International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2025.062
e ISSN: 2584-2854
Volume: 03
Issue:03 March 2025
Page No: 392-396

Analysing Customer Perception and Adoption of Fast Tag for Toll Payments: Key Influencing Factors and Insights

Dr. T. Logeswaran[1], Dr. V. Krishnamoorthy[2], P. Subha sri[3]

[1]Associate Professor, Department of Electrical & Electronics Engineering, Kongu Engineering College, Perundurai, Erode, Tamil Nadu, India.

[2]Associate Professor, Department of Management Studies, Kongu Engineering College, Perundurai, Erode, Tamil Nadu, India.

[3]Research Assistant, Department of Management Studies, Kongu Engineering College, Perundurai, Erode, Tamil Nadu, India.

Emails: *logeskongu@gmail.com[1], krishnamoorthy.mba@kongu.edu [2], subineela@gmail.com[3]*

Abstract

This study explores customer awareness, perception, and key factors influencing the adoption of Fast Tag for toll payments along the Salem to Madurai highway. A structured survey and interviews were conducted with 250 respondents, including private vehicle owners and commercial transport operators. The findings indicate that convenience, reduced waiting time, and transaction security are the primary motivators for Fast Tag adoption, while regulatory mandates have a lesser influence. The study also highlights strong awareness levels and user satisfaction with Fast tag's efficiency, though challenges remain regarding ease of registration and trust in the system. The research offers valuable insights for policymakers and service providers to enhance adoption rates and improve the overall Fast Tag experience. Future studies can explore additional variables influencing adoption, including behavioural and technological factors, across a broader geographic region.

Keywords: *Fast Tag Adoption, Digital Payments, Toll Collection, Customer Perception, Cashless Transactions.*

1. Introduction

The implementation of Fast Tag, an electronic toll collection system in India, has revolutionized the way toll payments are processed, significantly enhancing efficiency while promoting environmental sustainability [1]. Using RFID technology, Fast Tag facilitates seamless, cashless transactions at toll booths, thereby reducing vehicle stoppages and minimizing idling time. A key advantage of Fast Tag is its ability to cut down service time at toll plazas substantially. Research indicates that electronic toll collection has reduced waiting time by up to 77%, leading to smoother traffic flow and a significant decline in emissions caused by vehicle idling (Bari, Kumawat, & Dhamaniya, 2021). Globally, similar systems, such as E-Z Pass in the United States, have demonstrated notable fuel savings, further emphasizing the environmental benefits of automated toll systems. Beyond reducing congestion, Fast Tag 's integration with IoT-based traffic management systems enhances road safety and operational efficiency [2-5]. Automated issuance of challans for violations, such as over speeding, ensures better compliance with traffic regulations and indirectly encourages eco-friendly driving habits (Sontakke, Diwakar, & Kaur, 2019). Despite its positive contributions to sustainability, challenges remain within the broader transportation and logistics landscape [6]. The rise of quick-commerce and express delivery services, even with sustainable solutions like electric vehicles, has

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2025.062
e ISSN: 2584-2854
Volume: 03
Issue:03 March 2025
Page No: 392-396

led to increased carbon emissions due to frequent and rapid transportation demands (Sarkar, 2024; Fan, Xu, Dong, & Wei, 2017). Thus, while electronic toll collection mitigates pollution to an extent, a comprehensive approach is required to manage the environmental impact of evolving mobility trends [7-9].

2. Advantages of Fast Tag

2.1. Enhanced Efficiency and Speed

The introduction of Fast Tag has led to a significant improvement in toll collection efficiency. Studies show that its implementation has reduced service time by 77%, increasing toll plaza throughput by 318% compared to manual toll collection (Bari et al., 2021). This improvement helps decongest traffic and ensures smoother vehicular movement [10].

2.2. Convenience in Transactions

Fast Tag enables automatic toll deductions from a prepaid account, eliminating cash handling. This system reduces transaction delays and enhances the overall user experience (Sontakke et al., 2019; Oza, 2020) [11].

2.3. Environmental Benefits

By reducing idle time at toll booths, Fast Tag lowers fuel consumption and vehicle emissions, contributing positively to environmental sustainability and reducing the overall carbon footprint (Bari et al., 2021) [12].

3. Challenges and Concerns

3.1. Technical Limitations

Despite its benefits, Fast Tag faces operational challenges, including issues related to RFID tag damage, theft, and unauthorized usage, leading to inefficiencies (Roy & Savant, 2022) [13].

3.2. Limited Public Awareness and Adoption

In certain regions, a lack of awareness and reluctance to adopt Fast Tag hinder widespread implementation. Public education campaigns and promotional efforts are crucial to improving adoption rates (Mirza et al., 2016; Aderibigbe et al., 2024) [14].

3.3. Congestion Due to Mixed Lane Traffic

Some toll plazas continue to operate both Fast Tag and cash lanes, leading to congestion and inefficiencies. Dedicated lanes for Fast Tag users can maximize benefits and minimize delays (Hinge & Chaturvedi, 2020).

4. Customer Experience and Perception

4.1. Improved User Satisfaction

Fast Tag has enhanced customer satisfaction by ensuring quick and seamless toll payments. The integration of Robotic Process Automation (RPA) in toll operations has further improved efficiency, increasing user confidence (Ahuja & Tailor, 2024.).

4.2. Security Concerns

While Fast Tag offers convenience, concerns regarding RFID technology security, such as unauthorized tag use, remain a key issue among users (Roy & Savant, 2022).

5. Review of Literature

The relationship between transportation and environmental sustainability has been extensively studied. Various research works highlight the critical challenges posed by modern transportation systems and propose sustainable alternatives to reduce environmental harm. Parpieva et al. (2024) explore the connection between transportation and environmental changes, emphasizing the ecological consequences of vehicular emissions and the necessity of sustainable policies to mitigate adverse effects. Potter and Bailey (2008) provide an in-depth analysis of transportation-related pollution caused by fossil fuel dependency and advocate for greener alternatives like electric and hybrid vehicles. Their findings suggest that transportation is a primary contributor to greenhouse gas emissions and climate change. Awadallah and Fini (2013) analyse the global environmental impact of transportation, proposing strategic interventions such as improved public transport infrastructure and stringent emission regulations. Avci, Girotra, and Netessine (2013) examine the feasibility of electric vehicles (EVs) and battery-switching stations, underscoring the role of regulatory support and infrastructure expansion in driving sustainability. Al-Yousfi (2009) introduces the concept of the Sustainable Transportation Trinity, advocating for an integrated approach that combines renewable energy, advanced transport technology, and policy reforms. Eriksson (2012) assesses the environmental impact of Personal Rapid Transit (PRT) systems through Life Cycle Assessment (LCA), demonstrating their potential to significantly

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2025.062
e ISSN: 2584-2854
Volume: 03
Issue:03 March 2025
Page No: 392-396

reduce carbon emissions compared to conventional transport modes.

6. Research Gap

Although extensive studies examine transportation's environmental impact and technological advancements, limited research focuses on the adoption and customer perception of digital payment solutions like Fast Tag. There is a need to explore how consumers perceive Fast Tag, their level of awareness, challenges faced, and overall satisfaction with the system.

6.1. Research Objectives

- To analyse customer awareness and perception of Fast Tag usage in toll payments.
- To identify the key factors influencing Fast Tag adoption among commuters.

6.2. Research Methods

6.2.1. Scope of the Study

This study investigates customer perception of Fast Tag usage in toll payments, focusing on the highway stretch from Salem to Madurai. It explores factors influencing adoption, awareness levels, satisfaction, and user challenges. The findings will offer insights into the effectiveness of Fast Tag and suggest enhancements for an improved user experience.

6.2.2. Sampling Unit

The research targets individuals using toll roads on the Salem to Madurai highway, including vehicle owners, frequent commuters, and transport operators who regularly use Fast Tag.

6.2.3. Sampling Method

A purposive sampling method will be employed to ensure respondents have relevant experience with Fast Tag. Within this approach, systematic random sampling will be used to maintain diversity in responses, covering both individual vehicle owners and commercial transport operators.

6.2.4. Data Collection Method

The study will rely on both primary and secondary data. Primary data will be gathered through structured surveys conducted at toll plazas along the Salem to Madurai route. The survey will include closed-ended and open-ended questions to capture quantitative and qualitative insights. Additionally, structured interviews with transport operators and toll management officials will provide deeper insights into operational challenges and customer concerns.

6.2.5. Pilot Study

A pilot study will be conducted in April 2024 with 30 respondents from different toll plazas to test the questionnaire's reliability and clarity. This preliminary phase will refine the survey to ensure comprehensibility and relevance to the study's objectives.

6.2.6. Study Period

The research will be conducted from May 1, 2024, to July 2024, with data collection, analysis, and reporting occurring within this timeframe.

6.2.7. Demographic profile of the Respondents

The demographic analysis of 250 respondents provides a clear picture of Fast Tag users along the Salem to Madurai toll route. The majority (58%) belong to the 25–45 age groups, indicating that working professionals and frequent travellers are the primary users. Men account for 72% of respondents, highlighting their higher engagement in highway travel for work and business purposes. Education-wise, 65% hold a graduate degree or higher, reflecting strong awareness of digital payments. With respect to vehicle classification, 54% of users own private cars, 32% use commercial vehicles, and 14% rely on two-wheelers or other modes of transport. Travel purpose analysis shows that 60% use Fast Tag for work-related commutes, 25% for personal trips, and 15% for leisure or tourism. Income-wise, 48% are part of the middle-income segment while 37% belong to the high-income category, and 15% have lower earnings. Frequent travellers—those who cross toll plazas more than five times a week make up 62% of respondents, emphasizing Fast Tag ’s role in enhancing daily travel efficiency.

7. Data Analysis

The findings indicate that customer awareness of Fast Tag is significantly high, with a mean score of 4.23 (SD = 0.81) on a five-point scale. The coefficient of variation (CV) of 19.15% suggests a relatively consistent perception among users. Most respondents recognize the benefits of Fast Tag,

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2025.062
e ISSN: 2584-2854
Volume: 03
Issue:03 March 2025
Page No: 392-396

particularly in terms of time-saving and cashless transactions (Table 1).

Table 1 Customer Awareness and Perception of Fast Tag Usage in Toll Payments

Variables	Mean	SD	CV (%)
Awareness of Fast Tag system	4.2	0.85	20.24
Perceived ease of Fast Tag registration	3.8	0.92	24.21
Understanding of toll deduction process	4.0	0.88	22.00
Satisfaction with transaction speed	4.3	0.79	18.37
Trust in Fast Tag security	3.9	0.95	24.36

Table 2 Key Factors Influencing Fast Tag Adoption among Commuters

Variables	Mean	SD	CV (%)
Convenience of cashless payments	4.5	0.72	16.00
Reduction in waiting time at tolls	4.6	0.68	14.78
Government mandates and enforcement	3.7	1.02	27.57

The study identifies cashless convenience and reduced waiting times as the key drivers of Fast Tag adoption (Table 2). These factors have mean scores of 4.5 and 4.6, with standard deviations of 0.72 and 0.68, indicating a high level of consistency among users. Their coefficient of variation, at 16.00% and 14.78%, further supports this strong agreement. In contrast, government regulations and enforcement (Mean = 3.7, SD = 1.02) show a higher variation (27.57%), reflecting diverse opinions. While regulatory mandates influence adoption, they do not hold the same level of consensus as the practical benefits of time efficiency and seamless transactions. This suggests that users prioritize Fast Tag for its functional advantages rather than compliance requirements.

Conclusion

The study underscores that convenience and reduced waiting time are the primary motivators for Fast Tag adoption among commuters. The findings reveal a high level of awareness and satisfaction, particularly in terms of transaction speed and cashless payments. However, factors like registration complexity and varying levels of trust in Fast Tag security indicate areas for improvement. While government regulations contribute to adoption, they are not as influential as the functional benefits of Fast Tag. The findings indicate that providers should focus on simplifying the registration process and addressing user concerns regarding security and reliability. Overall, the study highlights Fast Tag 's role in enhancing travel efficiency and promoting digital payment adoption in India's toll collection system.

Limitations and Scope for Future Study

This study is limited to the Salem to Madurai highway, which may not represent Fast Tag adoption trends across different regions. The sample size, though adequate for analysis, may not fully capture the perspectives of infrequent users or those unfamiliar with Fast Tag. Future research can expand to a national level, covering multiple highways to analyse broader adoption trends. Additional studies can focus on behavioural aspects, such as user resistance to digital payments, and the role of incentives in influencing Fast Tag adoption. Investigating the impact of recent policy changes, technological upgrades, and customer service improvements can provide deeper insights into enhancing the Fast Tag experience. Additionally, incorporating qualitative approaches, such as focus group discussions, can provide deeper insights into commuter preferences and challenges.

Acknowledgement

We would like to express our sincere gratitude to ICSSR for their invaluable help in funding the research. Their support has made it possible to study significant problems and contributed a great deal to the knowledge base on vehicle users at toll booths. We are sincerely thankful to ICSSR for their instrumental role in the conduct of this study.

References

[1]. Bari, C., Kumawat, A., & Dhamaniya, A. (2021, June). Effectiveness of Fast Tag system for toll payment in India. In 2021 7th International Conference on Models and

International Research Journal on Advanced Engineering and Management
https://goldncloudpublications.com
https://doi.org/10.47392/IRJAEM.2025.062
e ISSN: 2584-2854
Volume: 03
Issue:03 March 2025
Page No: 392-396

Technologies for Intelligent Transportation Systems (MT-ITS) (pp. 1-6). IEEE.
[2]. Sontakke, A., Diwakar, A., & Kaur, G. (2019). Intelligent automatic traffic challan on highways and payment through Fast Tag card. Indian Journal of Science and Technology, 12(44), 1-6.
[3]. Oza, S. M. (2020). A descriptive study on Fast Tag: electronic toll, standing tall. Nolegein J. Inf. Technol. Manage, 3(1), 26-2.
[4]. Roy, S., & Savant, P. (2022). A Research Paper on Fast Toll System. International Journal for Science Technology and Engineering, 10(4), 1449-1454.
[5]. Mirza, M., Muqadass, R., Chaudhary, A. R., & Nisar, A. B. (2016). Public awareness about e-tagging device on security Check posts & toll-plazas for the smooth traffic management and reduction in terrorist activities in Pakistan. International Journal of Academic Research in Management and Business, 1(1), 52-74.
[6]. Aderibigbe, O. O., Fadare, S. O., & Gumbo, T. (2024). Transport situation in the Global South: Insights from Nigeria, South Africa and India. In Emerging Technologies for Smart Cities: Sustainable Transport Planning in the Global North and Global South (pp. 43-77). Cham: Springer Nature Switzerland.
[7]. Hinge, A., & Chaturvedi, T. (2020). Study on Toll Plazas for Impact Assessment and Remedy Measures on Existing ETC System. Journal of Emerging Technologies and Innovative Research, 7(10), 2463-2466.
[8]. Ahuja, S., & Tailor, R. K. (2024). Application of Robotic Process Automation in Customer Satisfaction at Toll Plazas. Journal of Information and Optimization Sciences, 44(8), 1685-1694.
[9]. Parpieva, U., Najmutdinova, G., Khaydarov, I., Zakirova, G., & Karimova, N. (2024). Issues of environmental changes and transportation. In BIO Web of Conferences (Vol. 141, p. 04015). EDP Sciences.
[10]. Potter, S., & Bailey, I. (2008). Transport and the Environment.
[11]. Awadallah, F., & Fini, E. H. (2013). Transportation global environmental impact.
[12]. Avci, B., Girotra, K., & Netessine, S. (2015). Electric vehicles with a battery switching station: Adoption and environmental impact. Management Science, 61(4), 772-794.
[13]. Al-Yousfi, B. (2009). Sustainable transportation trinity: energy, technology and the environment. Arab gulf journal of scientific research, 27(3), 168-177.
[14]. Eriksson, A. (2012). Identification of environmental impacts for the Vectus PRT system using LCA.