



# Adoption of Digital Ticketing and Mobility Applications: Behavioral Changes Among Railway Passengers

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**Abstract** – The adoption of digital ticketing systems and mobility applications has significantly transformed railway services by improving convenience, efficiency, and accessibility for passengers. This study examines the role of digital ticketing and mobility applications in railway services and analyzes the behavioral changes among railway passengers based on secondary data from existing literature and reports. The findings indicate that factors such as ease of use, real-time information availability, digital payment integration, and increased smartphone usage have encouraged passengers to adopt digital platforms. The use of these applications has led to behavioral changes including reduced dependence on physical ticket counters, improved travel planning, greater acceptance of cashless and paperless travel, and higher expectations for service quality. However, challenges such as digital literacy gaps, technical issues, data security concerns, and resistance to change continue to affect adoption. The study concludes that while digital ticketing and mobility applications have positively influenced railway passenger behavior, focused efforts toward inclusive design, reliable infrastructure, and passenger awareness are essential for sustainable digital transformation in railway services.

**Keywords** – Digital ticketing, mobility applications, railway passengers, behavioral change, technology adoption.

## I. INTRODUCTION

The rapid growth of digital technology has significantly influenced the transportation sector, particularly railway services. Railways serve as a vital mode of mass transportation, and the adoption of digital ticketing systems and mobility applications has transformed the way passengers access and use railway services. Digital ticketing allows passengers to book and store tickets electronically, while mobility applications provide real-time information such as train schedules, delays, seat availability, and platform details. These innovations aim to improve efficiency, convenience, and overall passenger experience.

The increasing availability of smartphones and internet connectivity has encouraged passengers to shift from traditional counter-based ticketing to mobile and online platforms. This transition has reduced waiting times, minimized paper usage, and promoted cashless transactions. As a result, passengers are increasingly planning their journeys in advance and relying on digital platforms for travel-related information and services.

Beyond operational benefits, digital ticketing and mobility apps have contributed to noticeable behavioral changes among railway passengers. Dependence on physical infrastructure has decreased, trust in digital systems has increased, and expectations for real-time updates and quick service responses have grown. However, challenges such as digital literacy gaps, technical issues, and data security concerns remain. Understanding these behavioral changes is essential for railway authorities to design inclusive, efficient, and passenger-centric digital solutions.

## Objectives of the study

1. To examine the role and significance of digital ticketing and mobility applications in railway services.
2. To analyze the factors influencing the adoption of digital ticketing and mobility applications among railway passengers.
3. To study the behavioral changes among railway passengers resulting from the use of digital ticketing and mobility applications.
4. To identify the challenges and implications of adopting digital ticketing and mobility applications for railway authorities based on secondary data.

## Limitations of the Study

- The study is based entirely on secondary data collected from existing literature, reports, and published sources; therefore, it does not capture real-time passenger opinions or primary behavioral responses.
- The accuracy and relevance of the findings depend on the quality, scope, and time period of the secondary sources used, which may limit the applicability of the results to current railway digital practices.

## II. LITERATURE REVIEW

Y.-H. Cheng (2013) — High-speed rail passengers' mobile ticketing acceptance  
Cheng's empirical study of high-speed-rail users combines TAM with behavioral economics constructs (e.g., mental accounting) to examine adoption of mobile ticketing and QR-based gate entry. Results showed that perceived convenience and reduced transaction costs strongly predicted intent to use mobile ticketing; however, concerns about reliability (app failures, scanning problems) moderated actual uptake. This paper highlights the



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operational reliability dimension—critical for rail contexts where a single failed scan can disrupt journeys.

#### **Q. Zhao (2016) — Factors influencing mobile ticketing adoption**

Zhao's study applied status-quo bias and technology adoption perspectives to identify why some users resist mobile ticketing. Key barriers included habit (preference for familiar counter-based routines), perceived switching costs (learning new apps), and trust concerns (payments, data privacy). The study recommends targeted interventions (trial offers, in-station assistance, simple onboarding) to overcome inertia—insights directly applicable to railway authorities seeking higher conversion from occasional to habitual digital users.

#### **M. R. Awal (2024) — Understanding railway passengers' e-ticketing usage (Bangladesh)**

Awal's recent study extends acceptance research to a South Asian railway setting, empirically testing factors such as trust, facilitating conditions (mobile/data access), and perceived usefulness on e-ticketing intentions. The paper finds that trust (in payment and refunds) and facilitating conditions (network reach, app support) are particularly salient in developing-country rail contexts—underscoring that infrastructure and perceived safety of transactions matter as much as interface design.

### **III. DIGITAL TICKETING AND MOBILITY APPLICATIONS IN RAILWAYS**

Digital ticketing and mobility applications represent a major shift in the way railway services are accessed and managed by passengers. Digital ticketing refers to the electronic process of booking, purchasing, storing, and validating travel tickets through online platforms or mobile applications. Unlike traditional paper tickets purchased at station counters, digital tickets are stored in electronic form on smartphones or email accounts and can be verified using QR codes, booking IDs, or mobile numbers. This system reduces dependence on physical infrastructure, minimizes human intervention, and improves operational efficiency.

Mobility applications go beyond ticket booking and function as integrated travel-management platforms. These apps provide comprehensive information and services throughout the passenger journey. Key features commonly include train search, fare enquiry, seat availability, real-time train tracking, platform and coach position details, cancellation and refund processing, alerts for delays or rescheduling, and customer grievance redressal. By combining multiple services into a single interface, mobility apps support seamless door-to-door travel planning.

One of the major advantages of digital ticketing is convenience. Passengers can book tickets anytime and from any location, eliminating the need to stand in long queues at railway stations. Mobility apps further enhance

convenience by enabling advance journey planning and real-time decision-making, especially during delays or disruptions. These tools empower passengers with information, allowing them to adjust travel plans proactively rather than reacting to last-minute announcements.

Digital ticketing systems are closely integrated with digital payment platforms, encouraging cashless transactions. This integration supports transparency, reduces the risk of cash handling errors, and aligns railway services with broader digital economy initiatives. Additionally, the reduction in paper tickets contributes to environmental sustainability by lowering paper consumption and printing-related costs.

From an operational perspective, digital ticketing and mobility apps help railway authorities manage passenger flow, analyze travel patterns, and optimize resource allocation through data analytics. However, the effectiveness of these systems depends on factors such as application reliability, network connectivity, user-friendly design, and data security. While digital ticketing and mobility applications have significantly modernized railway services, continuous improvement is necessary to ensure accessibility, inclusivity, and sustained passenger trust.

### **IV. FACTORS INFLUENCING ADOPTION**

The adoption of digital ticketing and mobility apps is influenced by several interrelated factors:

- Convenience and accessibility
- Reduction in travel-related uncertainty
- Availability of real-time information
- Integration with digital payment systems
- Increased digital literacy and smartphone usage

### **V. BEHAVIORAL CHANGES AMONG RAILWAY PASSENGERS**

#### **• Shift to Digital Ticketing:**

Passengers increasingly prefer booking tickets through mobile apps and online platforms instead of visiting physical ticket counters.

#### **• Improved Travel Planning:**

Access to real-time information on train schedules, delays, and seat availability enables better advance planning and informed decision-making.

#### **• Reduced Dependence on Station Staff:**

Mobile apps have reduced the need for enquiry counters and manual assistance at railway stations.

#### **• Adoption of Cashless Payments:**

Integration of digital payment options has encouraged passengers to move away from cash-based transactions.

#### **• Paperless Travel Practices:**

Use of e-tickets and QR codes has minimized paper usage and supported environmentally friendly travel behavior.

#### **• Increased Service Expectations:**



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Passengers now expect instant updates, quick refunds, and efficient digital customer support services.

• **Growing Trust in Technology:**

Repeated use of digital platforms has increased confidence in online systems and digital railway services.

## VI. CHALLENGES IN ADOPTION OF DIGITAL TICKETING AND MOBILITY APPLICATIONS

- Despite the increasing adoption of digital ticketing and mobility applications, several challenges continue to affect their widespread and effective use among railway passengers. One of the major challenges is the digital literacy gap. Elderly passengers, people from rural areas, and individuals with limited exposure to smartphones often find it difficult to use mobile applications. Complex interfaces, language barriers, and lack of digital awareness discourage these groups from adopting digital ticketing systems.
- Technical and infrastructural issues also pose significant challenges. Poor internet connectivity, especially in remote areas and inside trains, can interrupt ticket booking, payment processing, and ticket verification. Application crashes, server downtime, and failed QR code scans reduce passenger confidence in digital platforms.
- Another important concern is data security and privacy. Passengers may hesitate to use digital ticketing apps due to fear of online fraud, unauthorized data access, or misuse of personal and financial information. Such concerns can negatively impact trust and long-term usage.
- Payment-related problems such as transaction failures, delayed refunds, or double debits further discourage adoption. These issues create frustration and may push passengers back toward traditional ticketing methods.
- Finally, resistance to change remains a behavioral challenge. Some passengers prefer familiar, traditional systems and are reluctant to switch to digital platforms due to habit, lack of trust, or fear of making mistakes. Addressing these challenges through user-friendly design, digital awareness programs, reliable infrastructure, and strong cybersecurity measures is essential for ensuring.

## VII. IMPLICATIONS FOR RAILWAY AUTHORITIES

- The growing adoption of digital ticketing and mobility applications has important implications for railway authorities, requiring both technological and policy-level interventions. Railway authorities must prioritize the development of user-friendly and inclusive digital platforms. Applications should be simple to navigate, available in multiple regional languages, and accessible to elderly and differently abled passengers to ensure wider adoption.

- Digital inclusion and awareness programs are essential to bridge the digital literacy gap. Railway authorities can conduct on-site assistance programs at stations, provide help desks, and offer guided tutorials to encourage first-time users to adopt digital ticketing systems confidently.
- Ensuring technical reliability and infrastructure strength is another critical implication. Authorities must invest in robust server capacity, stable mobile applications, and improved internet connectivity at stations and inside trains to minimize technical disruptions. Regular system audits and updates can enhance performance and user trust.
- Data security and privacy protection should be treated as a priority. Implementing strong cybersecurity frameworks, secure payment gateways, and transparent data usage policies will help build passenger confidence in digital platforms.
- Finally, railway authorities should adopt a passenger-centric and data-driven approach. By analyzing app usage data and passenger feedback, authorities can improve service delivery, manage passenger flow efficiently, and design policies that align with evolving passenger expectations. These measures are essential for achieving sustainable and inclusive digital transformation in railway services.

### Findings of the Study

- Digital ticketing and mobility applications have significantly improved convenience and accessibility in railway services, reducing dependence on physical ticket counters.
- Convenience, real-time information availability, and integration with digital payment systems are the major factors influencing the adoption of digital ticketing among railway passengers.
- The use of mobility applications has led to noticeable behavioral changes such as improved travel planning, increased reliance on digital information, and reduced interaction with station staff.
- Passengers show a growing preference for cashless and paperless travel, indicating increased trust in digital platforms.
- Despite widespread adoption, challenges such as digital literacy gaps, technical issues, payment failures, and data security concerns continue to affect passenger confidence and usage.
- Secondary literature indicates that elderly passengers and passengers from rural areas face greater difficulty in adopting digital ticketing systems.

### Suggestions

- Railway authorities should design simple, user-friendly, and multilingual applications to ensure accessibility for all passenger groups.
- Digital awareness and assistance programs should be strengthened at railway stations to help first-time and elderly users adopt digital ticketing confidently.



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- Investment in robust technical infrastructure and improved internet connectivity at stations and inside trains is essential to minimize technical failures.
- Secure payment systems and transparent refund mechanisms should be enhanced to build passenger trust and reduce payment-related issues.
- Continuous feedback mechanisms should be implemented through mobility apps to understand passenger needs and improve service quality.
- Railway authorities should adopt a passenger-centric approach by regularly updating digital platforms in line with changing passenger expectations and technological advancements.

### VIII. CONCLUSION

The adoption of digital ticketing and mobility applications has brought a significant transformation in the way railway passengers access and experience railway services. The shift from traditional, counter-based ticketing systems to digital platforms has improved convenience, reduced waiting time, and enabled passengers to make informed travel decisions through real-time information. Digital ticketing and mobility apps have simplified ticket booking, enhanced journey planning, and promoted cashless and paperless travel practices, reflecting a clear behavioral shift among railway passengers. This study, based on secondary data, highlights that factors such as convenience, accessibility, real-time updates, and increasing digital literacy play a crucial role in encouraging the adoption of digital railway services. At the same time, the findings indicate noticeable behavioral changes, including reduced dependence on station staff, increased trust in digital systems, and rising expectations for efficient and responsive services. These changes demonstrate how technology has reshaped passenger attitudes and interactions within the railway ecosystem.

However, the study also identifies several challenges that continue to limit widespread adoption. Digital literacy gaps, technical and infrastructural issues, data security concerns, payment-related problems, and resistance to change remain significant barriers. Addressing these challenges is essential to ensure that digital transformation benefits all passenger groups, including the elderly and digitally less-exposed users. Overall, the study concludes that digital ticketing and mobility applications have positively influenced railway passenger behavior and service delivery. For sustained success, railway authorities must focus on inclusive design, reliable infrastructure, cybersecurity, and passenger-centric policies. Strengthening these areas will support sustainable digital transformation and enhance the overall efficiency and quality of railway services in the long run.

### REFERENCE

1. High Speed Rail Passengers' Mobile Ticketing Adoption — examines passenger acceptance of mobile ticketing using the Technology Acceptance Model

- (TAM), providing empirical evidence on factors influencing adoption.
2. Understanding Railway Passengers' E-Ticketing Usage Intention in an Emerging Economy — applies an extended TAM to study e-ticketing adoption among railway users in Bangladesh, exploring behavioral intention and determinants.
3. IRCTC Mobile Ticketing Adoption in an Indian Context — investigates how innovation attributes such as perceived ease of use and relative advantage influence adoption of mobile ticketing apps among Indian railway passengers.
4. Analyzing Benefits of Online Train Ticket Reservation App Using TAM — focuses on digital ticketing acceptance and passenger satisfaction, highlighting behavioral impacts and intention to use.
5. Digital Transformation in Railway Ticketing: User Satisfaction and AI Support — explores how digital ticketing and related technologies affect passenger experience and satisfaction with railway ticketing systems.