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"Digital Payments In Public Transport: A Study On Qr Code-Based Payment System Adoption In Ksrtc"

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Abstract: The surge in mobile device usage and widespread customer adoption of digital payment technologies are major drivers of QR (Quick Response) code payments. A QR code is a two-dimensional barcode that stores information, which can be scanned using a smartphone or a dedicated scanner to make payments instantly. This payment method offers many advantages, including cost-effective infrastructure, accelerated transaction processing. Karnataka State Road Transport Corporation (KSRTC) has introduced a QR-based ticket payment system in Buses. This study investigates the adoption of QR code-based digital payment systems in the public transport sector, specifically focusing on the Karnataka State Road Transport Corporation (KSRTC). This research aims to understand sources of awareness, the factors influencing the adoption of QR code-based payment methods and challenges faced by KSRTC passengers, including technological, behavioral, and infrastructural aspects. The study based on primary data collected through structured questionnaire and personal interview from 155 Male passengers of KSRTC who used to pay tickets through Dynamic QR code in Buses. The findings reveal that while a significant portion of the population is inclined to adopt QR code-based payments and faced the barriers like Difficulty in handling refund, lack of quick support, Transaction failures and Slow QR code processing, network issues, which hinder widespread implementation. Recommendations for enhancing adoption rates include improving digital infrastructure, providing awareness campaigns, and addressing user concerns. This study offers valuable insights for policymakers and transport authorities aiming to integrate digital payment systems into public transport to foster efficiency and user satisfaction.

Key Words: Digital Payment, Unified payment Interface, Public Transport, Quick Response code

INTRODUCTION

In the age of smartphones, with everyone adopting cashless and digital payments, the adoption of digital payment systems in public transportation has gained significant attention due to their potential to improve efficiency, security, and user convenience. However, the Karnataka State Road Transport Corporation (KSRTC) heavily relied on cash-based transactions, leading to various operational challenges. These include Rrevenue leakages, inefficiencies in fare collection, and security risks associated with handling cash. To address these challenges,

The Karnataka State Road Trasport, Corporation has launched a Dynamic QR code-based ticketing system on November 6 across all its 8,941 Buses and fully rolled out by November 18, to be art of the digital payment system, allowing passengers to make UPI payments quickly and conveniently. These systems have been introduced as a modern, contactless alternative, offers benefits such as faster transactions, reduced dependency on physical cash, and better financial transparency.

Working of QR Code-based Ticketing System

Each ticket generates a unique, dynamic QR code that autofill's the payable amount, enhancing security with features such password protection and access management. Passengers can scan the code with any UPI-enabled application and make the payment, these payments are directly credited into the account of the respective depot managers. Once the payment is successful, the conductor's device receives a confirmation. A ticket is printed as proof of payment. The digital payments will not take much time and they add to the convenience since it will reduce the time of the conductor looking for change for paying each passenger,"

However, several barriers hinder the widespread use of QR-based payments, including lack of awareness, limited smartphone penetration, resistance to technological change, network connectivity issues, and concerns regarding security and reliability. Additionally, the existing infrastructure and policies may not fully support the seamless integration of digital payments into the KSRTC ecosystem.

This study seeks to analyze the awareness level challenges, factors influencing the adoption of QR code-based payment systems and challenges faced by the passengers while using QR code-based payment system in KSRTC Buses. By understanding commuter perceptions, technological limitations, and operational hurdles, the research aims to provide insights for improving adoption rates and enhancing overall efficiency in public transportation. Addressing these concerns will help KSRTC transition towards a cashless, efficient, and user-friendly payment system, ultimately benefiting both commuters and the transport authorities.

Review of the Literature

Jaya S Pujar (2015) conducted a research study titled "Mobile payment system using QR Code" focuses on to design a secure and user-friendly mobile payment solution, which enhances digital transactions with minimal human intervention. The study based on analytical approach exploring QR code technology in mobile commerce, emphasizing security, efficiency and user convenience. The study found that QR

Code-based payment systems reduce transaction time, enhance security and provide cost-effective solutions for business and consumers. The study suggested that integrating multi-layer security protocols and wider adoption across industries to enhance reliability.

Warnars et.al (2017) in their research study developed a smart payment system for Jakarta's public transportation, collaborating numerous payment methods to improve competence, security, and user convenience. The study adopted system development approach, analyzing current payment challenges and proposed a new integrated payment model using advanced technologies. The study pointed that implementation of unified payment system across all transport modes, can enhance transaction speed, improve security and facilitate seamless interconnectivity and enhancing user accessibility.

The adoption of online payment guarantees cashless transactions, improves accessibility, and allows transport authorities to screen passenger flow and revenue in real time. As per **Tupare et.al (2024)** implementing QR codes for ticketing offering various benefits such as reducing wait times, preventing fraud, cutting operational cost and improved convenience for users.

Narote (2024) research study titled "Survey on Payment methods in Public Transport" pointed out highlighted the need to enhancing public transport payment system for easy and more user-friendly experience. The study explicated how use of contactless payments, QR Codes and UPI Systems makes public transit more competence, convenient and safe. However, it also pointed out challenges faced by commuters and transportation authorities like accessibility, affordability and technological integration, which hider the growth of public transportations. The study recommended to offer more payment options and improving security measures to make digital payments easy to use.

Research Objectives:

- To assess Sources of Awareness and usage of QR code-based ticketing Payments among KSRTC Passengers
- To identify the Factors influencing the adoption of QR code-based ticking in KSRTC
- To analyze the Challenges faced by Passengers in Using QR code for Ticket Payments

Research Methodology

Research Design

The study adopts a descriptive research design to analyze the experience of the Passengers with QR code-based payment system. It examines sources of awareness, factors influencing usage and challenges faced with QR code-code based ticketing system through a structured approach.

Sampling Method and Sample Size

A non-probability convenience sampling method is used to collect responses from passengers of KSRTC. The sample consists of 155 Male passengers, who use QR Code based ticketing payment in KSRTC Buses, which ensures a diverse representation across age groups, occupation and income levels.

Data Collection Method

Primary data is collected through Survey of KSRTC Passengers across Urban, Semi-urban and rural route, a Personal interview and structured questionnaire distributed via online platforms and direct surveys. The questionnaire includes demographic details, factors influencing usage of QR code-based ticketing Payments and challenges faced by the passengers

Methods of Analysis and Statistical Tools

The information collected through the questionnaires and other sources is analyzed with the help of graphs, percentage, the statistical tools like tabulation, average and percentage, Weighted average Mean are used for analyzing the data.

Data Analysis and Discussion of Results

Table 1: Showing demographic profile of the respondents

Category	Frequency	Percentage	Cumulative Percent
Gender			
Male	155	100	100
Age Group			
18-25	55	35.5	35.5
26-35	45	29.0	64.5
36-50	26	16.8	81.3
51-60	19	12.3	93.5
60 Above	10	6.5	100.0
Educational Qualification			
Below 10^{th} Standard	16	10.3	10.3
10th to 12^{th} Standard	36	23.2	33.5
Graduation	63	40.6	74.2
Post-Graduation	40	25.8	100.0
Occupation			
Self Employed	56	36.1	36.10
Employed (Full-time)	30	19.4	55.5
Employed (Part-time)	41	26.5	81.9
Daily Wage Workers	28	18.1	100.0
Monthly Income (₹)			
Less than 10,000	13	8.4	8.4
10,001 to 20,000	33	21.3	29.7
20,001 to 30,000	38	24.5	54.2
30,001 to 40,000	26	16.8	71.0

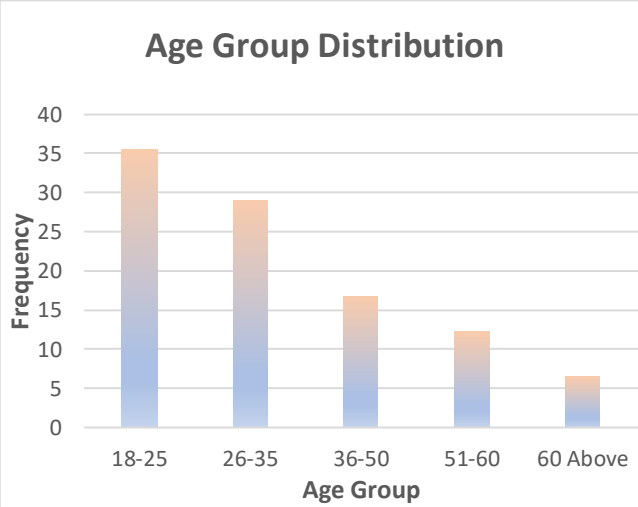
40,001 to 50,000	27	17.4	88.4
50,001 and above	18	11.6	100.0
Total	**155**	**100.0**	

Source: Primary Data through Questionnaire

Interpretation:

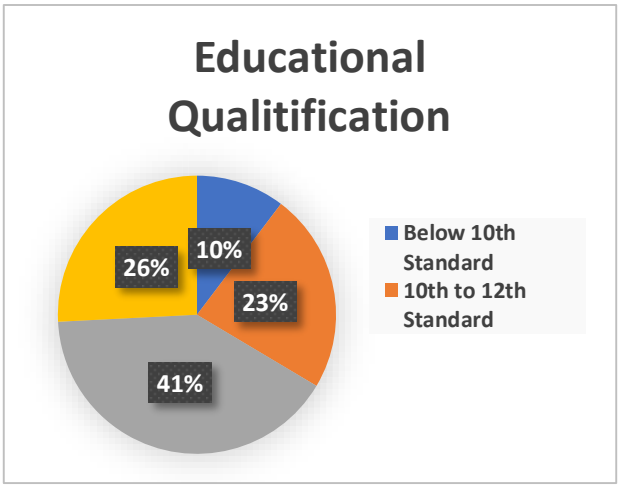
a) Gender Distribution: All respondents in the sample are **male (100%)**, indicating a study focused exclusively on men.

b) Age Group Distribution



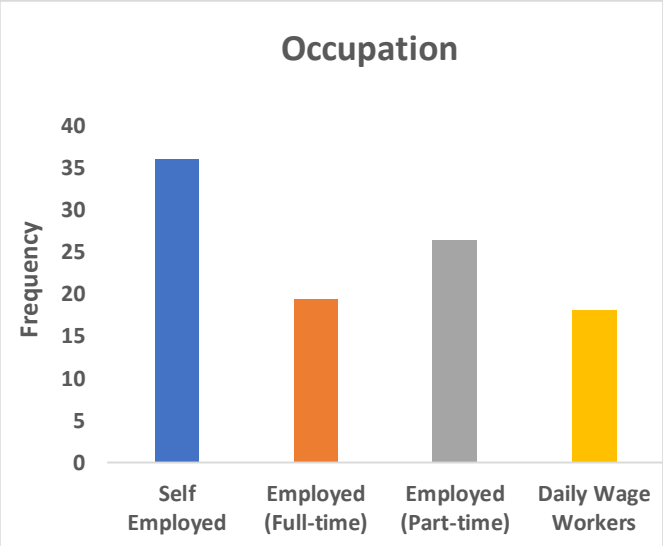
The majority of respondents belong to the **18-25 years** age group, accounting for **35.5%** of the total sample. likely consisting early-career individual. The second-largest group is **26-35 years** (29 %) This indicates that younger age groups dominate the distribution. The **36-50 years** age group represents **(**16.8%). The **51-60 years** group represents **12.3%** of the sample. A very small proportion (6.5**%**) of respondents are **60 and above**, indicating minimal representation from older individuals. The dataset predominantly includes Younger and middle-aged and working professionals.

c) Educational Qualification:

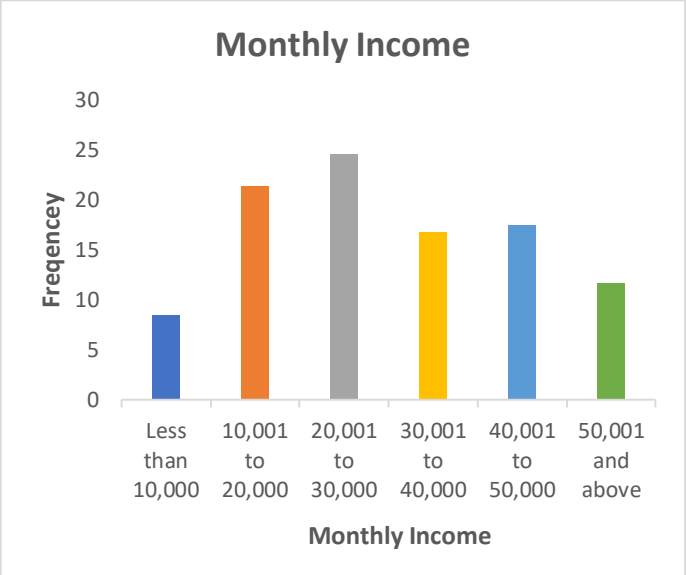


A majority (40.6%) are graduates, followed by 25.8% with post-graduate degrees. 23.2% have completed 10th to 12th standard, while 10.3% have education below 10th standard. A large proportion of respondents are well-educated, with over **66% being graduates or post-graduates**.

d) Occupation



Self-employed individuals make up the largest category (36.1%). Followed by Part-time employed respondents (26.5%) outnumber full-time employees (19.4%). Daily wage workers form the smallest occupational group at 18.1%. More than a third of respondents are self-employed.



e) Monthly Income

The highest number of respondents (38 people, 24.5%) earn between ₹20,001 and ₹30,000, reflecting a mid-income group. The ₹10,000 to ₹20,000 range (33 people, 21.3%) is the second most common, showing a significant number of lower-middle-income earners. 26 people (16.8%) fall into the ₹30,001 to ₹40,000 income bracket, indicating a moderate financial status.

A small portion (7 people, 7.1%) earn between ₹40,001 and ₹50,000, while 18 people (11.6%) earn above ₹50,000, representing higher-income groups. Only 13 people (8.4%) earn less than ₹10,000, showing a relatively low number of low-income respondents.

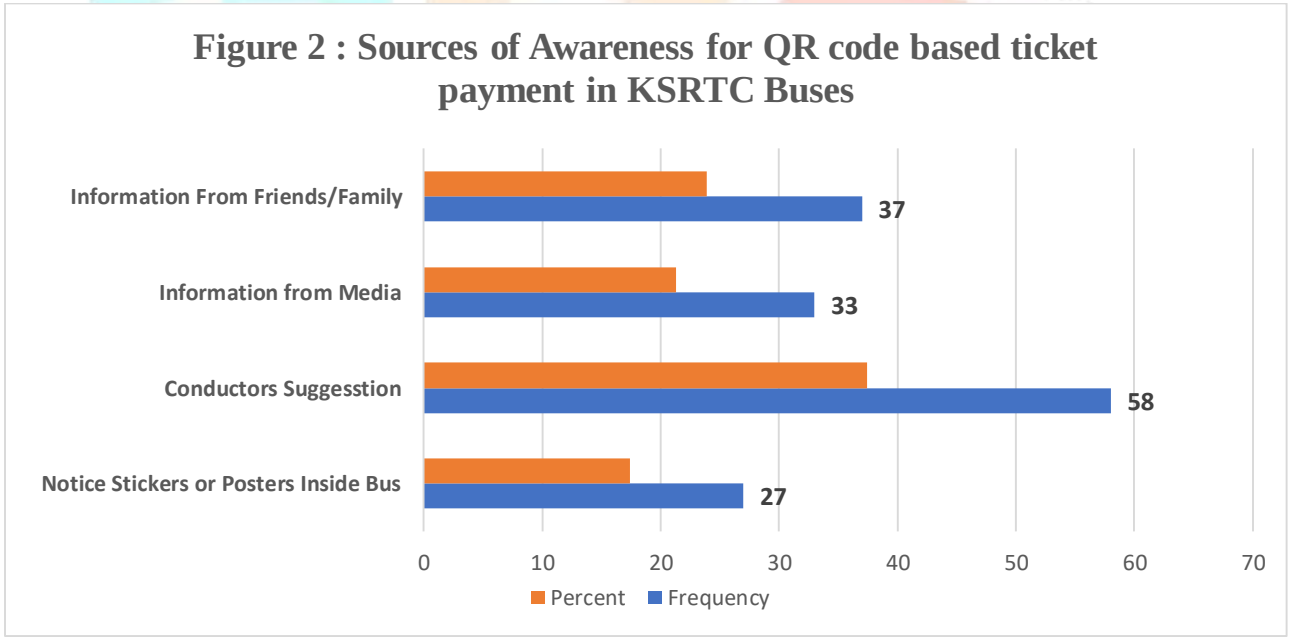
Table 2: Showing Passengers Frequency of Travel by KSRTC Buses

Period	Frequency	Percent	Cumulative Percent
Daily	45	29.0	29
2-3 times a week	53	34.2	63.2
Weekly	35	22.6	85.8
Occasionally	22	14.2	100.0
Total	**155**	**100**	

Source: Primary Data through Questionnaire

The majority of passengers (**34.2%**) travel by KSRTC 2-3 times a week, indicating that many passengers use KSRTC for regular, but not daily travel. A significant (**29 %)** portion of passengers relies on KSRTC for their daily commute. Only **(22.6%)** of passenger's travel by KSRTC weekly, this group likely included those who use for weekend trips or specific weekly activities, while **(14.2 %)** travel Occasionally represents those who use KSRTC for infrequent trips, such as long-distance travel or occasional visits.

Figure 1: Sources of Awareness for QR Code based ticket Payment in KSRTC Buses

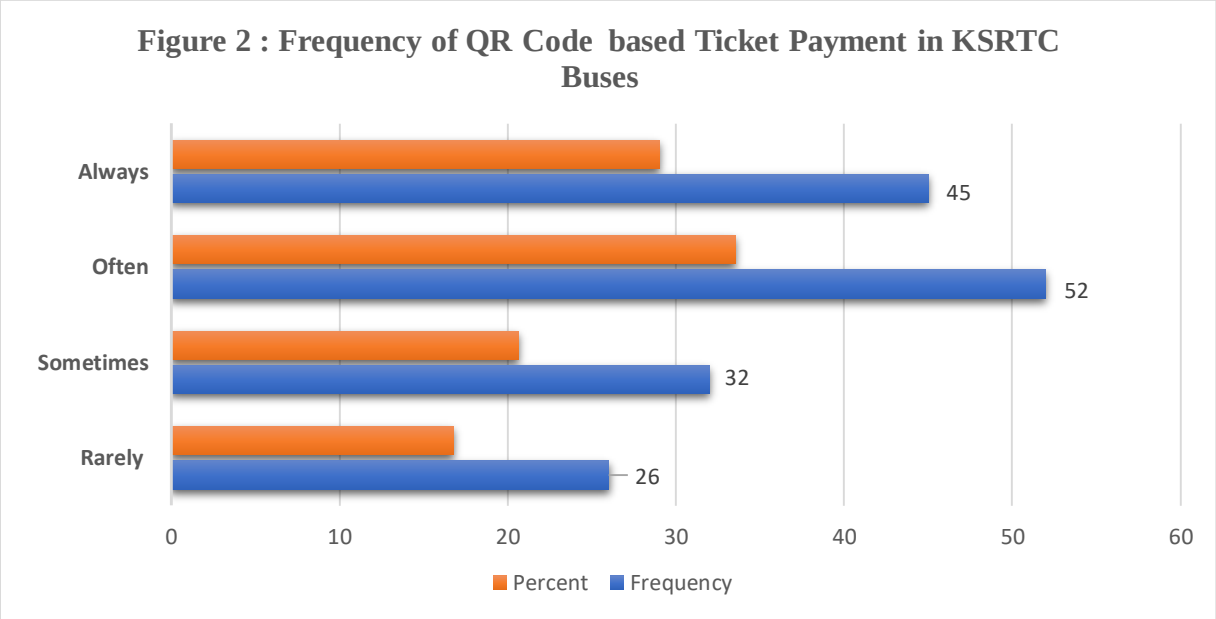


Source: Primary Data through Questionnaire

The above figure illustrates sources of awareness about the QR code-based ticket payment system in KSRTC Buses. It presents four sources of awareness namely Information from friends/family, information from Media, Conductors suggestion and Notice stickers or posters inside the Bus. The chart displays both the number of passengers and percentage of passengers for each source. Majority (37.4%) of the surveyed passenger reported learning about the system from conductors' suggestions. This is the most significant source of awareness, indicating that conductors playing a significant role in promoting the QR Code payment system, while 23.9 % of the surveyed passengers learned about the system from friends or family, indicating word of mouth play a significant role and 21.3% learned about the system from media

sources indicating media play a substantial role in distributing information about the system. Only 17.4 % of the surveyed passenger's source of information is in bus advertisements and notices plays a less significant role compared to other sources.

Figure 2: Frequency of QR code-based Ticket payment in KSRTC Buses



Source: Primary Data through Questionnaire

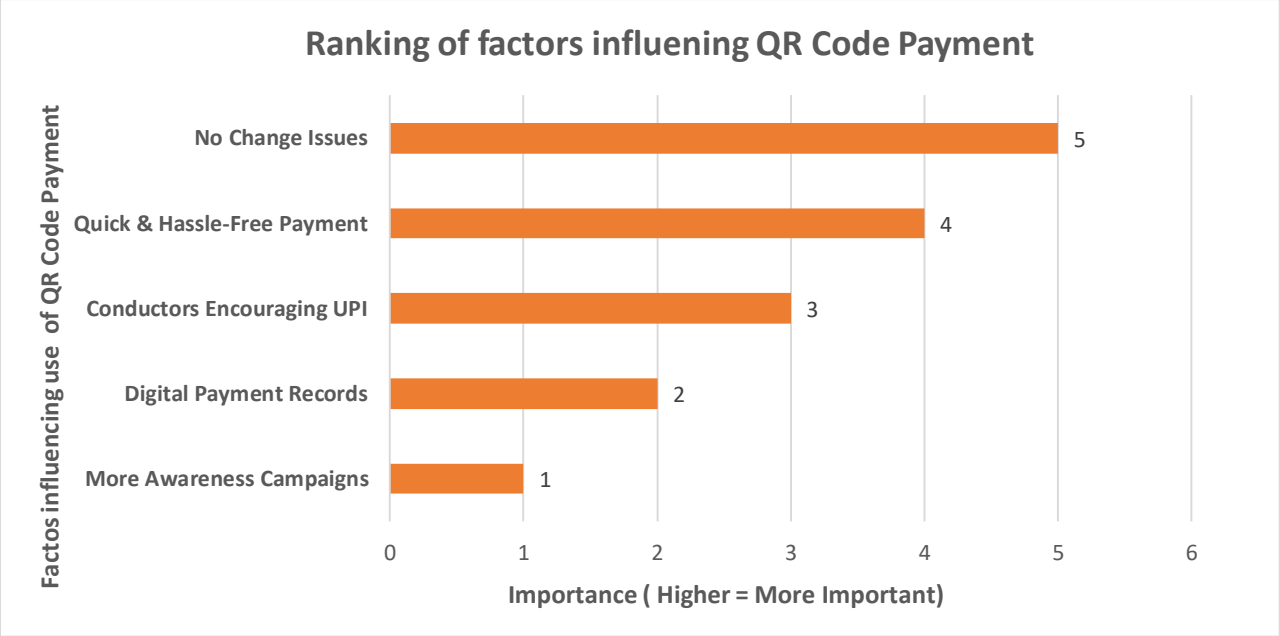
Majority (33.5%) passengers reported the frequency of QR code payment use "Often". This is the largest group, demonstrating a significant portion of passengers who frequently use QR code payments. (29.0%) reported using it "Always." This represents a strong and consistent adoption of QR code payments among a considerable portion of the surveyed population. (20.6%) reported using it "Sometimes." This group represents those with occasional or inconsistent use of the system. Only (16.8%) reported using QR code payments "Rarely." This indicates a group that has limited or infrequent interaction with the QR code payment system.

Key Observations:

- The combined "Often" and "Always" categories represent a substantial majority of the surveyed passengers, indicating that the QR code payment system has been relatively well-adopted.
- However, a significant portion of passengers (those in the "Rarely" and "Sometimes" categories) still use the system infrequently. This suggests that there might be barriers or reasons preventing them from fully embracing QR code payments.

Factors influencing QR code-based ticket payment in KSRTC Buses

Figure 3: Showing Ranking of Factors influencing QR code-based ticket payment



Source: Primary Data through Questionnaire

The above bar chart is showing the most important factors that influence passengers' use of QR code-based ticket payments in KSRTC buses. The ranking is based on importance, with higher numbers indicating greater importance. The factors are: No Change Issues, Quick & Hassle-Free Payment, Conductors Encouraging UPI, Digital Payment Records, and More Awareness Campaigns. No change issue emerges as the most important factor which makes it evident that consumers' key consideration is value for money, indicating that consumers Prioritize value for money, which is a common problem with cash transactions. This suggests that avoiding change-related hassles is a significant motivator for using QR code payments. The second most important factor is Quick & Hassle-Free Payment, which passengers find preferable to traditional payment methods. This highlights the significance of efficiency and convenience in promoting QR code adoption. The third most important factor is Passengers are influenced by conductors, who actively promoting and assisting with UPI-based QR code payments, followed by Digital payment records which can be useful for tracking expenses and managing finance. And last but not least, awareness campaigns are considered less influential compared to other factors. This suggested that passengers are more persuaded by the practical benefits and direct encouragement rather than general awareness initiatives.

Table no 3: Showing Challenges faced by the Passengers in QR code-based ticket payment

Sl. No.	Challenges	Passenger's Response					Weighted mean		
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	**Total weight score**	**Weighted mean score**
1	Internet Connectivity Issue	22	16	7	68	42	155	**373**	**2.41**
2	Slow QR code payment processing and causes delays.	25	34	10	50	36	155	**427**	**2.75**
3	QR code transactions sometimes fail, causing inconvenience.	29	33	8	56	29	155	**442**	**2.85**
4	QR Code Scanning Issues	12	16	6	78	43	155	**341**	**2.20**
5	Difficulty in Handling Refunds	78	49	8	12	8	155	**642**	**4.14**
6	Lack of quick Support for Payment Issues	76	43	9	18	9	155	**624**	**4.03**

Source: Primary Data through Questionnaire

Interpretation:

In the above Likert's five-point analysis tables, Challenges faced by the Passengers in QR Code based ticket payment in KSRTC Buses have been measured. For understanding the challenges, weighted average method has been adopted. Value of 5 is assigned for strongly agree Statement, value is 4; for Agree, value 3 is assigned for Neutral, value 2 is assigned for Disagree, for strongly disagree value 1 is assigned.

The study statistically inferred that the biggest challenges passengers face is Difficulty in Handling Refunds (4.14) which has the highest weighted mean score, indicating as many struggle to get their money back. Followed by the lack of quick support for payment issues (4.03) – Moderately significant issue, which causes frustration when help is needed regarding payment related problems. Slow QR Code payment process (2.75)- Noticeable concern Making payment unreliable, while slow QR code payment processing (2.75) is also a concern, though not as severe as refund issues or lack of support, Internet connectivity issues (2.41) affect some passengers but are not as serious compared to other problems, and QR code scanning issues has lowest weighted mean score (2.20), are the least problematic indicting not as critical as other challenges

Passengers face the most difficulties in handling refunds and receiving quick support for payment issues, followed by transaction failures and slow processing. Connectivity and scanning issues, while still problematic, are less severe compared to other challenges.

Findings

- **Adoption Trend of QR based Ticket Payment among Passengers:** Many of them use QR code payment, with a majority 62.5% using it often or always. However, some people still use them only occasionally
- **Awareness Sources**: Conductors play a major role in spreading awareness regarding use of QR code payment followed by Friends and family recommendations, advertainment in Media play a role but is less influential and notices and posters in buses have a least impact.
- **Factors Influencing Adoption**: The main reason passengers adopt QR code payments is to avoid "No Change Issues," it indicates that they prefer cashless transactions. Quick and hassle-free payments also make the system more appealing, while active promotion of UPI payments from the conductors further encourage usage. Additionally, digital payment records help passengers track their expenses easily, though awareness campaigns have a smaller impact on adoption.

Challenges Faced: the study statistically inferred that

- ✓ **Difficulty in Handling Refunds (4.14 mean score)**: The most significant issue faced by passengers.
- ✓ **Lack of Quick Support for Payment Issues (4.03 mean score)**: Causes frustration.
- ✓ **Transaction Failures and Slow QR Code Processing**: Leads to inconvenience and delays.
- ✓ **Internet Connectivity Issues**: Impact some passengers but are less severe compared to refund and support issues.
- ✓ **QR Code Scanning Issues**: The least problematic challenge

Suggestions:

The following suggestions can help to improve the adoption and efficiency of QR-based digital payments in KSRTC

- **Increase Digital Payment Awareness:** Conductors should be trained to educate passengers about QR-based payments. Especially older adults. Awareness campaigns (posters, announcements, and social media) should highlight the benefits of using UPI payments. Offer demo sessions at major bus stations to guide passengers on using QR codes.

Offer Incentives for Digital Payments: Provide small discounts or cashback offers for QR

Payments to encourage usage. Introduce a loyalty program where frequent users of digital payments get benefits.

- **Improving Refund and Customer Support System:** Passengers face difficulties in handling refunds and resolving payment issues. To address these concerns, KSRTC should

✓ Establish a faster and more transparent refund process to address the most common passenger complaint. Implement an automated refund system that ensures quick refunds for failed transactions

✓ Set up a dedicated helpline or chatbot service for quick assistance with payment issues. Train conductors to assist passengers with troubleshooting payment problems.

✓ Enable real-time tracking of payment issues through an official KSRTC app or website.

Ensuring Faster and More Reliable Transactions: To minimize transaction failures and delays, KSRTC must:

✓ Upgrade Electronic Ticketing Machines (ETM) to process QR payments more quickly and efficiently.

✓ Improve server and network connectivity in buses to reduce failures during transactions.

- **Improving Infrastructure for Seamless Payments**

✓ Ensuring all buses equipped with reliable and well-maintained ticketing devices.

✓ Conducting periodic technical maintenance and upgrades to prevent breakdowns in the payment system

Conclusion:

The Indian government's initiative to create a cashless economy has led to a significant push for digital payments in recent years. One of the key technologies driving this shift is Quick Response (QR) codes, which have emerged as a popular payment method in India. The Karnataka state road transport corporation has launched a QR code-based ticketing system, allowing passengers to make UPI payments quickly and conveniently, While the QR-based payment system has been adopted by a considerable number of passengers, barriers such as digital literacy, network issues, and difficulty in Handling Refund, lack of Quick support, transaction failures and slow QR code processing, still hinder full adoption. Improving infrastructure, conducting awareness campaigns, and addressing refund/support issues can enhance user experience and adoption rates.

References:

- Warnars, H. L. H. S., Lanita, Y., Prasetyo, A., & Randriatoamanana, R. (2017). Smart integrated payment system for public transportation in jakarta. Bulletin of Electrical Engineering and Informatics, 6(3), 241-249.
- Wani, S. A., & Mohan, R. (2023, December). From Cash to Cashless: Exploring Factors Influencing Digital Payments Acceptance Among Public Transport Drivers. In Conference of Transportation Research Group of India (pp. 63-77). Singapore: Springer Nature Singapore.
- Tupare, J., Tupe, A., Saudagr, M., & Mali, S. (2024). Smart Public Transport Ticketing System Using QR Code Online Payment Method. Available at SSRN 4843352.

- Narote, Ketan Sawant, Abhijet savable, Soham Sable (2024) Suvrey on payment method in Public Transport International Research Journal of Modernization in Engineering Technology and ScienceVolume:06/Issue:06/April-2024