) and a R^2 of 0.359, indicate that customer satisfaction accounts for about 35.9% of the variation in reuse intention. The modified R^2 value is 0.357, with a standard error of 0.6142. With a t-value of 12.91 and a significance level of 0.00, the regression coefficient for customer satisfaction is 0.60, suggesting a strong and very significant influence.

The regression model revealed a very significant connection between the determinants of QR code use and reuse intention, with an F-value of 1697.887 ($p < 0.001$). The factors that influence QR code utilization may account for 85.1% of the variance in the intention to reuse, according to the R^2 value of 0.851. The estimate's standard error is 0.2965 and the modified R^2 is 0.85. The corrected R^2 value is 0.85 and the estimate's standard error is 0.2965. With a t-value of 41.21 and a significance level of 0.00, the coefficient is 0.92. A very strong and statistically significant impact is shown by this.

Lastly, the factors that determine QR code use greatly affect consumer happiness. The variables that determine the use of QR codes explain 40.4% of the variance in customer satisfaction, according to the F-value of 201.657 ($p < 0.001$) and R^2 of 0.404. As an indication of the extent to which the independent variables account for the variation in the dependent variable, the adjusted R^2 value is at 0.402. As a measure of the typical dispersion between actual and expected results, the estimate's standard error is 0.5457. Using a t-value of 14.20 and a significance threshold of 0.00, the determinants of QR code adoption have a coefficient of 0.63. There has been a notable and statistically significant effect.

According to the findings, there is a strong relationship between customer happiness and reuse intention, which in turn is affected by the drivers of QR code use.

Fig 2: Impact of QR code use determinants on reuse intention, with customer satisfaction serving as a mediating variable

Using SPSS, a mediating analysis was carried out to determine the impact of QR Code usage on Reuse intentions by mediating the effect of Customer satisfaction.

Model:

Y: Reuse intention

X: Determinants of QR code usage

Mediating Variable (M): Customer Satisfaction

Table 4: Model Summary

R	R-square	MSE	F-statistic	df1	df2	p-value
0.9225	0.8510	0.881	847.9661	2.000	297.000	0.000

Here is a summary of the model in Table 4. In this model, customer satisfaction acts as a mediator between the independent variable (the factors that influence QR code use) and the dependent variable (the desire to reuse the code). At the 5% level of significance, the findings are statistically significant (p-value = 0.000).

According to the model summary, there is a robust correlation between the variables impacting QR code use and the likelihood of their repetition. A very strong positive relationship between the two variables is shown by the correlation coefficient (R) of 0.9225. In addition, the variables that determine QR code utilization account for about 85.1% of the variance in reuse intention, as shown by the R-squared value of 0.8510. The model's great explanation power is seen here. A very high degree of prediction accuracy is shown by the modest average squared difference (MSE) of 0.881 between the anticipated and actual values. Additionally, a strong and statistically significant connection is shown by the 847.9661 F-value, which emphasizes the relevance of the model. The astonishingly low p-value of 0.000, which is much below the significance threshold of 5 percent, clearly indicates that the drivers of QR code use have a considerable influence on reuse intention.

Table 4: Regression Coefficients for Predictors of Reuse Intention: QR Code Determinants and Customer Satisfaction

	coefficients	se	t-value	p-value	LLCI	ULCI
Constant	-.6171	0.1064	-5.8023	0.000	-8264	-.4078
Determinants of QR code	1.1004	0.0351	31.3235	0.000	1.0313	1.1696
Customer satisfaction	0.0235	0.315	0.7476	0.4554	-0.0384	0.855

Table 4 provides a brief overview of the concept. In this model, the factors that impact QR code usage are the independent variables, and the desire to reuse the code is the dependent variable. Customer satisfaction mediates this relationship. The results are somewhat noteworthy at the 5% level of significance (p-value = 0.000).

There is a strong relationship between the factors influencing QR code use and the probability of their repeat, as shown in the model summary. With an R-value of 0.9225, we can see that the two variables are highly correlated with one another. Moreover, with an R-squared value of 0.8510, the factors that influence QR code use explain about 85.1% of the variation in the intention to reuse information. You can see the model's powerful ability to explain things here. The small average squared difference (MSE) of 0.881 between the expected and observed values demonstrates a very accurate level of prediction. The 847.9661 F-value further demonstrates a robust and statistically significant relationship, highlighting the model's importance. The causes of QR code usage significantly impact reuse intention, as shown by the very low p-value of 0.000, which is far lower than the significance threshold of 5%.

Table 5: Direct and Indirect Impacts of QR Code Determinants on Reuse Intention

Direct effect of X on Y					
Effect	**se**	**t-value**	**p-value**	**LLCI**	**ULCI**
1.1004	0.0351	31.3235	0.000	1.0313	1.1696
Indirect effect(s) of X on Y					
Effect	**Boot SE**	**Boot LLCI**	**Boot ULCI**		
Customer 1.1004	0.0241	-0.0309	0.0638		

A value of 1.1004 with a standard error of 0.0351 indicates that X (the determinant of QR code use) has a direct impact on Y (reuse intention). With a p-value of 0.000 and a t-value of 31.3235, this impact is clearly extremely significant. The 95% confidence interval, which falls between 1.0313 and 1.1696, further proves the effect's statistical significance and robustness. This range clearly shows that there is a significant direct influence, excluding zero.

On the other hand, the mediating impact of X on Y, customer pleasure, is also 1.1004, even though the bootstrapped confidence interval is between -0.0309 and 0.0638. The lack of statistical significance of the indirect impact is shown by the inclusion of zero in this range. Thus, whereas variables impacting the usage of QR codes have a large influence on the desire to reuse them, consumer satisfaction plays a tiny moderating role in this connection. Since the findings were not statistically significant, it might be inferred that partial mediation is present.

To evaluate the importance of the indirect impact, it is essential to provide the bootstrapped confidence intervals in mediation research that uses bootstrapping. When utilizing bootstrapping, the t-value and p-value are often not needed since the confidence intervals provide the important information about the indirect effect's significance.

Conclusion

The main objective of this study was to investigate the relationship between consumer satisfaction and the usage of QR codes and its influence on the repeated use of QR codes in Pakistan. An online survey of 300 respondents revealed that 76% were female and 24% male, aged 18 to 45. The study employed correlation and regression analyses to test four hypotheses.

The correlation analysis revealed a significant positive relationship between QR code usage and the intention to reuse them. This suggests that enhancing QR codes' usefulness, acceptability, and feasibility can improve customer satisfaction and subsequently increase the likelihood of reuse, particularly during the COVID-19 pandemic. Regression analysis provided additional evidence that customer satisfaction acts as a mediator between QR code determinants and reuse intention, emphasizing the crucial impact of user satisfaction on reuse behavior.

The study revealed that a significant proportion of users, particularly those aged 18 to 25 (55.7%), have benefited substantially from QR code technology, utilizing its efficiency for quick and secure access to websites. This age group has been particularly engaged with QR codes on online platforms; the COVID-19 pandemic has only served to worsen this tendency. The widespread adoption of smartphones equipped with built-in QR code scanning capabilities has driven this increase in usage, particularly during the pandemic.

These findings underscore the growing engagement of Pakistan's younger population with emerging technologies spurred by the integration of QR codes into mobile devices and applications. This phenomenon exhibits a more extensive transition towards digital solutions and stresses the critical importance of customer satisfaction in promoting the continued utilization of QR codes.

Limitations and Directions for Future Research

This study employed a convenience sampling technique, highlighting the need for future research to be conducted with a larger and more diverse sample. Exploring alternative sampling methods would also help strengthen

the validity of the findings. Since the research was confined to Pakistan, expanding the study to include other developing Asian economies, such as China and India, would allow for comparative analysis and enhance the generalizability of the results.

Moreover, while this study focused on three key determinants of QR code adoption, future research should examine additional critical factors, such as data security and transaction integration, to gain a more comprehensive understanding. Finally, although this study considered a single mediating variable, future research incorporating multiple contingent and mediating variables could offer deeper insights into the complexities of QR code usage and its broader implications.

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