
Micro-mobility and MaaS as Part of Urban Mobility

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Transport Eco-system in Cities

- **Public Transport (Image of a City)** Versus **Personal Transport (Image of a Person)**
- **Micro-mobility:** Ability of movement through minimalistic (little) means.



small/light weight vehicles powered by human/ electric motors, suitable for first/last mile connectivity to mass/public transit.....



micro-mobility is 'right-sized vehicles' which demand less space for movement on road and smaller bay in parking lot..... Suitable in congested urban areas



- Micro-mobility was related to the gross vehicle weight : less than 500 Kg
Modified by SAE International : **powered micro-mobility as a category of powered vehicles**
- Vehicle weight of up to 227 kg (500 lb)
 - Vehicle width of up to 1.5 m (5 ft)
 - Top speed of up to 48 km/h (30 mph)
 - Power source by an electric motor or a combustion engine

Characteristics :

Micro-mobility uses wheeled vehicles that are

- low-speed,
- operated by individual,
- meant for travel a short distance
- by using human-powered, combustion & electric based propulsion.

- **Legitimacy of micro-mobility and its usage vary from country to country** based on prevailing regulations and laws.

In India, micro-mobility refers to small, compact, lightweight, **eco-friendly transport modes i.e.**

-e-scooters,

-e-bikes,

-bike-taxis, etc. with :

- limited speeds below 25 kmph,
- energy less than 250 W and
- used for short-distance travel.

Micro-Mobility:

Typically refers to smaller form factors like bicycles, e-bikes, and e-scooters (L1/L2 categories) that are often capped at 25 km/h for low-speed variants.

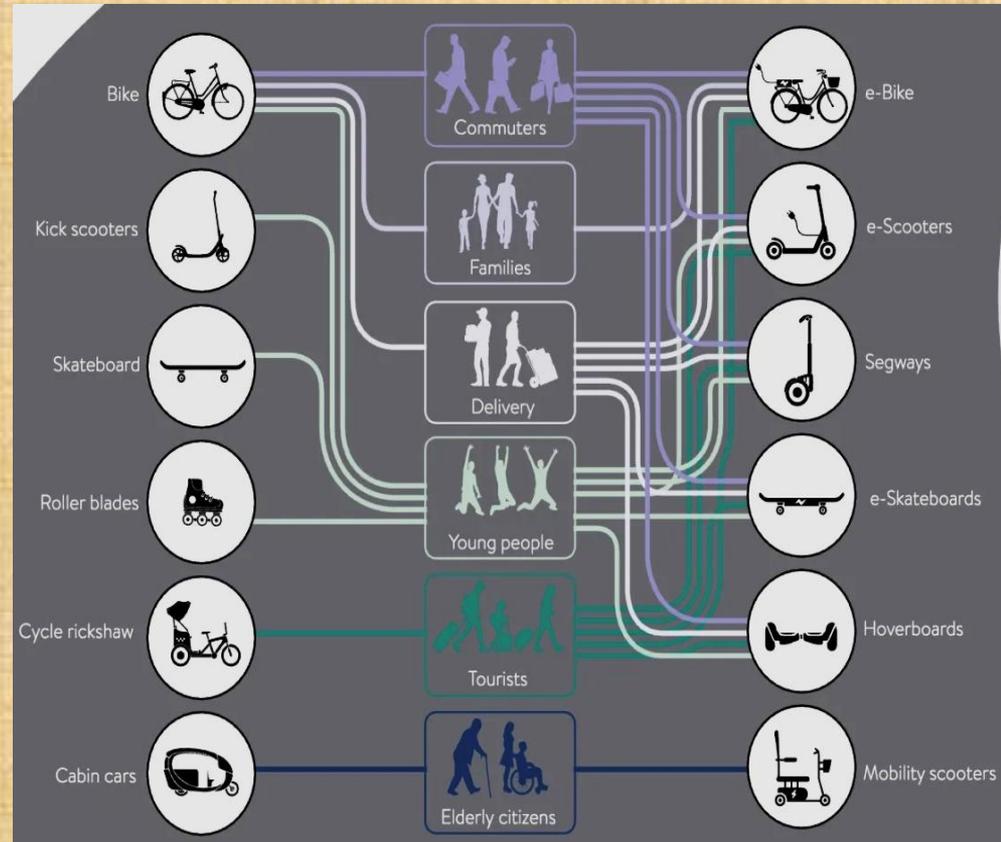
Micro-mobility as Part of Urban Mobility

-Affordability and
-Accessibility of micro mobility } key element in multi-modal urban mobility transportation ecosystem

- Significant Contributions in :

- reduced emissions,
- reduce congestion,
- less accidents,
- less fuel consumption, etc.

enhancing public health,
seamless multimodal trips, etc.



Micromobility in Neighbourhood

Source: Website Link

Policy Interventions

- Govt. of Maharashtra notified “ Maharashtra Bike-Taxi Rules, 2025” on July 4, 2025.
- Purpose : to regulate app-based electric bike-taxis (e-bike taxis) in the entire state.
- Aggregator firms have to obtain a license to operate legally, setting fares, defining driver /passenger safety (helmets, insurance, etc.) .
- app-only booking, speed limit up to 60 kmph. and maximum trip distance upto 15 km.
- Apps must also consist of GPS tracking, panic buttons, and a system for female passengers to choose female drivers.

Such initiative is encouraging micro-mobility to be part of urban mobility.

RNI No. MAHBIL /2009/31733



महाराष्ट्र शासन राजपत्र असाधारण भाग चार-अ

वर्ष ११, अंक ७९(२)]

शुक्रवार, जुलै ४, २०२५/आषाढ १३, शके १९४७

[पृष्ठे ११, किंमत : रुपये १५.००

असाधारण क्रमांक २४२

प्राधिकृत प्रकाशन

महाराष्ट्र शासनाने केंद्रीय अधिनियमान्वये तयार केलेले
(भाग एक, एक-अ आणि एक-त यामध्ये प्रसिद्ध केलेले नियम व आदेश वाच्यतिरिक्त) नियम व आदेश.

HOME DEPARTMENT

Madam Cama Road, Hutatma Rajguru Chowk,
Mantralaya, Mumbai 400 032, dated the 4th July, 2025.

NOTIFICATION

MOTOR VEHICLES ACT, 1988.

No. MVR-0821/C.R. 95/Tra-2.—The following rules of the Maharashtra Bike-Taxi Rules, 2025, which the Government of Maharashtra proposes to make in exercise of the powers conferred by section 73 and 74 of the Motor Vehicles Act, 1988 (59 of 1988), in its application to the State of Maharashtra and of all other powers enabling it in this behalf, the same having been Previously Published as required by section 212 of the said Act namely :—

1. *Short title.*— These rules may be called the Maharashtra Bike-Taxi Rules, 2025.

2. *Definitions.*— (1) In these rules, unless the context otherwise requires,—

(a) “ Act ” means the Motor Vehicles Act, 1988 (59 of 1988) ;

(b) “ Aggregator/Service Provider ”, as defined in Section 1A of the Motor Vehicles (Amendment) Act, 2019, refers to a digital intermediary or marketplace for a rider to connect with a driver for the purpose of transportation ;

(c) “ App ” means an electronic interface operated by the Aggregator or any third party on behalf of the Aggregator, which shall be accessed either through a computer resource or a communication device ;

(d) “ Area of Operation ” means the area for which Contract Permit, which can be one or more city within the state of Maharashtra, or entire state of Maharashtra has been obtained by the Licensee from the Licensing Authority ;

Micro-mobility in Urban Transport: Business Opportunity

- **electric bicycles and electric scooters :**
 - popular choices in micro-mobility
 - alternative to public transport for short trips.
- **India micro-mobility market is escalating due to :**
 - increasing adoption of electric two-wheelers,
 - government incentives,
 - popularity of subscription-based mobility models in metropolitan and Tier-II cities
- **New Opportunities :**
 - Economic model for shared e-scooter/bike services,
 - Technology Development (IoT, Apps, etc.)
 - Innovation in Battery Technology,
 - Fleet management, vehicle operational & maintenance , etc.

Business in Micro-mobility:

Micro-mobility prevailing in urban areas to pick-up and drop-off at selected locations.

- Corporate companies have introduced *monthly, weekly, and pay-per-use rental plans for electric scooters and bicycles.*
- It eliminates the *burden of ownership* of vehicles and providing easy and calm accessibility to the mobility.

Business in Infrastructure:

Business opportunities for charging infrastructure manufacturing, charging points operations, battery traction, battery recycling, etc.

Business in Energy:

- Opportunities are available for use of renewable energy and electric vehicle charging system.
- *Initiatives for using solar panel system, wind energy system, etc.*

2 rooftop solar EV charging stns to cut carbon footprint, 5 more in line

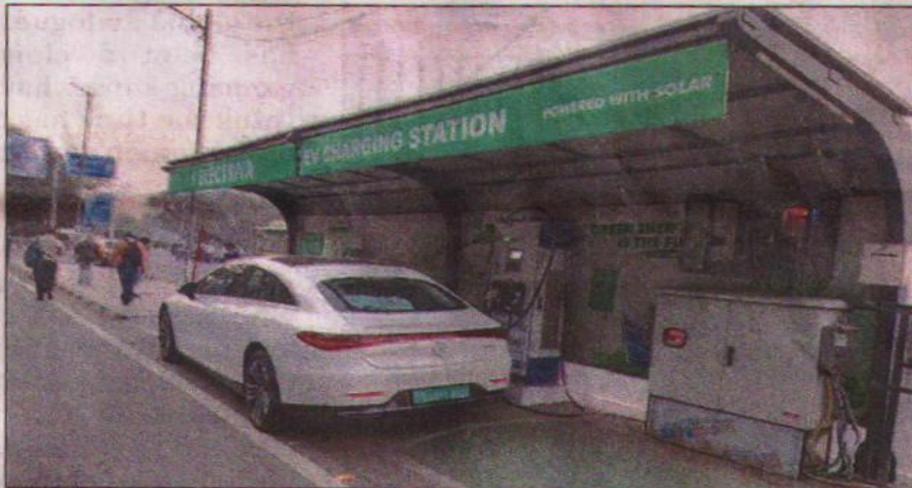
Atul.Mathur@timesgroup.com

New Delhi: Making the electric vehicle charging ecosystem greener, power discoms have started integrating rooftop solar chargers with them to create hybrid facilities.

Power discom BSES has set up two solar EV charging stations at South Extension-II and Bhikaji Cama Place, while five such facilities are likely to be launched soon. These stations cater to two-, three- and four-wheeled electric vehicles (EV).

According to officials, the rooftop solar powered EV charging stations use renewable energy to charge EVs during daytime, but at night or on a heavily cloudy day the chargers use grid power like any other charging station.

"There are several benefits to installing rooftop solar for EV charging vis-à-vis the grid-based charging network. It reduces the peak power requirement during the daytime. EV charging through renewable sources of electricity further decarbonises the cycle," said



BSES has set up two stations at South Ex-II and Bhikaji Cama Place

id a BSES official.

Officials added that using solar energy to charge EVs significantly reduces the cost of charging. The cost of the solar panels and installation can be offset by savings in energy costs over time. Since solar power is a clean and renewable source of energy, it helps reduce the carbon footprint of charging EVs and is more reliable during power outages or emergency.

The cost of a solar-powered EV station, however, is at least Rs 50,000 per kilowatt more

than conventional chargers. "The investments made in this hybrid set-up have an estimated pay-back period of around 7-8 years. After this period, the cost of charging a vehicle will be zero," said an official.

Power department officials accepted that for private charging setups, the higher installation cost of rooftop solar panels can be a deterrent. The rooftop solar panels require more space and orientation to maximise energy generation, which can also be a constraint in densely populated areas.

"Since EVs and their charging infrastructure are evolving rapidly, older rooftop solar-enabled charging stations can also lead to compatibility issues. But despite all these challenges, rooftop solar-enabled EV charging stations have significant potential to accelerate the adoption of EVs while reducing carbon emissions and energy costs," said a senior government official.

"As technology evolves and becomes more affordable, we can expect to see widespread adoption of this innovative solution," they added.

With the increase in sales of electric vehicles, the government is also making efforts to strengthen its charging ecosystem. As per the EV report for 2022, Delhi has over 2,300 charging points and 200-plus battery swapping stations running in different parts of the city. EVs contributed close to 15% of overall vehicle sales in March this year. EV sales in the capital saw an increase of 141% in 2022 compared to 2021. The government's goal is to achieve 30% EV penetration by 2030.



Yulu

Business : micro-mobility platform (Renting and leasing of electric cycles and electric 2-wheelers)

USP : Affordable solution for urban traffic

Legal Name : Yulu Bikes Pvt Ltd

Headquarters : Bengaluru, Karnataka, India

Business Modal : B2C

Founding Date : Aug 2017

Funding

Total Funding
\$20.0M

Investors

Bajaj Auto Finance	Wavemaker Partners	3one4capital	Blume Ventures	rocketship.vc
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Source: <https://e-amrit.niti.gov.in/new-e-mobility-businesses>





Ola Electric

Business : Electric-scooter manufacturers
USP : Disrupted the electric 2-wheeler market by providing economical 2-wheeler alternatives having best possible features

Funding

Total Funding
\$307.0 M

Legal Name : Ola Electric Mobility Private Limited
Headquarters : Bangalore, Karnataka, India
Business Model : B2C
Founding Date : 26th May 2017

Investors			
Pawan Munjal	Hyundai Motor Company	Matrix Partners India	Kia Motors
Tata Sons Private Limited	SoftBank	Tiger Global Management	

Source:<https://e-amrit.niti.gov.in/new-e-mobility-businesses>



Micro-mobility during COVID-19

- During COVID 19, the *shared mobility* was facing same challenges as the *public transport*.
- Business of shared mobility services such as shared taxi, car-sharing, bike-sharing, ride-hailing, ride-sharing, etc. was fallen down.
- All modes of transport were failed during pandemic then only *walking and cycling won the race*.
- walking and cycling supported the social/physical distancing and relieved the burden on public transport.

India to 'reimagine' streets for walkers, cyclists after coronavirus

India to 'reimagine' streets for walkers, cyclists after coronavirus

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An advisory issued recommended the pedestrianisation of up to three markets in each city, and adding more bicycle lanes.

PHOTO: AFP

'India Cycles4Change' challenge gains momentum

Cities across the country are embarking on the 'India Cycles4Change' movement

41 cities testing cycling friendly initiatives

प्रकाशित तिथि: 02 JUN 2021 7:16PM by PIB Delhi

The India Cycles4Change challenge is beginning to gain momentum in Indian cities. The challenge was launched last year under the Smart Cities Mission by the Ministry of Housing and Urban Affairs on 25th June, 2020, as a response to the COVID-19 pandemic that was gaining ground in the country. Over the last year, a cycling revolution has taken over India, with cycling being seen as an important mode of safe and healthy personal transport medium that ensures social distancing, while being environmentally sustainable.

As the COVID-19 pandemic was making inroads across the country, cycling saw a huge rise in demand. The lockdown restrictions had significantly affected the commuters of public transport, who saw cycling as a personal and COVID-safe alternative for short and medium distance commute. Moreover, cycling was also seen as a means of staying healthy- physically and mentally by the people who were confined to their homes.

In this backdrop, with the launch of India Cycle4Change challenge, 107 cities registered to be a part of the cycling revolution and 41 cities undertook initiatives vis. surveys, discussions, pop-up cycle lanes, safer neighbourhoods, open street events, cycle rallies, or online campaigns that were aimed at creating a cycle friendly city. Cities as part of the campaign have initiated work covering approx. 400 kms of arterial roads and more than 3500 kms of neighbourhood streets. The Smart Cities Mission, in association with Institute for Transport and Development Policy (ITDP) conducted training modules and other capacity building initiatives to guide 107 cities on various cycling initiatives.

Progress since launch of the challenge:

The challenge had a Test-Learn-Scale (TLS) approach which the participating cities adopted by testing various initiatives through quick low-cost interventions in the first phase of the challenge, learning from them, and preparing for scale up in the second phase. The key intervention areas

41 top cities of India Cycles4Change Challenge

New Delhi	Gurgaon	Hyderabad	Tumakuru
Nagpur	Vadodara	Kochi	Ahmedabad
Kohima	Silvassa	Indore	Mangaluru
Bengaluru	Aurangabad	Davanagere	Dehradun
Rajkot	Kakinada	Sagar	Kalaburagi
Chandigarh	Surat	Amritsar	Karnal
Udaipur	Bhubaneswar	Agartala	Mysuru
Jabalpur	Warangal	Faridabad	Bhopal
	New Town		
Nashik	Kolkata	Satna	Karimnagar
Pimpri			
Chinchwad	Panaji	Hubbali Dharwad	Raipur
Saharanpur			





Pop-up cycle lane in progress in Surat

(Source: Surat)

Source :<https://static.pib.gov.in>



Pop-up cycle lane in New Delhi
(Source: NDMC)

Source :<https://static.pib.gov.in>

Planning Intervention

During preparation of cities more pedestrian friendly after corona virus lockdown

MoHUA, Govt. of India issued advisory **on June 10, 2020** for holistic planning for pedestrian friendly market places i.e.

-atleast 3 market place in million plus cities and

-atleast 1 market place for non-million plus cities.

Source: www.pib.gov.in

Ministry of Housing & Urban Affairs

MoHUA recommends Holistic Planning for Pedestrian Friendly Market Spaces in Consultation with Stake Holders

Million Plus Cities to select at least three market places for Pedestrianisation & Non-Million Plus Cities to select at least one market area

Pedestrianisation in Market Places

प्रविष्टि तिथि: 10 JUN 2020 1:20PM by PIB Delhi

The Ministry of Housing & Urban Affairs has recommended holistic planning for pedestrian friendly market spaces in various cities and municipal areas in the country in consultation with stake holders. The advisory issued by Sh Durga Shanker Mishra, Secretary, Ministry of Housing and Urban Affairs to all states/cities/municipal corporations has also suggested the million plus cities to select at least three market places for pedestrianisation & non-million plus cities to select at least one market area for pedestrianisation in market places.

The following steps have been suggested for adopting the Pedestrianisation in Market Places –

1. Selection of Market Location – Million Plus Cities may select at least 3 market places and notify them for Pedestrianisation. Non Million plus cities may select at least one market area for pedestrianisation.
2. Holistic Planning of the Area – The planning for pedestrian friendly market space may be done in consultation with the stake holders – Vendors, Municipal officers, Traffic police, parking facility owners, Shop owners and consumers. This will require proper survey of space used in the present scenario by various stakeholders. A movement/direction plan has to be prepared to see that there are designated walking paths where visitors are able to follow social distancing. Plan could be made keeping the trees and other greens intact, adding tree canopy to improve walkability with clear spaces demarcated for vending, waste collection and access to toilet facilities. Plan should also incorporate interactive spaces for public to be carved out of contiguous unclaimed and under-utilized public

The Ministry of Housing & Urban Affairs has been pioneering the efforts for improving air quality in million plus cities, by promoting Public Transit through Bus and Metro systems, with special focus on promotion of cycle tracks and pedestrianizing market spaces as well.

Even before COVID-19 hit the world, a few Indian cities like Chennai, Pune and Bangalore started transforming into people-friendly cities. Over the last five years, Chennai has implemented more than 100 km of pedestrian-friendly streets across the city, including a pedestrian plaza at the commercial heart of the city. Further, it is quadrupling its efforts this year through the Mega Streets Programme, which aims to transform Chennai's unsafe streets into 'Complete Streets' prioritising pedestrians and cyclists. Inspired by Chennai's efforts, the state has allocated a budget to expand the program across ten cities of Tamil Nadu. Pune became the first Indian city to develop a Comprehensive Cycling Plan that proposes a 400 km of cycle-friendly streets. Multiple Indian cities rolled out cycle-sharing systems. They have empowered college students, especially women, to embrace cycling and move around the city with freedom. With the enthusiastic push for Bicycles by Mayors/Municipal Commissioners/Smart Cities and civic groups promoting cycling in various Indian cities, this moment could be the golden opportunity for cities to embrace this mode.

RJ/NG

(Release ID: 1630613) Visitor Counter : 2834

Read this release in: Urdu , हिन्दी , Marathi , Manipuri , Bengali , Punjabi , Odia , Tamil , Telugu , Malayalam

Micro-mobility as a Service (MaaS)

- Micro mobility modes such as e-scooters, e-bikes, shared bicycles, etc. are incorporated into a single digital platform along with other transit options such as public transport, ride-hailing, car-sharing, etc.
- MaaS is a platform which allows interoperability and use of multiple transport modes and services in urban areas.



MaaS is part of the transition

- from mobility as a commodity (ownership of vehicles)
- to mobility as a service (access to trips) (Araghi, et al., 2020; Münzel, 2020).

Critical Points :

- i. MaaS is considered as outcomes of Technologies.
- ii. MaaS is considered as outcomes of good Governance.

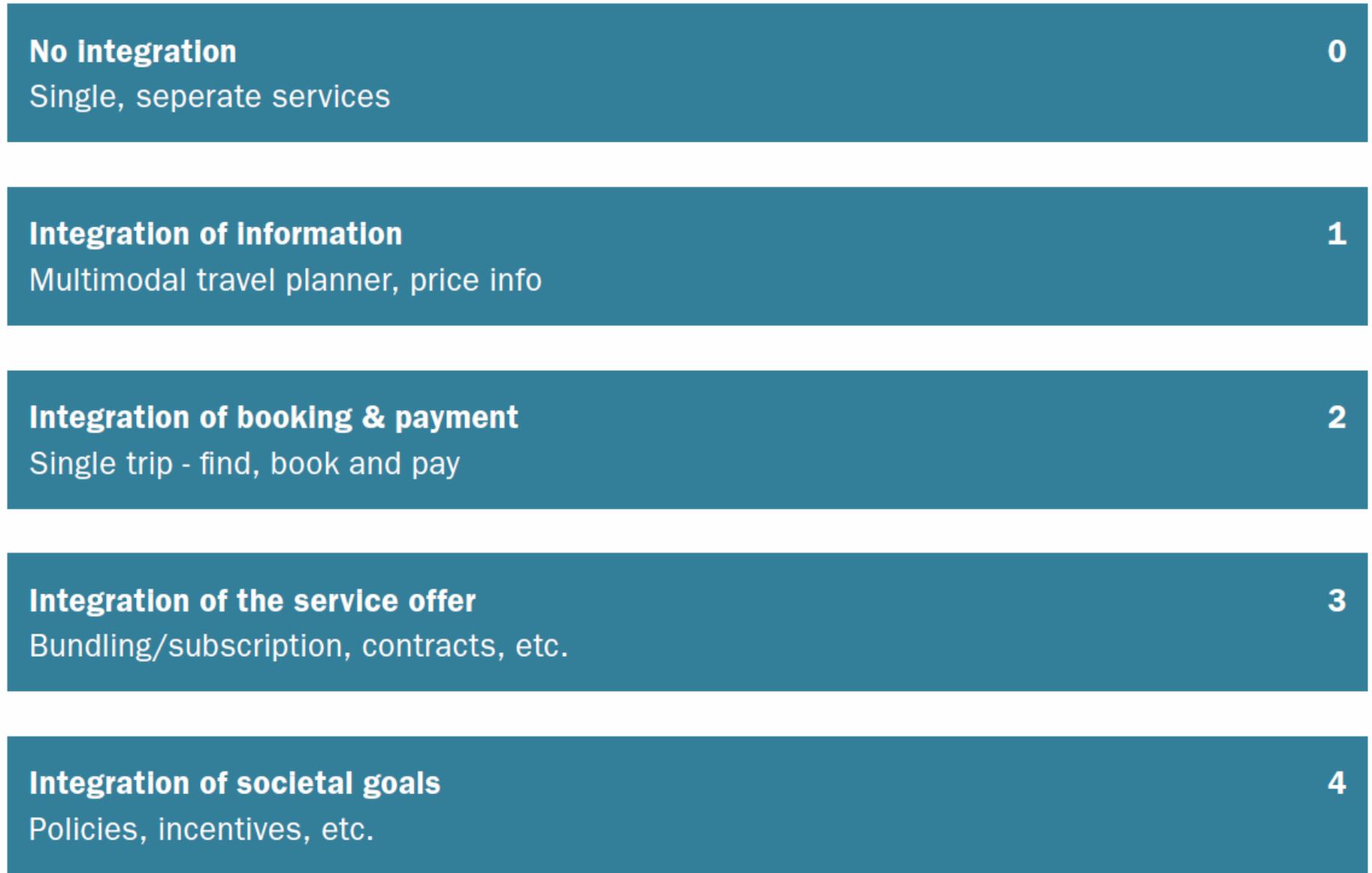


Figure 2 Levels of MaaS (Sochor et al., 2018)

MaaS is outcomes of good Governance

- **Customers:** Customers are the most important MaaS stakeholders. They are the ones who make use of and pay for the MaaS system. To create a desirable and successful MaaS system, it is imperative to comprehend their needs and preferences.
- **Stakeholders:** Role-playing stakeholders of MaaS are the companies that operate the various forms of transportation, including buses, trains, ride-sharing services, and bike-sharing services. They oversee the safety, comfort, and caliber of the services in addition to providing the actual transportation.
- **Regulators and authorities:** Regulatory agencies, municipal governments, and transportation authorities are important as they set the rules and regulations governing the transportation system in addition to granting providers licenses and permits.
- **Suppliers:** Technology suppliers, including software developers, data analytics firms, and platform providers. They supply the methods and tools necessary for MaaS providers to control the transportation network, conduct data analysis, and offer clients a hassle-free travel experience.
- **People or organizations** who are known as investors give financial assistance. These could include banks, venture capitalists, and other financial organizations that provide funding for the MaaS system's growth and development.
- **Local Communities** such as residents, businesses, and community organizations, are significant MaaS stakeholders. They may influence the design and implementation of MaaS systems and may be impacted by changes in traffic patterns, noise levels, and environmental pollutants.

Stakeholders in MaaS

Concluding Remarks

- Micro-mobility has direct impacts on :
 - transport sector** (last mile connectivity to public transport),
 - energy sector** (shift from fossil fuels to renewable energy)
 - urban sector** (shift from congested, polluted & slow mobility to environmentally friendly mobility).
- Convergence of technologies such as
 - AI,
 - IoT,
 - GPS,
 - mobile connectivity, etc.provide broad base for rapid growth of micro-mobility in India.

- Electrification of vehicles in the country has promoted
 - e-bikes,
 - e-scooters,
 - e-rickshaws, etc. which is a significant part of ‘disruptive mobility options’ because it introduced significant changes in access and travel.
- It often modified conventional norms from ownerships of vehicles to services of vehicles and creating new opportunities in investments and innovations.
- Lower operating costs and increased environmental benefits qualified electric micro-mobility as one of the sustainable modes of urban mobility especially for short trips in congested areas.

**Thanking you
for
kind attention**