

A CONCEPT BY



DIGITAL MOBILITY SUBSIDY:

LEVERAGING DIGITALISATION TO DELIVER TRAVEL SUBSIDIES



DECEMBER 2022

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OMI Foundation is a new-age policy research and social innovation think tank, focused on developing knowledge frameworks at the intersection of mobility innovation and public good.

OMI houses three interconnected centres which conduct cutting-edge evidence-based policy research on all things mobility.

Centre for Future Mobility

OMI Foundation's Centre for Future Mobility envisions a future which meets the aspirations of all in a diverse world, anchored in the paradigms of active, shared, connected, clean, and AI-powered mobility.

Centre for Clean Mobility

OMI Foundation's Centre for Clean Mobility explores the diversity of near- and long-term pathways to clean mobility. It focuses on the use of electric, future fuels, and renewable energy alike within the mobility ecosystem.

Centre for Inclusive Mobility

OMI Foundation's Centre for Inclusive Mobility ensures the existing and emerging mobility paradigms are Safe, Accessible, Reliable, and Affordable for every user of mobility infra and services, including persons with disabilities, women, LGBTQIA+, children, and the elderly. It further paves the road to the future of mobility and platform economy fulfilling the modern promise of labour.

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FOREWORD



Ambassador (Retd.) Gautam Bambawale
Managing Trustee, OMI Foundation



Harish Abichandani
First Trustee, OMI Foundation

A digital revolution is well underway in India, with the world's largest democracy tapping into the potential of a connected world to ensure no individual is left behind. Our adoption of technology to unlock socioeconomic opportunities for the masses is indeed a model worth emulating across the globe. As India embarks on the next 25 years of Amrit Kaal to become a developed nation by 2047, home-grown technological solutions will play a significant role in achieving inclusive growth.

Transport and mobility systems have played a critical role in India's growth story. Efficient, effective, and inclusive transportation systems are vital to facilitate access to myriad socioeconomic opportunities. People expect and require convenient and affordable mobility for work, education, and recreation to be able to create value for themselves, the communities, and the nation at large. This is all the more important for more than 23 crores of urban women, persons with disabilities (PwDs), and the elderly, whose needs are under-served by the existing mobility systems. Be it the diverse travel patterns of women, the need for accessible (usable) transport options for PwDs, or age-appropriate travel choices, there is much room for improvement. Private and government transport service providers are working to bridge this long-standing gap. Nevertheless, often, these users have to negotiate between an accessible travel option that meets their needs on the one hand, and an affordable choice that fits within their budget on the other.

Recognising this need, the government, through various schemes, subsidises travel to make public transport more affordable and accessible for these groups. However, the current, largely manual, delivery mechanisms are fraught with challenges such as subsidy leakage risks along with operational and economic inefficiencies.

Digital Mobility Subsidy, a tech-powered subsidy delivery solution conceptualised by OMI Foundation offers an innovative, digital, home-grown alternative. It envisages using the existing India Stack to overcome the limitations of the current model. We are thrilled that the concept is declared the winner of the UN-India and National Institute of Urban Affairs Smart Solutions and Inclusive Cities Award 2022 in the 'Early Stage Innovation' category. This recognition is a testimony to the potential of the tech-solution to improve the affordability and accessibility of mobility systems toward an inclusive India. We look forward to this solution, with the potential to revolutionise transport subsidy delivery, becoming available in various cities and towns across India in the near future.

RECOGNITION

The Digital Mobility Subsidy concept, developed by OMI Foundation, is an award-winning solution in the 'Early-stage Innovations' category of the Smart Solutions Challenge and Inclusive Cities Award 2022, organised by the National Institute of Urban Affairs (NIUA) and United Nations (UN) India and supported by the NITI Aayog, Ministry of Housing and Urban Affairs (MoHUA), Atal Innovation Mission, and others. On September 1, the award was presented by Shri Hardeep Singh Puri, Hon'ble Minister of Housing and Urban Affairs, Minister of Petroleum and Natural Gas; Mr. Shombi Sharp, United Nations Resident Coordinator, India; Mr. Kunal Kumar, Joint Secretary, and Director, Smart Cities Mission, MoHUA; and Mr. Hitesh Vaidya, Director, NIUA.

We are grateful to NIUA and UN India for giving us this opportunity and recognition.



CONTENTS

INTRODUCTION	8
<hr/>	
AFFORDABILITY VS ACCESSIBILITY	10
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CURRENT APPROACH	14
<hr/>	
PROPOSED SOLUTION: DIGITAL MOBILITY SUBSIDY	17
<hr/>	
LEARNINGS FROM AROUND THE WORLD	22
<hr/>	
CONCLUSION	23
<hr/>	
TERMS OF USE	24
<hr/>	
ANNEXURE 1: ESTIMATED BENEFICIARY POPULATION	24
<hr/>	
REFERENCES	25

ABSTRACT

Access to good public transport (PT) can improve mobility and social participation among mobility-disadvantaged groups such as women, persons with disabilities (PwDs), and the elderly. The policies that improve access and promote the use of PT, such as travel subsidy schemes, play an important role in facilitating access to socio-economic and educational opportunities, promoting quality of life, and participation in the economy. The current system has several disadvantages ranging from operational to economic inefficiencies. To address the issue, OMI has conceptualised a technological solution that leverages India's existing digital infrastructure.

INTRODUCTION

Mobility systems are a crucial driver of economic and social development. They provide people access to education, jobs, healthcare, etc. safe, accessible, reliable, and affordable mobility helps unlock people's full potential, especially mobility-disadvantaged groups such as women, persons with disabilities (PwDs), and the elderly. Access to affordable transportation fosters self-sustainability and promotes independence (Kulkarni, 2021; Agarwal, 2022).

When an individual's access to affordable public transport is restricted, their social and financial equity is put at risk - especially for women, PwDs, and the elderly. Therefore, the mobility-disadvantaged groups are forced to curtail the number of trips they take, use modes of transport that do not incur a direct cost (walking or cycling), and prefer to take cheaper modes of public transport. For them, affordability and accessibility of transport options go hand in hand. Sometimes, the mobility-disadvantaged groups may be forced to opt for a relatively accessible and more expensive transport mode due to mobility requirements.

The policies that improve access, provide affordable travel options, and promote the use of public transport are fare-free/

concessionary travel schemes. Free or reduced-cost access to public transport removes financial constraints to travel. Thus, reducing social exclusion, supporting employment, and giving a sense of freedom. For India, which is home to more than 23 crore women, PwDs, and the elderly (refer to annexure 1), it is all the more important to provide accessible and affordable public transport. Apart from women, PwDs and the elderly, such concessional travel schemes benefit other user groups such as under-resourced students to access additional learning opportunities and expanded affordable transportation options for school and beyond (Fan & Das, 2015, 1). Moreover, as we are in the 'Decade of Action' to implement Sustainable Development Goals (SDGs) by 2030, affordable transport would be a critical element for achieving SDGs. Furthermore, it assumes greater importance that India has entered the 25-year *Amrit Kaal* leading to India at 100 years of independence.

Against this backdrop, OMI has designed an implementable concept, addressing the following research questions.

- » What is the need for extending travel subsidies to women, PwDs, and elderly, i.e. mobility-disadvantaged groups?

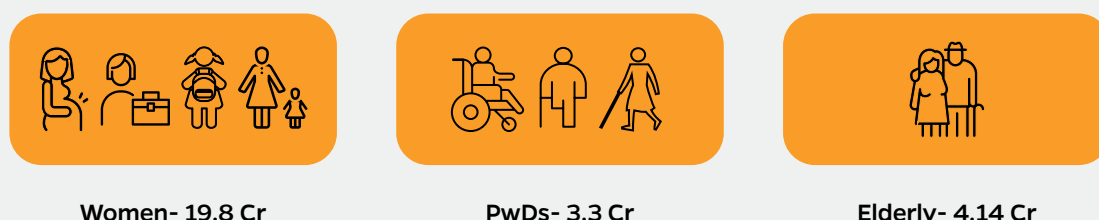
- » What are the limitations of current models of providing travel subsidies to mobility-disadvantaged groups?
- » How can technology be used to build a mechanism to deliver subsidies to the beneficiaries by overcoming the limitations of current models?

The Problem

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Transportation is unaffordable for **23 crore** urban Women & Girls (women), Persons with Disabilities (PwDs), and the Elderly making it difficult for them to access various socio-economic opportunities and unlock their full potential.

Urban Population 2021(estimated)*



Icon description: Women are represented by a group of icons in a sequence: a pregnant lady, a working lady, a school girl, and a woman with a young child. PwDs are represented by a group of icons in a sequence: a wheelchair user, a person using a crutch to walk, and a lady with a visual disability. The elderly are represented by an icon of an old couple

* The total will exceed 23 crores on account of intersectionality. The figure of 23 crores has been arrived at after eliminating double counting (Refer to Annexure 1 for details)

Note: This paper considers women, PwDs, and the elderly as a whole, regardless of socioeconomic status or occupation. Despite the fact that students are recognised as one of the mobility-disadvantaged groups, they are not included specifically in the study. In India, the travel requirements of students with respect to the affordability of public transport are understudied. There is no dedicated section in the paper to highlight factors that make transportation unaffordable for them due to a lack of relevant data points. However, the student user group crosses gender, age, and disability lines, and therefore, forms a part of the relevant sections.

AFFORDABILITY VS ACCESSIBILITY

The mobility-disadvantaged groups have to make daily tradeoffs between accessibility on the one hand and trip affordability on the other. This is because there is a shortage of accessible options, and often the more accessible options are also more expensive. Public transport may seem unaffordable to a certain user not because its price is excessive in relation to its costs of provision, but simply because the wide income gap in India limits the spending power of the user (Gwilliam, 2017, 6). Understandably, beyond spending power, a host of factors makes transportation unaffordable for women, PwDs, and the elderly.

Factors making transport unaffordable for Women

Travel behaviour studies conducted over several decades have established that women have daily mobility patterns more complex than men. Women typically combine multiple tasks requiring several short trips to balance household and work responsibilities, known as trip chaining. They tend to travel shorter distances, often accompanied by dependents (children or the elderly), for non-work-related activities such as errands, shopping, childcare, assisting the elderly, and so on (Ollivier et al., 2022, 18; Ng & Acker, 2018). For instance, having a young child in the house increases women's trips by 23% as women are three times more likely than men to take children to school and 80% more likely to trip chain (Zhen, 2021). Furthermore, women are time-poor (time poverty) as a result of the disproportionate level of household tasks they are required to perform, necessitating trade-offs in terms of allocating time, reducing their time for paid work, and other social activities (Asian Development Bank, 2015, 3). Also, women have off-peak travel needs and are heavily reliant on public transport, slower

and inexpensive non-motorised transport, and intermediate public transport in urban areas. Therefore, trip-chaining and time poverty often make travel costlier for women as they may have to pay for numerous single-fare tickets (Shah et al., 2017) and opt for expensive modes of transport due to paucity of time.

According to the International Monetary Fund, reaching gender parity in the economy could boost India's GDP by as much as 27% (Lagarde & Solberg, 2018). Yet, in India, women's labour force participation rate was only at 20.8% in 2019 (Ministry of Statistics and Programme Implementation (MoSPI), 2021). The lack of accessible and affordable mobility options affects women's ability to work or attend college, among other things. Women, for example, are more likely to take jobs closer to home than men, who can travel long distances because they are more likely to own a motor vehicle (Asian Development Bank, 2013). Therefore, the low women labour force participation along with the income and asset ownership gap limits spending power on transport.

Illustration 1: Affordable mobility needs of Women



Ms. Meena

I take a bus to go to work for Rs.36. I usually walk to my home from the bus stop but when I am getting late, I take a shared auto rickshaw for Rs.10. Sometimes, I have to go to get groceries from a government shop on the way. I end up spending more than Rs.1,100 per month on travelling which is a lot for me."



30 years old; Married



New Delhi; Migrant from rural Bihar



INR 9,500 monthly income



6 family members: Self, parents-in-law, husband, two sons (7 years, and 4 years old)



Engaged as a domestic worker



Non-disabled; No chronic health condition

Note: Image is for representation purposes only, Image source: Paula Rey, CC BY-SA 2.0, via Wikimedia Commons







Factors making transport unaffordable for PwDs

PwDs have limited options for accessible public transport as their needs are not considered while planning and designing the mobility systems (Kulkarni, 2021, 8). According to the Survey of Persons with Disabilities as a part of the 76th round of the National Sample Survey (NSS), conducted in 2018, around 59% of PwDs used public transport in urban India, and among them, 65.1% faced difficulties while using/ accessing it (National Institute of Urban Affairs, 2020, 159). Research finds that PwDs face challenges in boarding the bus safely (Kulkarni, 2021, 33). As per recent government data, less than 6% of buses are fully accessible (Ministry of Social Justice and Empowerment, 2022). PwDs find the metro accessible but a costly public transport option as the average metro user spends more than two-and-a-half

times that of the average bus user (Bhatt, 2019). Therefore, PwDs have to incur higher travel costs as the more accessible modes are also more expensive.

The limited access to affordable and accessible travel options also hinders their participation in the economy. The cost of excluding Persons with Disabilities from the workforce could be as high as 7% of a country's Gross Domestic Product (GDP) (Buckup, 2009, 51). Compared to an all-India labour force participation rate (LFPR) of 50.7%, PwDs have an LFPR of a mere 23.8% (Ministry of Statistics & Programme Implementation, 2019), which means that a significant number of PwDs are out of the workforce. Therefore, poor access to employment as well as educational opportunities limits the earnings and spending power of PwDs.

Illustration 2: Affordable mobility needs of PwDs

 <p>Ms. Sneha</p>	 <p>20 years old; Unmarried</p>	 <p>Bengaluru; Hails from a small town in Karnataka</p>
<p><i>“I spend around Rs.5,000 per month to go to my college by metro and auto. I could have saved Rs.3,500+ if I took a bus from the bus stop 200 metres from my house. But buses are inaccessible for me. Our family finances are tight, so I miss many of my classes to save some money. Anyways, relatives are questioning the need to spend on educating a disabled daughter. My father may soon ask me to stop going to college as he is finding it difficult to make ends meet.”</i></p>	 <p>Not earning; Dependent on her father who earns INR 25,000 monthly</p>	 <p>4 family members: Self, parents, and a younger brother</p>
	 <p>Not Working; A student</p>	

Note: Image is for representation purposes only, Image source: Instagram [@srisss_roll]

Factors making transport unaffordable for the Elderly

People (60 years and above) due to ageing have an accumulation of health risks across a lifespan of disease, injury, chronic illness, etc. and develop moderate to severe disability (Ageing and Disability | United Nations Enable, n.d.). In India, among populations aged 65 years and above, 10.48% have a disability (National Institute of Urban Affairs, 2020, 59) while around 23% of the population aged 60 years and above have multi-morbidities (Lal et al., 2021). These physical and physiological changes restrict their mobility. Additionally, economic barriers also contribute to the change in their mobility patterns. The elderly have less disposable income in retirement, making them dependent on other family members to support them financially. The financial situation becomes direr due to

frequent and costly medical treatment. NSS (1987, 1996, 2004) indicates that out-of-pocket expenditure for the elderly was four times as high as that among the working-age group members (Kulkarni et al., n.d., 10).

These barriers result in a change in their mobility patterns and needs, such as trip purpose, spatial activity range, and reachability of desired destinations (Shrestha et al., 2017). With limited resources, the affordability of public transport is a key concern for the elderly. The reduced income and higher healthcare expenditure limit spending power. As a result, the ability to travel safely and independently is also compromised. Not only this, the elderly need to opt for more accessible and consequently, more expensive modes of travelling because of age-related disabilities and chronic diseases.

Illustration 3: Affordable mobility needs of the Elderly



Ms. Jayasudha

“My husband and I need to visit a doctor at least twice a month. We take an auto to travel which costs Rs.1,000-1,200 per month, and spend another Rs.4,000-5,000 on medicines. The bus would be cheaper, but it is difficult for us to board it and travel safely. I sometimes miss my doctor’s appointments. These days, with rising costs, we have stopped going to the temple or visiting relatives so that we can cut down our travel expenses, but it makes us feel isolated and depressed.”



69-years old;
Married



Chennai; Lives in their own house



Not earning; Dependent on her retired husband’s pension of INR 12,000 a month



2 family members: Self, and 72-year old husband



Not working; a homemaker



Chronic arthritis, heart condition, and diabetes

Note: Image is for representative purposes only, Image source: Nithi Anand CC BY 2.0, via Flickr

CURRENT APPROACH

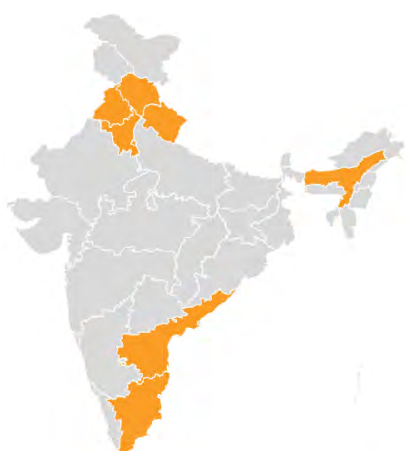
To make public transport affordable for the mobility-disadvantaged groups, a fare subsidy policy approach has been adopted by transport authorities around the world. It reduces travel costs, and thus encourages the use of public transport to meet the daily mobility needs of women, girls, PwDs, the elderly, etc.

Across the world, most governments have policies that provide fare concessions to mobility-disadvantaged groups, to achieve social equity. When implemented well, subsidies increase affordability, access, and mobility, especially for women, girls, PwDs, the elderly, etc. For example, the English National Concessionary Travel Scheme (ENCTS), provides free bus travel to people aged 60 years and above, and disabled people on all local buses across England from 9.30 am to 11.00 pm on weekdays, and all day at weekends and on Bank Holidays (Guidance for Travel Concession Authorities on the England National Concessionary Travel Scheme, 2010). A study conducted to measure the impact of the scheme found that there was an increase in the usage of buses by older people which also resulted in improved social inclusion and well-being (Mackett, 2014). Likewise, several other states/cities like New South Wales, Hongkong,

Bogota, etc. provide fare-free/ concessionary travel schemes to women, disabled people, and the elderly.

Similarly, in India, the provision of concessionary /free travel on public transport to women, girls, disabled people, the elderly, etc. is widespread at both the national as well as local levels provided by national/ local governments as well as by operators themselves. The scale and the level of concession provided vary from state to state, and also mode-wise. In the state of Andhra Pradesh, for example, the concessionary fare scheme entitles PWDs to free travel and the elderly to a 25% discount on fare for all types of Andhra Pradesh State Road Transport Corporation (APSRTC) bus services. Likewise, Tamil Nadu provides free travel to women, PwDs, and the elderly (as well as the LGBTQIA+) in state-owned transport corporation buses on all days and at all times.

Map 1: Travel concessions to women



Map 2: Travel concessions to PwDs



Map 3: Travel concessions to elderly (60 years and above)

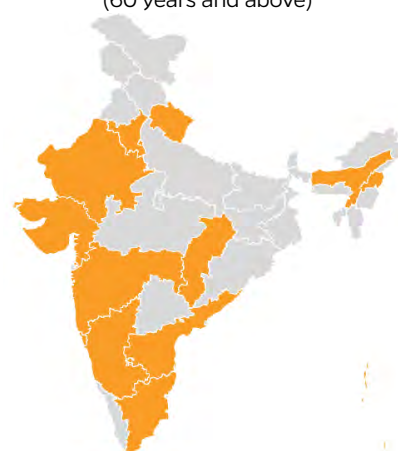


Image 1: India map highlighted with states having travel concession schemes for different user groups.
Source: Authors; compiled from multiple sources.

Notes:

- India map is not-to-scale
- Concessionary/ free travel schemes in States/UTs are marked based on news articles and other publicly available information as of August 2022.
- The States/UTs that specifically mention girl students in the travel concession scheme are marked in the map for women.
- Chhattisgarh provides travel concessions to the elderly of 80 years and above; Maharashtra & Uttarakhand to the elderly of 65 years and above; Andaman & Nicobar islands provide free bus pass to a person aged 80 years and above while 50% concessions to a person aged 60 years and above but below 80 years.

Current travel subsidy delivery models

The current travel subsidy is delivered in two ways:

» Free tickets

1. Beneficiaries are issued zero-value tickets.
2. The public transport operator then claims reimbursement from the government based on the number of zero-value tickets issued (Roy, 2019; Mahendru, 2022; PTI, 2019).

» Concessional passes

1. Beneficiaries produce the pass and pay the concessional fare.

In India, the travel subsidy is typically passed on to transport undertakings only when the beneficiary is served. The government reimburses the operator for the discounted trips taken by the beneficiaries (Kulkarni, 2021; Sreemol, 2022).

Case study- Delhi's Pink Ticket Scheme (Mahendru, 2022; Lalwani, 2019; Roy, 2019)

In November 2019, the Government of the National Capital Territory (NCT) of Delhi implemented free public transport for women to encourage safety and accelerate their role in Delhi's economy by providing access to various socio-economic and educational opportunities through affordable public transport. As per the scheme, women are issued pink tickets in Delhi Transport Corporation (DTC) buses and cluster buses to avail of the free-ride scheme. The Delhi government reimburses the operators based on the number of pink tickets issued. For every free journey undertaken by a woman commuter, a flat subsidy of Rs 10 is provided to the operator.



Image 2: A woman bus user showing her pink tickets

Source: Government of NCT Delhi

Image 2 description: A woman wearing a pink suit is sitting in a bus and showing her pink ticket. There are 3 other women sitting behind her

Limitations of existing solutions

- » **Higher fraud risk:** The disbursement of subsidies by public transport authorities is often criticised, particularly for having substantial leakages (Centre for Science and Environment, 2019, 57). In the case of free tickets for women, the government reimburses the transport authorities at a flat rate based on the average distance calculated and accepted by the government. This may have leakages as it is zero-value

tickets and the issuance of these tickets in our bus systems is carried out manually via conductors which can be altered to show higher ridership.

- » **Inability to capture travel data:** The paper-based free tickets/ concessional passes do not capture travel data of the beneficiaries such as the origin-destination (OD) matrix of the commuters, frequented routes and stops, mode choice, travel distance, etc. Consequently, the beneficiaries' mobility

needs are not taken into account in the decision-making and planning of mobility systems.

- » **Higher operational overheads:** The paper-based free ticket systems involve higher operational costs. For example, even if no fares are collected, transport authorities still need to deploy conductors to issue free tickets to measure passenger numbers and collect the corresponding reimbursement from the government. However, public transport authorities face delays in receiving reimbursements claimed by them for the concessions given to the beneficiaries. This increases the financial burden on the municipalities/ transport authorities in maintaining service levels which may lead to a decrease in the quality of public transport in an effort to reduce expenditure. In the case of the French city Lyon, the estimated savings from ticket distribution and control represented 5% of the operational costs (UITP Transport Economic Committee, 2020, 8). Another example demonstrates the savings of eliminating the paper ticketing system in Ostrava, Czech Republic.

The public transit authority of Ostrava spent roughly 20 million Czech crowns per year on the old paper ticketing system. In comparison, the new electronic system would only cost them 3 million crowns – a savings of 85% (Electronic Tickets Yield Cost Savings of up to 85%, n.d.). While these illustrations point to the cost-effectiveness of moving to an electronic ticketing system overall, they also apply to the sub-set of concessional tickets.

- » **Loss of dignity:** Several reports have surfaced of sneering and discrimination incidents involving women, PwDs, and the elderly while using public transportation. Bus drivers prefer to have a paying passenger and will sometimes refuse to take passengers at the reduced fares to which they are entitled. According to research, drivers and conductors do not always stop buses for PwDs to board them. The reason for such behaviour is that the PwDs are allowed ticket-less travel under the state's concessional scheme (Kulkarni, 2021, 34).

PROPOSED SOLUTION: DIGITAL MOBILITY SUBSIDY

To better implement the concessional subsidy scheme in India, OMI has conceptualised a tech-powered alternative 'Digital Mobility Subsidy'.

Concept

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The Digital Mobility Subsidy is a concept that envisages using the existing digital infrastructure consisting of the National Common Mobility Card (NCMC), Aadhaar, Direct Benefit Transfer (DBT), and Unique Disability Identity (UDID), to overcome the limitations of the current models.



Image 3: illustration of the building blocks that constitute Digital Mobility Subsidy; Source: Authors
Image 3 description: A jigsaw puzzle consisting of 4 blocks in a circular arrangement with the icons of rupee and public transport depicting affordability in the centre.

Building blocks

National Common Mobility Card (NPCI, n.d.)

- » Launched in March 2019
- » Contact and contactless prepaid, debit, or credit RuPay card
- » Valid on all public transport systems, Toll roads, ATMs, and RuPay points of sale.
- » 7.1 lakh online transactions made by NCMC holders in November 2021 (MoHUA, 2021).



NCMC enables the user to pay for travel across different public transport platforms.

Aadhaar (Unique Identification Authority of India, Government of India, n.d.)

- » Launched in January 2009
- » Unique ID system

» Operational Nationwide

» 128 Cr+ Aadhaar assigned, as of September 30, 2022, covering approximately 94% of India's population (Unique Identification Authority of India, 2022)



Aadhaar provides an objective and transparent mechanism for selecting beneficiaries for the subsidy based on gender and age.



UDID provides the identification and verification of persons with disabilities across India.

Direct Benefit Transfer (Direct Benefit Transfer, Government of India, n.d.)

» Launched in January 2013

» Transfer subsidies directly to the people in their linked bank accounts

Unique Disability ID (Unique Disability ID (UDID), n.d.)

» Launched in 2016

» Record of identification and disability details

» Aims to enable PwDs to claim benefits under government schemes

» Operational nationwide

» Operational nationwide

» Since 2014, Rs. 25 trillion crore subsidy disbursed till September 18, 2022 (Sharma, 2022)



DBT provides a simpler and faster flow of funds directly into the bank accounts of the beneficiaries.

Digital Mobility Subsidy workflow

The concept suggests a four-step implementation plan:

Step1: Set-up backend



Setting up a backend where NCMC, UDID, and DBT are enabled to interface with each other using Aadhaar as a common field where the beneficiary pays a full fare using NCMC.

Step 2: Link Aadhaar with NCMC, UDID, and DBT systems



The user links their Aadhaar with NCMC, UDID, and DBT systems and gives necessary permissions for the three systems to interface with each other for sharing information about trips and their respective fares, compute travel subsidies based on predetermined logic, and credit DBT-linked bank account.

Step 3: Subsidy scheme design and determining user eligibility



The subsidy scheme is designed as per the user eligibility which is determined based on gender, age, and disability. This could be a full subsidy or subsidy as a percentage of the fare with an optional cap or a flat subsidy with a cap or account-based subsidy, among others.

Step 4: Operationalising the scheme



The beneficiary takes a trip and pays the full fare using the NCMC. Trip details i.e., origin, destination, and fare are stored in the backend system. Using this data, based on user eligibility and a predetermined logic, the beneficiary's subsidy is computed every day at the backend. The total subsidy is then credited to the beneficiary's bank account via DBT every week or at predetermined intervals. The idea also proposes that below-poverty-line accounts may be credited with a one-time flat amount upon enrolment under the programme. Subsequently, the daily subsidy computed can be credited via DBT.

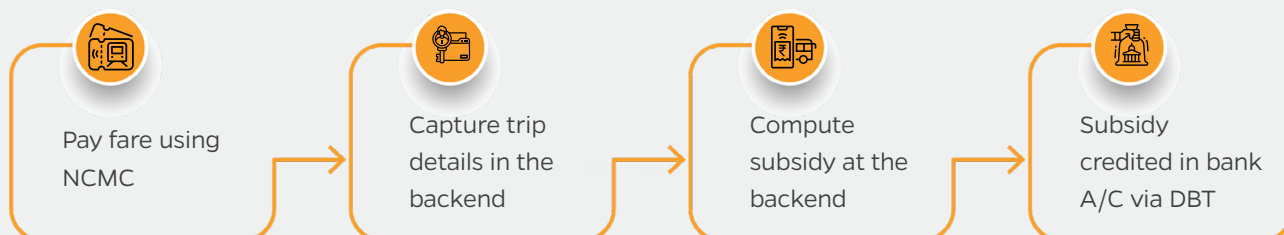


Image 4: Illustration of the working of the Digital Mobility Solution; Source: Authors

Image 4 description: The image illustrates the workflow of digital mobility through four steps. The first step is using NCMC card to pay the fare, represented by an icon of the ticket with a metro icon. In the second step, the trip details are captured at the backend, represented by an icon key with a person's face placed on top of a travel card. In the third step, the subsidy is computed at the backend, represented by a ticket placed on the bus. In step four, the computed subsidy is credited to the bank accounts of the beneficiaries, represented by an icon of a hand holding a money bag with a government icon on it.

Alignment with Universal Design India (UDI) Principles

The proposed concept of DMS aligns with the five principles of Universal Design India.

“The UDI principles are stand-alone universal design ideologies that focus on Indianness and inclusivity as they relate to age, gender, disability, caste, class, religion, poverty, and

urban/rural background.” Developed at the National Institute of Design and co-authored by nine Indian experts, these principles help strategise design activity and move India towards social and economic inclusion (Khare et al., 2011).

The manner in which the proposed Digital Mobility Subsidy (DMS) aligns with UDI principles is presented below.



Equitable (Samaan): Available to women, PwD, and elderly, and scalable for other groups



Usable (Sahaj): Option to use card/ apps; Subsidy directly deposited in bank account



Cultural (Sanskritik): Leverages digital infrastructure made in India, for India



Economic (Sasta): Leverages existing infrastructure - limiting development expenditure and cost to market



Aesthetics (Sundar): Elegant fare payment and subsidy disbursement mechanism

Stakeholder Benefits

The following constitutes the benefits of the proposed solution for travellers (users), the government, and the nation as a whole.



Users

- » Improves transport affordability and inclusivity
- » Unlocks socio-economic opportunities
- » Ensures dignity in travel



Government

- » Minimises fraud risk and leakages
- » Lowers operating cost
- » Captures travel actionable data including data disaggregated by gender, age, and disability
- » Has the potential to reduce the overall transport subsidy bill
- » Affords the opportunity to run experiments to optimise subsidy schemes
- » Presents a scalable solution



Nation

- » Encourages shared mobility, and reduces carbon footprint
- » Promotes digital transactions
- » Facilitates unlocking the full potential of human capital
- » Unlocks the opportunity to improve labour force participation of women and PwDs

Delivers Sustainable Development Goals

Affordable public transport is a key element for achieving Sustainable Development Goals (SDGs). The proposed solution directly contributes to SDG Target 11.2: “By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding

public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.”

The proposed solution of Direct Mobility Subsidy (DMS) contributes to the following SDGs directly and indirectly.

- » SDG 1 - No Poverty » SDG 3 - Good Health & Well-being » SDG 4 - Quality Education » SDG 5 - Gender Equality
» SDG 8 - Decent Work & Economic Growth » SDG 10 - Reduce Inequalities » SDG 13 - Climate Action



Image 5: Digital Mobility Solution delivers various SDGs directly and indirectly. Image Source: Wikimedia Commons¹; Analysis: Authors
Image 5 description: The image is made up of 17 Sustainable Development Goals (SDGs) icons arranged in a grid. SDGs 1, 3, 4, 5, 8, 10, 11, 13, and 17 are coloured, while the others are greyed out.

How can the solution be implemented across India?

As a start, Digital Mobility Subsidy can be piloted in 1-2 smart cities where the National Common Mobility Card (NCMC) is at various stages of implementation. DMS can provide travel subsidies to the targeted beneficiaries in at least one mode of public transport. The pilot can be then monitored and evaluated to assess the effectiveness of the solution, i.e its successes and shortcomings. It can, thus,

help to provide evidence-based feedback which could be helpful to modify or develop the solution further. The learnings from these cities can be incorporated to finetune the solution. The improved solution can be further scaled to 100+ smart cities. Over time, the use case can be expanded to fare payments in intermediate public transport, mobility aggregators, parking, and fuel payments. Once successful, the solution can be executed across the country.

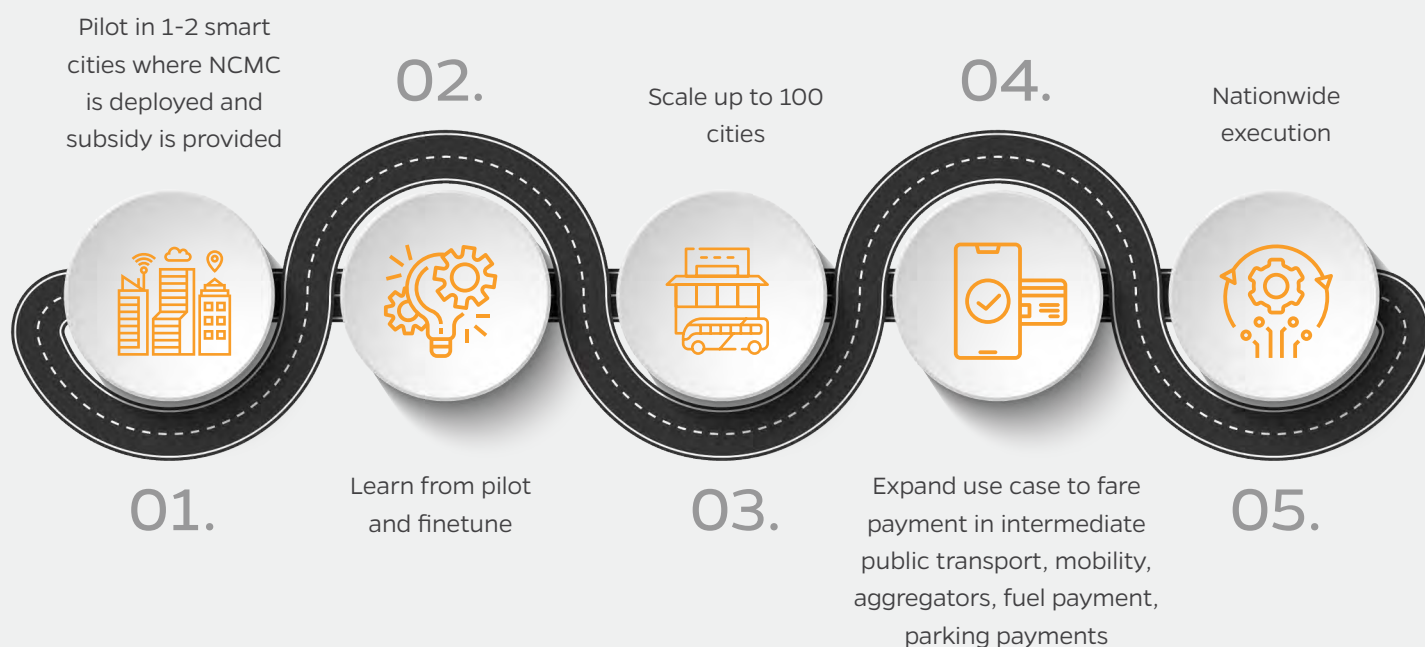


Image 6: Stages to execute the solution nationwide; Source: Authors

Image 6 description: The image illustrates a roadmap with each turn defining a stage. Stage 1 is 'Pilot in 1-2 smart cities where NCMC is deployed & subsidy is provided'. Stage 2 is 'Learn from pilot & finetune', Stage 3 is 'Scale up to 100 cities', Stage 4 is 'Expand use case to fare payment in intermediate public transport, mobility aggregators, fuel payment, parking payments' Stage 5 is 'Nationwide execution'.

LEARNINGS FROM AROUND THE WORLD

Several cities globally have adopted similar tech-powered methods of implementing concessional travel schemes for the beneficiaries. A select few are listed in Table 1.

Table 1: Global case studies on implementation of concessional travel

Scheme	Beneficiaries	Description of the Scheme
Taxi Transport Subsidy Scheme (TTSS), New South Wales, Australia (Transport for NSW, 2017)	Users unable to use public transport due to severe and permanent disability	<ul style="list-style-type: none"> » TTSS paper travel dockets replaced by a smartcard in a phased rollout from November 2020; » Taxi driver is compensated with smartcard for 50% of the fare up to \$60, and the user pays the remaining balance; » Provides an incentive payment for drivers of Wheelchair Accessible Taxis (WAT) to improve the accessibility, reliability, and response time for wheelchair users
Public Transport Fare Concession Scheme for the Elderly and Eligible Persons with Disabilities, Hongkong (Government Public Transport Fare Concession Scheme for the Elderly and Eligible Persons With Disabilities, n.d.)	Elderly people aged 65 or above and PwDs	<ul style="list-style-type: none"> » Scheme uses JoyYou - an On-Loan Personalised Octopus card.² » Beneficiaries can travel on designated transport modes and services at HK\$2 per trip. If the trip fare is below \$2, beneficiaries pay at actuals. » Before alighting, the user taps the octopus card so that the differential fare for the trip is calculated, which the bus operator claims as a government reimbursement.
Transport subsidy program, Bogota, Colombia (Rodriguez & Mehndiratta, 2014)	Economically weaker sections	<ul style="list-style-type: none"> » Social programme beneficiaries registered in the SISBEN (Sistema Nacional de Selección de Beneficiarios) database; » Qualifying beneficiaries are eligible for a 40% discount on public transit fares when using their transport smart card; » A maximum of 21 discounted trips per month

Conclusion

The existing free/ concessionary travel scheme is reported to provide access to various socio-economic and educational opportunities, and better quality of life. Given the additional benefits of Digital Mobility Subsidy, the concept presented in this paper offers the use of technology to deliver subsidies digitally that will provide measurable impact and generate data for informed policy-making. It affords a unique opportunity for India by providing an impetus to the government's efforts in making infrastructure more accessible and inclusive. To transform this concept into reality, a coordinated effort among various stakeholders including agencies within government across different sectors and at different levels is needed. Various critical elements need to be integrated such as

1. Tool to identify beneficiaries based on gender, age, and disability who are eligible for subsidy
2. Medium to enter the trip details and pay the fare digitally
3. Digital mode of receiving the subsidy

India already has the digital infrastructure required to make Digital Mobility Subsidy a reality. Potential cities or transport authorities have to come forward to implement it. In addition to the government stakeholders, the industry needs to come forward to help develop the platform for Digital Mobility Subsidy.

For India to achieve its goal of becoming a \$5 trillion economy, it must fully utilise its demographic dividend. As a result, there is an urgent need to empower all of its citizens, including women, people with disabilities, and the elderly. Given the catalytic role of mobility systems, accessible and affordable transport becomes all the more important. It's time that we take concerted efforts to make mobility infrastructure accessible and affordable for all that will set India on a path of inclusive development and growth. Thus, the opportunity today is to leverage technology-enabled mobility solutions to unlock the full potential of each individual.

TERMS OF USE

The solution is available on a non-commercial basis to maximise the benefit to the end users. Therefore, no pricing model has been articulated. OMI does not aim to generate revenue from this product. It is freely available for development with due recognition to OMI for the conceptualisation.

ANNEXURE 1: ESTIMATED BENEFICIARY POPULATION

Sr	Particulars	Women (in millions)	PwDs (in millions)	Seniors (in millions)
1	Estimated Population (India) - 2021 or latest available estimates	662.9 ³	100 ⁴	138 ⁵
2	Reduce double counting of female elderly from women and PwDs	-71	-10.1	
3	Reduce double counting of male elderly from PwDs		-10.6	
4	Reduce double counting of female PwDs (less than 60 years age) from women	-33.9		
5	Subtotal	557.9	79.2	138
6	Population (Urban)	167.4	23.7	41.4
7	Total Population (Urban)	232.5		
8	Population (Urban with gender overlap)	198	33.3	41.4

³ Muthyanolla, S. K. (2022, April 19). Data: What does MoSPI's Women and Men in India (2021) report say? FACTLY. Retrieved November 2, 2022, from <https://factly.in/data-what-does-mospis-women-and-men-in-india-2021-report-say/>

⁴ Kulkarni, A. (2021). On The Move: Urban travel experiences of Persons with Disabilities and a path to build more inclusive transport systems. OMI. <https://olawebcdn.com/ola-institute/on-the-move.pdf>

⁵ Ministry of Statistics and Programme Implementation. (2021). Elderly in India 2021. <http://www.indiaenvironmentportal.org.in/files/file/Elderly%20in%20India%202021.pdf>

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