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Introducing Virtual Travel Cards (VTCs) Accessed on the Application using AI

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ABSTRACT: Polyvinyl chloride (PVC) or plastic based metro and travel cards are the most common and age-old but non-ecofriendly mode of ticket vending systems across the globe. Though it is subject to the ease of ticketing and transportation in metro cities worldwide, it can be replaced with more affordable, convenient, green and digital/virtual travel cards which can be accessed through the hosts' application in the smartphones of the passengers with advanced artificial intelligence. In this article, a non-physical card-less system is being proposed in the form of a virtual metro/travel card for the transportation in the cities, which can be adopted with advanced technological developments in the corporations. The digital card systems will reduce the plastic burden, theft-loss issues as well as the carrying trouble of the customers. Replacing and issuing costs will certainly impart a big loss to the service provider corporations but it will on the other hand, cut down executives and manpower involved in keeping records, resolving issues related to non-functional and damaged cards and assisting authorities at the service stations. Furthermore, it can be issued automatically by the application using artificial intelligence programmed in the software tool according to the prior-seeded profile based information in the application. Moreover, personalized card publication digitally will also act as a watchdog on its unauthorized commutation by the personnel involved in illegal movements across the world. Customers can have an accountability on the travel history and transactions at stations or depot in the application itself, which will boost the transportation convenience and fiscal management.

Keywords: Metro Rail Corporation, City Transportation, Digital Metro Card, Electronic Travel Cards.

INTRODUCTION

Application-operated digital (virtual) card systems are the emerging tool to enhance the performance of FinTech as well as other corporate sectors worldwide (Mnyango & Hlangothi 2024; State Bank of India Virtual Debit Cards, 2021). Polyvinyl chloride (PVC) made debit and credit cards are nowadays phasing out and replaced with more convenient, self-managed and hassle-free virtual cards accessed in the smartphones itself and operated on the service providers' software tools (Mnyango & Hlangothi 2024; Nair *et al.,* 2019). Digitalization of metro and other travel cards are therefore of an immense need for reducing plastic burden and transaction failures worldwide (Mogaji & Nguyen 2024). Cutting-edge technologies including advanced artificial intelligence (AI) nowadays are making lifestyle much easier through blockchain technology enabled smartphone used as a wallet for all kind of transactions (Khando *et al.,* 2022; Kavitha & Rajini 2024; Javaid *et al.,* 2022).

People nowadays avoid carrying any belongings such as credit cards, identity cards, cash currencies or any paper document with the, as they are all digitally stored in the smartphones; carrying only metro cards or any other travel card physically with them in such case is an unwanted obligation (Kavitha & Rajini 2024). The digital card systems will promote sustainable and create green ecosystem favoring 'zero plastic use policy' of the states, reduce theft-loss issues as well as the carrying trouble of the customers. A single plastic card, usually predominantly made of PVC, only weighs about 5 grams, but 26 billion of them totals to 130,000 tons of plastic in circulation, 10 times the weight of the Eiffel Tower. Moreover, payment cards are made of toxic materials which are hard to recycle, and harmful when incinerated or left to decompose in landfill (Morvan, 2024). Replacements and issuing costs will certainly impart a big loss to the service provider corporations but on the other hand, it will cut down the payments of the executives and manpower involved in keeping records, resolving functional damages of the cards and assisting authorities at the service stations. Furthermore, it can be issued automatically by the application using artificial intelligence programmed in the software tool according to the prior-seeded profile based information in the card. Personalized card publication digitally will also act as a watchdog on its unauthorized commutation by the personnel involved in illegal movements across the world. Customers can have better accountability on the travel history and transactions at stations or depot in the application itself, which will boost the transportation

convenience and fiscal management. In this article a non-physical card-less system (virtual travel card) for the transportation will be proposed in the form of a digital metro/travel card, for its use in the cities, which can be adopted with its advanced technological developments by the city rail corporations.

New and Novelty

Till date there is no evidence of use of such electronic/digital travel cards; even in the literature, for its use in metro rail corporations, its proposal is a lacunae. In banking and other commercial sectors, these e-debit cards has emerged recently and are widely used for cashless and ecofriendly transactions. This communication will impart first and foremost guide to seed authorities, researchers and entrepreneurs to validate and adapt e-travel cards in the sectors such as rail corporations and other commercial transactions for low scale expenditure on frequent basis.

METHODS

Innovation research to introduce smartphone-enabled QR/barcodes based mobility or shopping card for its use in global city-based transportation during tourism.

How will it work?

Virtual travel cards (also e-Credit Cards in banking sector) are the emerging digital and green mode of smartcards for small scale expenditure in the transport sectors for frequently travelling passengers to their workplace and institutions. Virtual travel cards such as e-metro cards can be issued or generated easily in the host service providers' applications in the smartphones of the users on verification of personal details such as name of the user, card number, type of card and expiry date as shown in the Fig. 1. Details related to identity, date of birth, local address, email address and phone number can be verified and then linked with the profile to keep an accountability, which can be retrieved in case of any mishappening with the passenger. Virtual travel cards can be issued in the application post-feeding users details and profile completion in the application; service providers may ask for some details which are important for security purposes at the time of profile creation and keep in records for further pursual in case of any illegal activity by the used.

Virtual Metro Card is different from single-entry QR tickets purchased in Delhi Metro Rail Corporation (DMRC) where passengers have to book ticket for each journey but in a manner similar in reading ticket and accessing entry and exits at the source and destination stations (Jain *et al.*, 2021). There will be a personalized quick response (QR)/Bar code in the virtual travel card on the back or front side depending on the convenience of the passengers and service providers, unlike magnetic chip in the PVC cards, which can be easily scanned by the users at the entry and exit stations without any additional support from the executives for fare deductions. Travel fares including discounted fares can be fed in the application based on the class of the passengers holding cards, like service providers may impose some rebates on students' and seniors' and even their employees' travel.

Data collection and sharing should not abide the local information technology and commercial rules and regulations (Data protection and privacy laws). Service providers can give option to recharge the virtual cards in multiple of the regional currency by online mode of payments only, ensuring complete digitalization of the process (Khando *et al.*, 2022). Due to cessation of handling physical currency and cards, mis-management and hassle related to the purchase process and payments will tender a big relief to the sector and passengers too. Commercial logo of the service providers and rules and regulations of handling cards can be shown to the passengers in brief on the card itself (Fig. 1).

Illustration

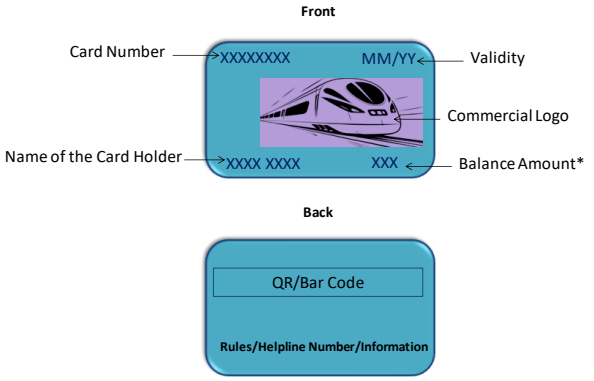

Fig. 1. Proposed card outlook: essential information and technological details.

RESULT

This is a novel idea to escalate the findings for virtual and cardless journey using e-travel card and its usage related benefits and hurdles, which are described with proper troubleshoots in this section.

Merits

- Convenient mode of ticketing: Ease of ticketing and self-managed utility. Furthermore, it can be issued automatically in the application using artificial intelligence programmed in the software tool according to the prior-seeded profile based essential information in the application. Passengers will not have to stay in queue for long to get new and replacement cards or return their old cards as in case of PVC cards.
- Accountability and travel history: Customers can have the accountability on the travel history and transactions at stations or depot in the application itself. This will give a better option for fiscal management to the passengers.
- Non-physical cardless system: Carrying trouble of the customers, functional as well as physical damage will be completely out of worries.
- Ecofriendly transportation in metro cities worldwide: The virtual cards are green mode and will help in reducing the plastic burden on the globe by promoting zero plastic pollution worldwide.
- Unauthorized usage threat and theft issues: Personalized card publication digitally will also act as a watchdog on its unauthorized commutation by the personnel involved in illegal movements across the world.

• Manpower savings: Free from replacements, return and issuance related cumbersome services will cut down the costs of manpower utilized at the vending counters by the service providers.
• Ease of implementation of e-passes and rebate on journey: Issuance of e-passes and rebate on the journey of senior citizens and student passengers can be easily implemented on virtual mode.
• Long queue and wait period: Passengers, especially tourists do not have to wait in the long queue for buying tickets and issuing cards; moreover, they can generate virtual cards off-premises digitally, prior to the travel day.
• Pooled card balances – a gold digger: Service providers may earn extra bucks as passengers will recharge more because they do not have fear to theft and loss cards. Service providers can utilize the static pooled card balances to get interests by investing in the market.
• Card surrender: Returning virtual cards are quite simpler as exact amount is reimbursed in the user's bank account on one click and card will disappear from the application without erasing travel history which can be followed up by the passenger in future. It can also give an option to reimburse remaining card's balance in the same bank from which early transactions for adding money in the cards were done (Capgemini World report series : Payment 2022).
• Identity retrieval in special cases: Retrieval of identity of passenger in case of any mis-happening can be undertaken to reach out the concerned family members based on profile information. Suspected terrorist and Interpol wanted personnel can be easily tracked.

Demerits

• Advanced technological developments will be required in regulation by the corporations. To tackle hacking related checks, corporations have to work on developing better digital infrastructures.
• Replacements and issuing costs will certainly impart a big loss to the service providers.
• Shrinkage of job opportunities of the executives and manpower involved in keeping records and assistance.
• Buying virtual cards by the passengers who do not seek its need, may cause an accumulation of data of unauthentic profiles and sham users.
• Following certain bylaws and guidelines may be a tedious task for the corporations; also service providers may have to make a huge amendments in the current rules and regulations of physical travel card use.
• Data privacy and data sharing policy may lead to violation of right to privacy, if not implemented with goodwill.

DISCUSSION

Although, the benefits of its use are numerous and critical trouble shoots for the hurdles faced by passengers must be taken care of. Some of the important points are listed below:

Troubleshooting

1. Auto-brightness adjustments of the smartphones while scanning the card may enhance the hassle free reading of the QR codes or barcodes. Virtual cards may also be designed in a color which can reduce latency to read and provide accesses to enter and exit at the barrier gates.
2. Flipping of the card interfaces (front and back) at the same portal on the screen will provide exhibition of more information on the card to present it before the users and authority.
3. QR codes or barcodes may be designed depending on service providers' preference but the visual interface and standard size must not be violated to kept uniformity in its implementation by the other corporations to win users' confidence.
4. Payment for the recharge of cards can be taken as digital payments. Virtual cards may be linked to an active phone number (preferably cellular confirmed by one-time-passcode) of the local passengers in addition to an authentic photo identity card to keep an accountability of the users. Phone number can be linked for the national users only as international passengers may not have an active cellular network in the phone, in that case email address and passport should be mandatory. Local payments using unified payment interface (UPI) can also be collected using the linked phone number (in India) to make recharging virtual travel cards faster and more convenient (Bhattacharya *et al.*, 2019).
5. There must be a set limit to add money in the card, may be an amount equivalent to the maximum monthly expenses possible by a passenger, to avoid money laundering.
6. Either the interface of the e-card or the application may be protected with passcode to keep money safe in case of loss of the smartphone of the passenger.

CONCLUSION AND FUTURE SCOPE

Pioneer in the field of introduction of virtual travel cards operated in the smartphones on service providers' application may be an effective, convenient, time-saving, user friendly and green mode of city travel fare vending such as by virtual metro cards for frequent passengers commuting to workplace and institutions. Virtual travel card is safe to be used in cities to save time and manpower in the transportation sector especially metro rail corporations.

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