PUNE KNOWLEDGE CLUSTER

PKC

INTERIM REPORT MAY 2024

Behaviour Nudges For Sustainable Transportation

Partners and Stakeholders

Government Bodies

R & D, Academia

NGO's

Background

India is poised for rapid economic growth, along with a significant growth in the urban population. The Ministry of Housing and Urban Affairs has projected that, the urban population of India will grow to 820 million by 2051 from 473 million in 2021. In order to support the massive rise in both, economic growth as well as population, the Indian Metropolitan cities must resort to significant changes in their existing infrastructure, to allow for easy and sustainable flow of goods and people.

The National Urban Transport Policy states that the rise in personal automobiles, in six of India's major metropolises, is nearly 4 times higher as compared to the rise in population. Personal automobiles are the preferred mode of transport for most of the citizens in order to have an easy access to jobs, education as well as other recreational activities.

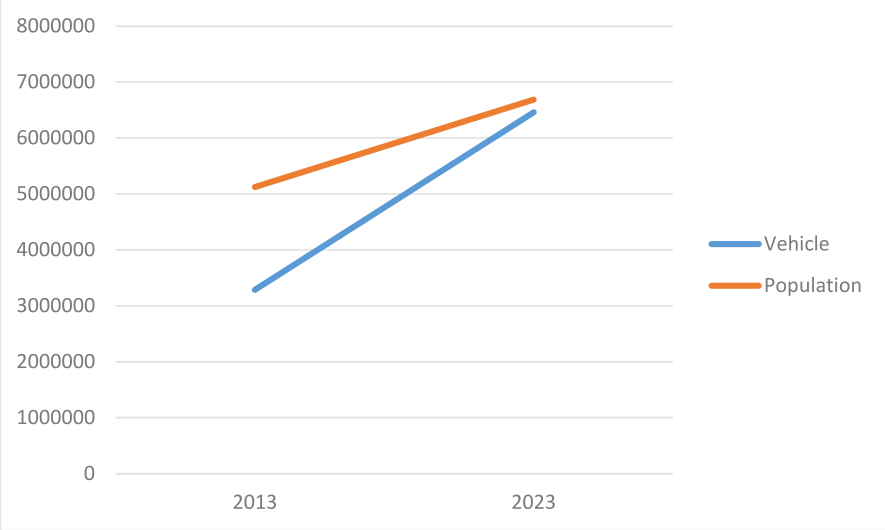

Figure 1: Vehicle and Population Growth Rate in Pune Metropolitan Region over the last decade

In the last 10 years, the population of Pune increased at a CAGR of 2.75%, whereas the vehicular population of the city has increased by a CAGR of 7%. For the purpose of this report, 'Pune' refers to the entire urban area covered by the Pune Municipal Corporation (PMC) and the Pimpri Chinchwad Municipal Corporations (PCMC). The modal share of public transport has remained at 18-20% (including intermediate public transport such as autorickshaws) for the last decade, in spite of the target of 40% by 2030. This is as per traffic studies conducted for the Comprehensive Mobility Plan by the PMRDA as well as earlier studies undertaken in 2013.

Increased use of personal vehicles has led to increased air pollution, along with a rise in traffic congestion and reduction in road safety. As per the GHG emissions inventory for Pune, the transport sector (~24%) has the largest share of direct emissions. To tackle this situation, the local government bodies i.e PMC, PCMC and PMRDA, have an objective to achieve 50% mode share for public transportation by 2038, however, they have not yet put together an action plan to achieve it.

The Need for Sustainable Transportation

In order to reduce vehicular pollution as well as traffic congestion, there is a need for improved transportation planning and infrastructure. While the 'Business As Usual' (BAU) scenario results in more infrastructure for personal motor vehicles, the 'Sustainable' paradigm heavily prioritises walking, public transportation and cycling as preferred modes of transportation.

Our calculations suggest that if Indian cities adopt the 'Sustainable' paradigm instead of continuing on the 'BAU' path, they would need 40-50% less fuel by 2030, leading to a similar reduction in carbon emissions.

Sustainable transport is also linked to achieving several Sustainable Development Goals (SDGs), particularly the SDGs 3, 7, 11, 13:

SDG 3 : Good health and well-being
Which includes a target to halve the number of global deaths and injuries from road traffic accidents.

SDG 7: Affordable and clean energy
Which calls for reducing the energy intensity of transport and increasing the share of renewable energy in the transport energy mix.

SDG 11 : Sustainable cities and communities
Which calls for providing 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.

SDG 13 : Climate action
Which aims to strengthen the resilience and adaptive capacity (of transport systems) to climate-related hazards and natural disasters in all countries and to integrate climate change measures into national policies, strategies and planning.

LiFE
Lifestyle for Environment

Mission LiFE or 'Lifestyle for Environment', launched by the Prime Minister, during COP26, aims to promote a healthy and sustainable way of living, including through a mass movement for LIFE, as a key to combating climate change. An increased use of public transportation for daily commute is one of the best practices for LiFE.

Behaviour Nudges for Sustainable Transportation

The Pune metro region has seen several policy and infrastructure improvements in the last decade. PMPML which operates a large fleet covering the Pune Metro Region, has introduced Cleaner fuels (CNG) as well as electric buses.

Significant investment and planning has gone into the metro rail project which has two corridors that will be fully operational in 2024. There are other enhancements to public transit systems such as increasing its reach and last/first-mile connectivity. Roads are being built with wider footpaths and dedicated lanes for bicycles.

A public bicycle sharing system can serve as an alternate mode for short trips and provide last/first-mile connectivity to commuters. While initiatives from the government are the first step, it is also imperative for the citizens to play their part in contributing towards the sustainable development goals by adopting sustainable practices of living.

PKC's program - **Behaviour Nudges for Sustainable Transportation**, focuses on encouraging citizens towards adopting sustainable practices such as an increased utilization of public transportation, over their personal automobiles. This is designed using a concept from behavioural economics called - Nudge'. As described in the 2008 book by Richard Thaler and Cass Sunstein, a Nudge is "any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives."

Accordingly, the program is designed in a manner that would encourage the citizens to opt for public transport as an optimal and economically viable option, in comparison to their own personal vehicles.

In his book, 'Better Buses, Better Cities' Steven Higashide has discussed what makes people use a public transit. Shah & Sinha have studied passenger perceptions of public transport in Mumbai. There have been other studies in Pune and PKC also conducted a preliminary survey in May-June 2023 to understand citizen preferences for choosing PMPML buses. All these studies show that citizens need a good quality service in order to choose that option for their transport needs. Some examples of a good quality service are - Information about buses at bus stops, Clean bus stops with shelter & seating, good frequency of transit, last-mile connectivity.

A 'nudge' is therefore designed as a 'service improvement' provided to the citizens, as a controlled experiment, in collaboration with the local transit and govt. authorities. The impact on ridership as a result of the nudge implementation, would be measured and studied.

Nudge examples:

- Bus Frequency Nudge: On an identified bus route, the bus frequency is improved from once in 20-30 mins to once every 10-12 mins, for a period of 4 months
- Last-mile Connectivity Nudge: For a set of bus/metro transit stops on a route, a last-mile connectivity solution is provided, e.g. shared auto / feeder bus service, for a period of 4 months.

Program Goals and Expected Outcomes

The program aims to complement the efforts of the local government bodies in improving the mode share of public transport

- ***Improve*** the ridership for designated routes of PMPML and the Metros - Maha metro and Pune Metro
- ***Quantify*** the impact of various 'nudges' or 'service improvements' through a data-driven approach
- ***Enable*** the transport providers to make an informed decision about the service improvements that need to be prioritized
- ***Provide learnings and best practices*** for public transport providers for smart cities

The Operating Model

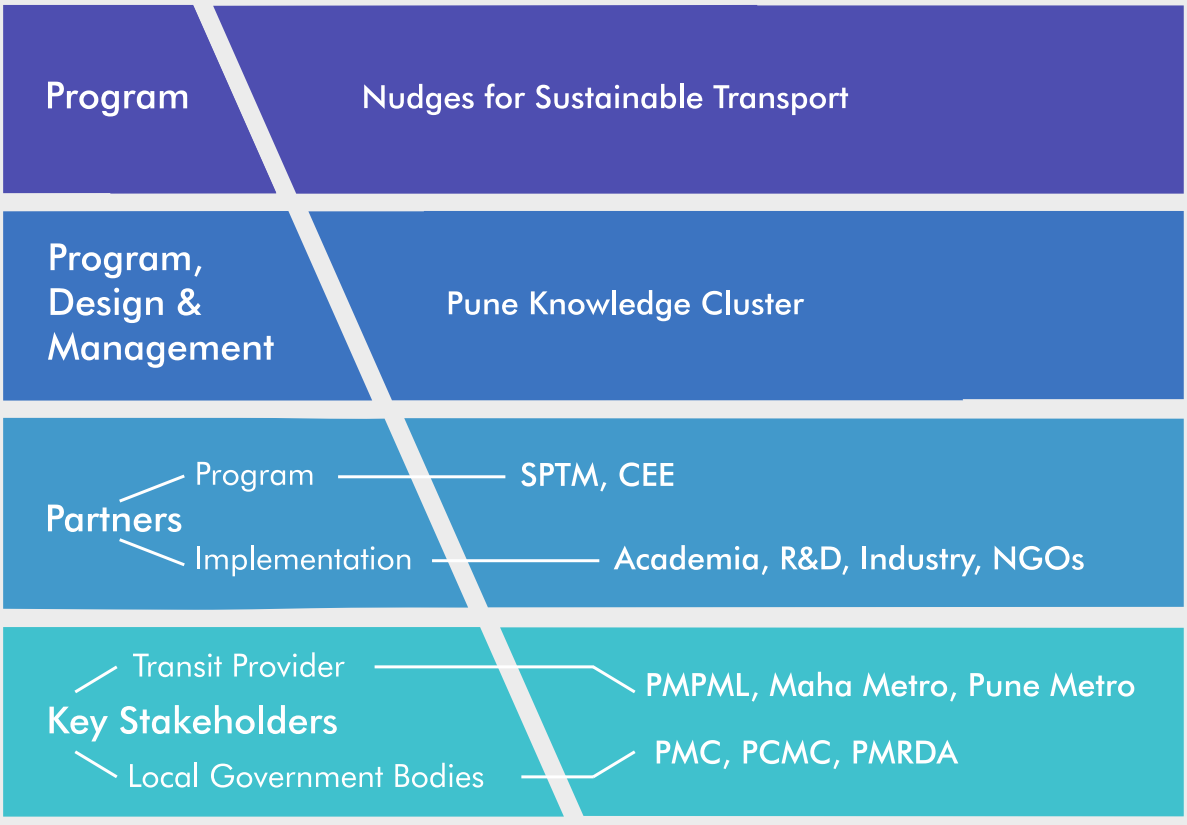

Figure 2: Operating model and key partners involved in the program

Pilot Nudge Implementation in Pune

The program commenced in May 2023. The metro network in Pune was still under development, and hence a decision was taken to pilot the nudge implementation with PMPML. Through several meetings/consultations with the PMPML leadership team, it was decided that the pilot should be conducted on bus routes with low 'load factor'.

PMPML shared their operations data for over 12 months. This was analysed using different criteria and 6 routes with low load factor were shortlisted for further interventions. These routes covered areas in Pune as well as Pimpri-Chinchwad.

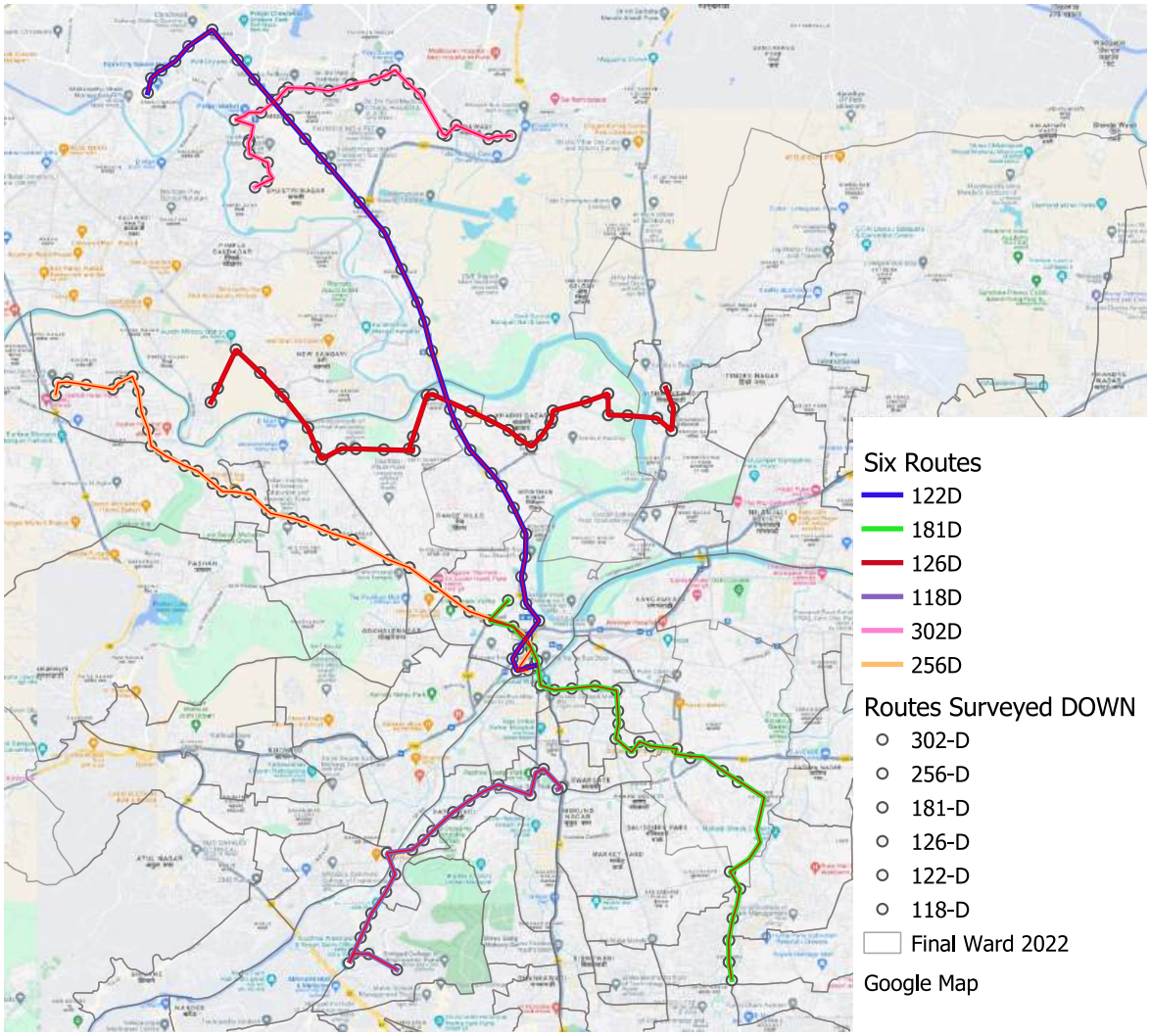

Figure 3: Routes shortlisted for implementation of the pilot nudge in Pune Metropolitan Region

The following surveys were conducted on the 6 shortlisted routes with an over-arching objective to identify candidate nudges for the pilot.

- Bus Stop Survey: To understand the condition of the bus stops
- Boarding Alighting Survey: To understand the route profile

Bus Stop Survey:

More than 300 bus stops were surveyed to understand the presence of a bus stop indication, basic amenities, passenger information, encroachment and accessibility. The charts for the bus stop indication & passenger information and shown below.

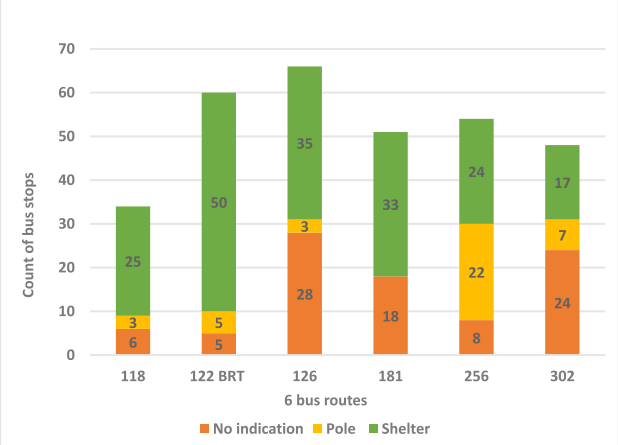

Figure 4: Bus Stop Indication

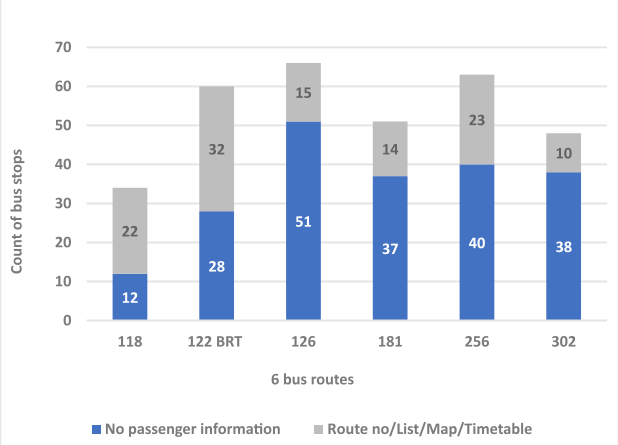

Figure 5: Passenger Information

Observations of the bus stop survey:

- Route 302 has 50 bus stops, out of which almost 48% have no indication. Although 52% of the stops have some indication, a majority of these have no passenger information. The remaining have only a route number mentioned.
- Route 256 has 69 bus stops, out of which 66% have some indication but a majority of do not have any passenger information.
- Bus stops for route 126 and 181 are in extremely poor condition
- In summary, for the four routes -126, 181, 256 and 302: Information about buses at the bus stops is in poor condition.

Boarding Alighting Survey:

A boarding-alighting survey was conducted for the four routes, to understand the route profile and identify stops that have significant boarding & alighting activity. Further studies were carried out to understand the land-use around the route. These surveys and studies led to the identification of two routes, for which nudges were designed as described below and the first one was chosen for implementation.

Route	Nudge
256: Balewadi to MaNaPa	Information/Outreach Nudge: Provide basic information about the bus route to the catchment area of the route
302: Pimpri to Bhosari	Better Bus Stops & Signages: Shelters with route maps at stops with significant boarding & alighting, Unipole with Route List at all other stops

Information/Outreach Nudge along Route 256 – Design & Implementation:

An outreach campaign to emphasize the benefits of public transportation and provide information about the bus route 256 was designed and implemented from November 2023 to March 2024.

- Balewadi, which is a mixed-use locality, was the focus area for the outreach. There are commercial areas, Residential complexes, schools, colleges & universities.
- A survey on Google Maps backed by a field survey led to the identification of ~25 intermediaries who would work as multipliers in their respective category - offices, residential complexes or educational institutions.
- An appeal from PMPML was circulated to Residential Societies, Companies/institutions.
- Communication design included design of information capsules and mapping them by category – posters, WhatsApp messages as well as campaigns.
- Dissemination of information was carried out through in-person as well as digital campaigns, reaching more than 9000 individuals
- A total of 12 campaigns were conducted from January to March 2024. These were spread across all categories/sites. The bubble chart below shows the details.

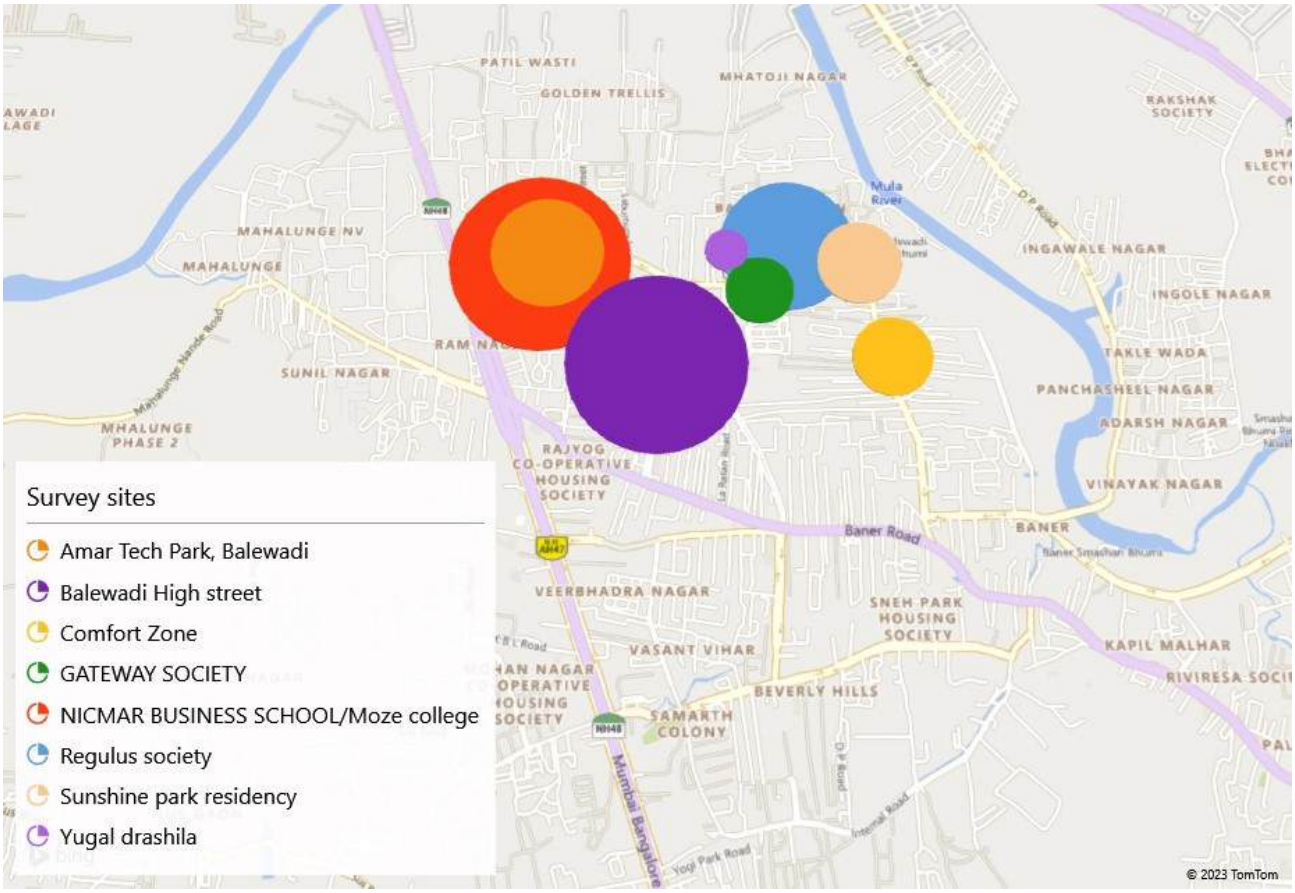

Figure 6: Details of the campaign sites and participation of the beneficiaries

Figure 7: Details of the campaigns conducted

- *Survey:* At the campaign sites, a survey was conducted to understand the travel behaviour of citizens. This included questions to determine the awareness of bus route 256, their propensity to increase their use of the bus and the access they had to personal automobiles
- 500+ persons participated in the survey

Illustrative findings of the campaign on-site survey

Awareness of the bus route: While a majority (57%) of the respondents had their regular travel destination along the bus route 256, almost 21% of these had never tried the bus route, as seen in the graph below.

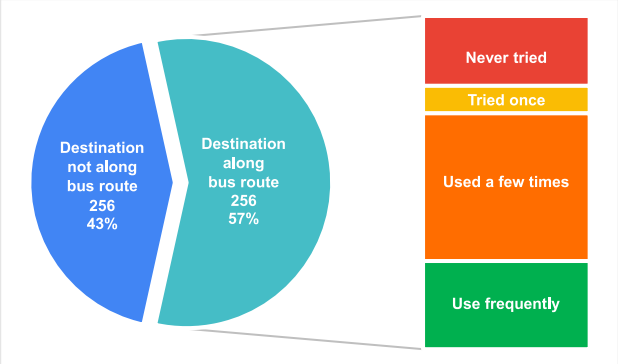

Figure 8: Awareness of Bus route 256

Propensity to use the bus: Out of the total respondents, 105 use the bus frequently (column 4). The remaining 406 have “never tried", “tried once” or at best "used it a few times”

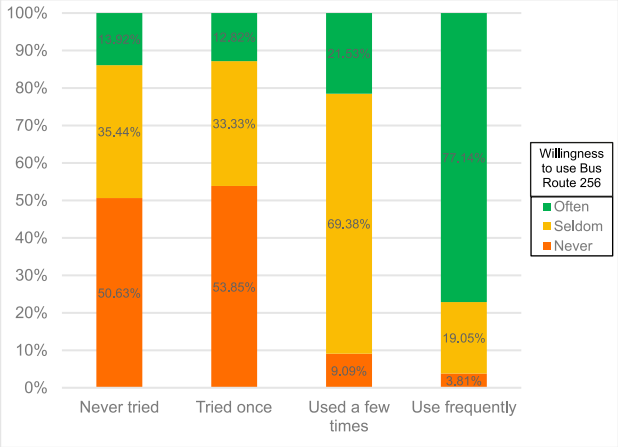

Figure 9: Propensity to use bus route 256

- Out of these 406 individuals, 53% (i.e. 214 respondents) agreed to increase their frequency of PMPML bus usage and 18% have agreed to use it frequently.
- Ridership data from PMPML is awaited- the data will be analysed and contextualized with respect to the reach.

Summary

- There is good potential to influence the people to adopt public transport instead of their personal automobiles, when adequate information is provided
- Assuming that Balewadi has ~1.5 lakh residents and ~15 thousand daily visitors for education, work, recreation etc; intensification of the campaign within Balewadi would fetch a significant ridership increase for PMPML. The reach of the pilot was rather limited.

Impact Metrics - Nudges Pilot

Bus Stop Surveyed	Citizens Surveyed	Institutions for Outreach	Awareness Campaigns
300	800+	20	12
Stop Indication, Encroachment, Accessibility	Travel, Behaviour & PMPML Service Experience	Companies, Housing Complexes, Colleges	Commercial Areas (4) Colleges (2) Hos. Societies (6)

Indirect Beneficiaries: 9000+

Future Roadmap and Scaling Nationally

Year 1

- Implement ~4 Nudges
- Expand Geographic Coverage
- Implement Complex Nudge
- Maha Metro Pilot Nudge

Year 2

- Implement ~6 Nudges
- Sustenance of "Service Improvements"
- Refinements to Nudges
- Best Practices and Learnings

Year 3 & 4

- Institutional Intensification of Nudge (~6) Implementation
- Scaling "Service Improvements"
- Model Development
- Methodology Document

The program works in a collaborative manner and welcomes partnerships in the form of employee engagement, volunteering by employees and CSR.

Sustenance & scaling of service improvements:

Service improvements that have been demonstrated as successful, need to be internalized by the transit providers. The program will endeavour to recommend methods and work along with the transit providers for internalization. For e.g. the preparatory studies for the Information & Outreach nudge development has demonstrated that citizens were unaware of the transit services that were available to them. It is important for PMPML to set up a comprehensive information and outreach program.

Scaling the Program Nationally

- Presentation at the Urban Mobility India Conference
- "Using Nudge Theory in Public Service Provisioning for LiFE & Climate Goals": Convening a workshop of public transit providers and other public service providers
- Brainstorming with other Knowledge Clusters on the use of Nudge Theory

About Pune Knowledge Cluster
The Pune Knowledge Cluster (PKC) is one of the seven Science and Technology Clusters established by the O/o PSA under The City Knowledge and Innovation Cluster Initiative (CKIC). PKC aims to bring together Academic Institutions, R&D organizations, Industries, Industry Associations, NGOs, Civic Bodies, and Local and State governments to collectively work for the betterment of Pune City by leveraging its partner organisations' science and technology capabilities.
More at: *https://www.pkc.org.in/*

About Save Pune Traffic Movement (SPTM)
'Save Pune Traffic Movement' (SPTM) is an NGO working to promote safe and sustainable transportation in Pune, with a focus on walking, public transportation and cycling as principal modes of daily commute. SPTM is a member of PMC's 'Non-Motorized Transport Committee' as well as 'Pune Road Safety Committee'.
More at: *https://savepunetraffic.org/*

About Centre for Environment Education (CEE)
Centre for Environment Education (CEE) was established in 1984 as a Centre of Excellence of the Ministry of Environment and Forests, Government of India. As a national institution, CEE's mandate is to promote environmental awareness nationwide and develops innovative programmes as well as educational material and builds capacity in the field of Education for Sustainable Development (ESD). In the urban sphere, CEE works to promote socially and environmentally sustainable mobility and road safety, with a focus on walking, cycling, shared and public transport.
More at: *https://www.ceeindia.org*

Credits and Acknowledgments:
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