

“A Study of Challenges and Opportunities of Digital Toll Payment System”

* Sandeep Sehra, * Student, Kurukshetra University, Kurukshetra

Abstract

Fast Tag is an electronic toll collection framework in India, worked by the National Highway Authority of India (NHAI). It utilizes Radio Frequency Identification (RFID) innovation for making toll installments straightforwardly from the paid ahead of time or investment account connected to it or straightforwardly toll proprietor. It is joined on the windscreen of the vehicle and empowers to pass through toll courts ceaselessly for exchanges. The tag can be bought from true Tag backers or taking an interest Banks and assuming it is connected to a prepaid record, re-energizing or top-up can be according to necessity. The present study will focus on the current scenario of digital toll payment system and issues and challenges regarding the payment system in India.

Keywords: Fastag, Digital, NHAI, NETC

INTRODUCTION

Digital Toll Collection Evolution

In the current situation, tolling-related technologies have acquired force for empowering acknowledgment of advanced installments in lieu of money at toll squares. With accentuation on carrying out a viable and effective toll collection framework, Electronic Toll Collection (ETC) arose as the critical answer for empower a quick, proficient and credit only installment choice for collection of toll passage. One of the fundamental necessities of ETC is to give an incorporated unified framework that gives an interoperable arrangement across all the National Highway toll courts of the country. The idea of ETC was proposed long back in the year 1959. During 1960s and 1970s, free stream tolling was tried with transponders fixed under the toll corners on expressways. Afterward, there were consistent improvements in e-tolling which the majority of the nations embraced to set up a completely mechanized and progressed tolling services. In Japan, the ETC program began in the year 2001, and has accomplished a use proportion of 90% with a volume of around 70 – 80 lacs of day by day exchanges. And so forth tasks in China began in the year 2014 and significantly acknowledge card based installment mode. Some European districts like Norway have been pioneers in the field of metropolitan tolling. The world's first toll court was opened at Bergen (in Norway) in the year 1986. With the progression of ETC innovation in the majority of the European and US areas just as brilliant urban communities like Dubai, the greater part of the toll stalls are automated. All the

vehicle related subtleties are caught by very good quality RFID perusers and cameras which are mounted at the toll corners. These information focuses are assembled in a brought together framework and observed by an incorporated administering body. India is at the cusp of advanced change. There has been an incredible headway in the innovation being received in the country for computerized installment environment in the toll and travel space. One such occurrence is the point at which the Ministry of Road Transport and Highways (MoRTH) chose to accept trend setting innovation in public interstates for toll passage collection. One of the main private area bank was the pioneer to execute ETC test case program. The bank collaborated with Ministry of Road Transport and Highways (MoRTH), NHAI and IHMCL for dispatch of ETC on National Highways. In April 2013, the principal ETC was set up on Mumbai-Ahmedabad thruway with six toll squares and 3 strategic suppliers. This was a shut circle arrangement with FASTags executed solely chipping away at the bank's procured toll courts. The execution of a container India electronic toll collection framework on public interstates may help save around 87,000 crore INR yearly, as indicated by a joint report by the Transport Corporation of India and the Indian Institute of Management Calcutta. Execution of e-tolling would help the vehicle clients diminish the fuel cost and cut the normal holding up time by around 10 minutes at the toll squares. The National Highways Authority of India (NHAI) and the National Payments Corporation of India (NPCI) have set up an interbank clearing house to carry out public electronic toll collection (NETC) at around 405 public roadways' toll courts in India. The stage would likewise be liable for taking care of disconnected clearing, settlement, debates, extortion and expert information the executives. NPCI alongside partaking banks have made a powerful and adaptable stage, equipped for dealing with a huge number of exchanges through constant handling utilizing standard interfaces and conventions.

Key drivers and opportunities for stakeholders

It is additionally expected that the exchange volume will increment by around 25 - 30% year-on-year thinking about the accompanying key development drivers: Government's order to join FASTags on every new vehicle (4-wheelers) fabricated from 1 st December, 2017. Expansion in the creation of vehicles, the creation volume in India developed at a CAGR of 4.43 percent from FY 2012 to FY 2018. Mindfulness crusade dispatched by NHAI to make street clients mindful of the FASTag and its advantages like cashback sum client gets on performing e-toll exchanges.

The Toll Plazas framework or Toll Management framework ought to be able in catching vehicle pictures and vehicle enlistment number. In light of the information models created from pertinent information sources and 'Vahan' data set, there would be a potential for concessionaires to tie up with the partaking banks in the ETC program to strategically pitch items like vehicle protection and advances. The concessionaires would have the option to band together with fuel stations, food shopping centers, 3PL strategic organizations, vehicle OEMs/vendors and taxi aggregators to target key corporate and retail

clients. For organizations, the information demonetisation model for a specific concessionaire would be not the same as different concessionaires dependent on the area of toll courts and the volume of exchanges.

Acquiring banks: By improving the framework between toll squares and obtaining, banks will actually want to use on the conditional information totaled at securing framework. The information will be additionally utilized for extortion investigation (following vehicles which might be basic for transport organizations and taxi aggregators), anticipating fuel utilization for a specific vehicle and by design examination; banks will actually want to make leads for other cross financial items and for OEMs/sellers.

Issuing banks: Right now, the label issuance is an issue cycle and it takes around 7 to 10 days for conveyance of FASTag to end client (both retail and corporate). Giving banks can use the current substitute advanced modes, for example, tab banking which can be utilized for examining and sending the archives to the branch or applicable relationship administrator (RM) inside couple of moments. This will help in consistent label issuance and improve the client experience while getting on boarded as FASTag client.

OEMs/dealers: All unique hardware producers (OEMs) and vendors in the current NETC esteem chain have a colossal chance to tie-up with concessionaires and banks to expand the take-up of FASTag issuance. OEMs and vendors will get commission on each FASTag offered to end client from giving bank.

Fast Tag

Fast Tag is an electronic toll collection framework in India, worked by the National Highway Authority of India (NHAI). It utilizes Radio Frequency Identification (RFID) innovation for making toll installments straightforwardly from the paid ahead of time or investment account connected to it or straightforwardly toll proprietor. It is joined on the windscreen of the vehicle and empowers to pass through toll courts ceaselessly for exchanges. The tag can be bought from true Tag backers or taking an interest Banks and assuming it is connected to a prepaid record, re-energizing or top-up can be according to necessity. According to NHAI, FASTag has limitless legitimacy. 7.5% cashback offers were additionally given to advance the utilization of FASTag. Committed Lanes at some Toll courts have been worked for FASTag. According to the information given by NPCI, in April 2018 FASTag use rate at the toll courts is roughly 16% to 18% of the complete number of exchanges. The normal number of e-toll exchanges each month at all the toll courts in the long stretch of April 2017 was around 7.5 million. Inside a range of one year, in the period of April 2018 the quantity of e-toll exchanges announced is around 18 million. The FASTag electronic toll collection programme is being implemented by the Indian Highways Management Company Limited (IHMCL), a company incorporated by the National Highways Authority of India (NHAI), and the National Payments Corporation of India in coordination with Toll Plaza Concessionaires, tag issuing agencies and banks.

FASTag has an onetime expense of Rs. 200 and is attached on the breeze screen of the vehicle. It utilizes

RFID innovation for making toll installments straightforwardly from the prepaid record connected to it. FASTags are accessible discounted from chosen toll squares on National Highways and assigned parts of taking an interest banks w.e.f. 25.04.2016 . These can be re-energized by making installments through check or online through Visa/charge card/NEFT/RTGS or through net-banking. The base re-energize sum is Rs.100 and can be up to Rs. one lac in the products of Rs 100. FASTag clients will get SMS cautions for all their toll exchanges, low equilibrium and so on.

Current Scenario of Fast Tag

- In January 2019, state-run oil marketing companies IOC, BPCL and HPCL have signed MoUs enabling the use of FASTag to make purchases at petrol pumps.
- As of September 2019, FASTag lanes are available on over 500 national and state highways and over 54.6 lakh (5.46 million) cars are enabled with FASTag.
- FASTags are currently issued by 23 certified banks through various channels such as Point-of-Sale (POS) at National Highway toll plazas and select bank branches. You can buy a FASTag from Paytm, HDFC Bank, ICICI Bank, State Bank of India, Kotak Mahindra Bank, etc. (The detailed list of issuing bank is mentioned below)

1. Here is the detailed list of 23 certified banks providing FASTags

1	Axis Bank	1800-419-8985
2	ICICI Bank	1800-2100-104
3	IDFC Bank	1800-286-9970
4	State Bank of India	1800-11-0018
5	HDFC Bank	1800-120-1243
6	Karur Vysya Bank	1800-102-1916
7	EQUITAS Small Finance Bank	1800-419-1996
8	Paytm Payments Bank Ltd	1800-102-6480
9	Kotak Mahindra Bank	1800-419-6906
10	Syndicate Bank	1800-425-0881
11	Federal Bank	1800-286-9620
12	South Indian Bank	1800-425-1809
13	Punjab National Bank	080-67995310
14	Punjab & Maharashtra Co-op Bank	1800-233-993
15	Saraswat Bank	1800-266-9545
16	Fino Payments Bank	1860-266-3466
17	City Union Bank	1800-2567200
18	Bank of Baroda	1800-1134568
19	Industrial Bank	1860-9005004
20	Yes Bank	1800-1200
21	Union Bank	1800-222244
22	Nagpur Naganik Sahakar Bank Ltd	1800-2667183
23	Airtel Payments bank	400

Source: IHMCL website

Benefits of Fast Tag

The FASTag is affixed on the windscreen of your vehicle. With the help of the FASTag, you will not have to stop your vehicle at toll plazas to pay the toll as this automatically gets deducted from the FASTag which is either linked to your bank account or a prepaid wallet. The activated FASTag works on Radio Frequency Identification (RFID) technology. The main objective of National Payments Corporation of India (NPCI) is to evolve the current National Electronic Toll Collection (NETC) ecosystem into four parties scalable model (Issuer, Acquirer, NPCI & Plaza Operator) from the existing single-party model (Issuer & Acquirer combined) being operated currently.

Review of Literature

S.Amrin (2019) expressed in spite of the fact that RFID based FASTag is viewed as a beneficial method of toll collection framework in India offering various financial and natural advantages to both – the client and the gatherer, until its downsides or the difficulties are not removed to the base, the module will keep on confronting genuine crunch and may not function as planned. By planning suitable answers for address the difficulties looked by FASTag it tends to be made a mechanically prevalent method of toll collection in the long run demonstrating itself to be a distinct advantage in programmed toll collection framework, in the years to come.

Likhita M (2019) introduced the execution of message producing framework in the utilization of toll charge framework. It clarifies the way toll collection stations permit the traffic to stream persistently and vehicle having been abstained from halting and beginning once more. This in mix with decreased fuel utilization has constructive outcome on climate for example contamination made will be least. The framework has effectively defeated the weaknesses of the current framework by lessening the labor at the toll stall. It gives simple method of toll collection and upkeep of the data.

Mahindra Deshmukh, (2019) There is restricted examination accessible for the physically worked toll square, for freedom time dispersion. Freedom time considered in the current examination is additionally a sort of delay contrast between progressive vehicles at (physically worked) toll court. The commitment of the current investigation can be utilized to display viable execution of the recreation models of the toll square. The general limit or proficiency of the toll square, gotten to from reproduction to a great extent influences with minor mistakes in the leeway time esteems that concentrated in the current examination. An appropriately fitting dispersion for these leeway time (alluded as stay time in reenactment) qualities ought to be utilized while reproduction model turn of events. Thus, the GEV circulation suits best to display the leeway time dispersion at physically worked toll court under blended traffic.

Nayan Parmar (2018) thinks that the issue in the current toll collection framework are more, so to defeat the framework, we made this framework. This framework includes the utilization of high limit cameras on toll court fit for catching number plate of vehicle. The picture handling is performed on caught vehicle number plate picture. It helps in smooth and proficient installment at toll square without holding up in long lines on thruways. These framework isn't just fit for lessening clog of vehicles traffic yet in addition forestall the deficiency of fuel . The entire framework is exceptionally productive and lessen the manual work on toll square. The measure of toll can be determined effectively with no assistance of manual work.

Malvik patel , 2018 The automated toll collection structure will help in hugely decrease the time expected to complete the cooperation of giving toll receipts and enable the whole system to be swifter. The system also takes out likelihood of such a human bungle that might be possible with the customary toll collection structures. This structure thusly makes way to a cleaner, greener and swifter collaboration when diverged from the current system.

Sudharma Mokashi, 2018 disclosed about how to create Automated Toll System dependent on QR codes. In our framework rules approval System which will approve the Speed Checking, Weight Checking, Prepaid toll installment framework, Mapping and following the vehicles among tolls and Data examination on regular routine.

Pankaj pathak, 2018 Self-driving vehicles, wellbeing cautioning frameworks, and astute driver help framework needs a ton of endeavors in India. Be that as it may, as the sensor's affectability, remote availability, and processing capacities for vehicles quickly increment, the use of proactive wellbeing notice and helped driving is speeding towards the real world. In this way, with the developing attention to the significance of safety, an arranged and all around planned ITS framework will make a huge improvement in the vehicle area in India giving a significant lift to projects like brilliant city.

Tapas Sarkar, 2018 The NETC program depends on a comparable model, being used in numerous nations like US, Canada, UAE and so on The FASTag program will help make travel more advantageous, quicker, and climate amicable, however will at last assistance introduce a progressive change of all vehicle and related frameworks, everywhere on the country.

Bharavi Joshi, 2017 Briefs about correlation of customary toll collection and some current programmed toll collection frameworks. Some Automatic toll collection frameworks talked about are FASTag which utilizes RFID (Radio-Frequency IDentification) innovation and the other is BookMyToll. There is likewise a framework called an Automated Toll Collection System (ATCS) for gathering charge naturally wherein an interesting RFID tag is connected to the windshield of the vehicle. Another toll collection framework, named BookMyToll System does installment through Android App and the versatile is identified utilizing a keen gadget close to Toll Plazas. Here we likewise propose a programmed toll collection framework utilizing Image Processing.

Samra (2015) believed that absence of straightforwardness and lucidity on how the toll collection period and the measure of toll are chosen. While the advertiser or customer of the street by and large concludes these boundaries based on traffic thickness contemplates, the workers feel this is regularly defective, there by prompting the toll collection workers for hire receiving tremendous rewards. They additionally feel that there ought to be an arrangement to make contracts more straightforward the arrangements ought to incorporate presentation of collection subtleties at the stalls, observing of traffic streams with advanced meters and by Govt. staff and a police chowk at every corner.

Nagarjuna et al. 2015 Tolls have been set on streets at different occasions ever, regularly to produce assets for reimbursement of toll income bonds used to fund developments or potentially activity. Lately there has been a developing acknowledgment in the govt. that street advancement can't be achieved uniquely through budgetary help or even through private speculation support. Including private area in return for the option to charge client tolls was viewed as an approach to moving the monetary weight to clients and keeping up streets all the more effectively. Anyway question emerge with regards to what sort

of streets as far as traffic thickness are appropriate for tolling, duty of client charges and industrially suitable model of account and how much the toll streets are effective and toll expense support the money needed for the street improvement in India.

Opoku et al (2013) assessed the presentation of toll squares outfitted with manual and electronic activities. The key presentation markers examined are administration time, administration rates, vehicle types of progress, and so forth. The models are created dependent on these critical markers to anticipate the framework execution under different traffic situations.

Kataria, 2014 The essential target of a street administrator ought to be consumer loyalty. It is essential to give great quality street foundation just as different conveniences to street clients with center around upgrading the wellbeing measures.

Dubey, 2013 The presentation of a toll street is essentially worried about the Operation, Maintenance and Tolling Segment (OMT) and it resembles whatever other industry where the client pays the toll and expects a specific degree of administration concerning street wellbeing, security, street way help administrations, and so forth.

Objectives of the Study

- To study current status of digital toll payment system
- To study the issues and challenges of digital toll payment system.

Research Methodology

Research methodology is an important part for research study. It includes research design, data collection methods, sampling design and methods of data analysis to carry out our research. It describes the methodological tools adopted in order to fulfill the research objectives of the present research. Properly conducted research reduces the uncertainty level for the top management in making critical decisions. Hence, it is extremely important to describe the research methodology here: In this study, descriptive cum exploratory research design is adopted. Secondary data has been used for the study.

Current Scenario of Digital toll payment system

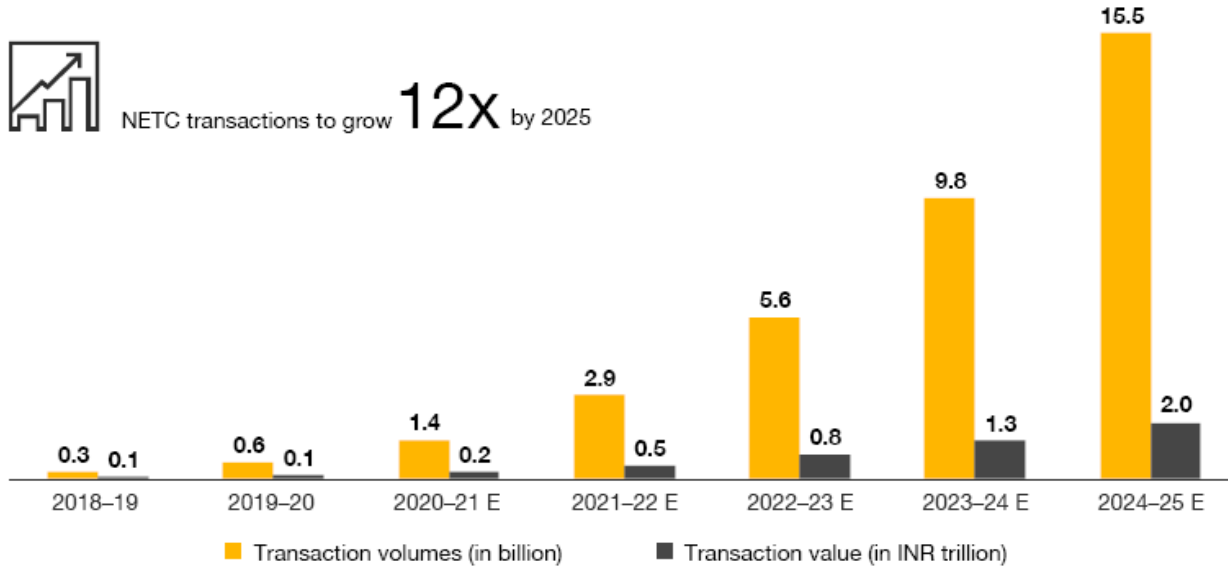
The National Electronic Toll Collection (NETC) framework has seen consistent development over the most recent couple of years. Late orders by the Government of India have put NETC on a dramatic development direction. NETC volumes were 64 million, 93 million furthermore, 110 million in the long stretches of December 2019, January 2020 and February 2020 separately. Be that as it may, inferable from the cross country lockdown, the volumes plunged by 90% to 10 million in April 2020. After monetary action continued in the country and limitations on between state development were lifted, the volumes continuously got back to pre COVID-19 levels, and 110 million NETC exchanges were recorded in September 2020.



Sources: NPCI

Currently, NETC covers 390+ national toll highway plazas and seven state toll plazas. We believe these numbers will grow in the coming years. Further, with the emergence of many new use cases and an extended Government push on usage of FASTAGs at tolls, we expect up to twelve times growth in NETC transaction volumes by 2025.

Projected Growth of NETC



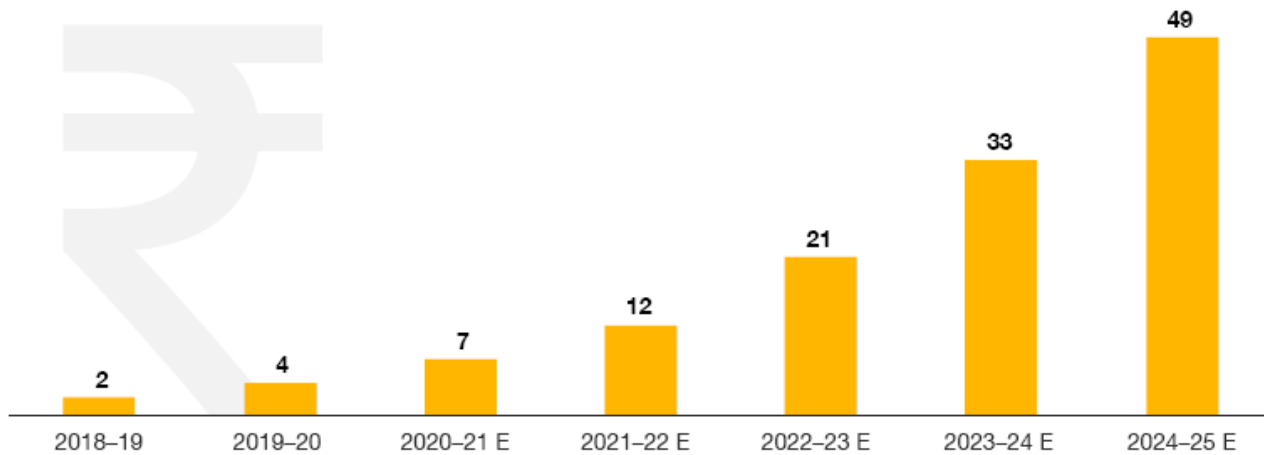
Sources: NPCI

NETC growth drivers

FASTag has gotten obligatory for all vehicles from a year ago. 18 million FASTags have effectively been issued and this number is probably going to reach up to 25 million by one year from now. All vehicle makers and sellers have effectively connected with FASTag backers to empower new vehicles to get RFID labels. All public interstate tolls courts are presently FASTag empowered. Public roadway toll squares are additionally quickly moving to the FASTag framework following the Government order. Fuel installments utilizing FASTag at petroleum siphons, alongside acquisition of food varieties and staple goods at shops at the petroleum siphons Different Government or private parking spots Collection of police fines.

NETC Growth Rates

NETC revenue growth (in INR billion)



Source: NPCI

Challenges and solutions of Digital toll payment system

The different challenges and its respective solutions are discussed as below:

- **Loss of FASTag**

The first and the most widely recognized worry that surfaced was the pain communicated by the drivers about loss of their FASTags. The concern originates from the way that since this card is fastened as a tag on the windscreen, it very well may be dependent upon robbery or misfortune.

Solution

In this situation, you can promptly tell the responsible office or bank about the robbery/misfortune. They would then be able to handle hindering the record and can assist you with getting another tag.

- **Technical glitch**

There may be times when the toll charge may be deducted twice from your account, in the wake of a technical error. Other than that, you may face the issue of your FASTag not working. What this essentially means is that your vehicle may go through the RFID scanner, and it is not able to detect your FASTag.

Solution:

The bank your label account is enrolled with can assist you with this. By going on your FASTag client entryway, you can enroll a case in regards to twofold allowance of toll sum, and can place in a solicitation for a recompensation.

- **Unauthorised cars in the FASTag lanes**

It is not uncommon for drivers to wait for their turns longer than expected in FASTag lanes due to vehicles without FASTag falling in the queue. This increases their wait time significantly, which is

one of the major FASTag problems faced by many. Moreover, drivers feel that this defeats the entire purpose of ETC and designated lanes.

Solution: There need to be stringent measures to ensure that the entry way into the designated FASTag lanes also has a scanner. This scanner will be the means to detect the card securely attached on the windscreen of vehicles. This will ensure that entry is allowed only to automobiles that have FASTag. And when these measures are in place, the user satisfaction and time saving opportunities will grow manifold.

- **Blacklisted FASTag**

This issue is a fairly common prevalence for RFID users. A FASTag gets blacklisted in the event the user fails to maintain adequate balance in their FASTag wallet. Thus if the user tries to pass through the toll gates with insufficient balance in their FASTag account, they would not be able to avail the National Electronic Toll Collection (NETC) services, forcing them to pay via cash.

Solution: For FASTag problems of this nature, the solution is absolutely simple. As a user of FASTag, one must be aware of the current balance in their account, such that they do not end up facing this challenge. Regular top-ups of the wallet is a must to ensure seamless passage through toll plazas.

Conclusion

The Toll Plazas framework or Toll Management framework ought to be able in catching vehicle pictures and vehicle enlistment number. In light of the information models created from pertinent information sources and 'Vahan' data set, there would be a potential for concessionaires to tie up with the partaking banks in the ETC program to strategically pitch items like vehicle protection and advances. The concessionaires would have the option to band together with fuel stations, food shopping centers, 3PL strategic organizations, vehicle OEMs/vendors and taxi aggregators to target key corporate and retail clients. For organizations, the information demonetisation model for a specific concessionaire would be not the same as different concessionaires dependent on the area of toll courts and the volume of exchanges.

REFERENCES

- a) S. Amrin “An Introduction to fast tag: A game changer in automatic toll collection system in India” in IJRAR, Volume 6, issue 2 June 2019
- b) Likhita , YaliniDevi , Hanisha , Chidambara Thanu “Toll Z-E (Online system)” in International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue 04 ,Apr 2019 Impact Factor value: 7.211
- c) Mahendra Deshmukh, yogeshwar V navandar, Ashish Dhamaniya, Statistical distribution analysis of Clearance time at manually operated toll plazas under mixed traffic conditions” , Proceedings of the East Asian Soceity for Transportation studies , Vol. 12, 2019

- d) Nayan parimar, Ajay Vatukiya, Mayanksinh Zala, Sweta Chauhan “ A comparative study of toll collection system in India” , International Journal of Research in Engineering, Science and management(IJRESM), Volume 1, Issue 4, April 2018
- e) Malvik Patel, Bharavi Joshi, kajal Bhagat, Hetakshi Desai “IOT based toll collection system using Image Processing” in International Journal of Computer Engineering and Technology (IJ CET) , Volume 9, Issue 3, May-June 2018, pp 132-139
- f) Sudharma Mokashi, Ketaki Ingavale , Dhanashri Nikam , Prof. Prashant Gadakh , “Automation in Highway Administration System” in IJSRSET, volume 4, issue 1, 2018
- g) Pankaj Pathak, Akhil Singhal, Shreya Bhutani, “Intelligent Transportation System In India”, Telecom business review, Volume 11, Issue 1, 2018
- h) <https://www.moneycontrol.com/news/trends/expert-columns-2/how-national-electronic-toll-collection-will-revolutionise-transport-in-india-2530245.html>
- i) Bharavi Joshi, Kajal Bhagat, Hetakshi Desai, Malvik Patel, Jekishan K. Parmar, “A Comparative Study of Toll Collection Systems in India”, in International Journal Of Engineering Research And Development, Volume 13, Issue 11 (November 2017)
- j) Nagarjuna, P. and Samanta, P.K. (2015), “Toll Supported Finance for Highway Development in India”, IOSR Journal of Business and Management.
- k) Opoku –Boahen, R. Adams, C.A. and Salifu, M. (2013), “Performance Evaluation of Two Toll Plazas on the Accra- Tema Motorway”, International Reference Journal of Engineering and Science.
- l) Kataria, A. (2014) Private Developers, Perspective Positive Experience in Outsourcing Tolling Work. Indian Infrastructure.
- m) Dubey R. (2013), “Developer Perspective Mixed Response to Outsourcing OMT”, Indian infra.
- n) <https://pib.gov.in/newsite/PrintRelease.aspx?relid=146152>
- o) <https://www.thehindu.com/news/national/how-will-the-fastag-toll-collection-programme-help-cut-delays-and-losses-on-indias-highways/article30125880.ece>
- p) <https://currentaffairs.studyiq.com/topics/government-schemes/fastag-and-it-benefits>
- q) <https://economictimes.indiatimes.com/wealth/save/fastag-mandatory-from-january-15-what-happens-if-you-dont-get-it-for-your-vehicle-by-today/articleshow/73264322.cms>
- r) <https://www.financialexpress.com/infrastructure/roadways/fastag-on-your-car-how-does-fastag-rfid-sticker-work-at-the-nhai-toll-plaza-explained-in-5-easy-steps/1772536/>
- s) <https://www.pwc.in/consulting/financial-services/fintech/dp/digitisation-of-toll-payments.html>