

Digital Transformation Through UPI Payment Systems: A Case Study of KSRTC

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ABSTRACT

The rapid growth of digital payment systems has transformed the functioning of public transportation services in India. The introduction of Unified Payments Interface (UPI) based ticketing in Kerala State Road Transport Corporation (KSRTC) represents a significant step towards digital transformation, operational efficiency, and financial transparency. The present study examines the impact of UPI-based ticketing on service efficiency, financial transparency, and passenger satisfaction in KSRTC. Primary data were collected from 200 KSRTC passengers through a structured questionnaire using purposive sampling. The study employed correlation analysis and regression analysis using SPSS software to examine the relationship between UPI-based ticketing variables and passenger perceptions. The findings indicate that digital ticketing contributes positively to operational efficiency, improves transparency in financial transactions, and enhances passenger satisfaction. The study concludes that UPI-based ticketing plays a crucial role in modernizing public transportation services and promoting cashless transactions. The findings provide valuable insights for policymakers and transport administrators seeking to strengthen digital governance and improve service efficiency in public transport systems.

Keywords: Digital Transformation, Financial Transparency, KSRTC, Passenger Satisfaction, Service Efficiency, UPI-Based Ticketing.

INTRODUCTION

The rapid advancement of information and communication technology has significantly transformed the manner in which organizations deliver services and manage financial transactions. Digital payment systems have emerged as a crucial component of this transformation by enabling secure, convenient, and real-time transactions. In India, the Unified Payments Interface (UPI) has revolutionized the digital payment ecosystem by providing a seamless platform for instant money transfers through mobile devices. Supported by the Government of India's Digital India initiative, UPI has witnessed remarkable growth across various sectors including banking, retail, healthcare, education, and transportation. The increasing preference for cashless transactions has encouraged public service organizations to integrate digital payment technologies into their operational systems.

Public transportation is an essential component of socio-economic development as it facilitates mobility, accessibility, and connectivity among individuals and communities. Traditional ticketing systems in public transportation primarily relied on cash transactions, which often resulted in operational inefficiencies, delays in ticket issuance, accounting errors, revenue leakages, and lack of financial transparency. The growing adoption of digital technologies has prompted transportation organizations to modernize their ticketing systems through

electronic payment mechanisms and digital ticketing platforms. These innovations not only improve operational performance but also enhance passenger convenience and institutional accountability.

Several researchers have examined the adoption and effectiveness of digital payment systems in transportation services. Agnivesh Pani et al. (2025) reported that technological advancement and digital infrastructure significantly influence the adoption of digital payment systems in public transportation. Their findings revealed that accessibility, technological readiness, and user awareness positively affect passengers' willingness to use digital payment platforms. Nakkala et al. (2025) observed that QR-code-based ticketing systems improve service efficiency by reducing transaction time and enhancing passenger convenience. The study further emphasized that digital ticketing minimizes operational delays and improves the overall travel experience.

Ayodo and Ondiek (2025) found that perceived ease of use, security, and performance expectancy are major determinants influencing passengers' acceptance of digitized fare payment systems. Their research highlighted that passengers are more likely to adopt digital payment methods when they perceive them as reliable, secure, and easy to operate. Bharadwaj and Tribhuvanam (2025) examined paperless ticketing systems and concluded that digital ticketing significantly improves service quality, reduces administrative burden, and strengthens customer satisfaction. Similarly, Mogaji and Nguyen (2024) emphasized the importance of trust, accessibility, and user engagement in the successful implementation of digital payment technologies.

In the context of public transportation, digital ticketing systems have been recognized as an effective solution for improving operational efficiency and financial accountability. Dr. K. Saravana (2016) observed that passenger satisfaction plays a crucial role in determining the effectiveness of transportation services and emphasized the importance of technological innovation in enhancing service quality. Marta Campos Ferreira et al. (2014) found that electronic ticketing systems positively influence customer satisfaction by providing convenience, data security, and improved service accessibility. Mazen Kamal Qteishat et al. (2014) highlighted that digitalization in transportation services enhances service efficiency, transparency, and accessibility while supporting better resource utilization. Nina Mallat et al. (2008) reported that compatibility, mobility, and ease of use significantly influence the adoption of mobile ticketing services in public transportation systems.

Kerala State Road Transport Corporation (KSRTC) is one of the largest public transportation organizations in Kerala and serves millions of passengers annually. Over the years, KSRTC has adopted various technological innovations to improve service delivery, operational efficiency, and passenger convenience. As part of its digital transformation initiatives, KSRTC introduced UPI-based ticketing facilities to encourage cashless transactions and strengthen financial transparency. Through QR-code-enabled payments and electronic ticketing machines, passengers can conveniently purchase tickets using mobile payment applications. This initiative aligns with the broader objectives of promoting digital governance, reducing cash dependency, and improving revenue monitoring systems within public transportation services.

Although previous studies have extensively examined digital payment adoption, electronic ticketing systems, and customer satisfaction in transportation services, limited empirical research has specifically investigated the impact of UPI-based ticketing on service efficiency, financial transparency, and passenger satisfaction within KSRTC. Most existing studies focus on technology acceptance and digital payment adoption at a general level, while relatively few studies examine the operational and financial outcomes of UPI-enabled ticketing systems in state-owned transportation organizations. Therefore, a significant research gap exists regarding the effectiveness of UPI-based ticketing in improving service delivery and strengthening accountability within KSRTC.

In view of the above discussion, the present study seeks to examine the impact of UPI-based ticketing on service efficiency, financial transparency, and passenger satisfaction in KSRTC. The study aims to provide empirical evidence regarding the effectiveness of digital payment systems in public transportation and contribute to the growing body of literature on digital transformation and service innovation. The findings are expected to assist policymakers, transportation administrators, and public service organizations in developing strategies for enhancing operational performance, promoting financial transparency, and improving passenger experiences through digital technologies.

Statement of the Problem

Public transportation in India is important for millions but traditionally relies on cash transactions, leading to inefficiencies. To improve this, the Kerala State Road Transport Corporation has adopted UPI-based ticketing systems. Despite the growing use of digital payments in India, challenges remain, including low digital literacy, connectivity issues, hesitation to adapt, and security concerns among passengers. KSRTC faces many operational challenges related to personnel training, system reliability, and overall functionality.

While prior studies have examined digital payment systems in developing countries, there is a notable lack of research on UPI-based ticketing specifically within Indian public transport and KSRTC. This highlights a gap in understanding commuter adoption, challenges faced, and potential improvements to enhance passenger satisfaction and service efficiency. This study aims to address the insufficient empirical knowledge regarding the implementation and effects of UPI-Based ticketing at KSRTC, which is important for advancing digital transformation in India's public transport sector.

Objectives of the Study

1. To evaluate the impact of UPI-based ticketing on service efficiency in KSRTC.
2. To evaluate the impact of UPI-based ticketing on revenue accountability and digital transaction transparency in KSRTC.
3. To examine the effect of UPI-based ticketing on passenger satisfaction in KSRTC.

RESEARCH METHODOLOGY

The present study adopts a descriptive and analytical research design to examine the impact of UPI-based ticketing on service efficiency, financial transparency, and passenger satisfaction in Kerala State Road Transport Corporation (KSRTC). The study primarily focuses on understanding passengers' perceptions regarding the effectiveness of digital ticketing systems and their contribution to operational performance and transparency in public transportation services.

Both primary and secondary data were utilized for the study. Primary data were collected directly from KSRTC passengers through a structured questionnaire designed to measure various dimensions of UPI-based ticketing, including transaction speed, convenience, system reliability, transparency, and passenger satisfaction. Secondary data were collected from books, journals, research articles, government reports, KSRTC publications, websites, and other relevant academic sources to provide theoretical and empirical support for the study.

The population of the study consists of passengers using KSRTC services. A sample of 200 respondents was selected using purposive sampling technique. The respondents were chosen based on their experience with UPI-based ticketing facilities provided by KSRTC. The sample was considered adequate to analyze the relationship between digital ticketing variables and passenger perceptions. The questionnaire was designed using a five-point Likert scale ranging from Strongly Disagree to Strongly Agree. The collected data were coded, classified, and analyzed using Statistical Package for Social Sciences (SPSS). Appropriate statistical techniques were employed to examine the objectives and hypotheses of the study.

Correlation analysis was used to determine the degree and direction of relationship between UPI-based ticketing variables and the dependent variables, namely service efficiency, financial transparency, and passenger satisfaction. Regression analysis was further employed to identify the impact and predictive power of the independent variables on the dependent variables. The results obtained from these analyses were interpreted to draw meaningful conclusions regarding the effectiveness of UPI-based ticketing in KSRTC. The study is limited to KSRTC passengers who have experience using UPI-based ticketing facilities. Therefore, the findings are based on the perceptions and responses of the selected respondents and may not necessarily represent all public transportation users.

REVIEW OF LITERATURE

A global trend that has been spurred by technological innovation and shifting client demands is the move of public transportation from cash-based ticketing to digital payment systems. According to previous studies mobile ticketing reduced waiting time and improved convenience, however user acceptance and trust concerns persisted as significant obstacles (Mallat et al., 2008) and (Dekkers and Rietveld, 2007). Later research indicated that QR-based systems and e-ticketing improved transparency and operational efficiency, service quality, and customer satisfaction by minimizing human intervention (Ferreira et al., 2014), (Qteishat et al., 2014), (Adducul et al., 2020), (Rizki et al., 2021). Researchers emphasized that digital payment platforms and UPI quickened financial inclusion and encouraged a move to a cashless economy in the Indian situation (Tasran, 2022). The adoption of smart ticketing technologies, such as RFID, NFC, and real-time analytics, further highlighted how digital systems may increase revenue collection, decrease fraud, and promote sustainable transportation (Chavan et al., 2023), (Kulkarni et al., 2023).

Recent research has started to emphasize the difficulties associated with adopting digital payments rather than only the advantages they provide. According to studies, digital payment systems may not be adopted well because of issues including digital literacy gaps, insufficient technological infrastructure, weak internet connectivity, cybersecurity risks, and passenger opposition (Ayodo and Ond Ondiek, 2025), (Chirakkal, 2024), (Mogaji and Nguyen, 2024). International studies on Account-Based Ticketing and Mobility-as-a-Service have indicated that although integrated digital platforms greatly improve passenger experience and accessibility, their success is contingent upon user readiness and strong institutional backing (Liyanaarachchi, 2024), (Martinez and Vallejo, 2024). Extensive research has looked into e-ticketing, smart mobility, and digital payments in different countries, but there is very little empirical data available on how UPI-based ticketing is being implemented in the Kerala State Road Transport Corporation (KSRTC) and how it affects service efficiency, transparency, and passenger satisfaction. Hence, this research fills this hole by examining how UPI-based ticketing helps KSRTC undergo a digital transformation and by highlighting the benefits and drawbacks of using it.

DATA ANALYSIS AND INTERPRETATION

TABLE 1 – DESCRIPTIVE STATISTICS

The demographic profile of respondents provides a clear understanding of the composition of the sample selected for the study. Variables such as gender, age and occupation influence the adoption and usage of digital payment systems, particularly UPI-based ticketing services. Also helps in understanding the background of the respondents and ensures that the findings are representative and reliable.

VARIABLES	CATEGORY	FREQUENCY	PERCENTAGE
GENDER	Male	99	49.5
	Female	101	50.5
AGE	18 – 25	76	38
	26 – 35	97	48.5
	36 – 45	13	6.5
	46 – 60	14	7.0
OCCUPATION	Student	68	34
	Employed	88	44
	Self-Employed	41	20.5
	Homemaker	3	1.5

INTERPRETATION

The above table presents the demographic profile of the 200 respondents selected for the study. The gender distribution is almost balanced, with females accounting for 50.5% and males constituting 49.5% of the sample, indicating the absence of gender bias in the study. Regarding age, the majority of respondents (48.5%)

belong to the 26–35 years age group, followed by 38% in the 18–25 years category. This shows that the study is largely represented by young and middle-aged individuals who are generally more familiar with digital payment technologies. In terms of occupation, employed respondents form the largest group (44%), followed by students (34%) and self-employed individuals (20.5%). Homemakers account for only 1.5% of the sample. The findings indicate that the respondents are predominantly economically active and digitally engaged individuals, providing a strong foundation for analyzing the acceptance and effectiveness of UPI-based ticketing in KSRTC.

TABLE 2 – CORRELATION BETWEEN SERVICE EFFICIENCY, PASSENGER SATISFACTION AND AWARENESS OF UPI BASED TICKETING

Variables			Service Efficiency	Passenger Satisfaction	Awareness of UPI based ticketing
Spearman's rho	Service Efficiency	Correlation Coefficient	1.000	.983**	.743**
	Passenger Satisfaction	Correlation Coefficient	.983**	1.000	.746**
	Awareness of UPI based ticketing	Correlation Coefficient	.743**	.746**	1.000
**. Correlation is significant at the 0.01 level (2-tailed).					

(Source: Primary Data)

INTERPRETATION

The above table service efficiency, passenger satisfaction and awareness of UPI Based ticketing is showing a positive correlation with r value (0.983) and p value significant at 1% level of significance. This implies that the correlation analysis of service efficiency and awareness of UPI Based ticketing is showing a positive correlation with r value (0.743) and p value significant at 1% level of significance. It implies that service efficiency, passenger satisfaction and awareness of UPI Based ticketing is positively correlated in each other.

TABLE 3 – IMPACT OF AWARENESS OF UPI BASED TICKETING ON SERVICE EFFICIENCY

We have use Multiple Regression analysis is used to analyze the impact of UPI Based awareness on service efficiency. It is explained with following tables:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.838 ^a	.702	.701	3.68863

a. Predictors: (Constant), Awareness

The correlation coefficient ($R = 0.838$) indicates a very strong positive relationship between awareness and service efficiency. The coefficient of determination ($R^2 = 0.702$) reveals that 70.2% of the variation in service efficiency is explained by awareness. The Adjusted R^2 (0.701) confirms that the model is highly reliable and not inflated.

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6347.382	1	6347.382	466.513	.000 ^b
	Residual	2693.989	198	13.606		
	Total	9041.371	199			

a. Dependent Variable: Service Efficiency

b. Predictors: (Constant), Awareness

Since the significance value is less than 0.05, the regression model is statistically significant. This indicates that the awareness has a significant effect on service efficiency. Therefore, the null hypothesis is rejected.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.252	.596		3.779	.000
	Awareness	4.171	.193	.838	21.599	.000

a. Dependent Variable: Service Efficiency

Source: Primary Source

INTERPRETATION

The regression coefficient ($B = 4.171$) indicates that for every one-unit increase in service efficiency, awareness increases by 4.171 units. The standardized beta value (0.838) shows a very strong positive influence. Since the p value is less than 0.05, awareness has a statistically significant impact on service efficiency among the respondents.

TABLE 4 – IMPACT OF AWARENESS OF UPI BASED TICKETING AND PASSENGER SATISFACTION

We have use Multiple Regression analysis is used to analyze the impact of UPI Based awareness on passenger satisfaction. It is explained with following tables:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.844 ^a	.712	.711	3.73659

a. Predictors: (Constant), Awareness

The correlation coefficient ($R = 0.844$) indicates a very strong positive relationship between awareness and passenger satisfaction. The coefficient of determination ($R^2 = 0.712$) reveals that 71.2% of the variation in passenger satisfaction is explained by awareness. The Adjusted R Square (0.711) confirms that the model is highly reliable and not inflated.

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6836.383	1	6836.383	489.639	.000 ^b
	Residual	2764.492	198	13.962		
	Total	9600.875	199			

a. Dependent Variable: Passenger satisfaction

b. Predictors: (Constant), Awareness

Since the significance value is less than 0.05, the regression model is statistically significant.

This indicates that the awareness has a significant effect on Passenger Satisfaction. Therefore, the null hypothesis is rejected.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.263	.604		3.749	.000
	Awareness	4.329	.196	.844	22.128	.000

a. Dependent Variable: Passenger satisfaction

(Source: Primary Source)

INTERPRETATION

The regression coefficient (B = 4.329) indicates that for every one-unit increase in passenger satisfaction, awareness increases by 4.329 units. The standardized beta value (0.844) shows a very strong positive influence. Since the p value is less than 0.05, awareness has a statistically significant impact on passenger satisfaction among the respondents.

TABLE 5 - MULTIPLE LINEAR REGRESSION ANALYSIS OF UPI BASED TICKET COLLECTION AND PASSENGER VOLUME ON TOTAL REVENUE COLLECTION

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.447 ^a	.200	.163	438299.40284

a. Predictors: (Constant), UPI-Based Ticket Collection, No of Passengers

The correlation coefficient (R = 0.447) indicates a moderate relationship between UPI-Based Ticket Collection, Number of Passengers and Total Revenue Collection. The coefficient of determination (R Square = 0.200) indicates that 20% of the variation in Total Revenue Collection is explained by UPI-Based Ticket Collection and Number of Passengers. The remaining 80% may be influenced by other operational and external factors not included in the model. The Adjusted R Square (0.163) indicating that after adjusting for the number of predictors, the model explains 16.3% of the variance in total revenue.

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2064709744917.508	2	1032354872458.754	5.374	.008 ^b
	Residual	8260573760680.584	43	192106366527.455		

	Total	10325283505598.092	45			
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a. Dependent Variable: Total Revenue Collection

b. Predictors: (Constant), UPI-Based Ticket Collection, No of Passengers

Since the p value is less than 0.05, the null hypothesis is rejected. This indicates that the regression model is statistically significant.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1	(Constant)	542073.596	107687.836	5.034	.000
	No of Passengers	-.652	.592	-.159	.277
	UPI-Based Ticket Collection	.455	.178	.369	.014

a. Dependent Variable: Total Revenue Collection

(Source: Secondary Source)

INTERPRETATION

The coefficient value of number of passengers is -0.652 with a p value of 0.277. Since the p value is greater than 0.05, the number of passengers does not have a statistically significant influence on total revenue collection. The coefficient value of UPI-Based ticket collection is 0.455 with a p-value of 0.014. Since the p value is less than 0.05, UPI-Based ticket collection has a statistically significant positive effect on total revenue collection. The result suggest that digital ticketing through UPI plays an important role in improving revenue ticketing and financial transparency in KSRTC operations.

FINDINGS AND FUTURE PERSPECTIVE

The important findings of this study revealed that the respondents were predominantly young and economically active individuals, with the majority belonging to the 26–35 years age group (48.5%) and employed category (44%). The almost equal representation of male and female respondents reflects a balanced sample and indicates the growing acceptance of digital payment technologies across different demographic groups. The findings further revealed that service efficiency, passenger satisfaction, and awareness of UPI Based ticketing are positively and significantly associated with one another. The Spearman's correlation analysis demonstrated an exceptionally strong positive relationship between service efficiency and passenger satisfaction ($r = 0.983$, $p < 0.01$), highlighting that improvements in operational efficiency directly enhance the overall travel experience of passengers. The regression analysis revealed that awareness of UPI-based ticketing shows a significant positive influence on service efficiency. The model explained 70.2 per cent ($R^2 = 0.702$) of the variation in service efficiency, indicating that increased awareness and adoption of UPI Based ticketing substantially improve transaction speed, reduce cash handling and waiting time, and streamline ticketing operations within KSRTC.

Similarly, the results indicated that awareness of UPI-based ticketing significantly enhances passenger satisfaction. The regression model explained 71.2 per cent ($R^2 = 0.712$) of the variation in passenger satisfaction, suggesting that digital ticketing provides greater convenience, ease of payment, reliability, and a more seamless travel experience for passengers. Finally, the multiple regression analysis revealed that UPI-based ticket collection has a statistically significant and positive impact on total revenue collection, whereas the number of passengers does not significantly influence revenue generation. This results underscores the strategic importance of digital ticketing in strengthening financial efficiency, improving revenue management, and enhancing transparency in KSRTC operations.

The research concludes that UPI-based ticketing has redefined public transport service delivery and revolutionized the traditional ticketing system, making it a revolutionary milestone in the digital transformation path of Kerala State Road Transport Corporation (KSRTC). Revenue collection, financial transparency, service

efficiency, and passenger satisfaction have all greatly increased thanks to the incorporation of digital payment technology. A more dependable, customer-centric, and efficient transportation system has been established by UPI-based ticketing, which allows for quicker transactions, lessens reliance on cash, shortens waiting periods, and streamlines operational procedures. The study findings are very consistent with the larger goals of India's Digital India initiative, which seeks to foster digital inclusion, cashless transactions, and technology-driven public services. The effective implementation of UPI-based ticketing in KSRTC demonstrates how digital innovations may modernize public transit and act as a replicable model for other State Road Transport Corporations in India that are working to hasten their digital transformation initiatives.

Nonetheless, the study recognizes a number of challenges, such as a lack of infrastructure, issues with internet connectivity, disparities in digital literacy, and barriers to user adoption, all of which could hinder the broad acceptance and long-term viability of digital ticketing systems. The KSRTC's experience shows how much digital payment technologies may increase operational efficiency and improve customer satisfaction, much like the digital revolution that has occurred in areas like retail and banking. Thus, the research suggests that in order to guarantee the long-term viability of UPI-based ticketing, transportation administrators should regularly conduct employee training programs, broad passenger awareness campaigns, continuous monitoring of system dependability, and periodic technical upgrades. KSRTC can solidify its position as a smart, open, technologically advanced, and future-ready public transportation organization by adopting these strategic efforts. This will establish a standard for digital change and long-term innovation in the Indian public transportation industry.

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