Pathway to One Nation One Card: A Review of NCMC Implementation and Global Lessons

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Abstract: National Mobility Card is India's attempt to create a unified and interoperable mobility payment system through National Common Mobility Card (NCMC). The rollout of NCMC remains uneven across states in India despite its policy significance. The study finds out the current status and challenges of NCMC. It then compares NCMC with global mobility systems in London, Seoul, and Singapore. Finally, the researchers propose a conceptual framework to improve implementation of NCMC throughout India. The reasons for low implementation of NCMC in India are low user awareness, lack of fare capping, fragmented governance, and legacy Automatic Fare Collection (AFC) infrastructure. In contrast, there is strong mobile integration, centralized planning, high interoperability, and unified fare structures in Singapore's SimplyGo, London's Oyster/contactless model, and Seoul's T-money Based on the global standards, a three-pillar conceptual framework, based on technology and interoperability, financial and pricing models, and access and adoption, was proposed by the researcher for strengthening policy and system design. This conceptual framework will help in achieving interoperability, enhance financial sustainability, and promote inclusive adoption of NCMC across India.

Keywords: National Common Mobility Card (NCMC), SimplyGo, Oyster, T-Money, Smart Mobility Cards, Urban Mobility.

1. INTRODUCTION

Mobility in urban India is rapidly transforming digitally due to the use of digital payments, smart city initiatives by government, and rise in demand for seamless multimodal travel. The Ministry of Housing and Urban Affairs (MoHUA) and the National Payments Corporation of India (NPCI) introduced the NCMC in 2019. NCMC was introduced to enable cashless and interoperable travel across various public modes of transport. Despite its policy significance the actual rollout of NCMC has limited interoperability across transport systems in India. On the other hand, London, Singapore, and Seoul have unified mobility card systems. These cards have features such as strong digital integration, seamless multimodal travel, and high adoption rates. The benefits of centralized governance, integrated fare systems, and account-based ticketing are highlighted through the examples of London, Singapore, and Seoul.

2. SCOPE AND SIGNIFICANCE OF STUDY

This study finds out the progress and implementation challenges of NCMC adoption in India. Furthermore, there is a comparison of NCMC with global mobility best practices used in Singapore, London, and Seoul. Finally, this study introduces a conceptual framework to achieve interoperability, financial sustainability, and higher user adoption This study will provide strategic insights for improving mobility system in India.

3. RESEARCH OBJECTIVE

To find out the current implementation status and challenges of the NCMC in India.

To compare NCMC with global best practices of EZ-Link/SimplyGo (Singapore), Oyster (London)/Contactless Payment, and T-money (Seoul).

To introduce a conceptual framework that enhances interoperability, financial sustainability, and user adoption of NCMC in India

4. LITERATURE REVIEW

The broader trends to modernize urban transportation and digital payments are shown through the introduction of smart mobility cards. This review is categorized into four parts namely, interoperability, governance, user adoption, and technological architecture.

4.1 Interoperability

Interoperability is the most important feature of successful mobility card system. Travelling is made easier through open loop and account-based ticketing (Transport for London, 2024). Furthermore, centralizing fare processing will support real time updates and flexibility in a cloud-based account system (Land Transport Authority Singapore, 2024).

4.2 Governance

Uniform implementation and consistent policies are ensured through centralized transport governance. Standard fare systems, coordinated tech upgrades, and integrated planning are supported by Singapore's Land Transport Authority (LTA) and London's Transport for London (TfL). On the other hand, uneven user experiences and fragmented development are often the result of decentralized systems (Belagavi et al., 2019)

4.3 User Adoption

Behavioral incentives, widespread acceptance, and ease of onboarding contribute to sustained usage of mobility cards. High mobility card adoption in Seoul is driven by strong mobile integration and through use in everyday payments (Korea Smart Card Co., 2024).

4.4 Technological Architecture

Old Automatic Fare Collection (AFC) technologies don't work smoothly with open-loop National Common Mobility Card (NCMC) set up (The Print, 2023; Times of India, 2023). For achieving nation-wide interoperability, there should be modernization of infrastructure with standardized fares and data protocols (MoHUA, 2023; NPCI, 2024).

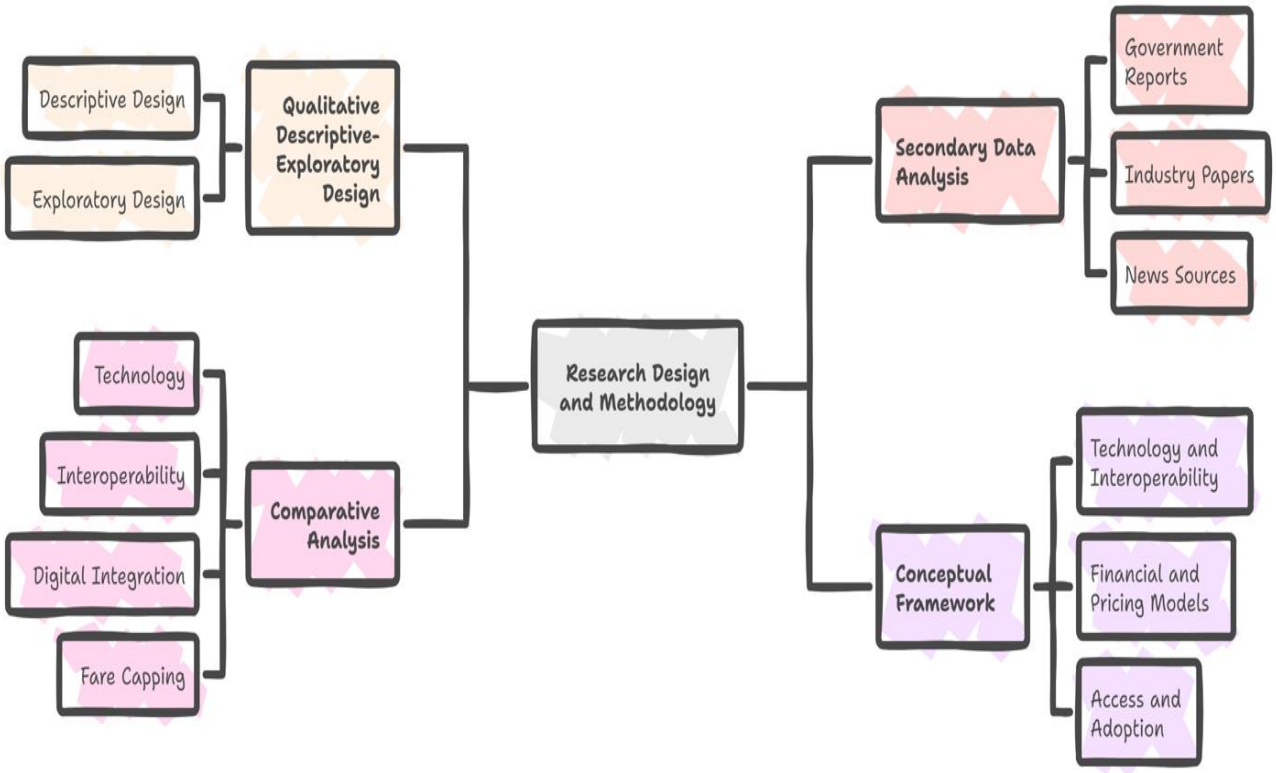
There has been no study carried out which discusses the implementation challenges of NCMC, compares the NCMC with global best practices, and proposes a conceptual model based on global best practices that will enhance interoperability, financial sustainability, and user adoption of NCMC in India.

5. RESEARCH METHODOLOGY

The study adopted a qualitative descriptive-exploratory research design. A descriptive design outlined the current status of NCMC in India with implementation challenges. An exploratory design identified the global best practices of Singapore, London, and Seoul with reference to mobility that can be adopted by NCMC in India. The researcher did not collect any primary data and the study was based entirely on secondary qualitative information. The researchers used government and agency reports, industry papers, and news sources. Insights were gathered on governance, technology, user adoption, and fare integration

from India, Singapore, Seoul, and London using systematic document review. These insights were then compared across countries. Finally, these comparative findings formed the basis of a three-pillar conceptual framework of technology and interoperability, financial and pricing models, and access and adoption. The Chart 1 shows the chart of research methodology.

Chart 1 Research Methodology



Source: Author's Own Work

2. Conceptual Analysis

5.1 Research Objective 1

To find out the current implementation status and challenges of the NCMC in India.

The below table 1 shows the current implementation status and challenges of NCMC In India.

Table 1 Current Implementation Status and Challenges of NCMC

Aspect	Current Implementation Status (as of 2025)	Key Challenges Identified
Coverage and Rollout	NCMC has been implemented in few metro networks such as Delhi, Mumbai, Ahmedabad, Nagpur, Kanpur, and Chennai. NCMC has been further implemented at fewer bus systems of Delhi, Chennai, and Goa.	Nationwide implementation of NCMC not achieved. Furthermore, nationwide interoperability of NCMC also not achieved. Several state transport undertakings are not yet NCMC compliant.
Technology Infrastructure	NCMC had been built on RuPay open-loop standard developed by National Payments Corporation of India (NPCI). NCMC supports both online and offline fare transactions.	There is a disparity in automatic fare collection system. This hinders compatibility in older metro systems due to their legacy systems.
Institutional Framework	Multiple agencies such as Ministry of Housing and Urban Affairs (MoHUA), NPCI, and local transport authorities are involved in implementation	There is a lack of unified coordinating authority. Hence, the governance is fragmented which delays coordination.
Payment and Fare Integration	NCMC supports combined retails and transit payments through banks, such as SBI, ICICI, Axis etc)	There is an absence of fare capping and intermodal discounting. Passengers pay separately across different modes.
User Adoption	There has been a gradual increase in NCMC card issuance through banks and metro stations	Awareness level among the public is low. Commuters are often unaware regarding the validity of cards beyond a single city or network.
Digital Integration	Integration of NCMC is underway with fintech apps like Chalo, Paytm, and UPI for recharge and ticketing.	There is limited interoperability between private apps (like Rapido and Yulu) and public transport system
Policy and Regulation	NCMC is supported under “One Nation One Card” Policy under MoHUA.	State level adoption of NCMC is not mandatory. Hence, there is an inconsistent pace of rollout across regions
Sustainability and Future Readiness	There is a plan to integrate NCMC with Electric Vehicle (EV) charging and parking system in smart cities	There is no last-mile integration. Furthermore, no linkage with green credits and micro-mobility

Source: Data compiled and interpreted from ThePrint (2023); Belgavi, Gandhi, & Raheja (2019); Times of India (2023); and Economic Times Infra (2025).

Based on research objective 1, there is a need for unified governance, interoperable technology, and improved user adoption. These dimensions are further explored through global best practices under research objective 2.

5.2 Research Objective 2

To compare NCMC with global best practices of EZ-Link/SimplyGo (Singapore), Oyster (London)/Contactless Payment, and T-money (Seoul).

Table 2 Comparative Evaluation of NCMC and Global Best Practices in Smart Mobility Cards

Criteria	NCMC India	Singapore – EZ-Link / SimplyGo	London – Oyster / Contactless Payment	South Korea – T-Money
Launch Year & Authority	It was launched in the year 2019 by MoHUA and NPCI under "One Nation One Card"	It was launched in the year 2002 by Land Transport Authority (LTA). It was later upgraded to SimplyGo in the year 2019 for account- based system	It was launched in the year 2003 by Transport for London (TfL). It supports contactless bank cards since the year 2014.	It was launched in the year 2004 by Korean Smart Co. It has support of Seoul Metropolitan Government.
Technology Type	It uses Open-loop RuPay qSPARC (Quick Specification for Payment Application RuPay Chip) card integrated with standard Europay–MasterCard–Visa (EMV) standard	It uses account-based open-loop system that supports Visa/MasterCard, Near Field Communication (NFC), and mobile wallets.	It uses fully open-loop system allowing direct contactless payment using credit/debit cards and mobile wallets.	It uses hybrid system, that combines both card-based and mobile-based contactless payments.
Modes Covered	It covers Metro, bus, suburban rail (partial), and limited integration with parking and tolls.	It covers Mass Rapid Transit (MRT), Light Rail Transit (LRT), buses, taxis, retail purchases, and Electronic Road Pricing (ERP)	It covers underground, buses, trams, ferries, national rail, and bicycles	It covers metro, bus, taxi, convenience stores, parking, and toll gates

Interoperability Across Cities	It has limited interoperability between select metros and bus networks	It has nationwide and seamless integration backed by LTA	It has full interoperability across Greater London transport network with harmonized fare structure	It has nationwide acceptance across multiple cities with real-time fare synchronization
Fare Capping and Integration	It has separate fares per mode with no automatic daily/weekly fare capping	It has daily fare capping with transfer rebates	It has daily and weekly fare capping. It further ensures that best fare is automatically applied	It has automatic transfer discounts with time-based capping available
Digital and Mobile Integration	It is Linked with RuPay cards and some fintech apps (Paytm, Chalo).	It is fully mobile-compatible (SimplyGo app, NFC phones, Apple/Google Pay).	It is integrated with Apple Pay, Google Pay, and Transport for London app	It is integrated with KakaoPay, Samsung Pay, and T-Money mobile app
Governance & Institutional Model	Multi-agency (MoHUA, NPCI, State Transport Undertakings)	Centralized under Land Transport Authority (LTA)	Centralized under Transport for London (TfL)	Public private partnership led by Seoul Metropolitan Government
Public Awareness & Adoption	Public Awareness is increasing gradually. Its usability is still limited beyond metros	Public awareness is very high. It is been used by over 90% of commuters	Over 85% of trips use contactless or Oyster payment.	More than 95% of urban commuters use T-Money
Sustainability and Future Readiness	It has to be integrated with EV charging, parking, and smart city networks	It is integrated with ERP, EV charging, and smart parking.	It is part of TfL's Sustainable Transport Strategy and links with e-bikes and green travel credits.	It supports EV charging, bike sharing, and congestion management systems

Source: Comparative data compiled and adapted from Ministry of Housing and Urban Affairs (2023); National Payments Corporation of India (2024); Land Transport Authority, Singapore (2024); Transport for London (2024); Korea Smart Card Co. (2024); and PwC India (2019)

6. COMPARATIVE EVALUATION AND LESSONS FOR INDIA

India's efforts to establish a unified and interoperable transport payment system is represented through NCMC. This NCMC is inspired through successful global models from Singapore's EZ-Link/SimplyGO, Seoul's T-Money, and London's Oyster/contactless fare system. The above comparison highlights both progress and areas for improvement.

The most successful systems of smart mobility cards have features, namely, account-based open loop systems, centralized institutional control, and seamless integration of intermodal fare. These features of global smart mobility cards ensure that passengers can transfer between different modes of transportation such as buses, taxis, trains, and shared mobility with one tap and unified fare capping.

On the other hand, NCMC in India is network fragmented and card centric. Here, independent Automatic Fare Collection (AFC) are operated by various metro corporations and state transport undertakings.

Another distinction lies in governance. The LTA of Singapore and TfL of London are responsible for system integration, fare policy, and upgradation of infrastructure through single mobility authority. On the other hand, in India, the rollout pace and technical compatibility of NCMC depends on coordination between NPCI, MoHUA, and local authorities. India could address this fragmentation by establishing Unified Metropolitan Transport Authorities (UMTAs) for major Indian cities. This unified authority would be responsible for both policy and technical oversight.

From the standpoint of technology, India has open-loop RuPay architecture which is modern and compatible globally. However, interoperability is hindered due to older metro stations having legacy AFC (closed loop). India can learn from the example of Singapore which migrated to Simply Go by upgrading fare gates and moving to cloud based account management.

This migration of Singapore to Simply Go improves interoperability and provides real time fare updates.

From the standpoint of user adoption, in India, the awareness level of NCMC among the public is low.

Furthermore, merchant acceptance is also limited outside transit networks. India can replicate from South Korea's example of near universal usage. South Korea has linked transport cards with mobile wallets, retail payments, and green mobility incentives.

From the standpoint of sustainability, global mobility cards create a carbon efficient mobility ecosystem that integrates with parking payments, EV charging, and micro mobility platform system.

For elevating NCMC from a payment card to a core element of sustainable urban transport strategy, NCMC should be integrated with smart city EV infrastructure and digital twin-based transport management systems.

The below conceptual framework under research objective 3 are developed through global best practices.

6.3 Research Objective 3

To introduce a conceptual framework that enhances interoperability, financial sustainability, and user adoption of NCMC in India

NCMC should evolve beyond its card centric model and be structured around three pillars, namely, Technology and Interoperability,

Financial and Pricing Models, and Access and Adoption. These three pillars are discussed below in detail

Pillar 1: Technology and Interoperability

Global Best Practice	Enhancement Strategy for NCMC	Rationale/Benefit
Account-Based Ticketing (ABT)	NCMC should develop ABT system where fare calculation and settlement occur at centralized back end	ABT will support dynamic fare models, support post-paid billing, and reduce dependence of stored value
Mass Mobile Integration	NCMC should adopt Host Card Emulation (HCE) and tokenization technologies for functionality on mobile devices. It should also ensure compatibility with UPI, RuPay and other wallets	It will expand accessibility through smartphones. It will further reduce dependency on physical cards.
Data Standardisation	NCMC should standardize data formats for route, fare structures, and passenger information for all transport operators. All this data should be fed into a unified NCMC data hub	This unified data will enhance interoperability, policymaking, and facilitate integration with Mobility-as-a-Service (MaaS) and digital twin-based transport systems

Source: Author's Own Work

Pillar 2: Financial & Pricing Models

Global Best Practice	Enhancement Strategy for NCMC	Rationale/Benefit
Fare Capping	To ensure that users pay the best available fare automatically, there should be daily, weekly, and monthly fare capping	It will promote affordability and encourage frequent public transport usage
Integrated Multi-Operator Fare Structure	There should be a zonal or distance based unified fare system that covers metro, bus, and suburban railway networks	It will simplify fare structures and ensure seamless transfers with multimodal integration
Risk Management Optimization	To ensure secure transactions during offline operations, creation of centralized risk and blacklist management framework with real-time synchronization	It will enhance financial security and will maintain high-speed validation under low connectivity conditions

Public–Private Partnership (PPP) Model	To encourage innovation and operational efficiency, there should be an adoption of PPP model for clearance, settlement, and system upgrades	This will ensure financial sustainability and continuous modernization with new technology

Source: Author's Own Work

Pillar 3: Access & Adoption

Enhancement Strategy for NCMC	Rationale/Benefit
Simplified Issuance & KYC	To reach first time users, digital issuance of low limit NCMC through mobile wallets after completing simplified e-KYC norms
Inclusion for the Unbanked	To ensure equitable access, allow cash based top ups and recharges at authorized centers such as Post offices
Mobility-as-a-Service (MaaS) / Transit-as-a-Service (TaaS) Integration	Open APIs should be developed so that third party platforms such as Google Maps show NCMC linked fares, and ticket purchase options
Public Awareness and Behavioural Nudges	Public awareness campaigns should be conducted on a large scale. Furthermore, there should be cashback, loyalty rewards, and green mobility cards for frequent NCMC users.

Source: Author's Own Work

Hence, the above three pillar conceptual framework makes NCMC as a digital mobility backbone rather than a standalone payment card. It aligns with best practices globally and promotes an interoperable, financially sustainable, and user-centric mobility system in India.

7. SUMMARY AND CONCLUSION

India has introduced the National Common Mobility Card as a digital mobility solution but its implementation remains limited to a few metro systems. The reason for slow implementation is due to legacy AFC infrastructure, low user awareness, lack of fare capping, fragmented governance, and limited acceptance beyond transit. On the other hand, Singapore's Simply Go, London's Oyster/contactless model, and Seoul's T-money have strong mobile integration, centralized planning, high interoperability, and unified fare structures.

Hence, there is a need for India to transit to a fully integrated mobility ecosystem from the current card centric model. A three-pillar conceptual framework proposed by researcher will help to guide nationwide rollout of NCMC in India. Furthermore, it will also help to achieve interoperability, enhance financial sustainability, and promote inclusive adoption.

8. RECOMMENDATION

A unified metropolitan transport authority should be started in India. This authority will ensure coordinated decision making, fare harmonization, and infrastructure upgrades. To promote affordability and multimodal travel, there should be daily, weekly, and monthly fare capping. There should be implementation of account-based ticketing which will help real time reconciliation. Lastly, there should be standardization of data formats for ensuring compatibility nationwide. This can be done by upgrading legacy AFC systems.

9. LIMITATIONS OF THE STUDY AND FURTHER RESEARCH

The study is based on secondary data, namely, government and agency reports, industry papers, and news sources. Primary data was not used in this study. Hence, the ability of this paper is limited as it didn't capture various stakeholder perspectives such as user experiences and viewpoint of regulatory authorities towards implementing NCMC nationwide. Further research can be carried out by interviewing commuters, transport operators, and policymakers for understanding the on-ground challenges of implementing NCMC nationwide. Various city level case studies can be taken up for studying barriers to NCMC integration and scalability.

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