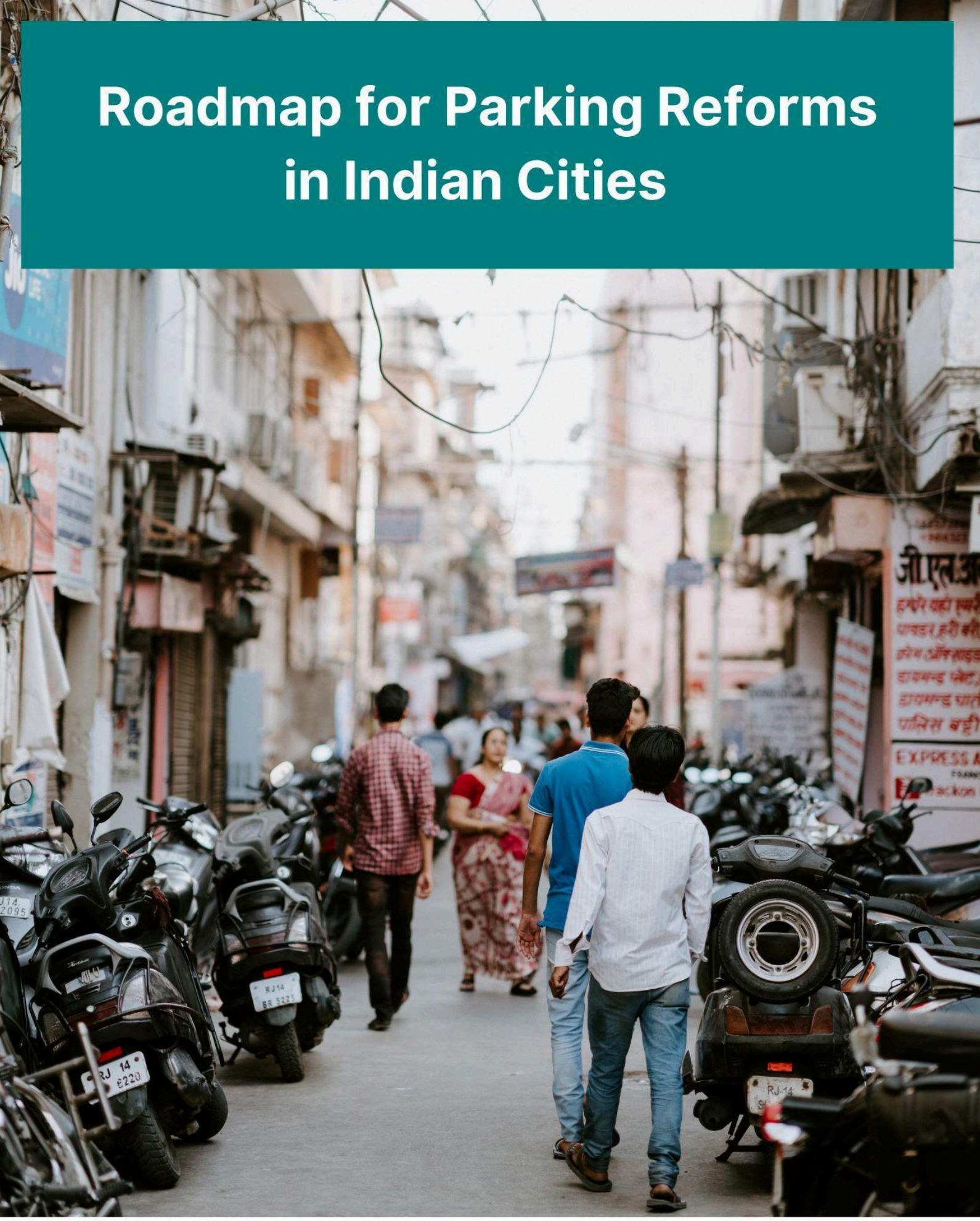
Roadmap for Parking Reforms in Indian Cities



Urban Works

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coordinates

SHAKTI SUSTAINABLE ENERGY FOUNDATION

For Private circulation only

March 2023

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Website: shaktifoundation.in

Acknowledgement

The team would like to thank Shakti Sustainable Energy Foundation for supporting the study on preparing a roadmap to implement parking reforms in Indian cities. Special thanks to Vivek Chandran and Prasanth Narayanan for accommodating the changing demands of the project.

We wish to extend our gratitude to Surat Municipal Corporation (SMC) and Pimpri Chinchwad Municipal Corporation (PCMC) for engaging with the team and supporting us in organising city and state level workshops. The engagement with the city authorities would not have been possible without initiation from DN Basak at SMC and Bapu Gaikwad in PCMC.

We extend our gratitude to Mukesh Kumar, Principal Secretary of Urban Development Gujarat and Avinash Patil, Joint Secretary at Urban Development Department Maharashtra for supporting us in organising and conducting the state-level workshops in the Ahmedabad and Pimpri-Chinchwad.

We would like to Gujarat Institute of Civil Engineers and Architects (GICEA) and Vatsal Patel for supporting us in organising the state-level workshop in Gujarat. A special gratitude to Mahesh Bangad for assisting us in organising a workshop at the Architects Engineers and Surveyors Association (AESA) in Pune.

We extend our gratitude to the survey agency, Kaizen Market Research for conducting user surveys in both the case cities. The study would not be holistic without valuable inputs from different stakeholders who participated during the multiple sessions conducted over the course of the study.

We thank Nidhi Modi, Vidhi Shah, Rijhul Ladha, Haiya Dalal, Pooja Shah Nayanika Misra, Aviral Goyal, Neha SK, and Bhavika Makhija for their assistance in conducting this study.

We thank Aarti Nair and Ashok Kumar N from UrbanWorks for assisting in organising the workshops and outreach. The team would also like to thank Parin Visariya, Pranjal Kulkarni, Siddhartha Godbole, and Naveena Munuswamy, former staff of UrbanWorks, for their contribution to the study in its early stages.

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1. Introduction

1.1. The need for a paradigm shift

Parking is fast becoming a problem in India. Today, parking is difficult to obtain for the driver, difficult to enforce for the government and has safety issues for other road users. People see parking as a service the state is obliged to provide—it should always be enough to cater to peak demand and prevent spillover. Any shortage is seen as the result of a lack of planning and foresight. Charging parking fees is not considered politically savvy, and cities resist levying parking charges.

Originally, parking regulations were intended to mitigate the effects of spillovers. Parking regulations initially focused on ensuring supply through mandatory parking provisions, also known as minimum parking requirements. Another popular strategy to supply parking is to build multi-storied parking lots. However, in many cities in India, these parking lots remain unutilised since there is a high disparity in the rates charged for on-street parking and parking in these structures.

The current paradigm focuses on increasing the parking supply to cater to the ever-increasing parking demand. Decision makers also believe increasing the parking supply in buildings will solve the parking problem. However, evidence from around the world suggests that such ideas are misplaced and detrimental to a city's liveability and sustainability. Currently, on-street parking in Indian cities is ample, free, or minimally charged. This has resulted in parking occupying more than a third of the streetscape.

As urbanisation increases, cities continue with the old paradigm. Free parking and minimum parking requirements continue to add to the supply and fuel vehicle growth, causing more congestion – one of the things they are supposed to alleviate.

Parking is an extremely suboptimal use of precious street space. Streets are vibrant public spaces where people meet, eat, relax, and enjoy the city. They are essential for people's movement, especially via sustainable modes such as walking, cycling, and public transport. Parking on streets, or even adjacent to streets, blights the urban environment with the singular use of storing vehicles

on the street. Moreover, maximising parking provision has become the central principle in designing architectural floor plans, limiting and distorting the built environment design.

Parking space should be seen for what it is: a form of real estate whose supply and price are best determined by the market. It is a commodity, not a public good. However, public agencies continue subsidising parking with public funds and/ or through public lands. An assessment of a public multi-level car parking (MLCP) in Sarojini Nagar, Delhi, revealed that the city spent around INR 1 million to create one car parking space, which was equal to the cost of an affordable housing unit (Roychowdhury, 2012). An additional INR 30 million is required for its operation annually. A heavy subsidy is needed to keep it functioning and for the car user to pay what is deemed an acceptable charge. Car users enjoy enormous subsidies, paying a small proportion of this rate. This excludes a large part of society from the investments required for better urban living. Limited public money and land are better used for other essential things that benefit the entire population rather than just a few.

Lastly, one must understand that more parking, even if the market provides it, encourages more private motor vehicle use. Current parking regulations and policies in India focus almost exclusively on parking supply and regulating parking minimums. Ironically, while space for people, whether for residential, commercial, institutional, or other purposes, is controlled in Indian cities through floor space index (FSI) caps, no such limitation exists on parking space. Instead, building codes require a certain minimum amount of parking. Public agencies across India have consistently raised these minimum parking requirements in the last few decades. In some cities, public agencies incentivise developers to create more parking than the applicable building code requires. In the case of Pune, the minimum parking space per 100 sqm of a residential unit has increased from 0 in 1982 to 1.3 in 2013 to 1.65 in 2017.

Donald C. Shoup, Professor of Urban Planning at the University of California, Los Angeles, aptly titled his pioneering work, ‘The High Cost of Free Parking.’ This path-breaking book gives irrefutable empirical evidence of the negative consequences of parking requirements that public agencies often institute based on misguided, unscientific assumptions. The right approach—one that many progressive cities in the world have adopted—is to limit parking supply

through appropriate policies, regulations, and pricing to mitigate the negative externalities that parking creates.

The new paradigm for parking is one where parking is limited, priced, and enforced. Most parking is moved to off-street parking facilities whose supply is market-driven, and parking supply (both on-street and off-street) is limited to curb private motor vehicle use. The role of city authorities is limited to governing the overall market to ensure parking supply is capped in off-street locations, on-street parking is restricted, and most on-street parking is shifted to off-street locations by incremental curbing of demand.

This study highlights the importance of planning the storage of vehicles, thus making it an important subject for the future discourse on urban planning.

1.2. The current state of parking in Indian cities

Between 1951 and 2015, the number of private four and two-wheelers in India increased by 26.3%. In contrast, buses reduced from 10% to just 1% (Offices of State Transport Commissioners/ UT Administrations, 2015). From land-use planning to street design, cities have been modified to conform to the increase in private vehicles. Nearly 53,700 vehicles are added to Indian streets every day (Dash, 2016). An increase in the number of vehicles comes with an anticipated rise in traffic chaos, vehicular pollution, and the space required to park vehicles.

The following section gives a broad overview of the present attitude towards parking, existing parking regulations and policies, and challenges of various parking management initiatives.

1.2.1. Parking is my right and a necessity

The common attitude that prevails among personal vehicle users is that parking is a right. The city administrator is responsible for providing parking where and when required. It should be available for free. Non-availability of parking is perceived as a threat to the privilege of using one's vehicle.

1.2.2. On-street parking is not managed

Most on-street parking in Indian cities is haphazard. Parking and no-parking zones are not clearly demarcated. Parking slots are not clearly defined, and enforcement is weak. On-street parking is either completely free or cheaply priced. Moreover, even footpaths are encroached by vehicular parking.

i. *Figure 1: Vehicles parked on footpath in Pimpri Chinchwad*

1.2.3. Cities are mass-producing parking spaces

The ownership of personal vehicles is growing exponentially in Indian cities. It took 55 years (1951-2005) to cross the 10 million cars mark, whereas it took only 10 years (2006-2015) to add another 20 million cars. It is estimated that personal two-wheeler and personal four-wheeler use will increase by 8% and 16% for work and education trips, respectively, due to the fear of commuting by public transport and other shared mobility during the pandemic[1].

[1] UrbanWorks conducted a nation-wide survey on post-lockdown travel. Views of over 3400 respondents across the country are captured.

Parking chaos on the streets and the increased use of personal motorised vehicles have made decision-makers believe that more off-street parking provisions will meet future parking demand and reduce street congestion. Building plans are approved only if minimum parking is provided as mandated by the city or state Development Control Regulations (DCRs).

DCRs allow parking in single or multi-level basements, on the stilt floor or in the podium or upper parking floors (with or without height restrictions), at the surface level in the setbacks (side setbacks generally), or in other common spaces with adequate vehicular access. Regulations suggest providing 16-32 sqm of off-street car parking space, including the circulation space. This is equal to the size of an affordable housing unit, office, or apartment bedroom. The Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines and the National Building Code (NBC) suggest the following parking space requirements for each type of parking:

- 16 sqm for automated/mechanical parking
- 23 sqm for parking in open space
- 28 sqm for parking on stilts (ground level)
- 30 sqm for multi-level car parking with ramps
- 32 sqm for parking in the basement

1.2.4. Not all parking is optimally used

On-street parking is unevenly distributed—overflowing at a few locations and relatively empty at others. Due to the free availability of on-street parking, drivers tend not to park in public multi-level car parks (MLCP), as it involves parking fees and is inconvenient to enter and exit. Donald Should suggests that parking be priced such that the occupancy is 85% at a given time. If the occupancy is higher than this, it means parking is under-priced. If the occupancy is lower than this, it means parking is overpriced.

A parking study in a 22-hectare area around Ghatkopar station in Mumbai revealed that only 50% of parking was occupied in residential and commercial buildings (Rangwala et al.). Similarly, a parking study in Jasola, New Delhi, found a 30% higher supply of parking spaces in the area than the average peak demand (Roychowdhury, Nasim, and Dubey 2018).

Many parking spaces are occupied only for a part of the day in residential and commercial complexes. For instance, in residential complexes, parking spaces are vacant during the daytime, and in commercial areas, they are vacant during nighttime. However, the perception is that there is not enough parking. This may be true in the urban core, but a reality check is required in other areas of the city, especially the ones with new developments with ample parking supply.

1.3. Perspectives on parking

As part of the study, the team conducted focused group discussions with developers, architects, and urban planning experts to understand their perspectives on current parking challenges and reforms. The following section elaborates on key points from these discussions.

1.3.1. Developers and architects

Currently, architects and developers are providing parking provisions as per market demand. They believe that parking is a determinant of the saleability of the project. Most developers provide parking as per the parking mandate. However, parking beyond two basements becomes financially unviable.

As per the industry, parking reforms must be introduced gradually, starting with on-street parking enforcement and parking caps in commercial establishments. Priced on-street parking can be telescopic, and its supply can be capped. Secondly, off-street parking regulations must depend on the congestion levels, with congested areas having stricter regulations. The need for a good public transport network was pointed out to implement parking reforms.

Developers reflected that the market and the industry are not ready for parking maximums. Currently, parking is perceived as necessary to sell real estate inventory, especially residential units. At least one car park is essential to sell 1BHK (bedroom-hall-kitchen) and 2BHK houses, and two car parks are required for more significant properties.

Similarly, developers strongly believe that retail developments will only succeed with ample parking as those visiting there come by personal motorised vehicles. They pointed out that huge parking lots are provided in many IT parks

and institutes, often vacant as many employees travel by public transportation, company bus, or carpool. However, these vacant spots are not publicly accessible. They suggested that such private off-street parking spaces can be opened for shared parking.

Presently, parking space is not included in the FSI limit. Instead, there is a minimum parking requirement without a cap or limit on the amount of parking that can be created. In contrast, progressive parking regulations consider parking a form of real estate and often include parking in FSI limits. Developers from Pune feel that the inclusion of parking in FSI will lead to a market crash as the profitability of projects depends on saleable areas. If permissible, FSI is increased with the inclusion of parking in FSI; it will lead to innovation in building options as developers will create different real estate options.

1.3.2. Planning experts

The discussion with planning experts aimed to identify potential parking reforms. They agreed that cities must develop area-level parking management action plans integrated with public transportation plans. The area plan should identify parking and no-parking zones and must have area-level parking caps.

Management of on-street parking is critical to implementing off-street parking reforms. They suggested that the existing private off-street parking be utilised as shared parking so that parking is optimally used. Moreover, on-street parking should be managed by legalising/regulating it instead of charging it.

The off-street parking should be included in the FSI limit, and the market should determine the optimum supply. The experts also suggested linking parking and transit policies such that hourly parking charges are at least 1.5 times the public transport fare. Additionally, the authorities should consider increasing the contract period from 11 months to 5 years and having contracts that share the revenue risk between the authority and contractor.

1.4. Parking reforms around the world

Cities across the globe, both in developed and developing nations, are moving away from providing more parking and have instead started adopting parking reforms that limit parking supply. They are removing parking minimums and capping parking supply through parking maximums at building and area levels, or both. Cities are reducing on-street parking spaces and repurposing them for walking, cycling, public transport facilities, and public spaces. On-street parking is priced and enforced. They now provide cycle parking on streets and mandate minimum off-street cycle parking.

San Francisco, Seattle, Los Angeles, Mexico City, São Paulo, Seattle, Boston, Portland, Auckland, London and Amsterdam have adopted parking maximums in their building regulations. Kenya's Draft National Building Code 2020 has proposed to replace its parking minimum requirements with parking maximums (NBC, 2020). Some examples of city-level reforms are explained below.

1.4.1. Mexico City

Need for reforms

Mexico City has a population of about 22 million and an area of 1500 sq. km. Mexico City's car ownership doubled in 10 years, and by 2007, it faced serious congestion problems. Like many other cities, Mexico City also established minimum off-street parking regulations to accommodate growing demand.

Despite only 30% of people owning cars, the regulations universally applied to all low, middle, and high-income households. These regulations inadvertently incentivised the use of personal vehicles and worsened the congestion problem. The oversupply of parking resulted in inefficient use of urban land. This harmed housing affordability in the city.

Reforms

In 2017-18, Mexico City abolished minimum off-street parking regulations to replace them with parking maximums. The new rules also require developers to pay a fee if they build more than 50% of the maximum parking allowed. This fee applies only to the city centre, which is well-served by public transportation.

The fees collected are used to improve the overall public transport in the city. However, this fee (about INR 300,000 if parking is within the range of 50-75% and about INR 600,000 if parking is above 75%) is a fixed one-time payment rather than a fee per car park. Also, only residential developments can be built above the maximum provided the developer pays fees (about INR 900,000) per additional car park.

Maximums vary as per their land use. For restaurants, markets, schools, and housing with an area of more than 300 sq. m, maximum limits are lower than the previous minimums. In shopping centres, malls and housing less than 300 sq. m, maximum limits are higher than previous minimums. However, no changes are observed for offices and gyms. The new rules mandate minimum bicycle parking requirements in new buildings and constructions. The off-street policy reform is coupled with effective on-street parking management. On-street parking is priced from 8 am to 8 pm on weekdays with a fee of around INR 10 per 15 minutes. The revenue surplus generated from parking is used to improve public transportation, neighbourhood development, and housing subsidies.

Process

It took about ten years for the city to adopt the parking reforms. Several activities were initiated, which contributed to the successful adoption of the parking reforms in 2017. Some of those activities were:

- A parking study to understand the overall parking scenario and its impact on traffic. The findings were presented to the Secretariat of Transport and Roadways (SETRAVI), and the traffic police
- A communications campaign around sustainable mobility modes was developed in collaboration with agencies like SETRAVI, the Public Space Authority, the Secretariat of the Environment and experts
- Further parking studies to show space inefficiency and inequality due to parking regulations and about parking management practices in North American cities
- A travel demand management training workshop with decision makers on parking management

In 2011, the city launched the Mayor's Green Plan - a fifteen-year sustainable development strategy plan. The need for parking reforms was embedded in the plan. Parallelly, the city launched EcoBici, a public cycle-sharing system to combat air pollution. They also launched EcoParq, an on-street parking management system. It piloted an on-street parking management system in a neighbourhood to manage around 6000 car parking spaces, which were previously free. The pilot neighbourhood was well served with public transport but had high car use. The revenue surplus from parking fees was invested in improving walking facilities within the neighbourhood. This helped to reduce the traffic and improve the streetscape. On a broader note, it created the demand for expanding on-street parking management to other neighbourhoods.

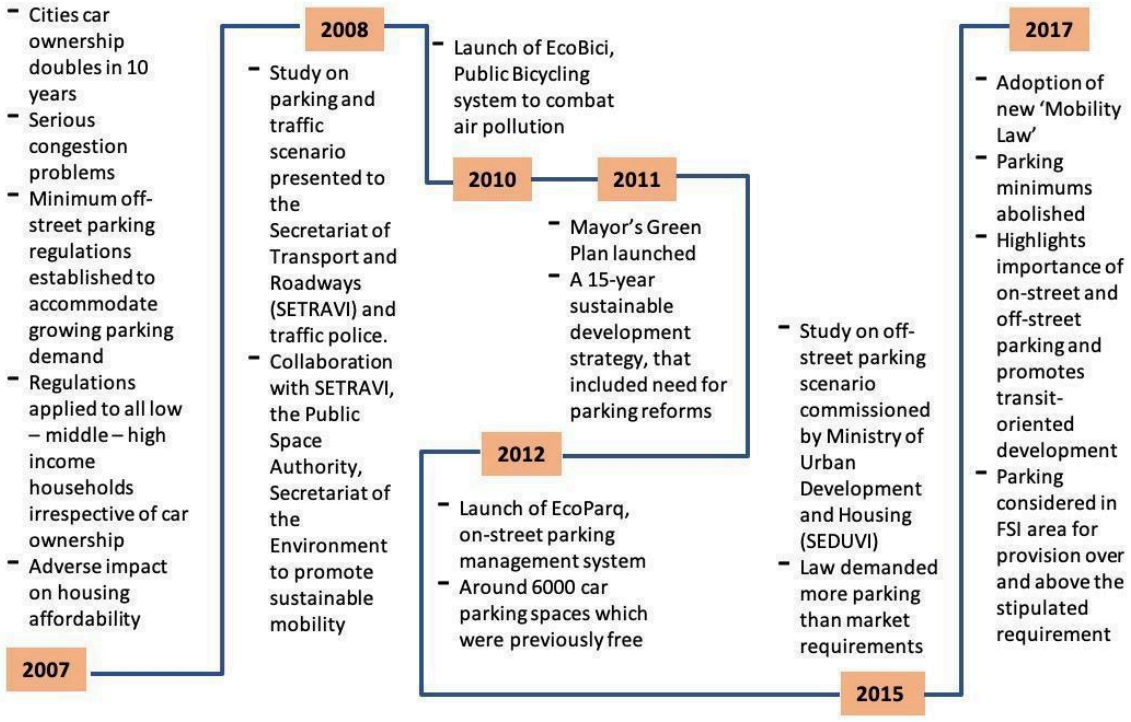

Figure 2: Parking reforms in Mexico City

A study on off-street parking scenarios was commissioned by the Ministry of Urban Development and Housing (SEDUVI). The findings got real estate developers, decision-makers, and other civil society organisations to deliberate

on off-street parking reforms. It showed that the law demanded more parking than the market requirement and highlighted the negative impacts of parking on housing, the environment, and the economy. Additionally, the city launched a public design competition to reimagine the parking spaces in the city centre into productive spaces for work, education, culture, recreation and housing to initiate dialogue on parking reforms amongst the citizens.

In 2017, Mexico City adopted parking reforms with the support of a new Mobility Law. This law replaced the previous 'Transport and Roadways Law', which only regulated motor vehicles. The Mobility Law now embeds the importance of managing on-street and off-street parking and promoting transit-oriented development. Also, the Transport and Roadways Ministry was replaced by the Mobility Ministry. The ministry now looks at mobility plans comprehensively to ensure the integration of walking, cycling, public transport systems, and parking management.

1.4.2. São Paulo

Need for Reforms

Parking reforms in Sao Paulo were led by the momentum around the Urban Reform Movement in the 1960s. The erstwhile development and urban mobility policies led to urban sprawl and the increasing use of private motorised vehicles. Between 2001 and 2015, such ownership increased, reaching over 600 vehicles per 1,000 inhabitants. Despite having the largest public transport network amongst other Brazilian cities, only 15% of the population lived near public transport (medium and high-capacity public transport) in 2014, compared to about 31% in Rio de Janeiro. The urban sprawl increased travel time (an average of about 50 minutes) and demand for more parking. This resulted in increased per capita carbon emissions and road crashes.

Parking Reforms

The city of Sao Paulo adopted parking reforms in its Strategic Master Plan, 2014. The city abolished off-street parking minimum requirements and gave flexibility to developers to provide parking as required. It imposed parking maximums in the influence area of mass rapid public transport (bus rapid transit and rail transit) to encourage higher use of public transport and disincentivise the use of personal motor vehicles. It also managed on-street parking in the transit influence zones to provide more space for walking and cycling.

The city adopted parking reforms to develop within the mass rapid public transport influence area. The reforms mandate a maximum of one parking space per household unit, irrespective of size. For non-residential areas, one parking space for every 70 sqm was required. These are free of FSI. However, the provision of additional parking spaces over the maximum cap is counted in the FSI calculation. This leaves a developer choosing between providing more usable space or parking.

Process

The Urban Reform movement initiated in the 1960s led to the discussion around reforms in urban development policies. The previous version of São Paulos' city strategic master was approved in 2002. The city government tried to revise the strategic master plan in 2007 and 2008. However, the court ordered the city government to restart the process due to a lack of participatory planning. This led the city government to involve civil society organisations in reforming public policies. The city revised the strategic master plan in 2013, which was later adopted in 2014.

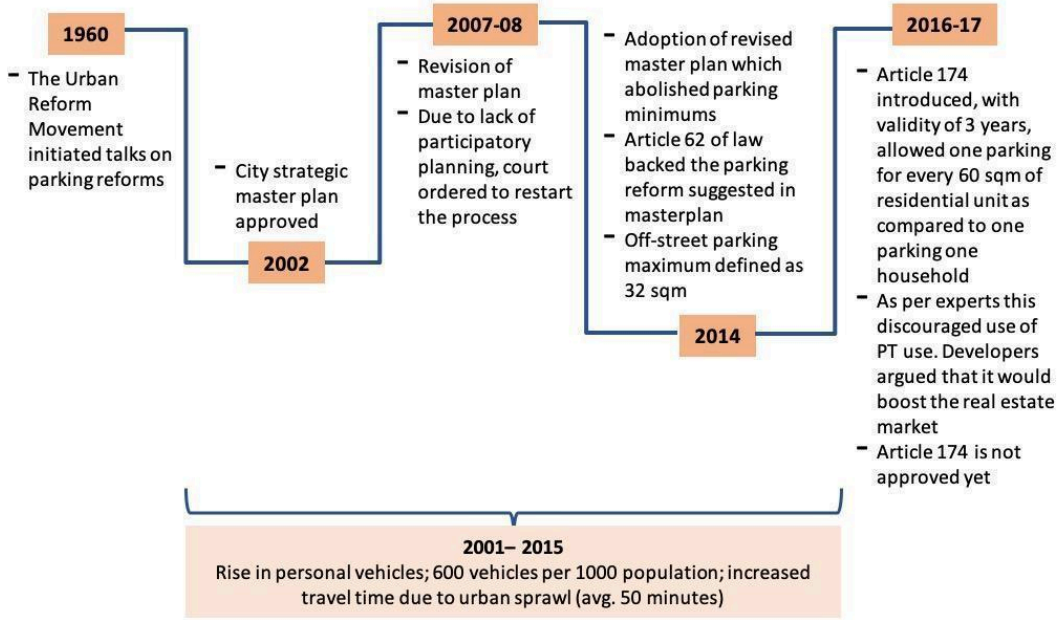

Figure 3: Parking reforms in Sao Paulo

1.4.3. Rio de Janeiro

Need for reforms

The city faced a critical economic and political crisis in 2016 after the Olympic Games. A major slump was observed in the real estate sector, which the developers believed was due to the building approval process causing significant delays and losses. A new city government was elected in 2016. In this context, the city started investing its efforts in urban planning policies to facilitate new construction and development in the city. To revive the real estate market, the city planned to simplify the building rules and approval process. The city initiated the process of revising the zoning law and the building codes. This set the stage for the revision of parking regulations.

Parking Reforms

Rio de Janeiro approved new building codes in 2019, with lower minimum parking requirements in the transit zones. The city rejected the proposal to set a maximum parking requirement and charge for more parking spaces. The reforms lowered a mandate for a minimum of one space per housing unit for

buildings within 800 meters of transit to a minimum of one parking space for every four residential units. Offering a minimum of one cycle parking per housing unit is now mandated. The city has proposed reducing its minimum parking requirements and charging developers for building parking spaces over the set limits. Additionally, it has limited on-street parking spaces and allows for converting existing parking areas to other uses.

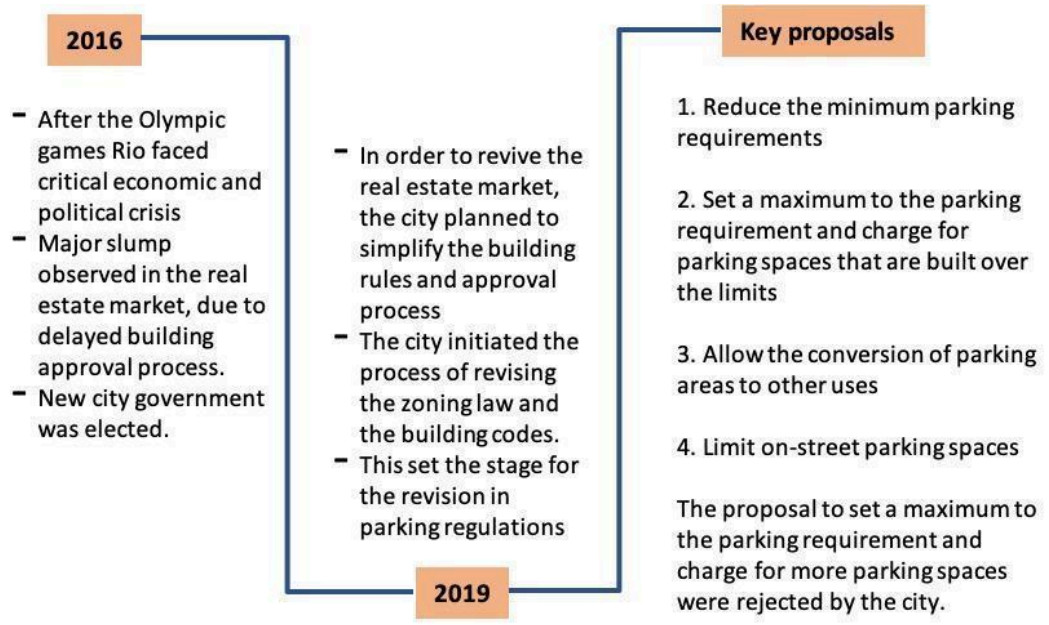

Figure 4: Parking reforms in Rio de Janeiro

1.5. Summary of progressive parking reforms

The table below captures some of the progressive parking practices cities worldwide have adopted.

Parking Reforms	Cities
Area level parking cap wherein for every off-street space created, equivalent on-street space is reclaimed	Zurich
Parking permit or Parking Permit Certificate to purchase vehicle	Tokyo, Singapore
Market-driven parking supply and management	Seoul and most cities in Japan

Parking Reforms	Cities
Open option parking system with no minimum parking requirement for off-street development	Vancouver
Overall reduction in parking requirement and provision of range of parking based on ease of access to transit.	Singapore
Parking considered in FSI area for provision over and above the stipulated requirement	Singapore
Shared parking - Open to public off-street parking within private residential and commercial buildings	Shenzhen, Vancouver
Parking maximums	Seoul
Gradual decrease in on-street parking spaces and limited on-street parking	Paris, Zurich, Tokyo

Table 1: Parking reforms around the world

1.6. Report structure

The report provides a step-by-step process of the study performed in two case cities to develop the roadmap for parking reform in Indian cities. The brief synopsis of each chapter is mentioned below.

1. Introduction
2. Study process
    - What is the study framework adopted for the study?
    - How are the two case studies selected?
    - How were three case study sites selected in the two case cities?
    - What is the method to assess parking supply and demand in a selected site area?
    - What is the method adopted to understand current market readiness for parking?
3. Parking-related legislations
    - What regulations affect the provision and usage of parking?
4. Case of Surat
    - What are the characteristics of the typologies selected as case site?

- What is the parking supply and demand in selected case sites in Surat?
- What are the key insights and opportunities for the private parking market?
- What will be the impact of parking charges on mobility choices?
- How much are citizens willing to pay for two-wheeler and four-wheeler parking?

5. Case of Pimpri-Chinchwad
    - What are the characteristics of the typologies selected as case site?
    - What is the parking supply and demand in selected case sites in Pimpri-Chinchwad?
    - What are the key insights and opportunities for the private parking market?
    - What will be the impact of parking charges on mobility choices?
    - How much are citizens willing to pay for two-wheeler and four-wheeler parking?
6. Business model for private parking market
    - What are the challenges with current business models of MLCPs?
    - What are the potential business model solutions for the private parking market?
    - What is the potential revenue from parking for the city?
7. Socio-economic benefits
    - What is the approach to calculating the socio-economic benefits of implementing parking reforms?
    - What are the socio-economic benefits of implementing parking reforms in Surat?
    - What are the socio-economic benefits of implementing parking reforms in Pimpri-Chinchwad?
8. Regulatory barriers in parking reform
    - What are the regulatory barriers in charging for parking?
    - What are the regulatory barriers in charging for parking within private parking?
    - What regulatory barriers hinder the emergence of the private parking market?

- What is the market perspective on unbundling parking from real estate?

9. Roadmap for parking reform
    - What are the immediate steps to facilitate the private parking market?
    - What are the immediate business models for private parking that can be implemented?
    - What regulatory and institutional changes are required to enable an ecosystem for the private parking market?

2. Study Process

This chapter outlines the method and process adopted to meet the study objectives. The approach to the study includes a literature study, on-ground surveys and analysis, interviews, consultations with relevant stakeholders, and workshops with national, state, and city officials. The section below presents a description of the methods followed for this project.

2.1. Study framework

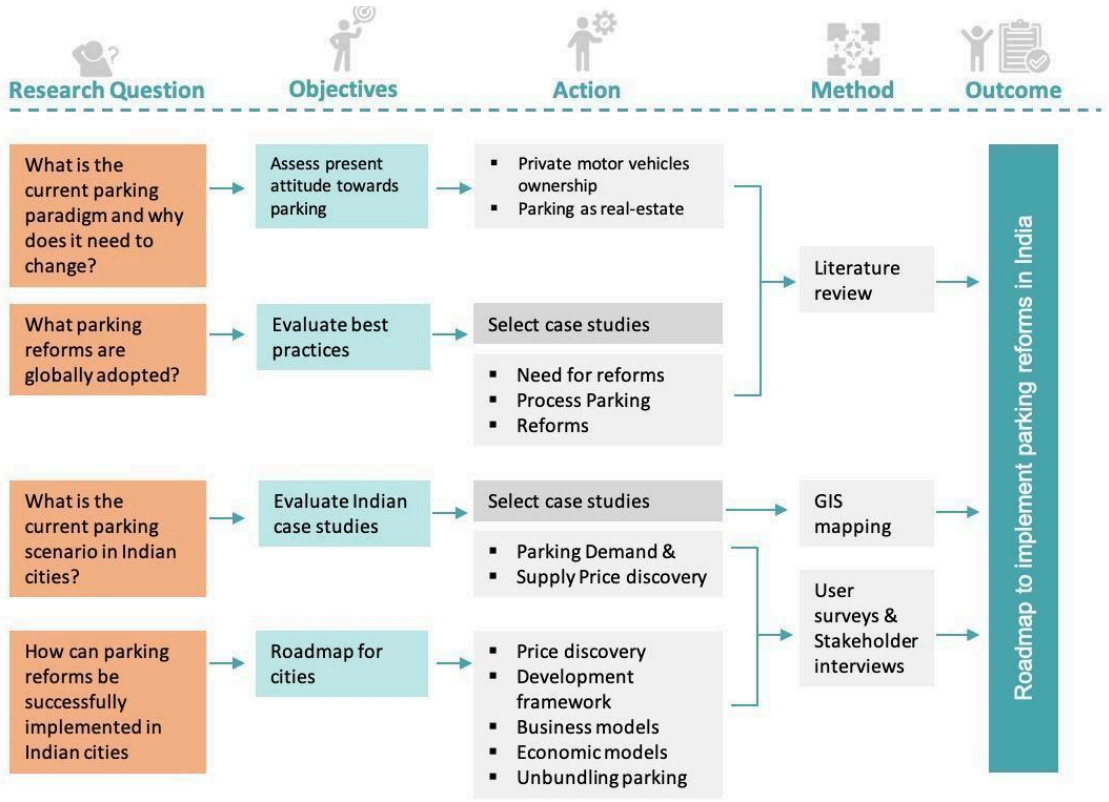

Figure 5: Study framework

2.2. Understanding Stakeholders' Perspectives

To understand on-ground operations and challenges related to parking, various stakeholder consultations were conducted. The participants included architects, developers, urban planners, public officials (municipal corporations, traffic police), entrepreneurs, and university students.

One-on-one discussions and workshops on current parking conditions and parking reforms at the city, state, and national levels in two cities in Gujarat and Maharashtra were organised. Some key themes discussed were existing parking provisions, issues related to enforcement of parking rules, priced on-street and off-street parking, and possibilities of revenue generation when a private agency manages parking. A parking game was played with the participants, which helped them better gauge the current scenario versus a scenario where parking is charged differently on and off-street and enforced.

Moreover, these consultations also helped to understand their views on unbundled parking and probable ways the market could respond. The developers and architects believe that parking is an asset for the real estate market, and it is their selling point. Inter-departmental issues emerged amongst government officials, which is a barrier to implementing effective parking solutions. Stakeholder consultations help us to gain a broader perspective on the problem from all levels to create a more comprehensive roadmap for parking reforms.

2.3. Selection of cities and sites for case study

2.3.1. Selection of cities

Surat and Pimpri-Chinchwad were selected for the case study. Both are quintessential Indian cities facing typical parking issues of spillover, municipal corporations concerned with these issues and high rates of motorisation. Both cities have prepared parking policies and are willing to look for new solutions to address these issues.

Surat

Surat is the eighth largest city in India, with a population of 6 million and an area of 462 sq. km. It is a commercial and economic centre driven by manufacturing, textiles, petrochemicals, shipbuilding, automobiles, and ports. It has an extensive public transport network of city buses and Bus Rapid Transit (BRT).

With rising incomes, private motor vehicle ownership per capita increased by nearly 35% between 1994 and 2015 (SMC 2018). Surat has a high economic growth rate that is expected to increase the level of motorisation even further. Surat has a parking policy approved in 2017, which states that all parking in Surat shall be charged. Though there has been some movement in this direction - with SMC demarcating on-street parking and fixing rates - many areas still remain where on-street parking is free and unregulated.

Pimpri-Chinchwad

Pimpri-Chinchwad is part of the Pune Metropolitan Region. North of and adjoining Pune, it is spread over an area of 181 sq. km and has a population of approximately 2 million. The city is a large automobile industry hub that has grown as an IT hub in recent decades. In 2020, Pimpri-Chinchwad and Pune recorded 23,000 vehicle registrations 2020, the highest in Maharashtra (TOI 2020). Its vehicular traffic has grown by nearly 150% in the last five years and is expected to rise rapidly (Maharashtra RTO).

Although a parking policy exists, parking is charged only on a few streets, and the enforcement is weak. It has an extensive public transport network of city buses, Bus Rapid Transit (BRT), and metro rail.

2.3.2. Selection of sites

The study team identified various typologies, each representing a unique urban form with its own parking challenges. Some typologies identified were old city areas with mixed-use development, planned high-end gated residential, planned retail and commercial neighbourhoods, monofunctional residential developments, informal settlements, and industrial zones.

An extensive assessment of all the typologies was conducted to identify a few critical cases that represent most areas in Indian cities in terms of their parking

conditions and potential reforms. The three key typologies selected for the study are outlined below:

- *Old & dense development:* Predominantly a planned retail and office commercial neighbourhood with some residences. The buildings are no greater than G + 3/4. The plots are mid-sized, measuring 350-1500 sqm and have good public transport connectivity. Some off-street parking is available at stilt level or setbacks, and on-street parking is also observed.
- N*ew & high-end residential development:* A suburban mono-functional residential development with high-rise gated residential complexes and ample parking. The plots are large, measuring more than 22,500 sqm, and the urban blocks are not walkable. On-street parking is less in this area.
- *Retail CBD:* Areas that act as job centres and attract work trips. A suburban mono-functional commercial development (non-retail). The plots are large, measuring more than 22,500 sqm, and the urban blocks are not walkable. It has poor public transport connectivity. The streets are 18-30m wide, with high traffic volumes. Ample off-street parking is available, and on-street parking is also observed.

Surat comprises old and dense developments with increasing high-rise residential developments.

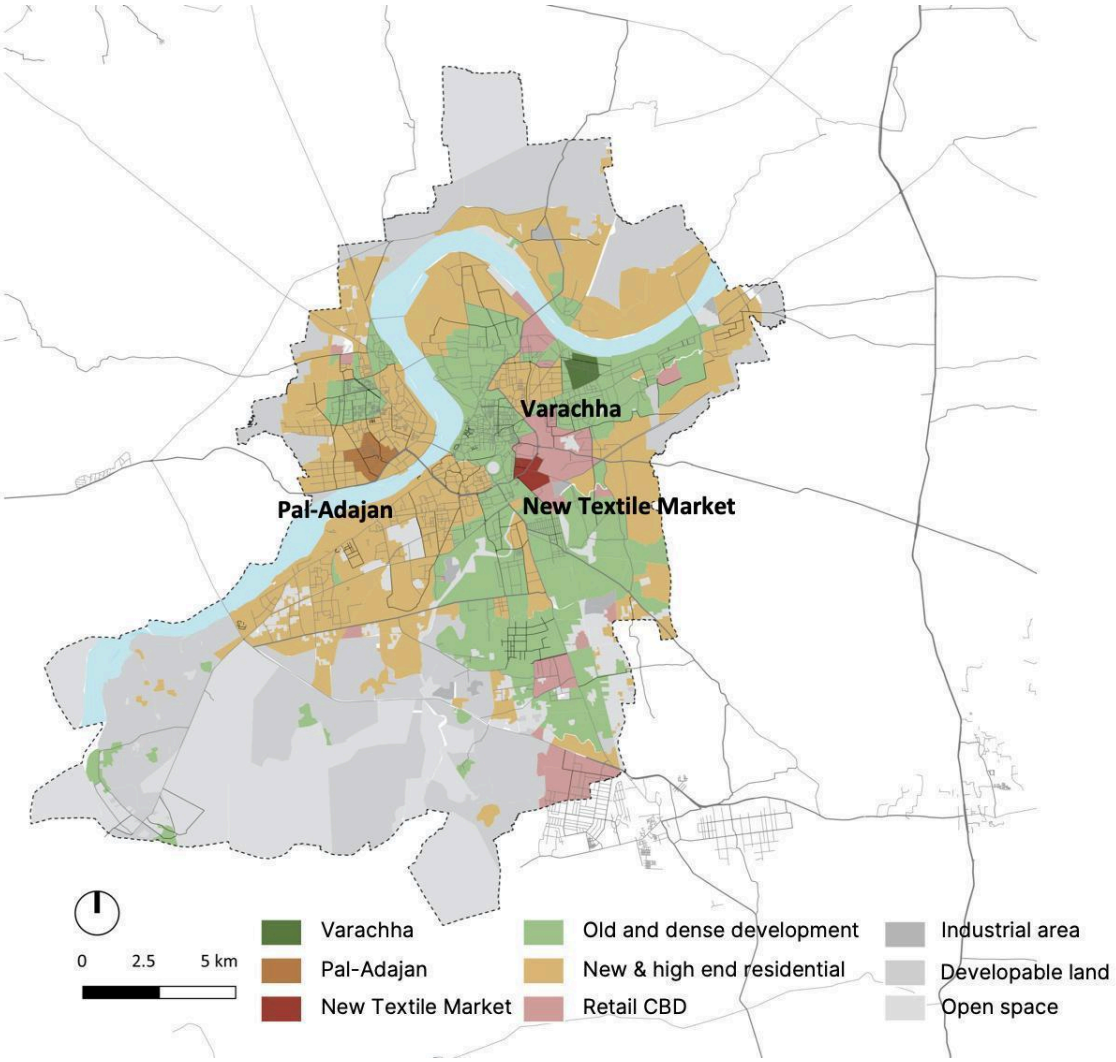

Figure 6: Surat typologies

The selected sites in Surat are New Textile Market, Pal-Adajan and Varachha.

- The New Textile Market represents 'retail CBD', comprising a wholesale textile market.
- Pal-Adajan represents 'new & high-end residential development', with ample off-street parking available.
- Varachha represents 'old & dense development', where parking largely happens on-street.

Pimpri Chinchwad is predominantly a mix of residential and commercial uses, with emerging IT offices, as shown in Figure 2.

The selected sites in Pimpri Chinchwad are Kalewadi, Wakad, and Pimple-Saudagar.

- Kalewadi represents ‘old & dense development’, predominantly residential with dense fabric and narrow streets.
- Wakad represents ‘retail CBD’ and is largely mixed-use, with emerging commercial spaces.
- Pimple-Saudagar represents ‘new & high-end residential development’ and comprises large residential complexes, with commercial and retail activities on its primary streets.

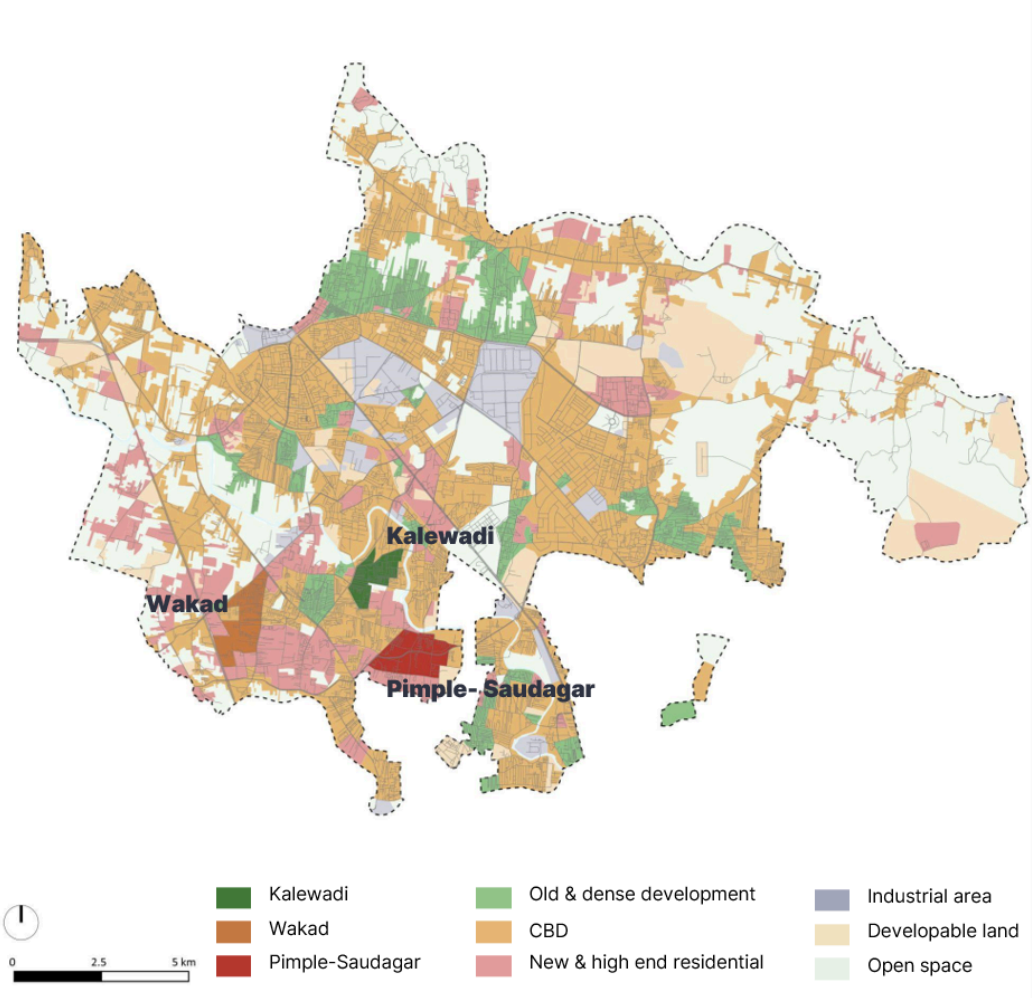

Figure 7: Pimpri-Chinchwad typology

2.4. Assessment of parking provision and demand

The following section elaborates on how the current parking scenario was assessed. Parking demand and supply for off-street, on-street and supply on-designed streets were calculated based on sample surveys. Land-use and street-use maps were generated for the basis of the analysis.

2.4.1. Off-street parking demand & supply

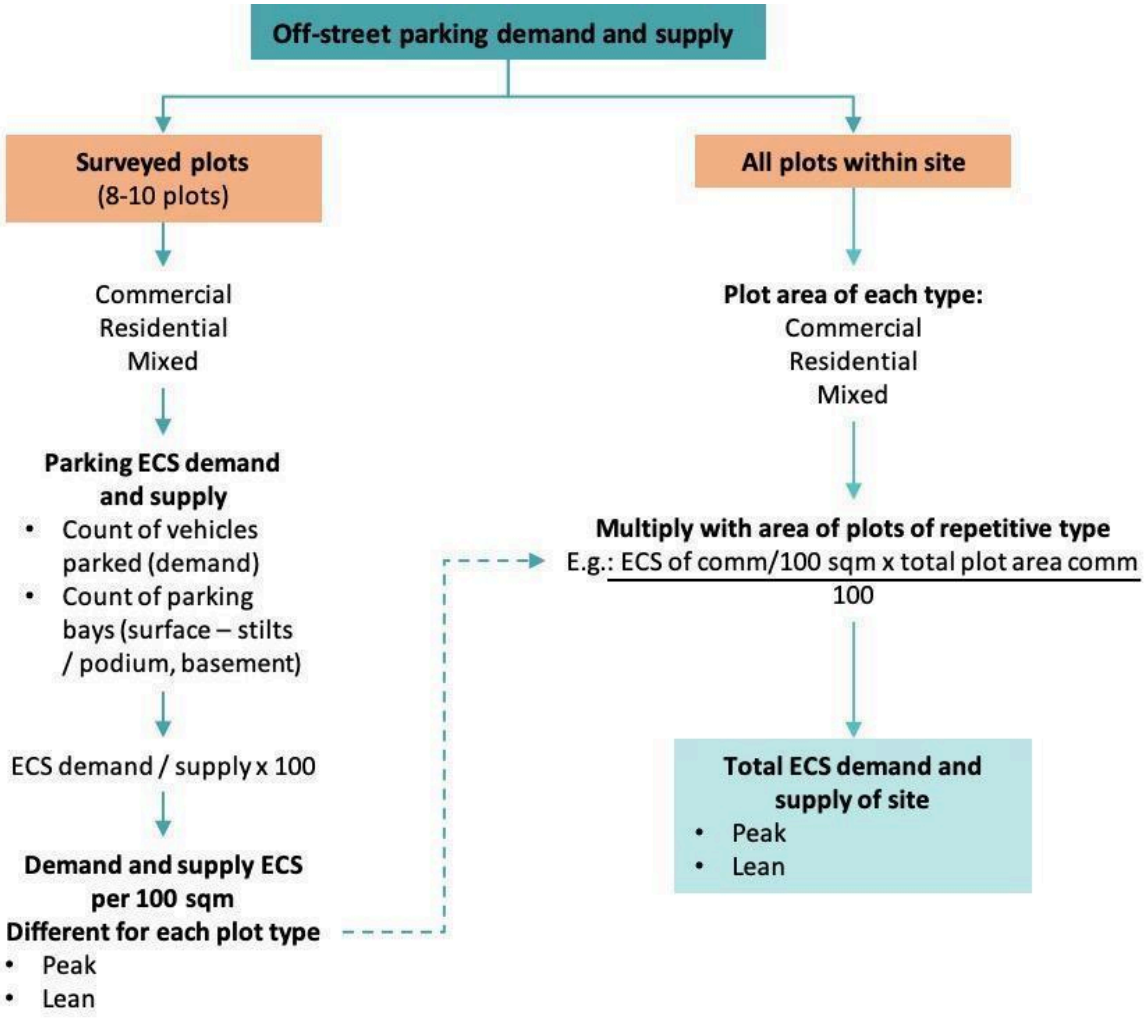

Figure 8: Method of off-street parking demand and supply

To get a holistic view of off-street parking conditions, eight to ten buildings were surveyed from each site. These buildings are residential, commercial and mixed-use types. These included parking on stilts, buildings with basements,

and buildings without basements. The data collected from the survey is as follows:

- Number of buildings
- Number of floors
- Number of units and units currently occupied
- Off-street parking type: surface, podium, basement
- Number of basements (if applicable)
- Off-street parking: count of parking bays, count of vehicles parked at that time

The count of vehicles parked was conducted over two visits to get an overview of parking conditions during lean and peak times of the day. This gave an idea of maximum and minimum parking occupancy in a building complex throughout the day.

Parking demand of the whole site, in terms of equivalent car spaces (ECS), was extrapolated based on the off-street count of vehicles parked in surveyed buildings. Parking demand and supply in each building were derived from the count of parking bays and parked vehicles – on the surface (stilts or podium) and in the basement. Demand and supply per 100 sqm were calculated based on total plot areas. The parking supply per 100 sqm of buildings with and without basements was calculated separately.

The parking supply per 100 sqm calculated was cross-verified from RERA data of respective cities. A few sample buildings to be constructed were selected from the RERA website. Parking bays which are provided in the buildings, with and without basements, were converted to ECS. ECS per 100 sqm was derived from this data supply for the new developments and checked with the surveyed data.

The availability of off-street parking in each plot was visually assessed and mapped from satellite imagery and Google Street View to derive the total plot area with parking. Similarly, plots with and without basements were also separated. Total ECS demand and supply in that site were derived by multiplying the total plot area with off-street parking with ECS per 100 sqm of each type.

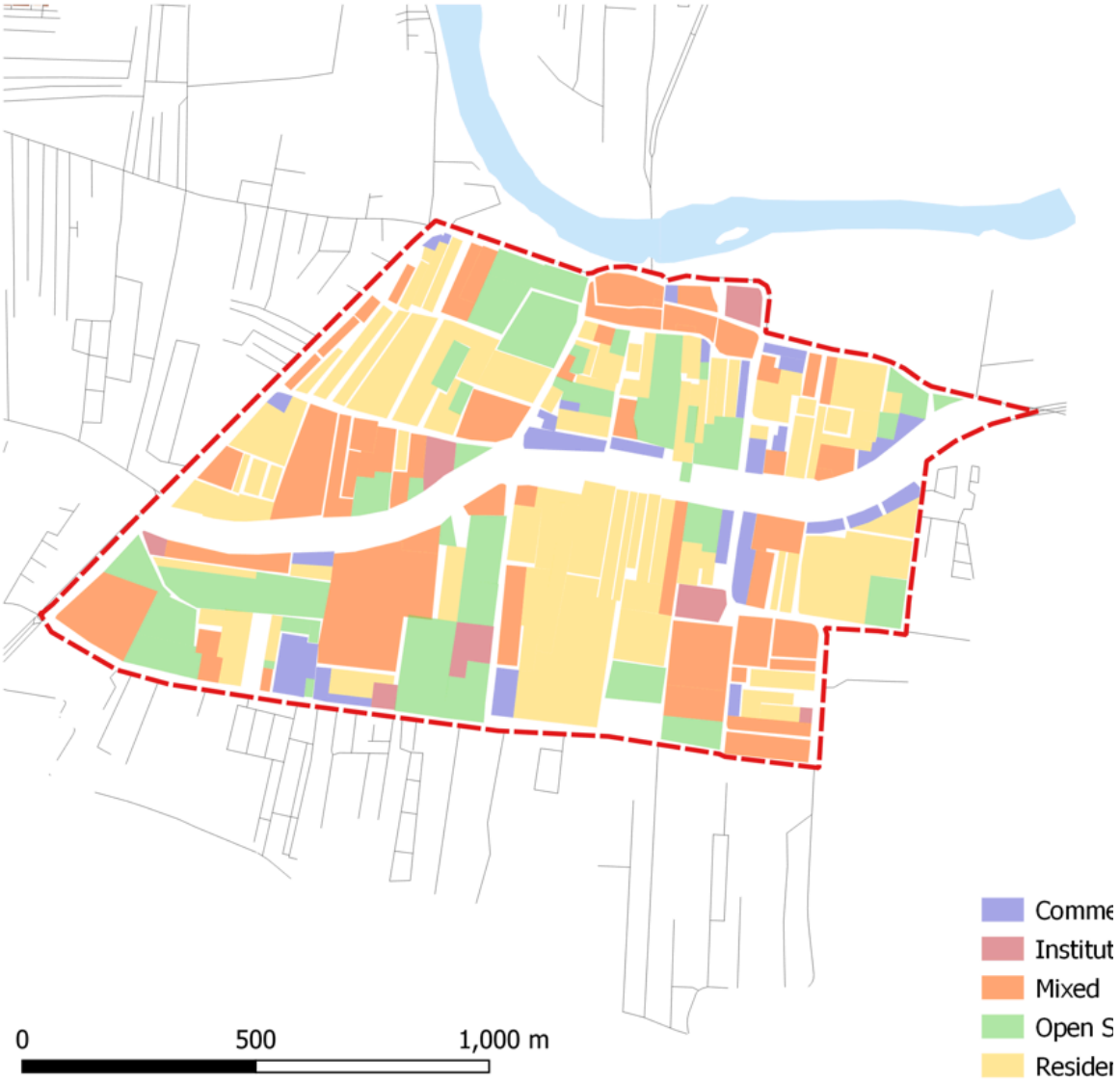

Figure 9: Land-use map used as a base for off-street parking calculation, Pimple - Saudagar

2.4.2. On-street parking demand & supply

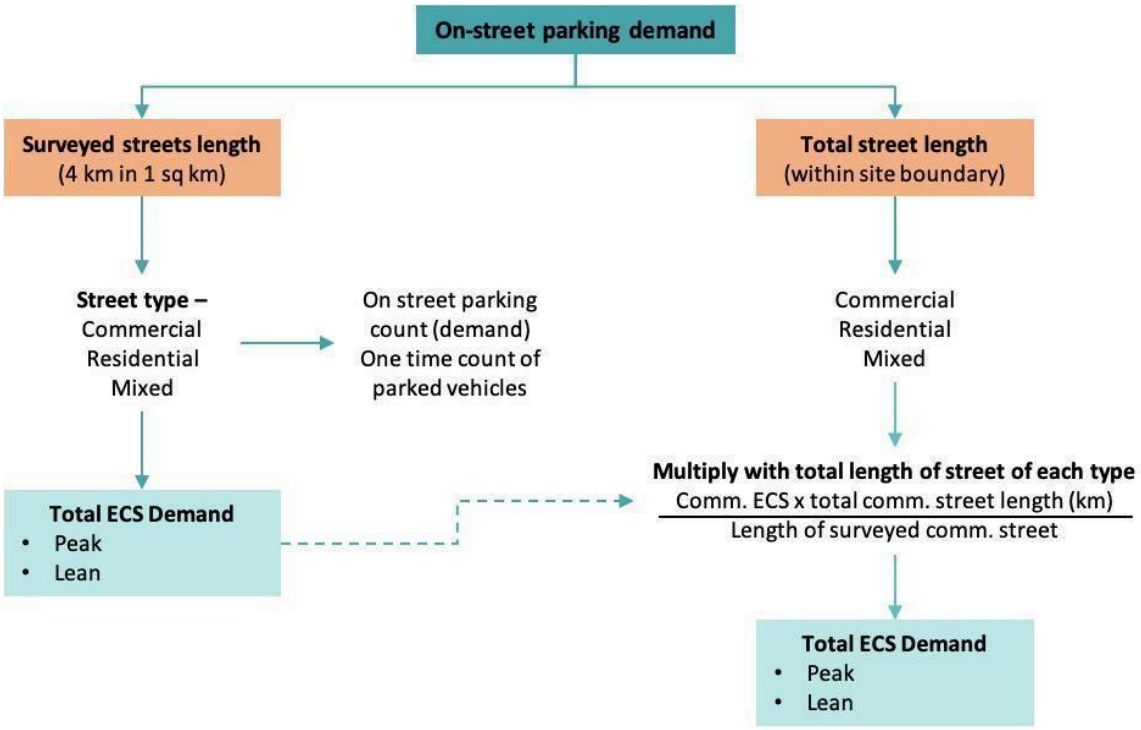

Figure 10: Method of on-street parking demand

Based on their right of way and the predominant use, nearly 4 km of streets were identified for the survey. The street uses were derived from the surrounding land use and subsequently categorised into residential, commercial and mixed-use. Through photographs and video documentation, on-street parking conditions were also documented. The data collected from the survey is as follows:

- On-street parking count, both sides of the street, below flyovers, and along service roads (if applicable)
- Video documentation of surveyed sites

The survey was conducted both at peak and lean times to get a larger view of on-street parking conditions at different times of the day. As no official/ regulated on-street parking is available in either of the cities, all on-street parking was considered the site's demand. ECS demand for each surveyed street was derived from a one-time count of parked vehicles.

All streets within defined site boundaries were mapped and categorised based on surrounding land use. The total length of streets for the whole site was

derived. Total on-street ECS demand was derived by multiplying the total length of streets with the total ECS demand of surveyed streets, which was then divided by the total length of surveyed streets.

2.4.3. City-level projections

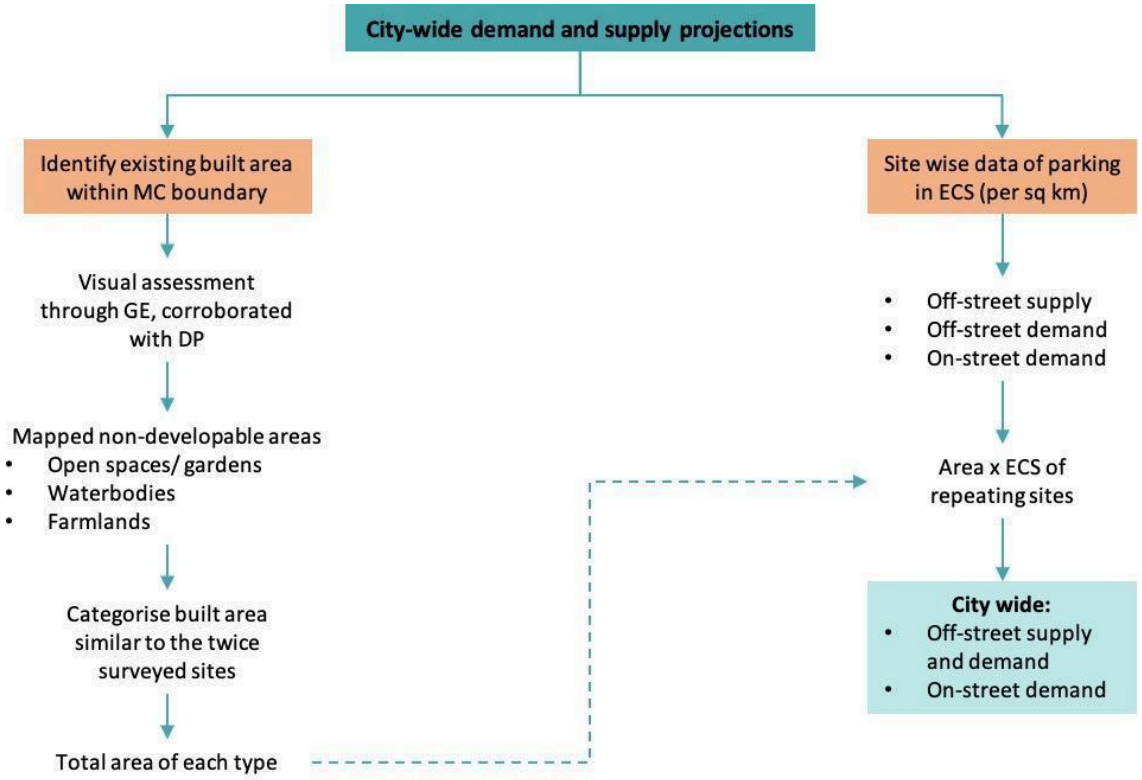

Figure 11: Method of city-wide demand and supply projections

City-level projections for developed areas in each city were derived based on site-level parking supply and demand. Satellite images and Development Plans of respective cities were referred to identify and mark the developed areas. These areas were further categorised based on their similarity to the built characteristics of the three surveyed sites. For instance, areas with block sizes and street patterns similar to Varachha in Surat were categorised as “Varachha Type” and so on. Citywide off-street supply and demand and on-street demand were calculated by multiplying the total area of each type of site in the city with the ECS of the respective sites.

2.4.4. On-street parking supply – designed streets

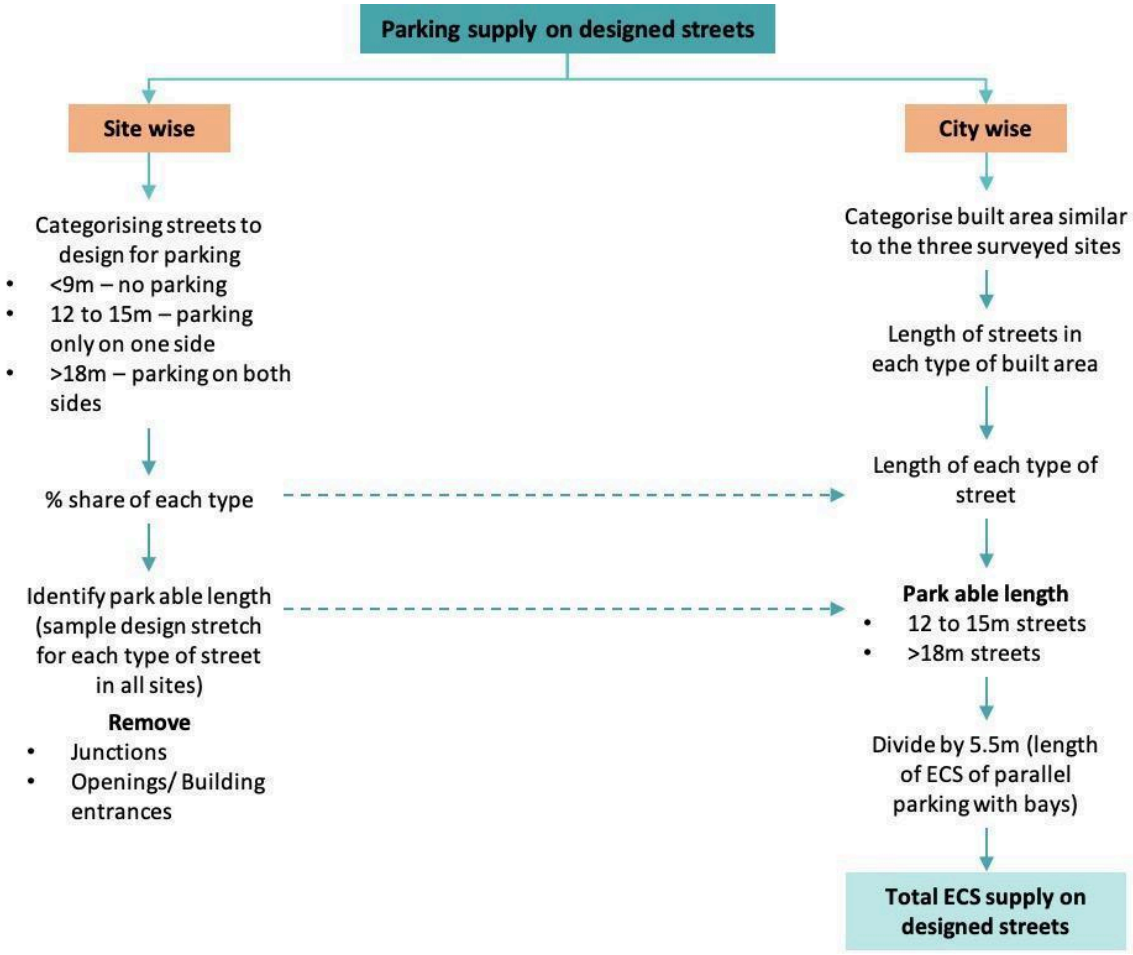

Figure 12: Method of parking supply on designed streets

To calculate the parking supply on designed streets at the city level, both site-level data and city-level data were used.

The case of Varachha in Surat is taken to explain the calculation methodology. At the site level, the total length of streets in Varachha was determined through GIS. Three parking conditions were identified – with no parking, parking only on one side, and parking on both sides of the street. They were determined based on their street widths, given as follows:

- Less than 9m – streets with no parking
- 12m to 15m – streets with parking only on one side
- More than 18m – streets with parking on both sides

The total length of each type was derived following by percentage share of each category of street in the site. The full length of streets in all areas identified as ‘old and dense’, was derived with a similar method. Streets less than 9m were not considered for further calculations, as there would be no parking on these streets.

The parkable length for each street type was derived based on appropriate street design principles such as distance from the intersection, presence of property entrances, and typical street conditions. For instance, parking can be provided on 53% of the 18m streets. In the New Textile Market, the figure drops to 46%. The standard space for car parking was taken as 5.5m (length) x 2.5m (width). Total possible parking (in terms of ECS) was derived by dividing the parkable length by the length of one parallel car parking space.

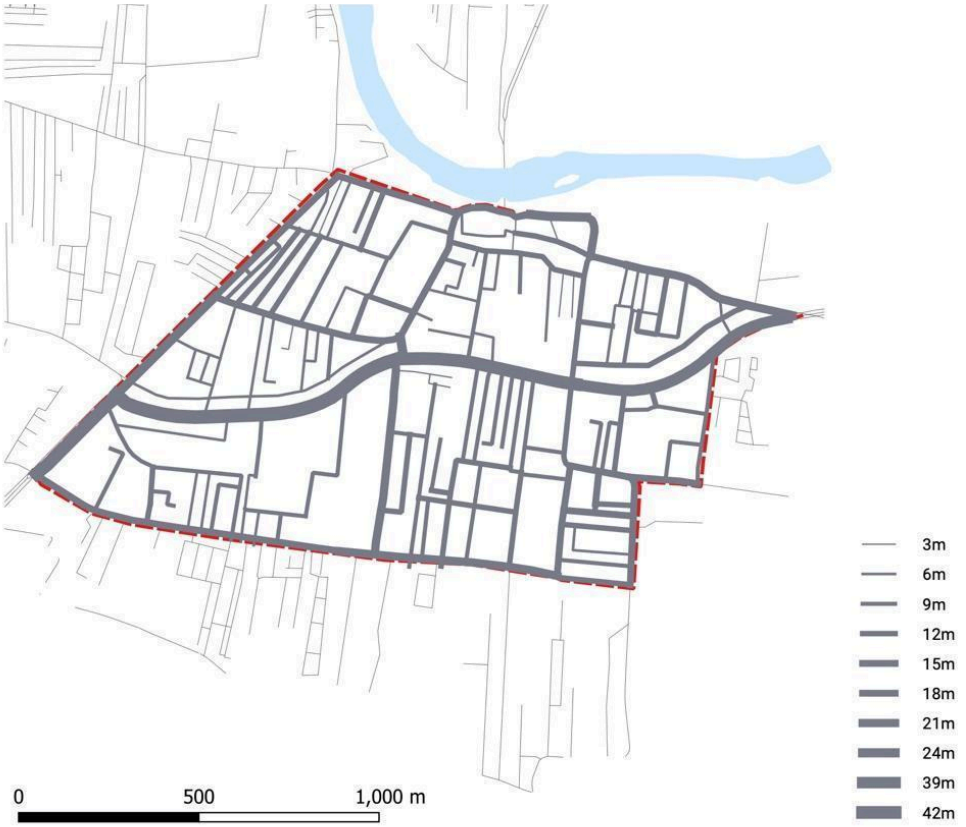

Figure 13: Right of Way map for on-street parking calculation, Pimple-Saudagar

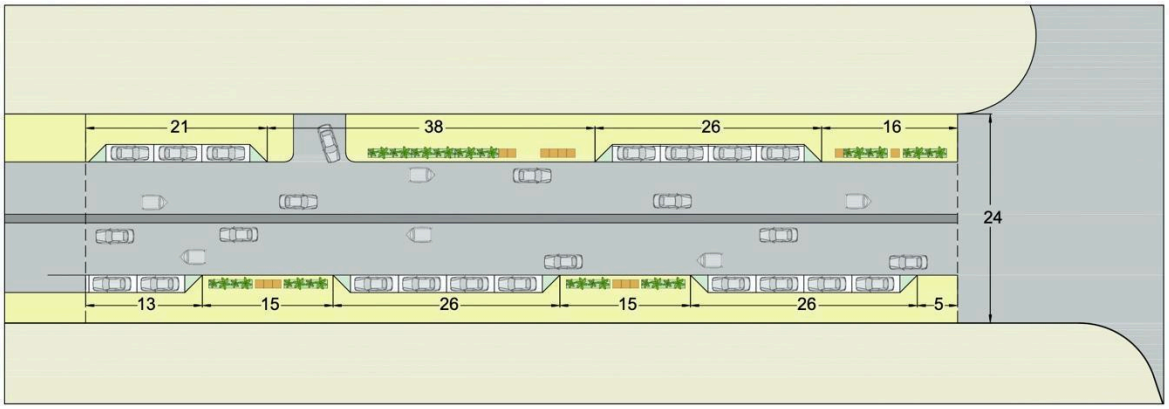

Figure 14: Sample 24m designed street

2.5. Price discovery for parking

A survey was conducted to understand people's parking choices. The survey focussed on people owning or travelling by personal two-wheelers and four-wheelers. Respondents were selected from residential, commercial, and retail areas, as parking conditions vary in all three contexts.

The intent of the user survey was

- To inform the authorities about the willingness of users to pay for parking and to suggest revisions in parking charges in the city.
- To identify the gap between willingness to pay and feasible pricing for the private parking market to develop a roadmap suggesting steps to increase parking pricing for a conducive private parking market.

The study team interviewed around two thousand respondents in the two study cities to capture their current parking behaviour and willingness to pay for parking. Users were divided into two categories - long-term parkers who would park for more than six hours, representing residential and workplace parking, and short-term parkers who would park for less than six hours, representing visitor parking.

Both types of parkers were asked about their willingness to pay for parking by presenting them with incremental price points. The parking fee charged is currently taken as the lowest price point. The highest price point was what would have to be charged for an entirely market-driven parking business with no form of public subsidy, including land.

The price ranges were:

- INR 20-100 per hour for short-term car parkers
- INR 5000-25000 per month for long-term car parkers
- INR 10-50 per hour for short-term two-wheeler users
- INR 1500-7500 per month for long-term two-wheeler users

Users could either choose to pay for parking, shift to another mode of transportation or, in some cases, choose not to come to the location at all. The discovered price was used to develop economic and financial models that explore opportunities for the private market to create functional and profitable multi-level car parking.

2.6. Perspective on unbundling parking

Parking not only involves capital costs but also requires regular operations and maintenance costs. Occupants who don't own personal vehicles have to bear the cost of parking, as parking is bundled with the unit — presently, one doesn't have the choice to buy units without parking. Non-car owners have to pay for the maintenance of parking, as building regulations categorise parking areas as common areas. Therefore, unbundling of parking is when the cost of car parking space is separated from the real estate.

In the survey, the users were given a scenario where parking is not free anymore, and they were required to pay an additional 15% or 25% of the cost of the house for each car parking space. They could choose to pay the additional cost and keep the parking space, reduce their house budget to purchase the parking space, live a car-free life, or go to a less desirable location with less expensive housing that comes with parking. The aim is to understand their willingness to purchase parking space over and above the cost of the house.

Both Surat and Pimpri Chinchwad have distinct urban typologies, vehicular populations and, consequently, their own parking challenges. Based on the surveys, the following chapter breaks down the parking scenario in both cities and analyses opportunities for the private market to consider parking a viable business.

3. Parking Related Legislations and Regulations

3.1. Classification of parking types

Parking can be classified into four types: public on-street parking, private on-street parking, public off-street parking, and private off-street parking. In the Indian context, completely privatised on-street parking is not common. The following section highlights the regulatory arrangements for the other three types of parking.

- Public on-street parking: Parking on streets is regulated under the Motor Vehicle Act (1988) and specifically, under the rules framed under this Act – i.e. Gujarat/ Maharashtra Motor Vehicles Rules (1989) specify powers to designate/ notify parking places and the fees to be charged and manner of maintenance and management. Apart from the Act and Rules, the Police Act in both states gives powers to the police to make or enforce rules or regulations related to traffic and parking management to maintain public order in public places, including streets.
- Public off-street parking: This type of parking is mainly publicly owned as Multi-level Car Parks (MLCPs) or open plots built and maintained by municipal authorities. In the city of Ahmedabad, Gujarat, for example, of the 108 designated parking areas, there are four MLCPs with a capacity of 658 cars and 1053 two-wheelers, 61 in off-street plots, and 29 in spaces like traffic islands and under flyovers. Private players operate some of these off-street parking complexes. The Municipal Commissioner is given the power to acquire land to provide parking. The urban local body (ULB) is given the power to make by-laws to provide and maintain parking spaces on private land. The ULB gets this power in the State of Gujarat[2] and Maharashtra from the Gujarat Provincial

[2] Gujarat Provincial Municipal Corporations Act, 1949. gives the power to provide, maintain and secure public parking spaces.

a. Section 209 (2)- Commissioner may acquire land for providing or improving a place for parking of vehicles will be deemed to be for improving public street.

b. Section 458 (9A)- The Corporation may make by-laws with respect to provision and maintenance of parking space and loading and unloading space for buildings erected or re-erected in such locality or for such use as may be specified.

Municipal Corporations Act, 1949, and the Bombay Provincial Municipal Corporations Act, respectively.

- Private off-street parking: This is parking provided inside buildings that is regulated by the town planning legislation and the building by-laws. For example, Maharashtra Regional and Town Planning Act (1966) and Gujarat Town Planning and Urban Development Act (1976)[3] regulate the provision of parking as part of the development plans, town planning schemes, or local area plans (in Gujarat only). Specific building bylaws are framed under these acts to regulate parking inside the buildings – i.e., General Development Control Regulations 2019 in Gujarat and Unified Development Control and Promotion Regulations 2020 in Maharashtra.

3.2. Parking regulations in city contexts

In the Indian urban planning system, a Master Plan (also known as Development Plan[4] (DP)) functions as the long-term macro-level statutory planning instrument to guide and regulate the growth of cities and manage urbanisation. The DP is accompanied by building-level regulations that govern how the floor spaces in the building need to be divided and used. The plans of the city and their related regulations propose that off-street parking is provided in all buildings as a prerequisite to counterbalance the limitations faced by the limited supply of on-street parking. This off-street parking is regulated through minimum parking requirements prescribed in the DCRs. The developers must

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c. Section 458 (36)- The Corporation may make by-laws with respect to securing the protection of public parking places.

[3] The Gujarat Town Planning and Urban Development Act, 1976- The development plan of an area is responsible for providing certain amenities; parking spaces are one of them. Section 12 (2) In particular, it shall provide, so far as may be necessary, for all or any of the following matters, namely: - (m) provision for controlling and regulating the use and development of land within the development [including imposition of charges at such rate as may be provide for grant of Floor Space Index (FSI) or height, and also imposition of] conditions and restrictions in regard to the open space to be maintained for buildings, the percentage of building area for a plot, the location, number, size, height, number of storeys and character of buildings and density of built up area allowed in specified area, the use and purposes to which a building or specified areas of land may or may not be appropriated, the subdivisions of plots, the discontinuance of objectionable uses of land in any area in any specified periods, parking spaces, loading and unloading space for any building and the sizes of projections and advertisement signs and hoardings and other matters as may be considered necessary for carrying out the objects of this Act

[4] The idea of statutory planning in India (through Master Plans) was inspired by the United States and the UK planning frameworks (Vidyarthi, 2018).

provide a certain ‘minimum’ amount of parking within the building plot to ensure no spillover of the building users parking on the streets.

The minimum parking requirements increase with the increase in the built-up area of a particular building, its use (residential or commercial), and the number of units. Parking space in cities is often calculated as linked to the number of dwelling units, the unit size, the total floor space, or even the capacity for non-residential uses. Tamil Nadu and New Delhi have the highest residential parking requirements, where almost 38% of the building area is allocated for parking, while Kolkata has the least (13%). Maharashtra and New Delhi have the highest parking requirements for commercial uses like retail and restaurants, while Kerala has the least.

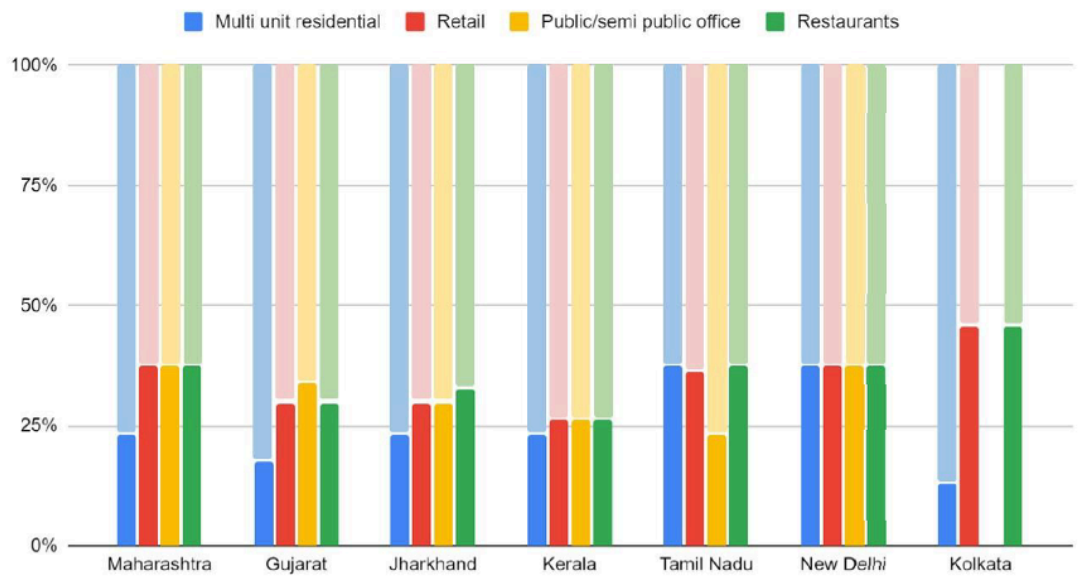


Figure 15: Parking requirements as part of the land use regulations in different cities

A car needs about 23-26 square meters of land for comfortable parking and its associated circulation space. Under the housing schemes for economically weaker households as part of the public housing schemes, the government mandates 25 square meters of floor space per dwelling unit. In other words, with a purchase of every apartment of about 100 sq.m., the residents are forced to consume a car parking area equivalent to an EWS dwelling unit size. It is essential to understand every car's demand on the city’s limited supply of

serviced land and floor space and how it inflates the real estate markets. This may price out a lot of people from the formal housing markets.

Figure 16: Comparison of space required for parking and EWS unit from the United States

Use	Ahmedabad (Gujarat) (% of total utilised FSI)	Mumbai (Maharashtra) (% of Floor Area)	Bangalore (Karnataka) (% of Floor Area)	Delhi (% of Floor Area)
Residential Multi-dwelling units	20%	a) 12.8% (carpet area up to 45 sqm each) b) 19.5- 25.5% (carpet area between 60 and 90 sqm) c) 25.5% (Carpet Area 90 to 120 sqm	15.3% (Dwelling unit measuring more than 50 sqm up to 150 sqm of floor area) Additionally, it can go up to 46%	a) 46% (Open) b) 56% (Ground Floor Covered) c) 64% (Basement)
Retail	50%	a) 57.5 (for every 40 sq.m of floor area up to 800 m.) b) 15.3 (for every 150 sq.m of floor area with each shop up to 20 sq.m)	a) 30.6 (Food and drinks - for every 75 sq.m of floor area) b) 46% (Shops, complexes, and malls) c) 57.5% (Multiplex integrated with shopping)	a) 69% (Open) b) 84% (Ground floor covered) c) Basement: 90% for multilevel with ramps; 48% for automated multi-level with lifts

Use	Ahmedabad (Gujarat) (% of total utilised FSI)	Mumbai (Maharashtra) (% of Floor Area)	Bangalore (Karnataka) (% of Floor Area)	Delhi (% of Floor Area)
Office	50%	61.3% (for every 37.5 sq.m of floor area up to 1500 sq.m)	46% (for every 50 sq.m of floor area)	a) 69% (Open) b) 84% (Ground floor covered c) Basement: 90% for multilevel with ramps: 48% for automated multi-level with lifts

Table 2: Parking minimums in Indian cities

The parking minimums vary from city to city. Among the larger cities (Ahmedabad, Mumbai, Bangalore and Chennai), Mumbai has the lowest parking requirements for residential use, while Bangalore has the lowest for office and retail commercial. Delhi has high parking minimum requirements in all categories of buildings.

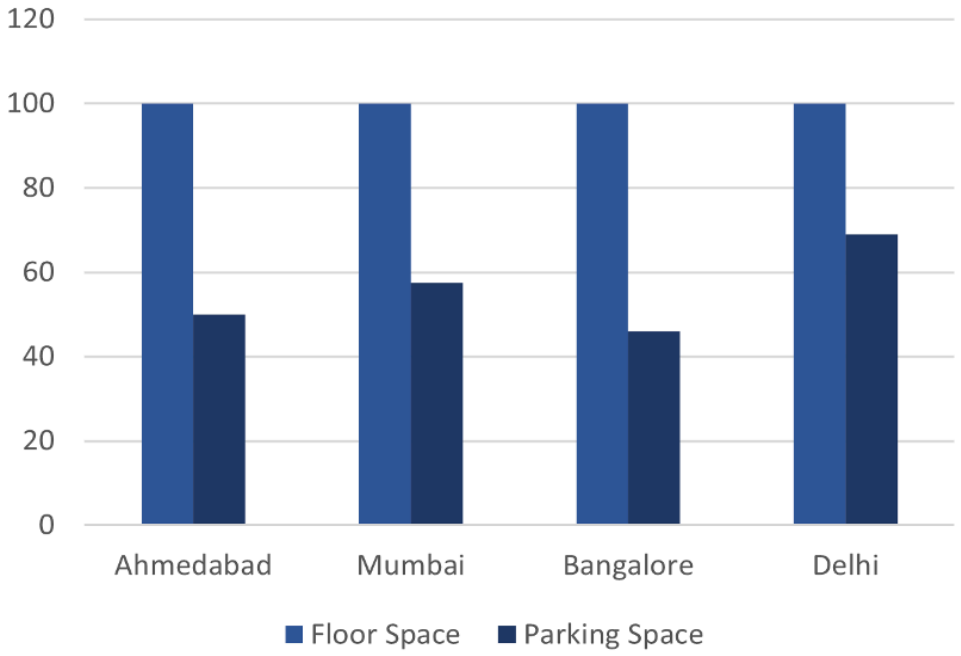


Figure 17: Parking in retail buildings

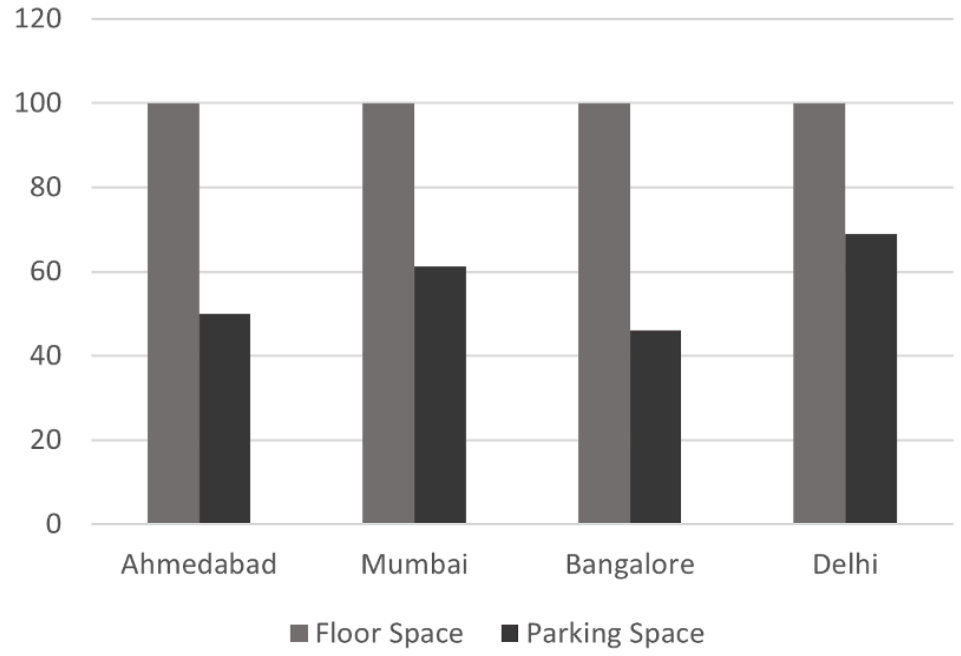


Figure 18: Parking in retail buildings

To avoid the on-ground repercussions of freely available parking space, parking in buildings became mandatory via DCRs as part of the statutory planning mechanisms. Similarly, to address the lack of publicly available parking spaces, building multi-level car parks was the subsequent step with the supply-centric approach adopted to solve the parking issue. The process of prescribing minimum parking requirements comes from the notion that parking is a prerequisite for all buildings. This approach of providing 'parking minimums' in buildings to remove parking from the streets is often criticised for being ineffective for the following reasons.

- It is difficult to predict 'how much parking is sufficient' in the buildings.
- The parking requirements keep increasing when more and more people buy vehicles (especially cars). Thus, the buildings might run out of parking supply (as they have done in our cities)
- This approach assumes that parking in buildings will automatically remove parking from the streets, which is not always the case. The demand for parking is determined by a particular location and the willingness to pay for that particular location. Parking is not a location-neutral or price-neutral activity.
- This distorts the real estate markets with either the under or over-supply of parking spaces in the buildings, which in either way renders this approach ineffective.
- The cost imposed on the buildings to provide an 'adequate' supply is eventually passed on to the users or the consumers, many of which might be priced out of the market. This inequitable parking provision occupies more space than providing toilets, and an excess supply of the former encourages more vehicle use, which should not be ignored.

The use of parking and its price tag for a particular location works on the demand and supply principles like any other economic good. The discrepancy in approaching on-street and off-street parking demand adequately requires parking to be priced at its true cost.

3.3. Conclusion

The approach that most Indian cities take is to increase parking supply infinitely by earmarking public land for parking, constructing multi-level parking structures, and mandating all buildings to have a minimum number of parking slots. This comes from the view that the demand for parking will continue to grow with motorisation; therefore, adequate parking spaces must be set aside to meet this growing demand. The notion of on-street parking being public and abundantly available and off-street parking being private and expensive is the root cause for insatiable and haphazard parking. It is crucial to understand that both on-street and off-street parking are interlinked. Private vehicle users prefer on-street parking due to the ease of availability and convenience over a dedicated off-street parking space.

Litman (2006) suggests that managing existing parking facilities is more effective than increasing the parking supply. This approach that tries to incrementally and holistically solve the parking issue in designated areas requires planning to be synchronised between city planners and other government authorities (Marsden 2006; Litman 2006; de Wit 2006; Rye 2010). The discourse on parking has shifted the perception of it from mandatory infrastructure to a market good (Barter 2015).

Due to flawed policies or the lack of it attached to parking, the legitimate and fair cost of parking goes unknown. To alter this, parking fares should be market-responsive, both in the buildings and on-street. In this manner, pricing would dictate the demand for parking rather than offering an indefinite supply of space for parking (Shoup 2005). In most Indian cities, parking on the street is free or has a very minimal charge. In fact, the parking fees charged in India are one of the lowest in the world. Thus, a market-responsive parking policy that oversees the management of parking on-street and off-street must be put in place.

4. Surat

4.1. City context

As per the 2011 Indian Census, Surat was the eighth largest city in India, with a population of 4.6 million. Its current population is estimated to be six million. As per the Global Economic Research report, Surat would be the world's fastest-growing city in the 2019-35 period.[5] Surat's GDP will see an average growth rate of 9.2% in this period.

Data from the Regional Transport Office in Surat tells us that, of the three million vehicles registered in the city till March 2018, 80% were motorised two-wheelers; only 7% were four-wheelers. But, as the city becomes wealthier, not only will vehicle ownership increase significantly, the percentage of cars will rise dramatically, and demand for parking will grow manifold.

With each car needing at least two parking spaces of 25 sq.m. each in the city—and a motorised two-wheeler needing around a fifth of that—parking in Surat currently occupies 35 sq.km. That is nearly one-quarter of the total built-up in Surat, i.e., 125 sq. km as of 2019 (Shahfahad et al., 2021). The space parking occupies in Surat currently is equivalent to 3300 football fields.

An increase in demand for parking comes at a high cost, as parking occupies prime real estate both on and off the street. There is an urgent need for parking reforms to address the impending crisis.

4.2. Parking in Surat

Surat, like any other Indian city, faces parking challenges due to growing motorisation. Many streets have on-street parking. Spaces under flyovers are also occupied by parking. Further, 75% of all existing off-street parking provisions (open plots and MLCPs) are occupied.

Based on discussions, SMC has realised that the city cannot infinitely increase the parking supply, nor will this approach resolve the parking issues in the long run. As of 2018, 47.5% of the road space is utilised by parking. On-street

[5]https://economictimes.indiatimes.com/news/politics-and-nation/surat-to-be-worlds-fastest-growing-city-during-2019-35-report/articleshow/66991793.cms?from=mdr

parking and cruising to search for parking were prime factors contributing to congestion. Surat's parking regulations are based on Gujarat's General Development Control Regulations – 2017 (GDCR). A look at the GDCR reveals that in areas with no transit-oriented development, the minimum parking must be provided is 20% of the utilised FSI for residential (multi-units) and 50% of the utilised FSI for commercial retail and office. To help visualise this, if there is a 1,000 sqm plot with an apartment, which has been built to its total FSI (1.8 in most of the city), 360 sqm of the area must be provided as parking. This space is more than the built-up area required for ten economically weaker section houses, each just less than 35 sqm in Surat.

No.	Type of Use	Minimum Parking Requirement	Visitor's Parking Requirement
1	Detached dwelling unit, Semi-detached dwelling unit, Row House, Tenement	1 car parking – for more than 80 sq.m. and up to 300 sq.m. of plinth area per unit. Additional 1 car parking for every 100 sq.m. additional plinth area per unit. This shall be permitted within the marginal space.	
2	Apartment	20% of Total Utilised FSI	10%, of the required parking space, shall be provided as visitors' parking
3	Residential Mixed Use (Residential + Commercial)	(a) For respective residential use, parking shall be provided as the case may be (b) For respective commercial use, parking shall be provided 50% of used Total Utilised FSI	10% of Residential parking requirement (a); and 20% of the Commercial parking in (b) shall be provided as visitors parking.

Table 3: Parking minimums in Surat

SMC has 37 authorised parking sites. Of this, fifteen are surface parking, nine are multi-level car park facilities, and the remaining thirteen are either below flyovers or on-street parking. A total of 1,39,000 sqm of land is reserved and devoted to providing parking to the city.

4.3. Parking policy and management

Recognising the challenges posed by the supply-centric parking approach, SMC developed a parking policy and parking master plan for Surat in 2018, which also received approval from the state government in the same year. The policy is comprehensive and recommends proactive strategies to manage parking. However, it has not been implemented to a large degree.

The overarching principle of this parking policy is to progressively reduce the demand for parking and facilitate organised parking for all types of vehicles. The policy further states that Surat shall pursue a policy of demand management rather than capacity augmentation to manage its parking requirements and promote high-quality public and non-motorised transport. Table 1 captures the key policy directives of Surat's parking policy and the status of their implementation. As seen in the table, many directives have not been implemented.

Directives	Description	Status
Charging for parking	• All parking in Surat shall be charged. • Charging shall depend on parking turnover and demand.	On-street parking in Surat is priced at most locations. There are 9 MLCPS. The price in MLCPs is lower than on-street.
Enforcing parking	Formulation of Traffic Cell to enforce all parking in Surat	Implemented
Providing proof of parking	Every vehicle purchased must provide proof of parking within 250m of the address	Not implemented

Directives	Description	Status
Sharing parking	Facilitate sharing of parking amongst neighbouring buildings	Not implemented
Reducing parking minimums	Reducing parking minimums with respect to land use, availability of parking, transit proximity and sharing of parking	Not implemented
Issuing parking permits	Residential and work zone permits	Not implemented
Regulating IPTS parking	Designated on-street parking for IPTS	Not implemented
Managing freight	Restrict movement of freight vehicles during working hours to avoid congestion	Partly implemented
Promoting NMT near transit and off-street parking facilities	Improve first and last mile connectivity, provision of city-wide PBS scheme, and parking for cycling	Partly implemented. Surat has a 1200-cycle fleet PBS system operational from 2020.

Table 4: Synopsis of Surat Parking Policy

4.4. Urban form and parking

Mixed-use is the predominant form of land use in Surat, along with a few pockets developed exclusively for residential, commercial, institutional or industrial uses. Typologies range from edge-to-edge construction in the older parts of the city, with narrow roads and limited off-street parking, to newer areas with wide streets and high-end apartment and office buildings with up to two basements for parking.

Neighbourhoods developed in the late 80s and early 90s, like Varachha—with limited parking typically in the front margins—now face the challenge of accommodating the growing demand for parking due to increased

motorisation. Parking within buildings in older commercial areas like New Textile Market is currently insufficient for the peak parking demand, thus creating a spillover on the streets. Newer suburbs like Pal-Adajan have higher vehicle ownership and associated parking demand. Parking on streets is mostly free, except for parking under flyovers, which is charged.

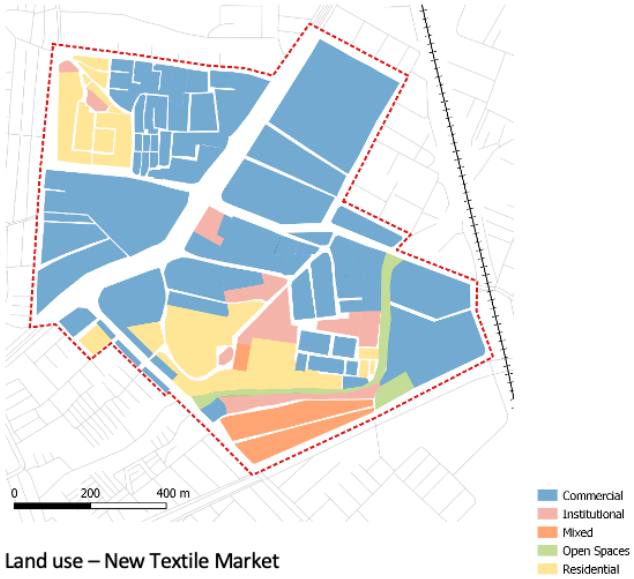
Surat provides an opportunity to study these varied built forms vis-a-vis parking challenges and necessary reform.

4.5. Understanding typologies

4.5.1. New Textile Market

Land use

It is predominantly a commercial area comprising a wholesale textile market. Some mixed-use developments with retail shops, residences and housing societies are also seen in this area.



Land use – New Textile Market

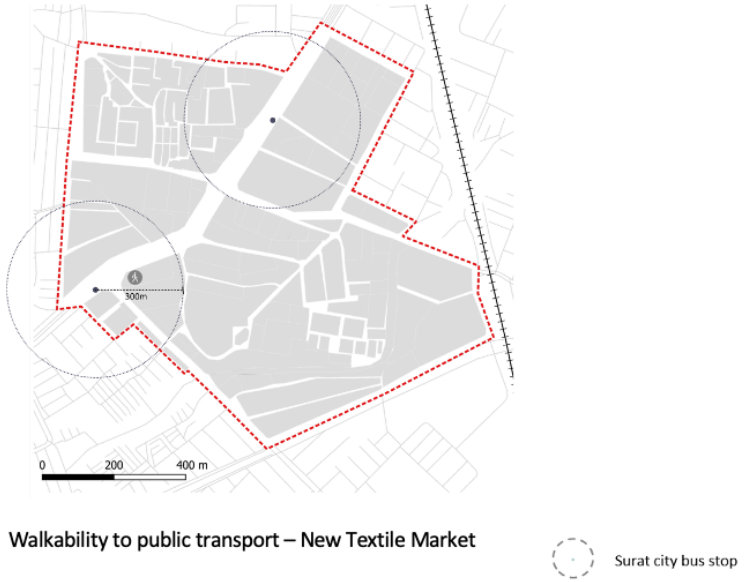
Plot size

The majority of the plots are more than 1500 sqm. With large urban blocks, walkability in this area is poor and inconvenient.

Plot sizes – New Textile Market

Public transport

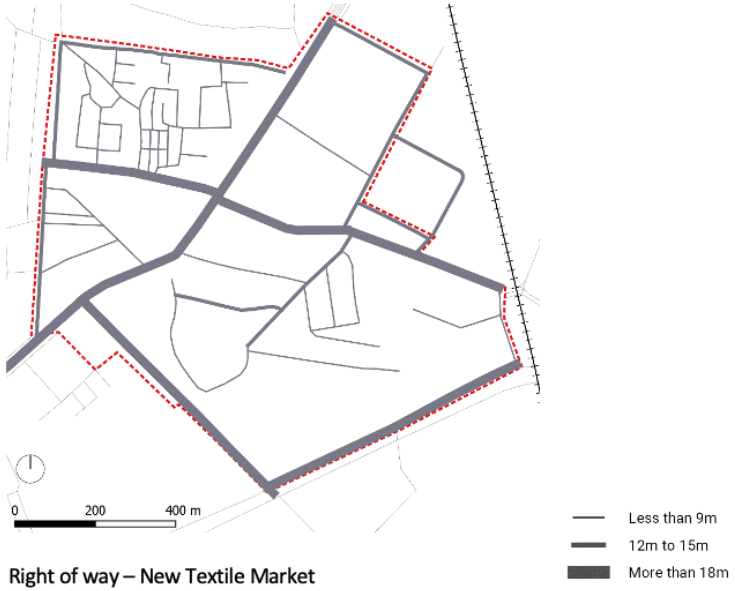
The New Textile Market is accessible through the Surat city bus. However, only two bus stops are seen in nearly one square kilometre. The bus stops are not accessible to most people working or residing here.



Walkability to public transport – New Textile Market

Street network

The street network is sparse, with the Right of Way of the primary street greater than 18m. A small but dense network of streets is observed near the residential part of the area.

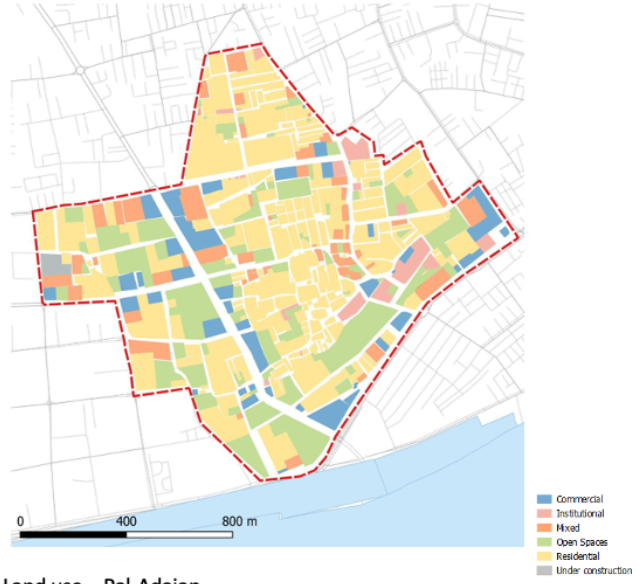


Right of way – New Textile Market

4.5.2. Pal–Adajan

Built use

Pal-Adajan is predominantly residential, with some retail and commercial developments along its primary roads. It also has a large number of public open spaces as compared to the other two sites.



Land use – Pal-Adajan

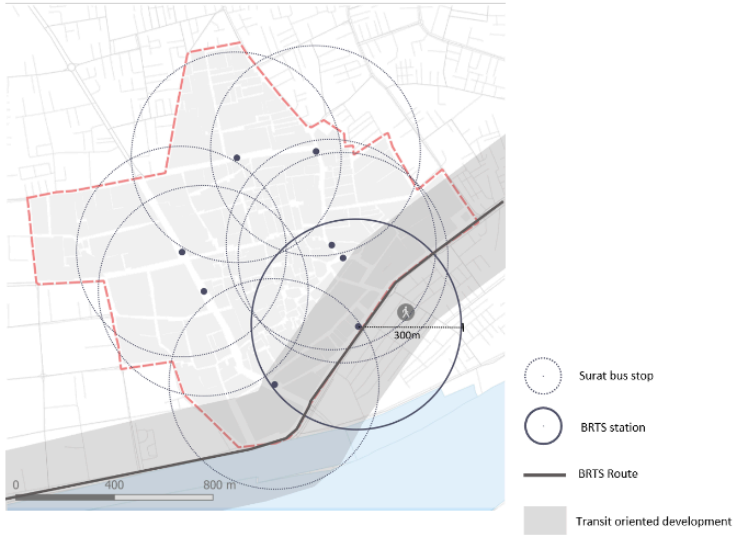
Plot size

As a new and upcoming area, several large-scale residential complexes with plot sizes of more than 1500 sqm are observed. Medium-sized plots, between 350 to 1499 sqm are also sparsely located in the area.

Plot sizes – Pal-Adajan

Public transport

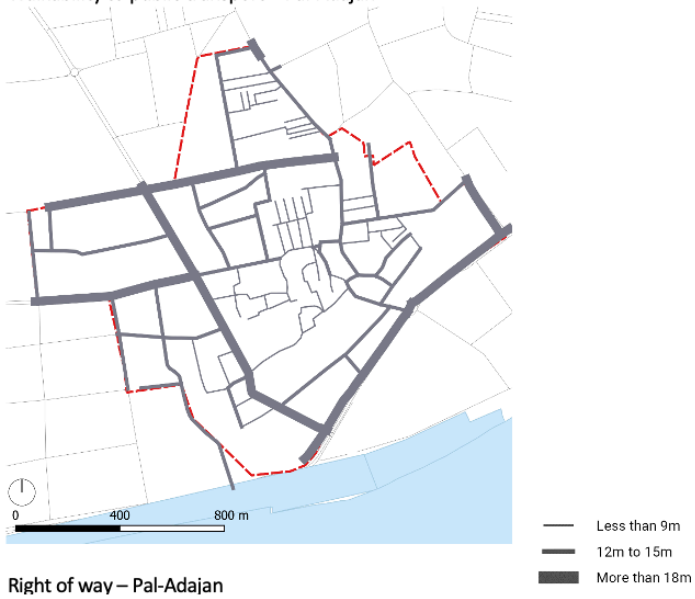
Public transport in Pal-Adajan comprises both BRTS and Surat city buses. The bus stops are located less than 300m of distance, making them easily accessible by walking.



Walkability to public transport – Pal-Adajan

Street network

The street network is extensive, with a mix of all primary, secondary and tertiary streets. This means that most urban blocks in this area are walkable. The city buses operate on both primary and secondary streets.



Right of way – Pal-Adajan

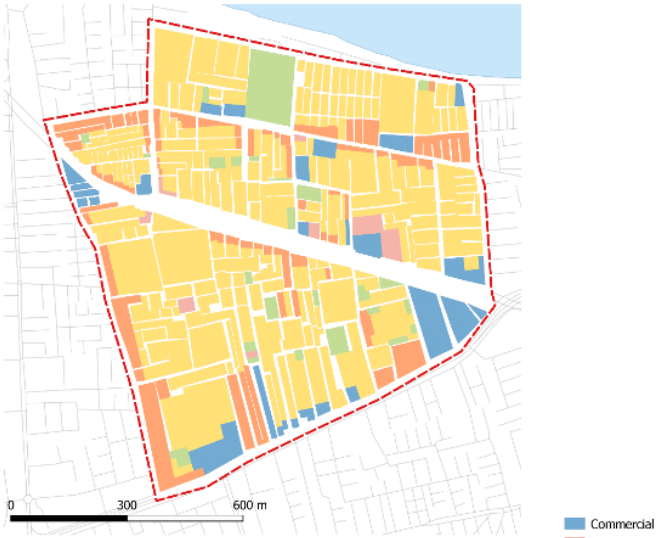
4.5.3. Varachha

Land use

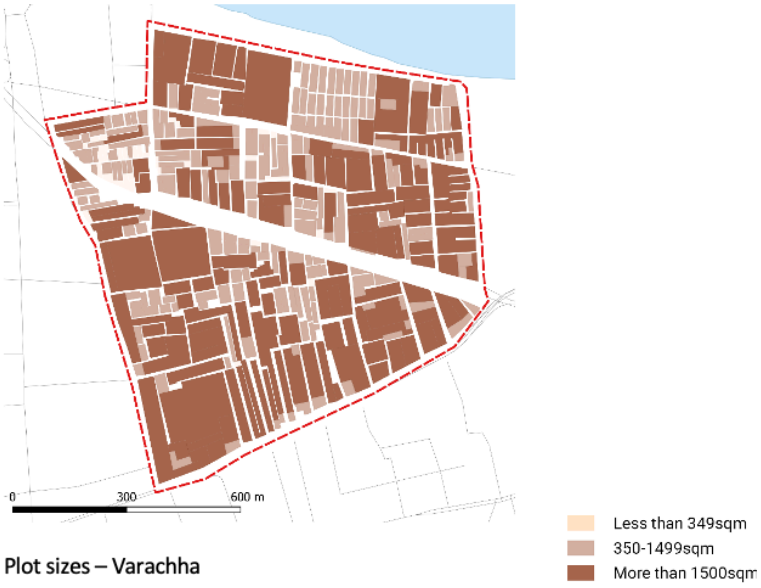
Varachha is predominantly residential, with some retail and commercial developments along its primary roads. It also has a few public open spaces like gardens and playgrounds.

Plot size

Varachha is a mix of medium and large-size plots. A majority of these plots are linear in shape.



Land use – Varachha



Plot sizes – Varachha

Public transport

Public transport in Varachha comprises BRTS. The bus stops are located at a 300m of distance, making it easily accessible by walking for most of the residents.

Walkability to public transport – Varachha

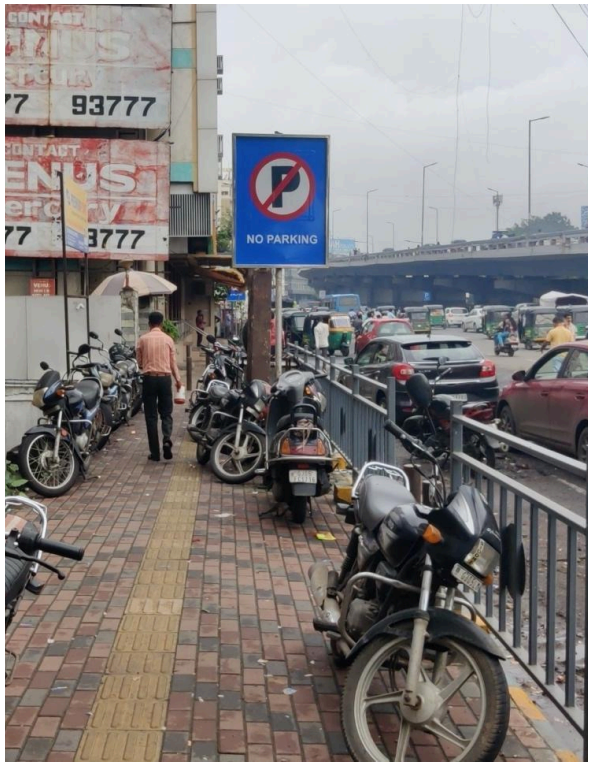
Street network

The street network is extensive, with the majority of the streets' ROW less than 9m. This has helped to make the urban blocks walkable. The BRTS operates on the primary streets, which are more than 18m wide.

Right of way – Varachha

Varachha
Old and dense development where parking happens predominantly on-street

Pal-Adajan
New and upcoming development with ample off-street parking supply



New Textile Market
CBD with high parking demand both on-street and off-street

4.6. Parking supply and demand

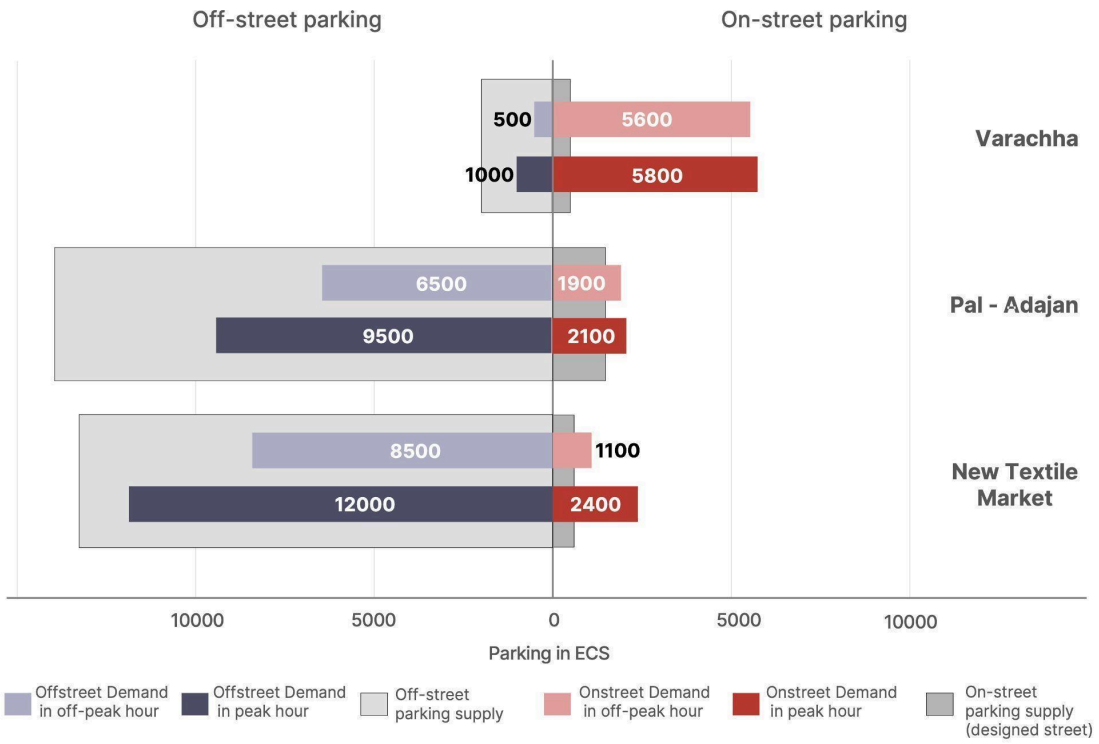


Figure 19: On-street and off-street parking supply and demand in the case study sites

4.6.1. Old and dense development (Varachha)

Varachha needs more off-street parking supply. The built use is commercial retail along large roads, with residential development along the internal roads. Buildings are built edge to edge with parking in margins. It has higher two-wheeler parking and minimal four-wheeler parking. The area also has low car ownership compared to two-wheeler ownership, with 395 cars and 721 two-wheelers per 1000 population.

The total demand for off-street parking ranges from 500-1000 ECS, whereas the total off-street supply is around 2000 ECS. The off-street parking is only 50% occupied during peak hours. The low occupancy could be on account of restricted access of off-street parking facilities as it is only used by residential

users. Secondly, in the current paradigm, on-street parking is more convenient as it is free and provides easier access to the end destination.

Demand for parking on streets peaked at 5800 ECS, significantly higher than what narrow streets in this area can accommodate. Streets in this area can only cater to 500 ECS if appropriately designed with footpaths.

Considering optimum occupancy of 85% during peak hours, existing off-street parking can absorb up to 850 ECS of the existing on-street parking demand if conducive regulations enabling the sharing of private parking are implemented.

The evident gap in parking demand and supply indicates a potential for the private market, mainly catering to the short-term on-street parking demand, as will be seen in a subsequent section on willingness to pay. Land for off-street parking would have to be made available through preparing Local Area Plans, which encourage plot amalgamation to create buildable plots. Obviously, other interventions to make parking a viable business for the private sector would have to be made. These interventions are discussed in the chapter on parking reforms.

4.6.2. Central Business District (New Textile Market)

New Textile Market is a wholesale textile market. The study area is primarily commercial and retail, with some residential pockets. The area attracts traffic from outside Surat. It also has substantial Light Commercial Vehicle (LCV) parking in addition to two-wheeler and four-wheeler parking.

The on-street parking demand ranges from 1100-2400 ECS. Streets in the CBD are narrow, ranging from 12-15m in width. These streets can accommodate parking on one side if designed well with footpaths and would have a capacity of 600 ECS. Most of the parking will have to move to off-street facilities.

At 13,000 ECS, the overall off-street parking supply is quite high compared to Varachha. However, the demand is equally high, ranging from 8,500-12,000 ECS—a peak occupancy of 90%. Therefore, the present off-street supply can accommodate no more parking.

Over-utilisation of the existing off-street parking supply and high on-street demand suggest a potential for a private parking market in the CBD. Again, the

area would have to be redeveloped over a period of time to make land available for off-street parking.

4.6.3. Upcoming high-end residential development (Pal-Adajan)

Pal-Adajan has ample off-street parking. Building units are predominantly high-rise with G+7 structures with basement and plinth parking. The built use is mixed with residential development (residential towers and bungalows) and retail commercial.

The present demand for parking on streets is 2,100 ECS during peak hours. Most of the streets in Pal-Adajan are wider than 15m, which provides the potential for parking on both sides of the road. If designed well, the streets can accommodate 1,500, which is 500 ECS short of the current parking on streets during peak hours.

Parking within most building premises is permitted only for owners and tenants (other than some retail properties). Visitors typically park on streets. The off-street parking supply is 13,500 ECS, of which 6,500-9,500 ECS are occupied depending on the time of the day. The existing off-street parking can absorb all the on-street parking if conducive regulations enabling sharing of private parking are implemented.

The ample availability of parking on both on-street and off-street, ease of availability, and higher parking supply than demand suggest a non-conducive environment for a private parking market. However, there is a potential for the private market if the on-street parking supply is restricted and enforced and existing private off-street parking is converted into publicly accessible pay-n-park facilities.

4.7. Key insights for parking reforms

The analysis leads to some key insights:

- Higher the parking supply, higher the parking demand. Varachha has the lowest total parking supply and the lowest parking demand compared to the other two study areas, Pal-Adajan and New Textile Market.
- Except for CBD, where the built use is predominantly commercial, on-street parking demand is similar during peak and off-peak hours in the other two study areas. This could hint that the on-street parking is predominantly occupied by long-term parking that must be shifted to off-street locations. On-street parking ought to be ideally used for short-term parking.
- Off-street supply is sub-optimally used in mixed-use areas such as Pal-Adajan and Varachha, with an occupancy of 50% and 70% during peak hours. Both locations have a high on-street parking demand. With a supportive policy, this unused off-street parking stock can be made accessible as paid parking for others. Such a phenomenon is prevalent as off-street parking is only available to tenants of the building unit. Additionally, tenants use only the allotted parking. Visitor parking and additional parking required by tenants beyond their allotted parking space spills over to on-street spaces. Converting the existing private off-street parking to public off-street parking will allow efficient use of cost-intensive off-street parking facilities.

4.8. Opportunity for parking market

- Old-dense developments have the potential for a private parking market. The evident gap in parking supply-demand indicates a potential for the private market. Currently, the area has high two-wheeler ownership (75% of the survey respondents own two-wheelers). However, the expected economic growth will increase the transition from two-wheelers to cars. There is limited land availability in such areas for developing new parking structures to cater to this expected increase in demand. To enable the parking market in such areas, the parking reforms must allow and incentivise the redevelopment of existing buildings into parking facilities.

- New developments demonstrate potential for shared parking practices. Ample availability of parking on both on-street and off-street, ease of availability, and higher parking supply than demand, suggest a non-conducive environment for a private parking market. There is also a case to start capping the supply and unbundle parking from real estate to reduce property prices. There is a potential for the private market to manage the existing parking supply in a scenario where existing private off-street parking is converted into public parking, and the on-street parking supply is priced and enforced.
- The central business district has a potential parking market. The current off-street supply is utilised beyond the optimum capacity. The on-street parking demand is high during peak hours. This suggests a potential for a private parking market in the CBD.

4.9. Parking Price Discovery in Surat

4.9.1. Visitor parking (hourly fee)

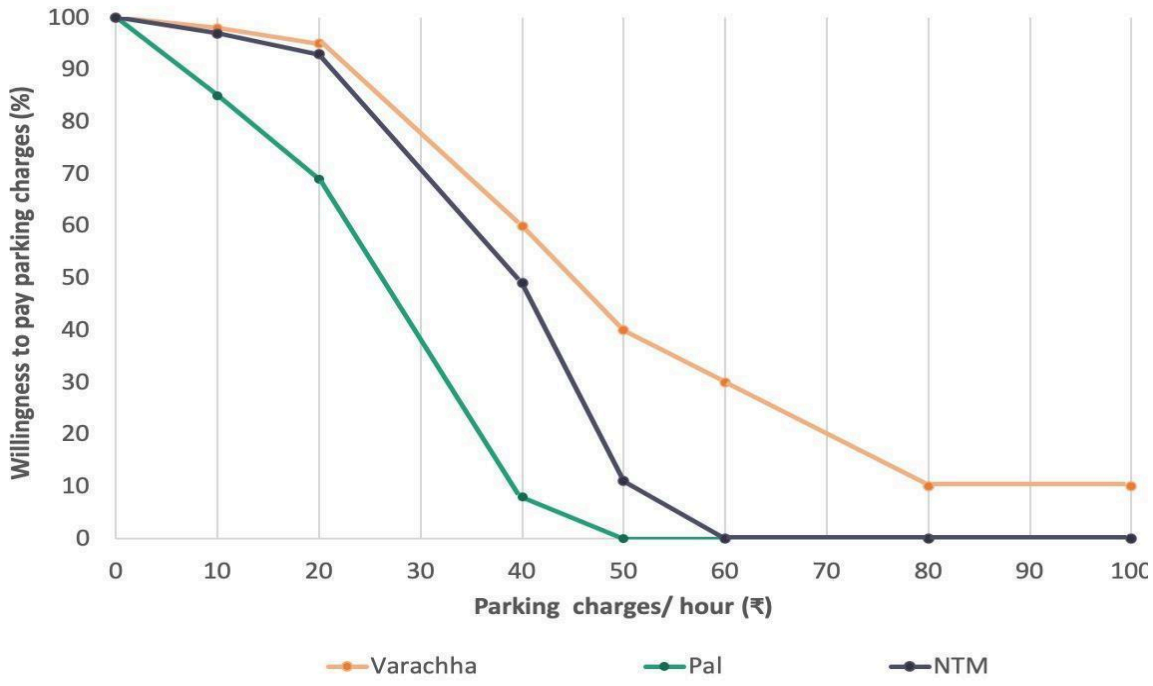


Figure 20: Willingness to pay for hourly parking charges - car

Varachha has the highest willingness to pay for short-term parking. Nearly everyone was willing to pay INR 20 per hour (the present parking rate in Surat). More significantly, six out of ten were ready to pay twice as much. Varachha also has the highest demand for parking on streets as compared to the other two study sites. High demand and limited parking spaces might be why users are willing to pay a higher price for parking.

In comparison, respondents from Pal-Adajan—an area with predominantly high-end residential development with ample parking on streets and off streets—were the least willing to pay for parking. Less than 70% of users would pay INR 20 per hour, and the willingness to pay drops to a paltry 8% at twice the fee (INR 40 per hour). This suggests that abundant parking reduces the willingness to pay for it.

In the New Textile Market, the willingness to pay for parking was higher than Pal-Adajan but lower than in Varachha. Like Varachha, nearly everyone was ready to pay INR 20 per hour, and half of the respondents were willing to pay

INR 40 per hour. However, the willingness to pay dropped to 11% at INR 50 per hour, unlike Varachha, where 40% of the respondents were ready to pay this amount. The off-street parking supply in the New Textile Market area is filled to the brim and can accommodate no more.

4.9.2. Long-term car parking (monthly rental)

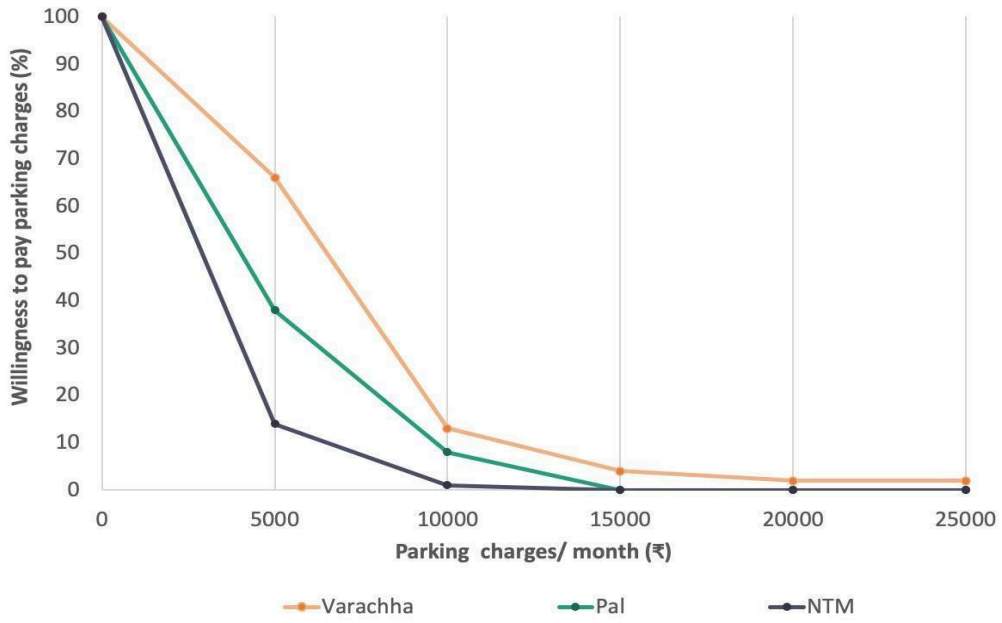


Figure 21: Willingness to pay for monthly parking charges (Office/retail) - four-wheeler

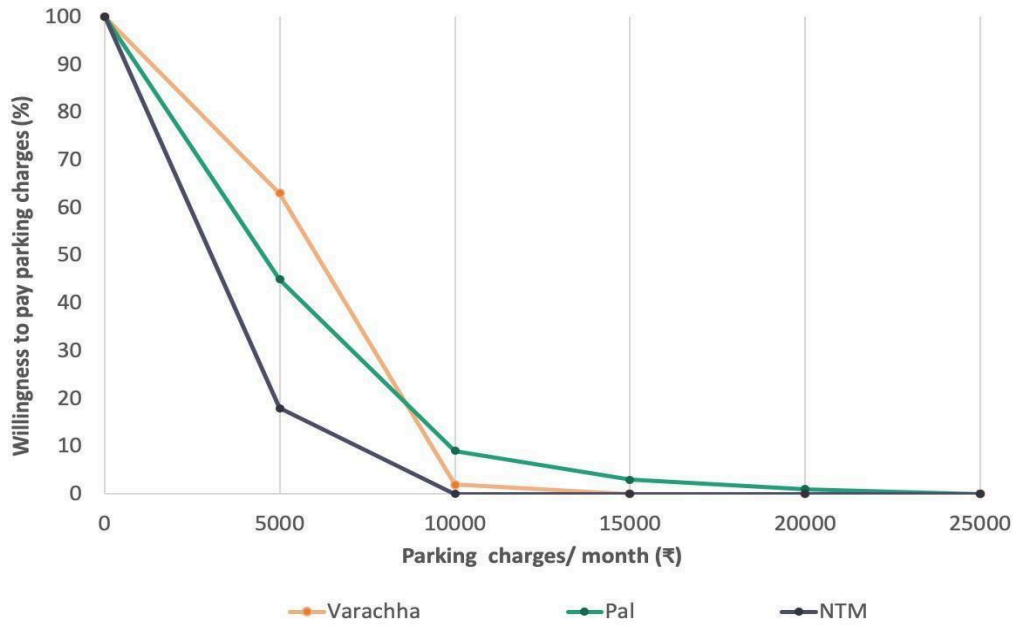


Figure 22: willingness to pay for monthly parking charges (Residential) - four-wheeler

The study assessed the willingness to pay for long-term parking for residential and commercial usage. Varachha, once again, has the highest willingness to pay a monthly rental for car parking for both residential and commercial long-term parking. More than 60% of the respondents were willing to pay INR 5000 monthly for a car parking space. In comparison, the willingness to pay was lower in Pal-Adajan. Only 40% of respondents were willing to pay INR 5000 per month for parking. At 17%, the willingness to pay a monthly rental for parking was the least in New Textile Market.

When the monthly rental was doubled to INR 10,000, the willingness to pay dropped to less than 10%, approaching no willingness to pay as the rental price increased.

4.10. Two-wheeler willingness to pay for parking

4.10.1. Short-term parking on hourly rental

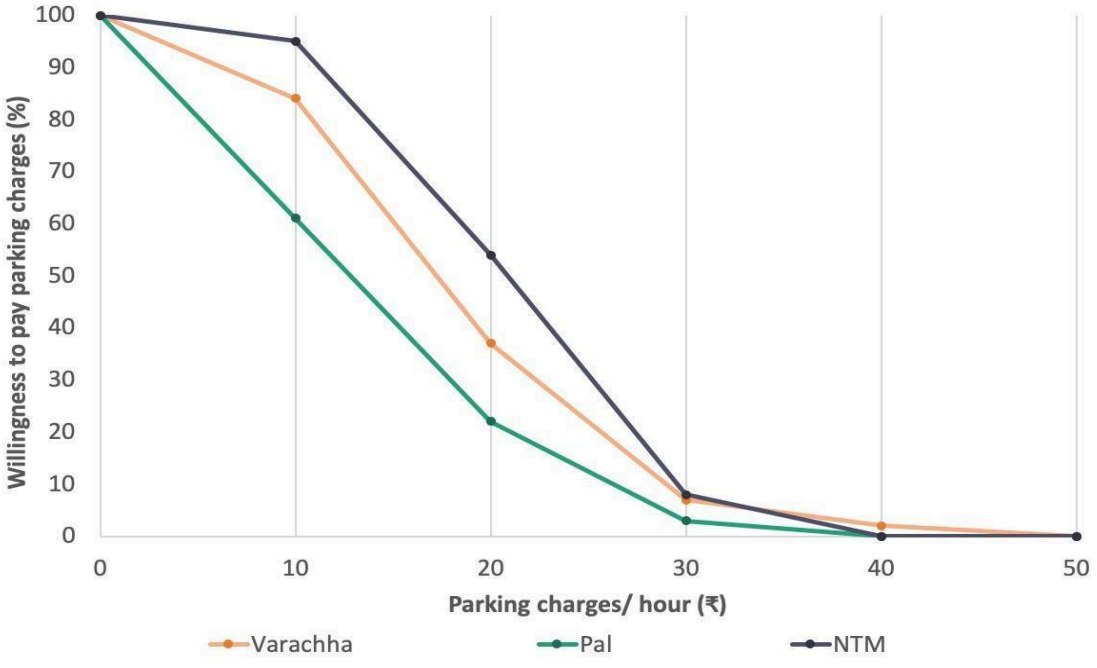


Figure 23: Willingness to pay for hourly parking charges - Two-wheeler

Nearly all two-wheeler users in New Textile Market were willing to pay a fee of INR 10 per hour. Over half the respondents were willing to pay even INR 20 per hour.

There is a significant market for two-wheeler hourly rental in Varachha also, where 84% of the respondents were ready to pay INR 10 per hour. However, the willingness to pay dropped to 37% in Varachha with an increase in parking fees to INR 20 per hour.

The willingness to pay was the least in the high-end residential development of Pal-Adajan, where 60% of the respondents were ready to INR 10 per hour and only 22% were willing to pay INR 20 per hour. The user group in such an area are comparatively wealthier (as car ownership is high), yet the willingness to pay is low. The area has ample off-street supply and readily available on-street parking, reflecting the unwillingness to pay higher parking charges.

The commercial area has a higher parking turnover than residential and mixed-development areas such as Pal-Adajan and Varachha. This suggests that willingness to pay is higher for shorter durations.

4.10.2. Long-term parking on monthly rental

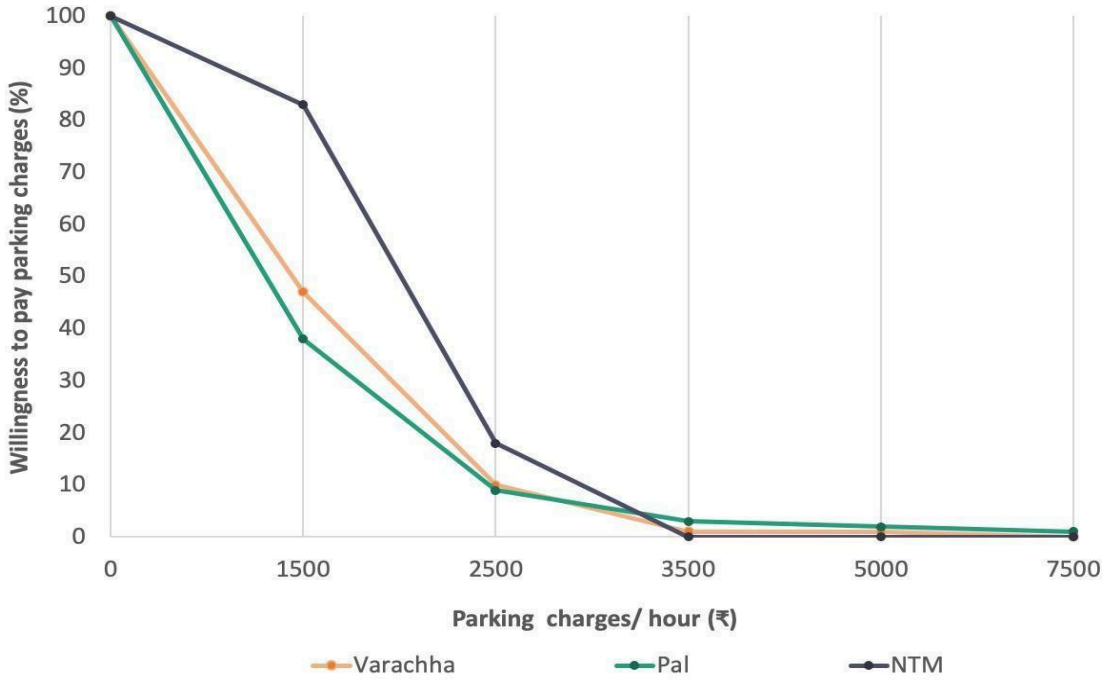


Figure 24: Willingness to pay for monthly parking charges - Two wheeler

Amongst the three typologies, New Textile Market has the highest potential for two-wheeler monthly rental. Four out of five respondents were willing to pay INR 1500 per month. Varachha, too, has a potential market, but it is smaller

than New Textile Market. Only half of the respondents were ready to pay a monthly parking charge of INR 1500. The high-end residential development of Pal-Adajan showed the lowest market potential. Less than 40% of respondents were willing to pay INR 1500 per month.

Two-wheeler users are more sensitive to a price change than car users, as an increase in monthly charges to INR 2500 resulted in a significant drop in respondents' willingness to pay in all typologies. Like hourly parking charges, easy availability of parking on streets and ample off-street provision reduces the willingness to pay for parking.

4.11. Key insights and opportunities for private market

The market assessment suggests that the willingness to pay for car parking is dependent on the ease of availability of parking, existing off-street parking supply, and ease of finding parking on the street. As the supply decreases, the willingness to pay increases. Hence, the city could gradually decrease the parking supply on streets. This would increase the willingness to pay for parking and create a market for privately owned and operated parking facilities without any public subsidy.

The existing market for monthly rentals beyond INR 5,000 per month is negligible. Monthly parking rental as a concept is relatively new in Indian cities. 40% of the respondents willing to pay for parking suggests that a private market for a monthly rental can be developed with conducive policies.

4.11.1. Key insights for private parking market

Car parking

- Areas with limited parking supply, off-street and on-street, show the highest opportunity for a parking market. Areas like Varachha have the highest potential for a private market as willingness to pay is high for all pricing points.
- Initially, different on-street pricing can be implemented in three typologies: higher pricing in old dense development and CBD and lower pricing in newly developing high-end residential areas. Later, the city can further implement differential pricing within the area based on parking demand.
- There is a potential monthly rental market in dense old development. However, such areas have limited land availability to develop new parking facilities. Parking facilities can be developed as standalone real estate units. Allowing the development of such units will require conducive regulations for creating a private parking market.

Two-wheeler parking

- Commercial areas with high parking turnover, like New Textile Market, present the highest potential for a private parking market for short-term hourly and long-term monthly rental.
- Two-wheeler users are as sensitive to parking charges as four-wheeler users. Doubling the parking pricing reduced the parking demand by approximately 40% in both scenarios.
- Areas with excess parking supply on-street and off-street, such as Pal-Adajan, do not present a strong potential for a parking market as the willingness to pay for parking is significantly lower than other typologies. However, with a growth in the number of vehicles, parking in these areas will soon be complete, resulting in favourable conditions for a private parking market.

- There is a limited parking market for two-wheelers if the price per hour exceeds INR 20 in old dense and new high-end residential developments.

4.12. Willingness to shift to alternative modes

4.12.1. Four-wheeler long-term and short-term willingness to shift

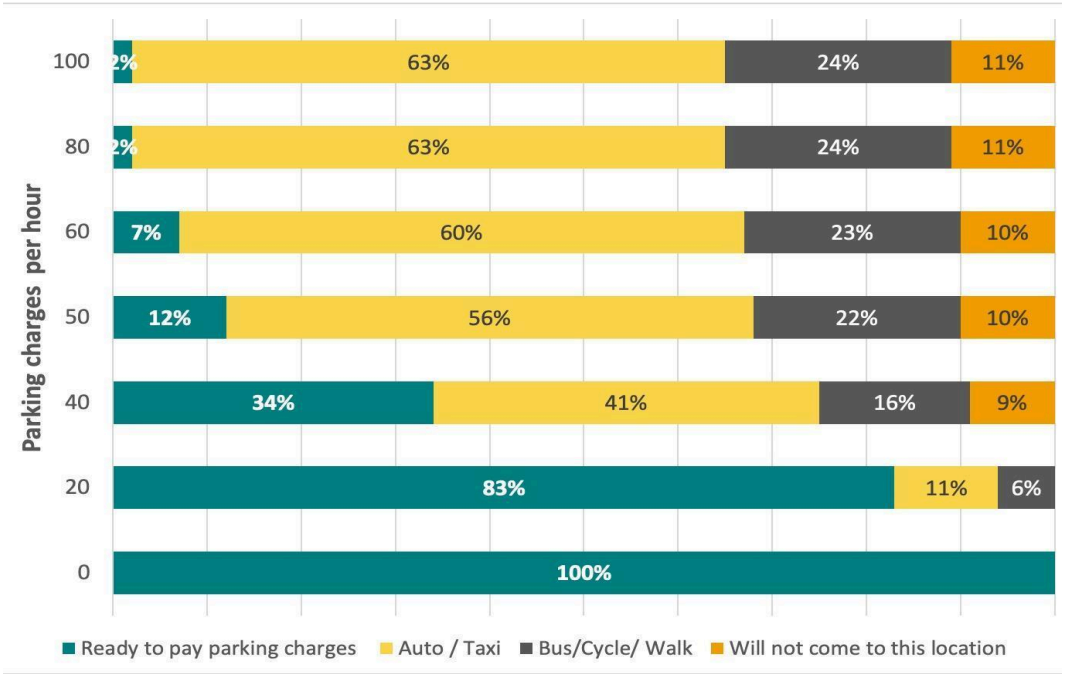


Figure 25: Willingness to shift short-term - four-wheelers

Short-term parking for four-wheelers

- For short-term trips 83% of surveyed four-wheeler users are willing to pay INR 20 per hour, suggesting a high willingness to pay and retain the current mode of transport.
- More than 55% will travel by auto/ taxi after the parking charges exceed INR 50 per hour. However, at this parking charge, only a quarter are willing to shift to bus/ cycle/ walk.

- As the parking charges increase, more people are willing to shift to auto/ taxi rather than choose bus/ cycle/ walk, which is a more sustainable mode of transportation in the long run.
- The graph suggests that short-term parking charges do not strongly influence or nudge people to shift to bus/ cycle/ walk, which are modes that will help cities reduce parking demand in the long run.

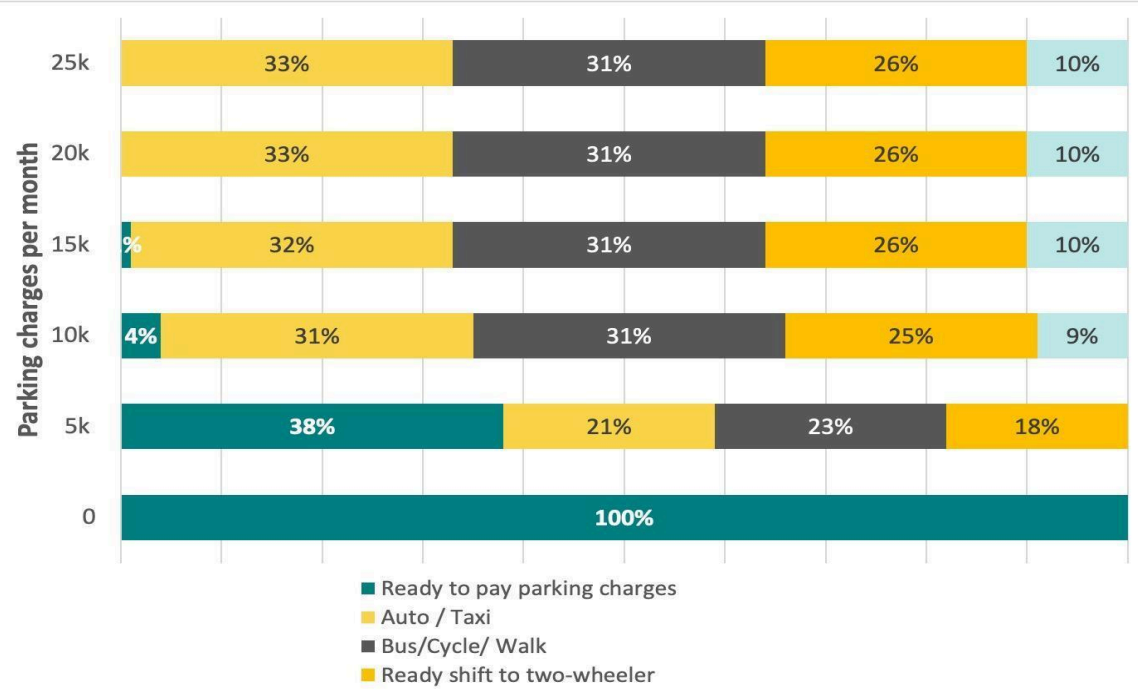


Figure 26: Willingness to shift long term - four wheelers

Long-term parking for four-wheelers

- More than a third of the surveyed population is willing to pay INR 5,000 per month for parking. This drops down to 4% as the parking charges double INR 10,000 per month.
- For trips requiring long-term parking, people predominantly shift to two-wheelers and autos/ taxis.
- There seems to be a permanent change in vehicle mode shift to two-wheelers and autos/ taxis, respectively, when monthly parking charges exceed INR 10,000.

- Shift to two-wheelers range from 30-33%; while 31% will shift from four-wheelers and stick to autos/ taxis. Hence, the modal share of private vehicles (including auto/ taxi) is more than 60%.
- Willingness to shift to bus/ cycle/ walk is 2-4% more for long-term than short-term parking charges.
- However, nearly 10% of them are not willing to shift to another mode of transport. Instead, they agree to move to another location where parking is cheaper.

4.12.2. Two-wheeler long-term and short-term willingness to shift

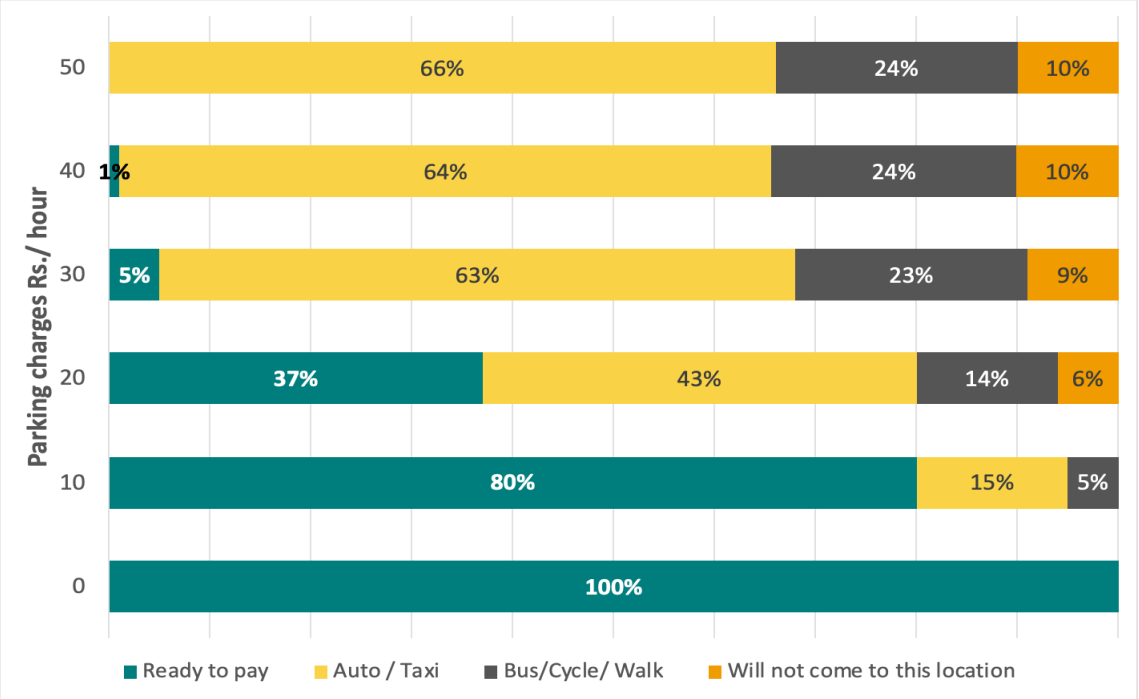


Figure 27: Willingness to shift short-term - two-wheelers

Short-term parking for two-wheelers

- A significant modal shift is observed when the parking charge is INR 20, where merely 37% of two-wheelers are willing to pay.

- Two-wheeler riders are predominantly shifting to auto/ taxi for their short-term trips, similar to what was observed in four-wheelers.
- Parking charges beyond INR 30 per hour, a majority of them (63-66%) are willing to shift to auto/ taxi. While around a fourth of them suggest they are willing to take a bus/ cycle/ walk.

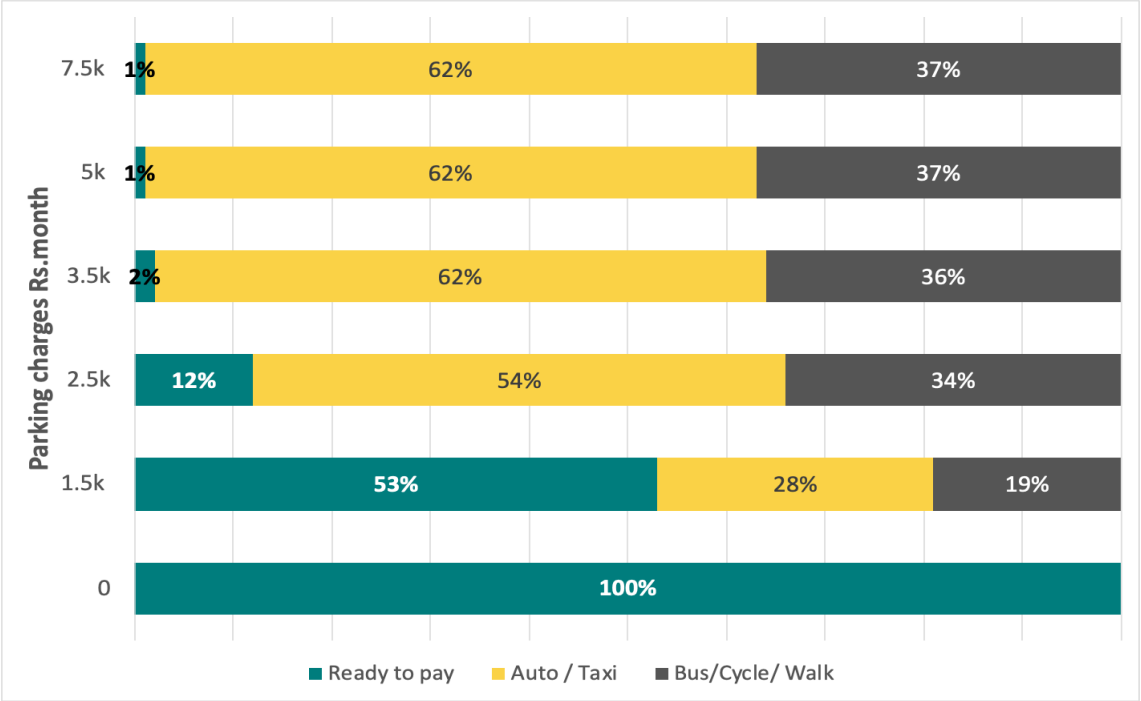


Figure 28: Willingness to shift long term - two-wheelers

Long-term parking for two-wheelers

- When two-wheelers are charged monthly, a significant 47% of them shift to alternative modes, i.e., auto/ taxi or bus/ cycle/ walk
- Although more than 50% of them still prefer to take auto/ taxi, more than 35% are willing to shift to bus/ cycle/ walk.
- This behaviour suggests a low willingness to pay monthly charges for two-wheelers.
- It may also suggest that in the long run, using a bus/ cycle/ walk may be cheaper than using an auto/ taxi or paying monthly parking charges.

4.13. Influence of wealth on parking charges

The survey included questions on the size and ownership of houses and the number of cars owned as a proxy to assess wealth/ income. The respondents were classified into the following categories:

- No car ownership but willing to purchase in the near term
- One car
- Two or more cars.

The relationship between car ownership and willingness to pay for parking is esented below.

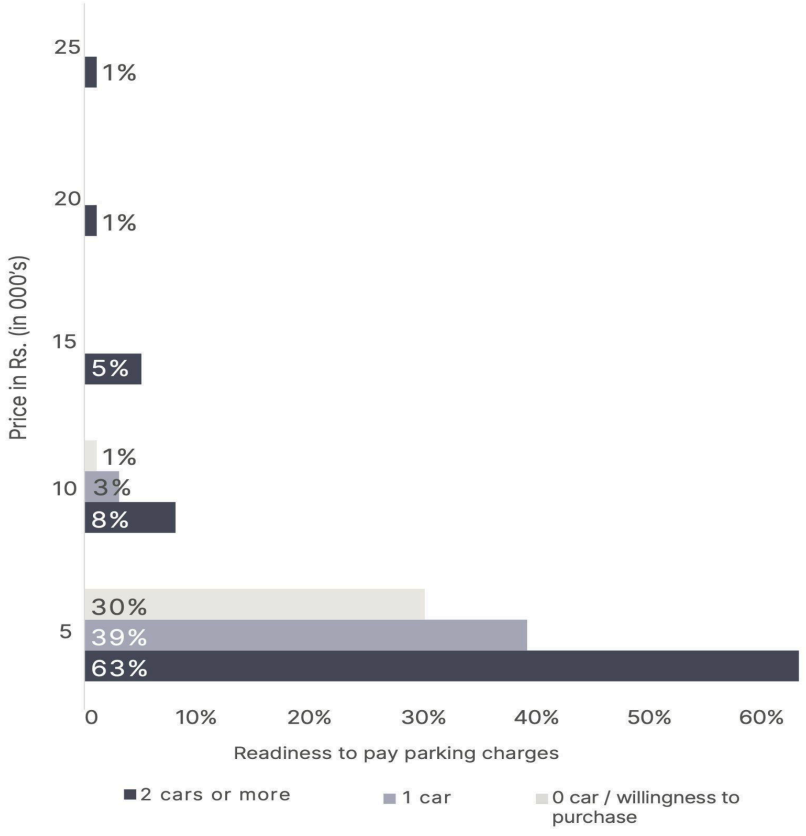


Figure 29: Influence of wealth on willingness to pay parking charges

Not unsurprisingly, as seen in the graph above, more affluent people, i.e., those with two or more cars, were far more willing to pay for parking. At the base rate of INR 5,000 per month, they were 60% more likely to pay than those with a single car and more than twice as likely to pay than those without a car but were planning to buy one.

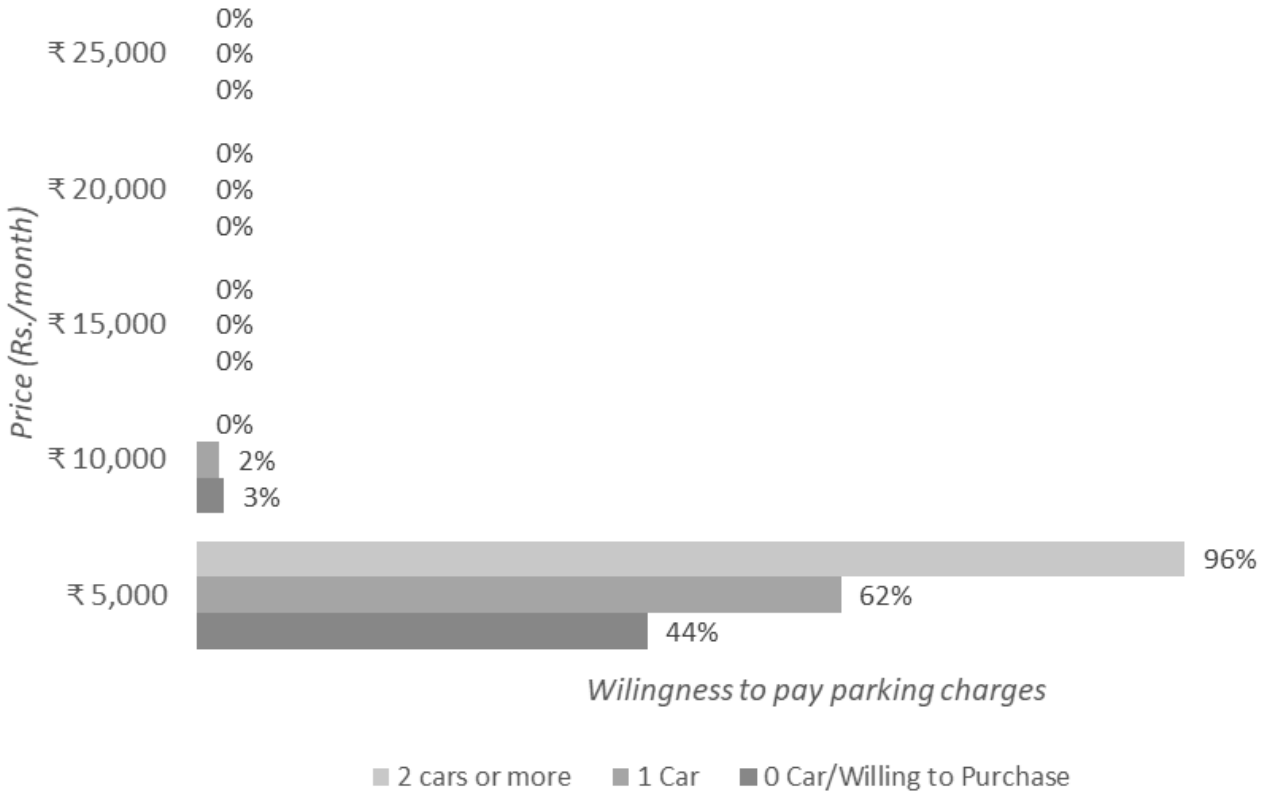


Figure 30: Willingness to pay with wealth/ income in Varachha

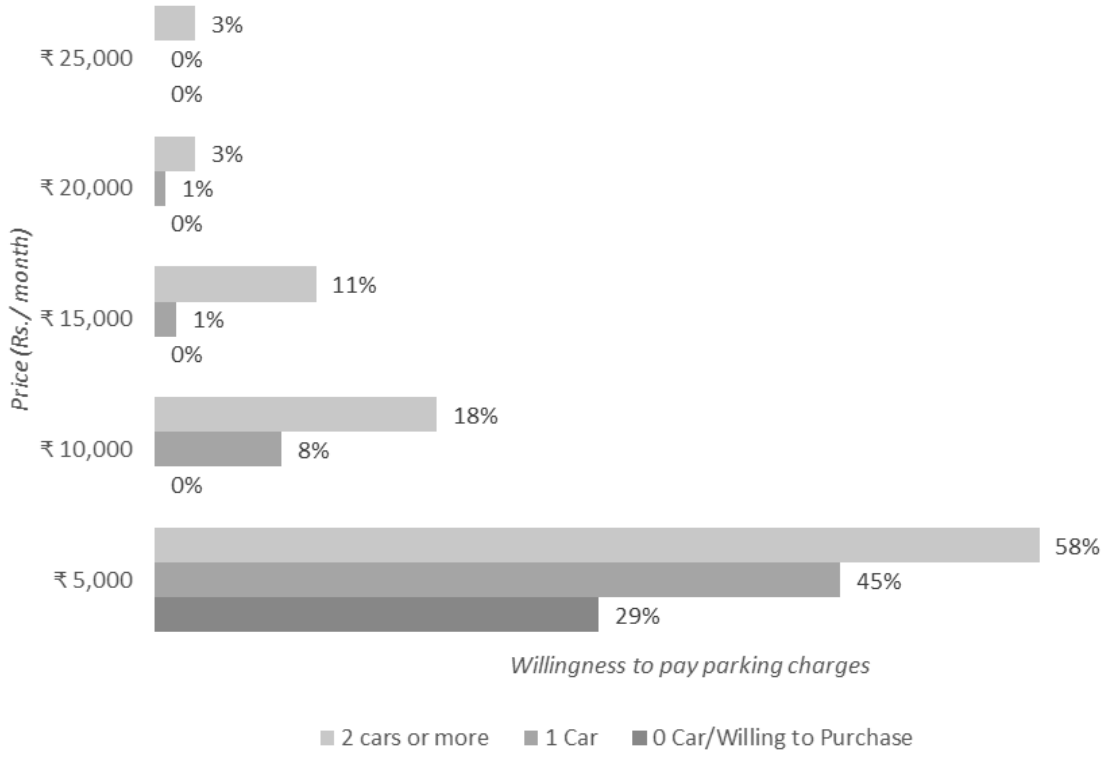


Figure 31: Willingness to pay with wealth/ income in Pal Adajan

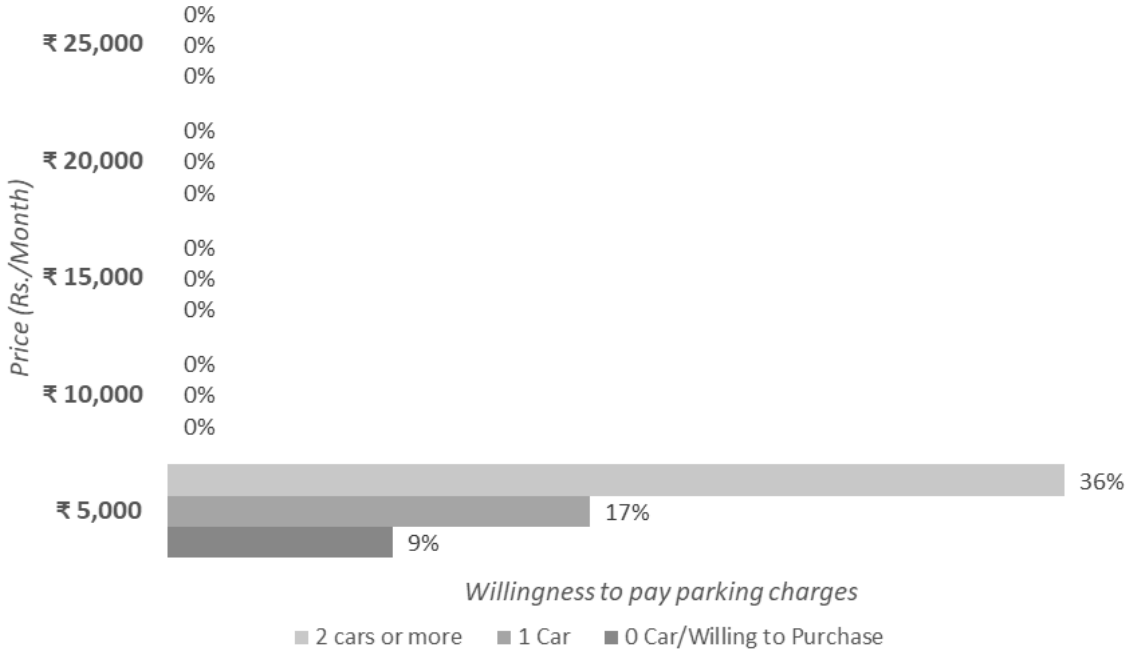


Figure 32: Willingness to pay with wealth/ income in NTM

Almost everyone in Varachha owning two or more cars was willing to pay INR 5,000 per month, followed by Pal Adajan (58%) and NMT (36%). This could be because of the lower parking supply in the Varachha area.

As seen in the graph above, the parking demand is highly elastic even in the case of high-income group respondents (owning two or more cars). Except for Pal-Adajan, a negligible proportion of respondents in Varachha and NTM were ready to pay the second price point

5. Pimpri-Chinchwad

5.1. City and context

Pimpri-Chinchwad developed as an industrial suburb north of Pune and is part of the Pune Metropolitan Region, the seventh largest metropolitan area in India. In recent decades, it has also grown as an IT hub.

Pimpri-Chinchwad is spread over 181 sq. km. and has a population of over 2 million. Its built form varies from low-rise, dense development with narrow streets (such as Kalewadi) to high-rise gated residential complexes (such as Pimple-Saudagar). Large swathes of the city are private industrial estates.

Pimpri Chinchwad has an extensive bus network managed by Pune Mahanagar Parivahan Mahamandal Limited (PMPML) that connects it to Pune. It also operates the BRTS. A metro rail was recently launched. It works on the north-south route, connecting to Pune.

According to Pimpri-Chinchwad RTO data, there are four times as many two-wheelers (1.8 million) as four (0.47 million). However, with increasing per capita income, there will be a transition from two-wheelers to four-wheelers, significantly impacting the space required for parking.

An increase in demand for parking comes at a high cost as parking occupies prime real estate space both on the street and within building premises. Additionally, the city can only provide finite parking space with expected motorisation. There is a need for parking reforms that can enable efficient and optimum use of parking.

5.2. Parking woes in Pimpri-Chinchwad

Parking challenges in Pimpri Chinchwad are increasing with unabated vehicle growth. Despite the high off-street private parking supply, streets are choked with parked vehicles. The space under flyovers is also occupied with parking. In the current scenario, on-street parking is not enforced. This has led to haphazard parking and chaos on-street. Additionally, the Pimpri Chinchwad Municipal Corporation (PCMC) and traffic police are constrained by a lack of resources and equipment to manage on-street parking.

On-street parking and cruising for parking are prime factors contributing to congestion. The average vehicle speed recorded in Kalewadi, Pimple-Saudagar, and Wakad areas is only 25 km/hour. Developers provide more parking than mandated by the DCRs due to market demand. PCMC has realised that this approach of increasing the parking supply will not resolve the problem.

5.3. Parking regulations in Pimpri Chinchwad

No.	Size of Tenement	Parking Space required				Remarks
		Congested Area		Non-Congested Area		
		Car	Scooter	Car	Scooter	
1	Multi-Family Residential					
	Every tenement has a carpet area of 150 sq.m. and above.	2	2	2	3	In addition 5% of Visitor Parking
	For every tenement having a carpet area equal to or above 80 sq.m. but less than 150 sq.m.	1	2	1	3	In addition 5% of Visitor Parking
	For every two tenements, each tenement has a carpet area equal to or above 40 sq.m. but less than 80 sq.m.	1	4	1	5	In addition, 5% of visitor parking
	For every two tenements with each tenement having a carpet	1	1	1	2	In addition, 5% of visitor parking

No.	Size of Tenement	Parking Space required				Remarks
		Congested Area		Non-Congested Area		
		Car	Scooter	Car	Scooter	
	area of less than 40 sq.m. but more than 30 sq.m.					
	For every two tenements, each tenement has a carpet area of less than 30 sq.m.	0	4	0	4	In addition 5% of Visitor Parking
2	Mercantile (markets, departmental stores, shops, and other Commercials users)					
	For every 100 sq.m. carpet area or fraction thereof	1	6	2	6	

Table 5: Parking minimums in Pimpri Chinchwad

5.4. Urban form and parking

Pimpri Chinchwad's built use comprises residential, commercial and industrial uses. Its built type ranges from high-end residential buildings with both surface and basement parking to plotted development to built-to-edge developments where parking only happens on-street.

The demand for parking is increasing rapidly in both residential and commercial spaces. This has severely impacted the form of the buildings, which are now designed based on parking requirements. Parking is the selling point for real estate properties in Pimpri Chinchwad. This has led to developers over-supplying parking spaces, which encourages the use of private vehicles

and creates an unending, vicious cycle of supply trying to catch up with demand.

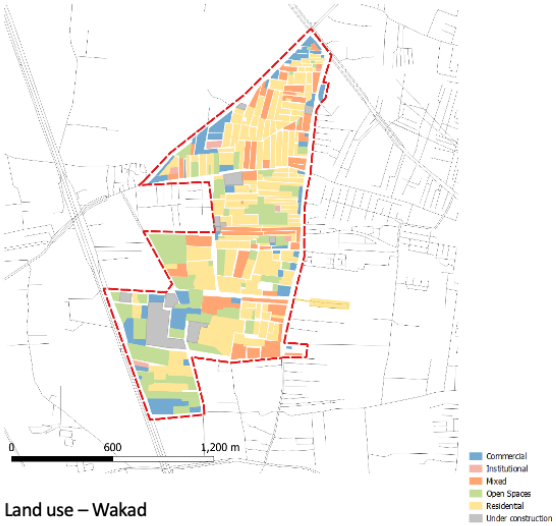
For instance, as seen in Wakad, high parking demand directly correlates to high parking supply. With vehicle numbers nearly tripling between 2017-2027, parking challenges in the city will be manifold. Therefore, the city must study these parking challenges and implement parking refor

5.5. Understanding typologies

5.5.1. Wakad

Built use

It is predominantly a residential area, with commercial and mixed-use at the periphery. There are pockets of open spaces and some areas under construction.



Land use – Wakad

Plot size

Majority of the plots are more than 1500 sqm. Significantly few medium and small-size plots are observed.

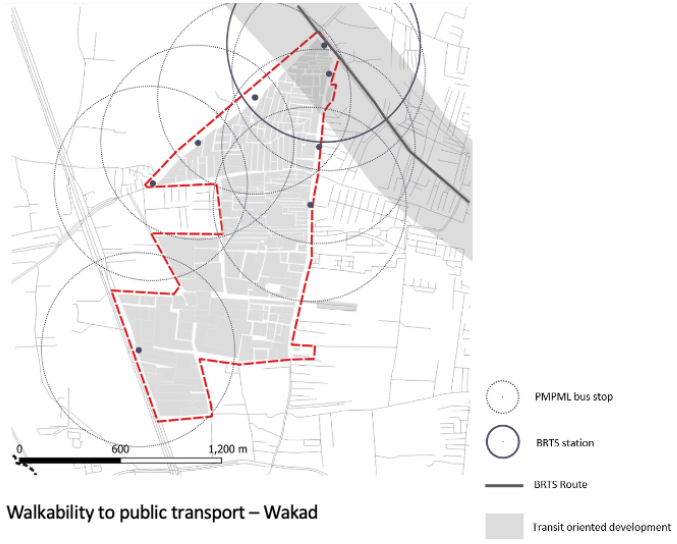
Plot sizes – Wakad

Public transport

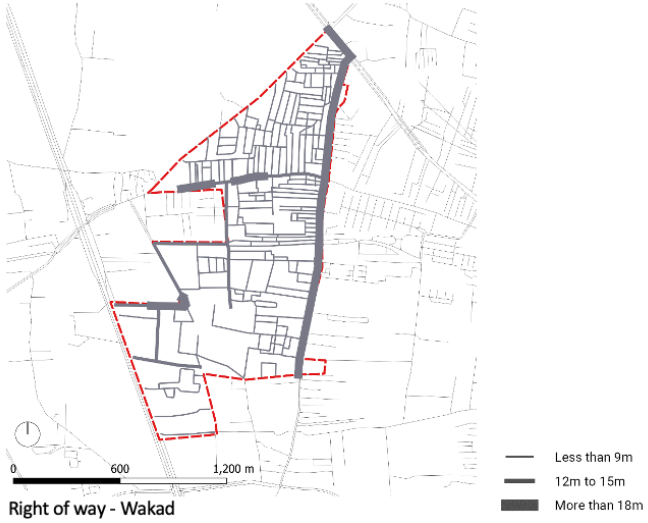
This site is accessible through the BRTS corridor and is well-connected along the periphery through PMPML buses. Most bus stops lie within a walkable distance of 300m.

Street network

The street network is sparse towards the site's southern end, whilst it is very dense towards the north. The linear shape of plots and street network helps to make the area walkable.



Walkability to public transport – Wakad

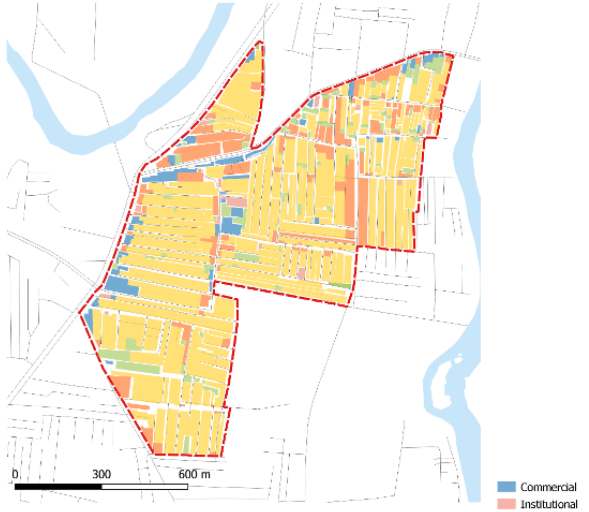


Right of way - Wakad

5.5.2. Kalewadi

Built use

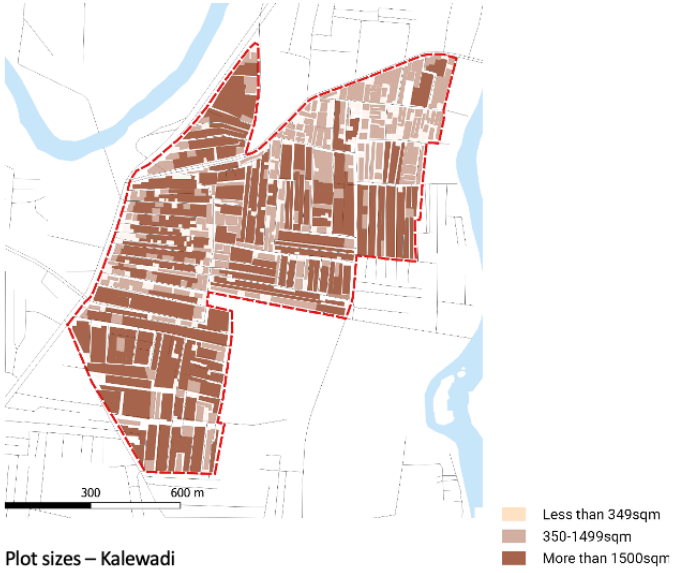
Kalewadi is predominantly residential, with some retail, commercial and mixed-use developments.



Land use map – Kalewadi

Plot size

Kalewadi is a mix of medium and large-size plots. A majority of these plots are linear in shape. Plots less than 349 sqm are also observed here compared to the other two sites.



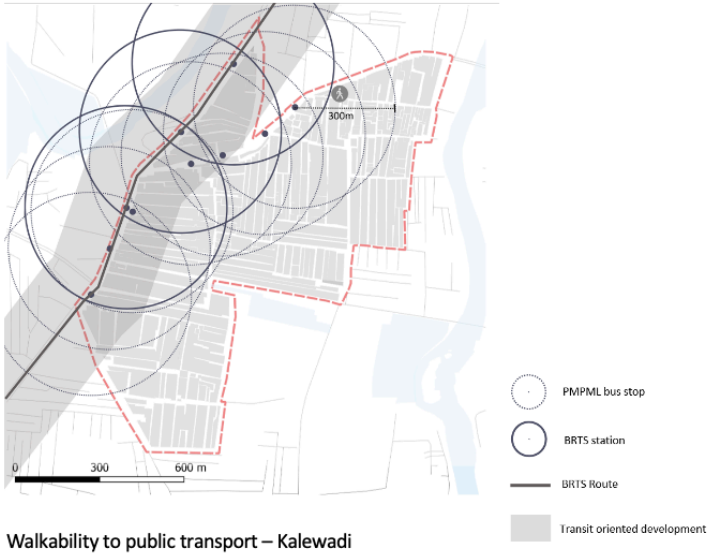
Plot sizes – Kalewadi

Public transport

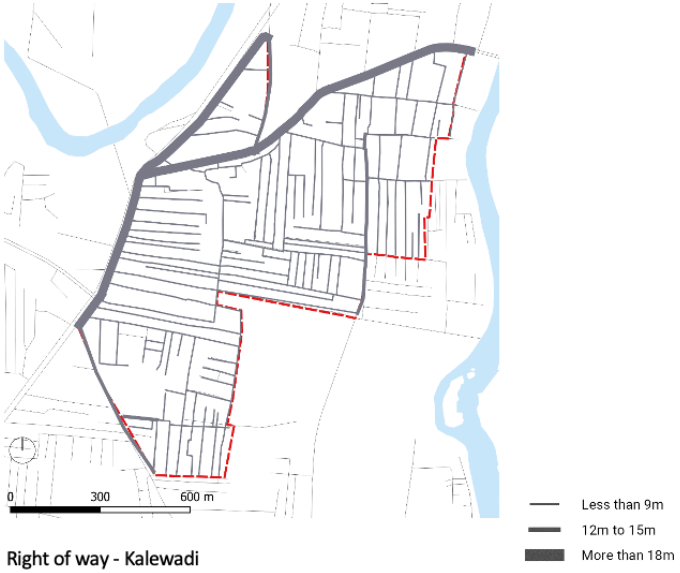
Public transport in Kalewadi comprises three BRTS stations and a few PMPML bus stops, mostly along its primary roads. The bus stops are located at 300m distance, making it easily accessible by walking for most residents.

Street network

The street network is extensive, with most of the streets' Right of Way less than 9m. This has helped to make the urban blocks walkable. The BRTS operates on the primary streets, which are more than 18m wide.



Walkability to public transport – Kalewadi

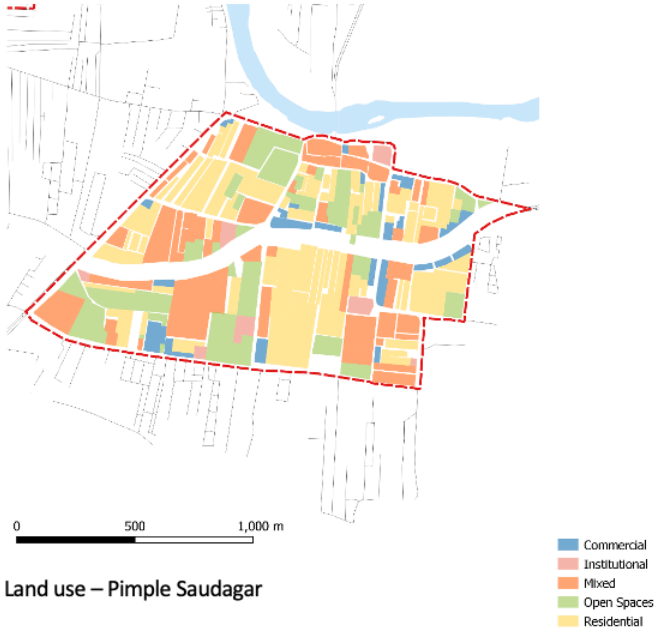


Right of way - Kalewadi

5.5.3. Pimple Saudagar

Built use

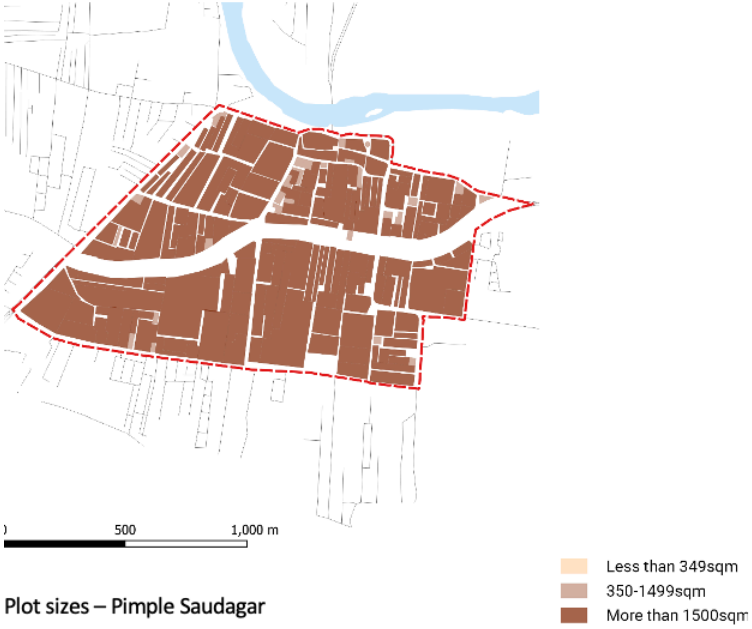
Pimple Saudagar is predominantly a mixed-use neighbourhood, with residential, commercial and retail developments along its primary roads. It also has a few public open spaces like gardens and playgrounds.



Land use – Pimple Saudagar

Plots:

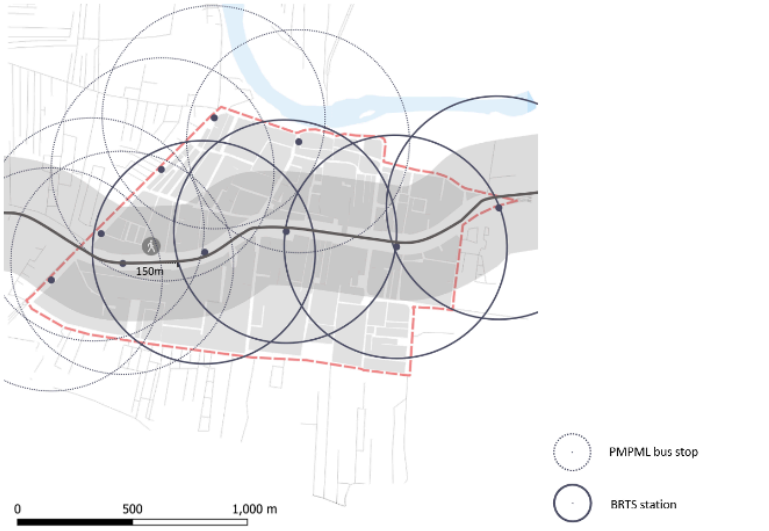
Most sites in Pimple-Saudagar consist of more than 1500 sqm plots.



Plot sizes – Pimple Saudagar

Public transport

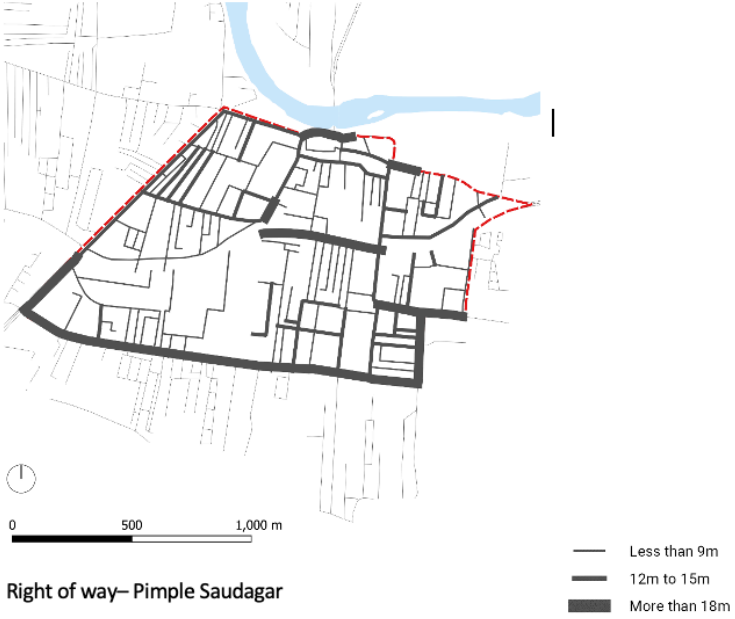
Public transport in Pimple Saudagar comprises three BRTS stations along the road, making it easily accessible. PMPML bus stops operate along the edges of the site. As compared to the other two sites, public transport here is almost entirely accessible by walking.



Walkability to public transport – Pimple Saudagar

Street network

The street network is unevenly distributed. However, the primary street acts as a central spine of connectivity for the entire site.



Right of way– Pimple Saudagar

Pimple Saudagar

Represents high-end gated residential complexes with ample off-street parking.

Wakad

Represents mixed-use development with high on-street and off-street parking demand.

Kalewadi

Represents low-rise dense residential development with predominantly on-street parking.

5.6. Parking supply and demand

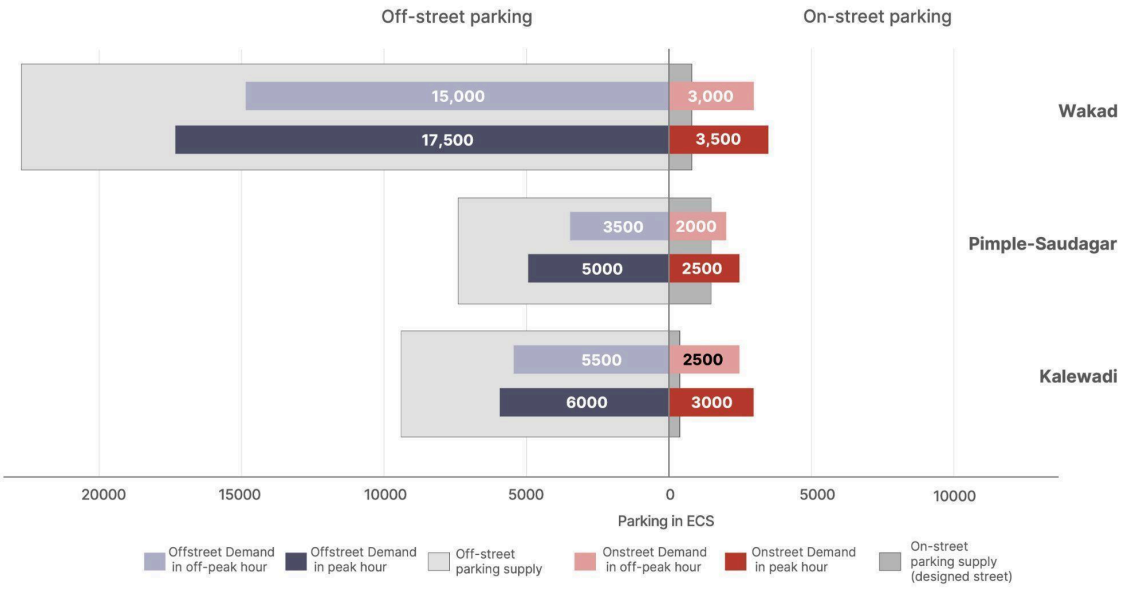


Figure 33: Off-street parking supply and demand in the case study sites

5.6.1. Old and dense development (Kalewadi)

Built use in Kalewadi is predominantly residential, with commercial development along the primary streets. It is mostly built edge-to-edge, resulting in high on-street parking. The total demand for off-street parking in peak hours is nearly 6,000 ECS, whereas the total off-street supply is about 9,500 ECS. Off-street parking is more than 60% occupied at peak parking demand. The area observes the highest on-street parking demand of 3,000 ECS during peak hours. The streets, if designed, can only cater to 500 ECS. Additionally, the existing off-street parking supply can absorb 100% of the on-street parking demand, subject to the implementation of conducive regulations that enable the sharing of private parking. Kalewadi has an excess off-street supply that is required for the existing parking demand (on-street and off-street combined).

Higher parking supply than demand suggests a non-conducive environment for a built and operated private parking market.

5.6.2. Upcoming high-end residential development (Pimple-Saudagar)

Pimple-Saudagar has ample off-street parking. It is a mix of residential units on the internal streets & retail commercial on the primary streets. The building units are predominantly high-rise with G + 7 structures and comprise basement and plinth parking. Parking within the building premises is permitted for owners and tenants. Visitor parking predominantly occurs on-street. The total on-street parking demand is 3,500-5,000 ECS, whereas the off-street supply is 7,500 ECS. Off-street parking is 67% occupied during peak parking demand. Peak on-street parking demand is 2,500 ECS. 52% of the streets in Pimple-Saudagar are less than 9m, so parking is not permitted on either side of the road. If the streets are designed, they can accommodate 1500 ECS parking. Additionally, the existing off-street parking can absorb all the on-street parking, subject to the implementation of conducive regulations enabling the sharing of private parking.

Ample availability of parking on both on-street and off-street, ease of availability, and higher parking supply than demand, suggest a non-conducive environment for a build-and operate-private parking market. The demand for parking is also less compared to the other two typologies. However, there is a potential for the private market to manage the existing parking supply in a scenario where private off-street parking is converted into public parking, and the on-street parking supply is restricted.

5.6.3. Office and high-end residential (Wakad)

Wakad is an emerging commercial hub of Pimpri-Chinchwad. Commercial and retail shops dominate the primary streets, while more residential use is observed on the internal streets. In addition to two-wheelers and four-wheelers, the area also observes substantial Light Commercial Vehicle (LCV) parking. The overall off-street parking supply is 23,000 ECS, whereas the demand ranges from 15,000 to 17,500 ECS. During peak time, off-street parking is more than 75% occupied. Additionally, on-street parking ranges from 3,000 to 3,500 ECS. 76% of the street network in Wakad is less than 9m wide, which does not allow parking on either side of the road. Therefore, designed streets can only accommodate 1,000 ECS out of the total on-street demand of 3,500

ECS during peak hours. Additionally, the existing off-street parking supply can absorb 100% of the on-street parking demand, subject to the implementation of conducive regulations that enable the sharing of private parking. Wakad has an excess off-street supply that exceeds what is required for the existing parking demand (on-street and off-street combined).

Ample parking availability on the street and off-street and higher parking supply than demand suggest a non-conducive environment for a build-and-operate private parking market.

5.7. Key insights for parking reform

- The higher the parking supply, the higher the parking demand. In all three sites parking is significantly over-supplied than what is demanded even at peak times. It is observed that higher the parking supply, higher the parking demand. For instance, Wakad has the highest off-street parking supply and demand compared to Pimple-Saudagar and Kalewadi.
- Off-street parking is sub-optimally utilised throughout the day. Both Kalewadi and Pimple-Saudagar parking occupancy, even at peak demand, is only 60% and 67% respectively. Both locations observe a high parking demand on the street. The parking here is generally allotted and is predominantly used by residents of that building unit. Visitor parking and additional parking required by tenants beyond their allotted parking space spills over to on-street spaces. This means nearly 35-40% of parking space remains unoccupied and is a waste of space. Converting the existing private off-street parking to public off-street parking will allow efficient use of cost-intensive off-street parking facilities.
- On-street parking can be moved to off-street. As it is evident in all three sites, that off-street parking is over-supplied. If streets are well designed, with limited parking supply and strict enforcement, and if private off-street parking spaces are opened for public use, the existing existing on-street supply can be fully absorbed. This way, on-street parking can be efficiently used for short-term parking needs.

5.8. Parking Price Discovery – Pimpri Chinchwad

5.8.1. Short-term car parking (hourly rental)

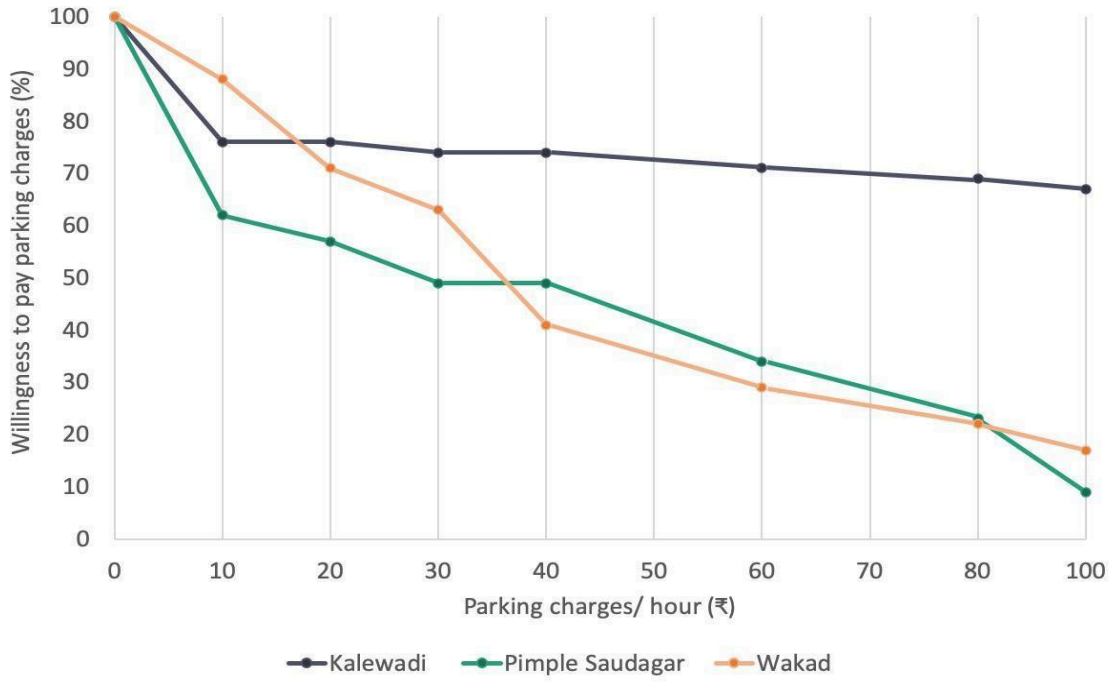


Figure 34: Short-term car parking hourly price discovery

Kalewadi—an old dense development with limited parking supply and high building occupancy—has the highest potential for a private parking market. Over three-quarters of respondents were willing to pay INR 30 (at present, two-wheelers are charged INR 5 per hour, and four-wheelers are charged INR 10 per hour). Two-thirds of the respondents were willing to pay even INR 100 per hour for car parking. This greater willingness to pay could be attributed to the shortage of parking in this area, on-street and off-street.

Respondents interviewed in Pimple-Saudagar, an upcoming high-end residential development, and Wakad, an area with offices and high-end residences, were less willing to pay than those interviewed in Kalewadi. Easily available, free or cheap parking in these locations could be the reason behind a lower willingness to pay. However, over half the respondents were willing to pay INR 30 per hour, even in these areas.

5.8.2. Long-term car parking (monthly rental)

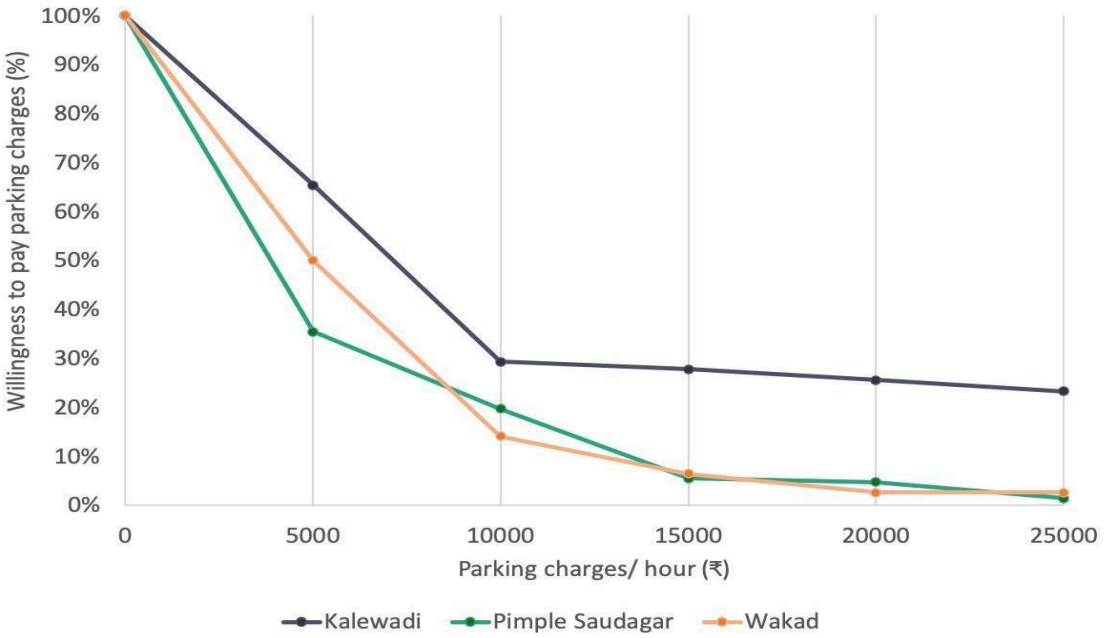


Figure 35: Long-term car parking monthly price discovery - Office/retail

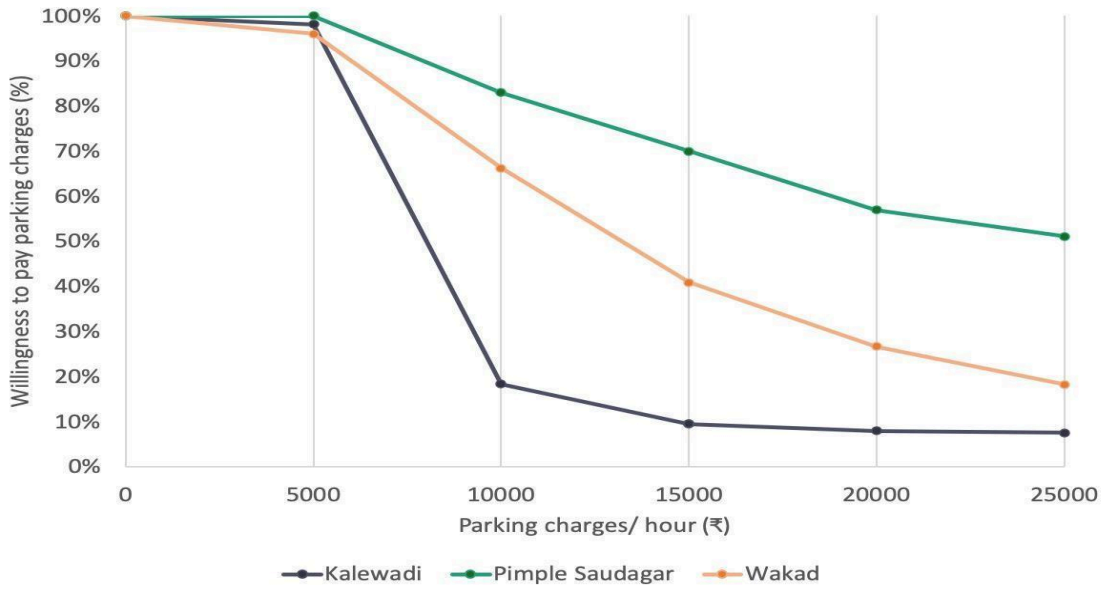


Figure 36: Long-term car parking monthly price discovery - residential

The team studied the willingness to pay monthly rental parking charges for residential and commercial users. More than 90% of the residential users are willing to pay INR 5,000 per month for car parking. In Wakad and Pimpri, even

with the availability of ample off-street parking supply, more than 70% of users are ready to pay up to INR 10,000 per month. The willingness to pay for long-term parking in commercial areas is lower than in residential areas. Users require or aspire to have more than 1 car parking in residential areas and are willing to pay a rental for additional car parking.

The willingness to pay in Kalewadi drops significantly as the potential price is increased from INR 5,000 to INR 10,000 for residential areas, followed by Wakad. This could be due to lower income levels in Kalewadi compared to Wakad and Pimple-Saudagar. New developing areas like Pimple-Saudagar have the highest market potential for long-term off-street parking rental as more than 50% of the respondents were ready to pay up to INR 25000 per month for car parking.

The market for short-term parking is more mature than the market for long-term parking in old dense developments like Kalewadi. The area has market potential for long-term monthly rental. Nearly 85% of the respondents are ready to pay INR 5000 monthly.

5.8.3. Short-term two-wheeler parking on hourly rental

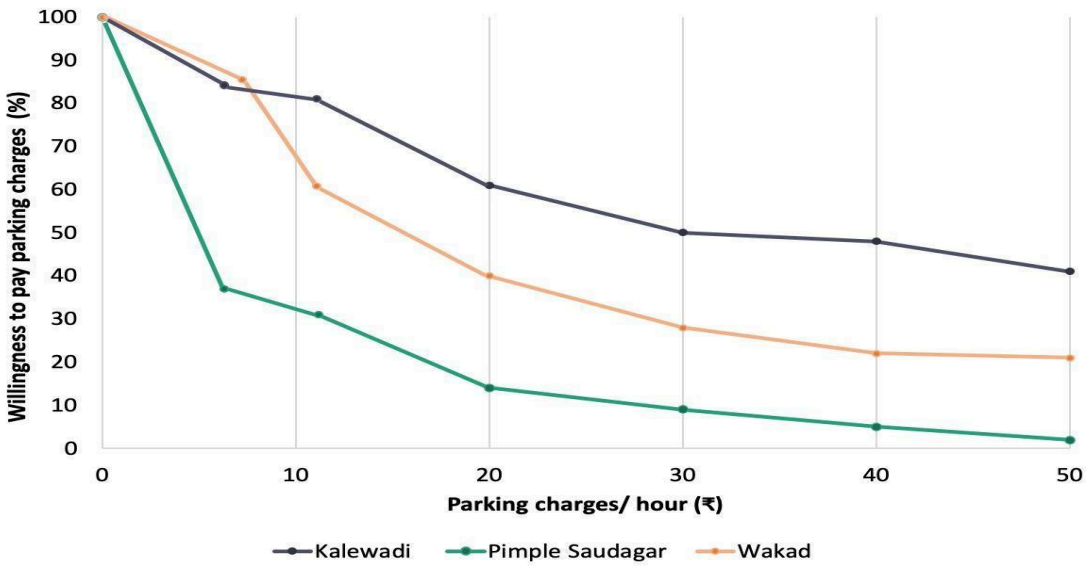


Figure 37: Short term two-wheeler parking price discovery

Old dense development (Kalewadi)

Similar to short-term parking for cars, old dense development like Kalewadi has a high market potential. Close to 40% of the respondents are ready to pay a price as high as INR 40. However, the market for short-term car parking is more mature in such areas, as nearly 70% of users were ready to pay INR 100 per hour.

High-end residential development (Pimple Saudagar)

There is no potential market for two-wheeler short-term parking in high-end residential areas like Pimple Saudagar. At present, on-street parking is easily available due to the wide street network.

Office and high-end residential (Wakad)

Mixed-use development with offices and residences also showcases the potential for a short-term parking market for two-wheelers. However, the willingness drops beyond INR 10 per hour.

5.8.4. Long-term two-wheeler parking (monthly rental)

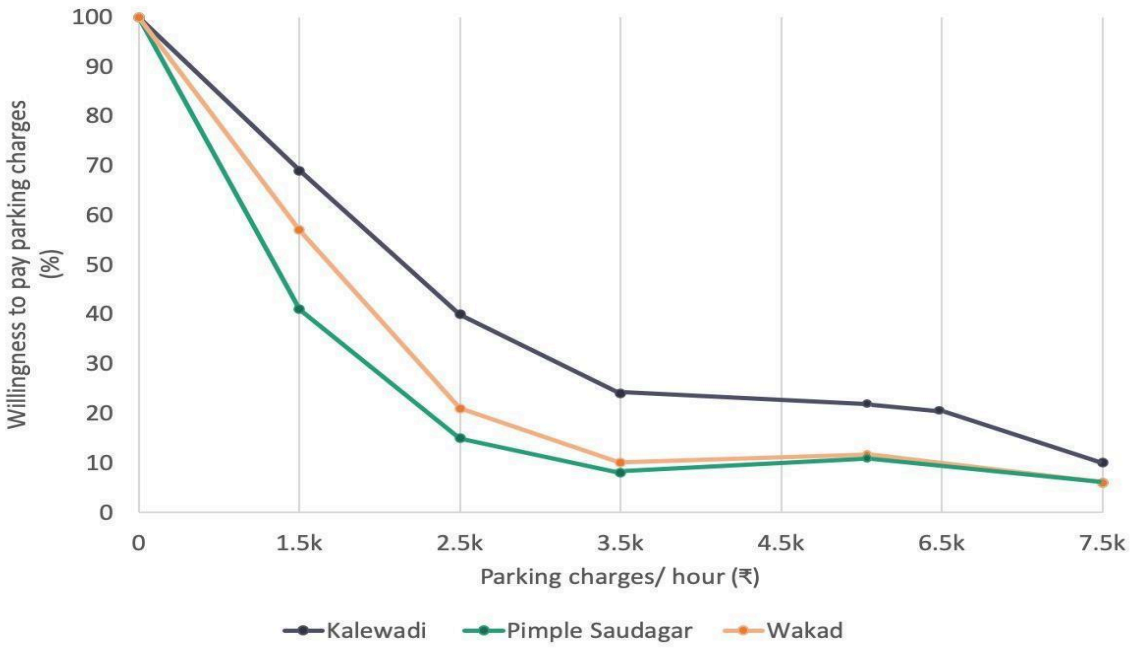


Figure 38: Long-term, two-wheeler parking price discovery

Old dense development (Kalewadi)

There is some market potential for the monthly rental market. Close to 70% of respondents are ready to pay INR 1,500 per month for two-wheeler parking, and 40% are ready to pay INR 2,500.

High-end residential development (Pimple Saudagar)

There is limited potential for monthly rental for two-wheelers in high-end residential development. Only 40% are ready to pay INR 1,500 per month. The willingness drops significantly beyond this price. The area has sufficient provision for on-street parking due to wide roads.

Office and high-end residential (Wakad)

There is limited potential for monthly rental for two-wheelers in high-end residential development. Close to 60% are ready to pay INR 1,500 per month.

The willingness drops significantly beyond this price. The area has sufficient provision for on-street parking due to wide roads.

5.9. Key insights and opportunities for private market

5.9.1. Car parking

Users are willing to pay more in areas with limited parking supply. Old dense development showcases the highest market potential for short-term hourly car parking charges. At the same time, high-end residential development in Pimple-Saudagar shows the highest market potential for the monthly rental market. People are less willing to pay for parking in areas with ample and free parking (e.g. Wakad), thus thwarting the potential for a private market.

Potential for hourly pricing:

- Old dense development has a feasible market potential for the private market as the willingness to pay INR 100 per hour is close to 70%.
- The willingness to pay short-term parking charges suggests a potential for a private market. More than 50% of respondents are willing to pay more than INR 40 per hour.
- One-third of respondents were willing to pay as high as INR 100 per hour. The results and price points are indicative and suggest that there is market acceptance for paying an appropriate price for parking.
- Ease of availability of parking and ample parking limits market potential. New developing areas like Wakad, have ample off-street supply and wide streets that allow unregularised parking. The market willingness in such a scenario is less than other locations.
- The variation in market willingness across the three typologies highlight that parking charges should respond to ease in finding parking, availability of parking, built form, and indicative income group in that area. The city can implement higher charges in old dense development like Kalewadi, followed by Wakad, and Pimple-Saudagar.

Potential for monthly rental:

- Pimpri Chinchwad has significant potential for a private parking market offering long-term parking. The potential is higher in residential than commercial areas as more than 90% of respondents are willing to pay INR 5,000 monthly.
- PCMC has market willingness to cater to the current demand despite ample supply. Constraining the parking supply will increase market potential and feasibility for the private market.
- New-developing areas like Pimple-Saudagar have the highest market potential for monthly car-parking rental.

5.9.2. Two-wheeler parking

Potential for hourly charges

- The willingness to pay for short-term two-wheeler parking is similar to a car. People in areas with limited parking supply are willing to pay a higher price.
- People are less willing to pay in areas with surplus parking supply and easily available on-street parking.

Potential for monthly charges

- The market potential for long-term monthly rental for two-wheelers is primarily in old dense developments like Kalewadi. However, the extent of the existing potential is limited.
- There is no market potential for long-term monthly rental for two-wheeler parking in developing high-end residential developments like Pimple Saudagar.

5.10. Willingness to shift to alternative modes

5.10.1. Four-wheeler long-term and short-term willingness to shift

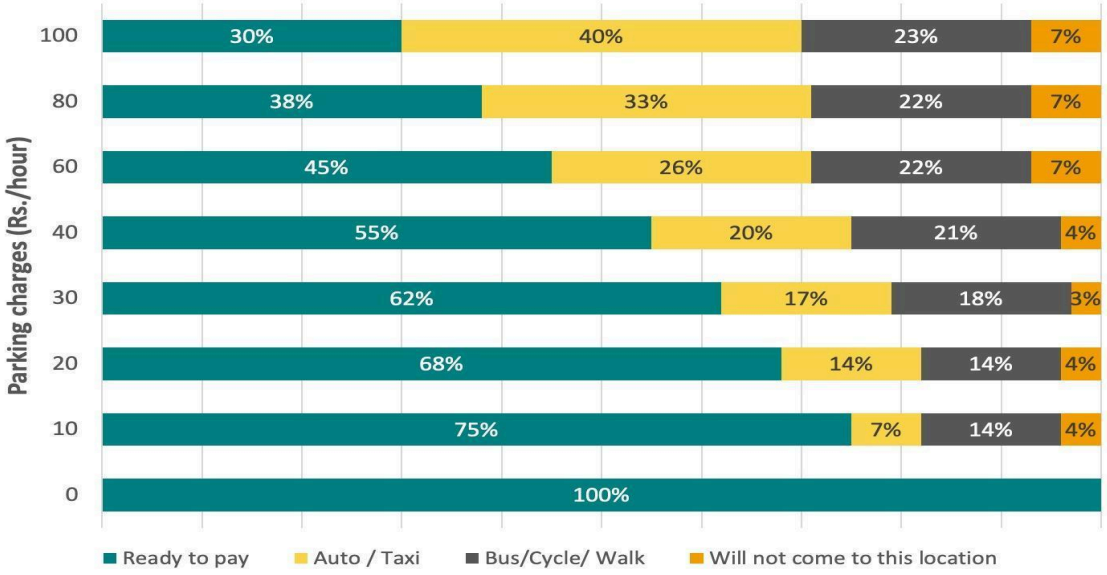


Figure 39: Willingness to shift short-term - four-wheelers

Short-term parking for four-wheelers:

- For short-term trips, 75% of surveyed four-wheeler users are willing to pay INR 10 per hour.
- There is only a gradual decrease in willingness to pay as parking charges increase to INR 20, 30, 40, 60, etc.
- At INR 100 per hour, 30% are willing to pay, suggesting a high willingness to pay and retaining the current mode of transport.
- There is a near equal modal shift distribution between auto/taxi and bus/ cycle/ walk, up to a parking charge of INR 60 per hour.

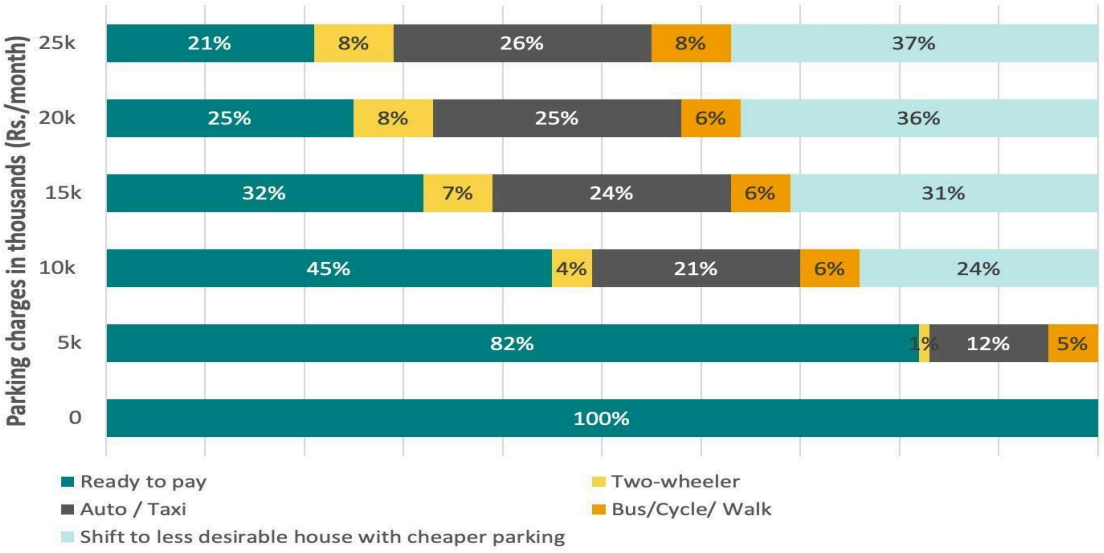


Figure 40: Willingness to shift long-term - four-wheelers

Long-term parking for four-wheelers:

- More than a fifth of the surveyed population is willing to pay INR 25,000 per month, suggesting a high willingness to pay for parking.
- Willingness to shift to a two-wheeler is pretty low at 4-8%.
- Similarly, merely 5-8% are willing to shift to bus/ cycle/ walk.
- More than a third of the population prefers to move to a less desirable location where parking is cheaper, suggesting they are unwilling to shift to a different mode.
- Overall, parking seems very important, as people are either willing to pay for it or even move to another location.

5.10.2. Two-wheeler long-term and short-term willingness to shift

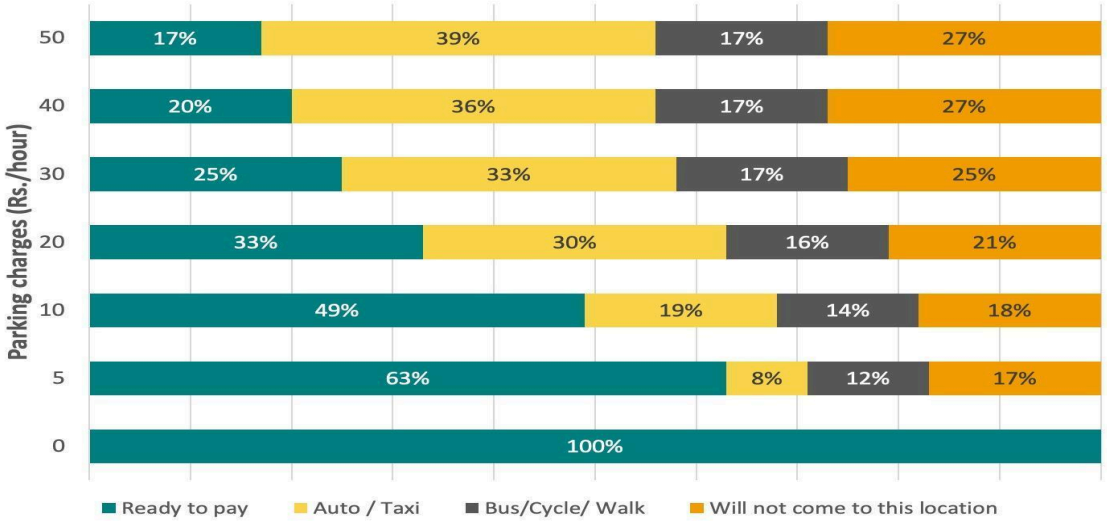


Figure 41: Willingness to shift short term - two wheelers

Short-term parking for two-wheelers:

- As compared to the trends of four-wheelers, users of two-wheelers are less willing to come to the location if parking is chargeable.
- As the parking charges rise to INR 30, 40 and 50, more than 25% of users are unwilling to come to this location, suggesting their unwillingness to pay.
- Nearly 30-40% of two-wheeler users would shift to an auto/ taxi if the parking charges increase more than INR 20 per hour
- Willingness to shift to bus/ cycle/ walk is comparatively low, and its share remains constant at 17% after parking charges exceed INR 30.
- Overall, the willingness to shift from private vehicles to other modes seems low

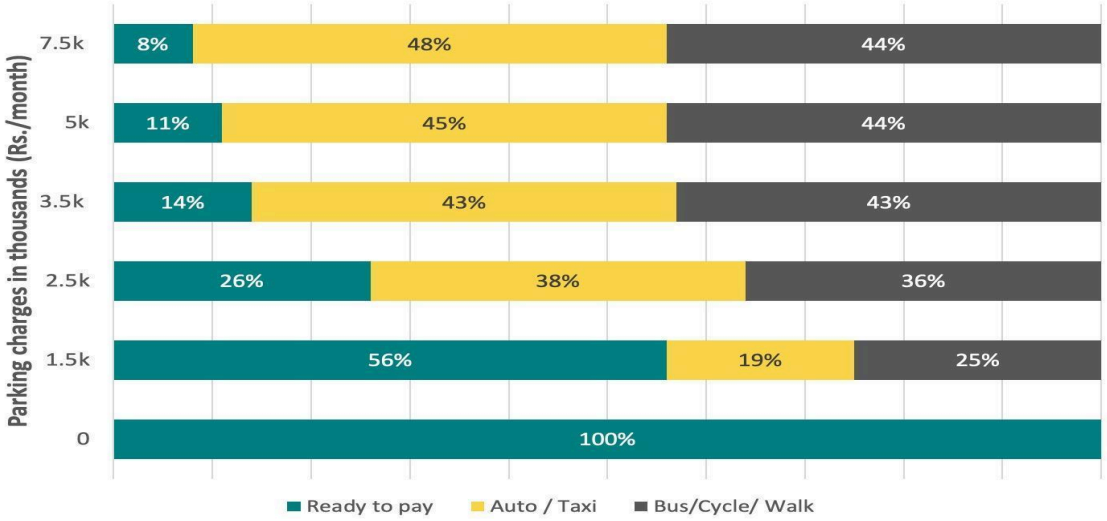


Figure 42: Willingness to shift long term - two wheelers

Long-term parking for two-wheelers:

- 56% of the users are willing to pay monthly parking charges of INR 1,500 per two-wheeler.
- As compared to short term-users, long-term users are more willing to shift to bus/ cycle/ walk.
- Modal share of auto/ taxi and bus/ cycle/ walk increase by near equal proportions as parking charges increase.
- At a parking rate of INR 7,500 nearly 45% of the users are willing to shift to bus/cycle/walk; this would mean a significant decline in parking demand for two-wheelers.
- Long-term parking charges for two-wheelers seem to nudge users to shift to bus/ cycle/ and walk, which are more sustainable modes of transportation.

5.11. Influence of wealth on parking charges

Survey questions also included inquiries on ownership of flats/ houses with size in terms of the number of cars to understand the relationship between wealth/income and willingness to pay parking charges. To do this, the respondents were classified into the following:

- No car ownership but willing to purchase in the near term
- Respondents owning one car
- Respondents owning two or more cars.

The relationship between car ownership and willingness to pay parking charges at different price points derived from the survey is presented below.

No of cars owned by family (Rs/Month)	₹ 0	₹ 5,000	₹ 10,000	₹ 15,000	₹ 20,000	₹ 25,000
0 Car/ Willing to Purchase	35	30	9	4	2	1
1 Car	423	415	205	137	100	84
2 Cars	164	164	125	96	75	62
3 Cars or more	39	39	34	31	27	24
Total	661	648	373	268	204	171

Table 6: Demand elasticity with wealth/income – overall

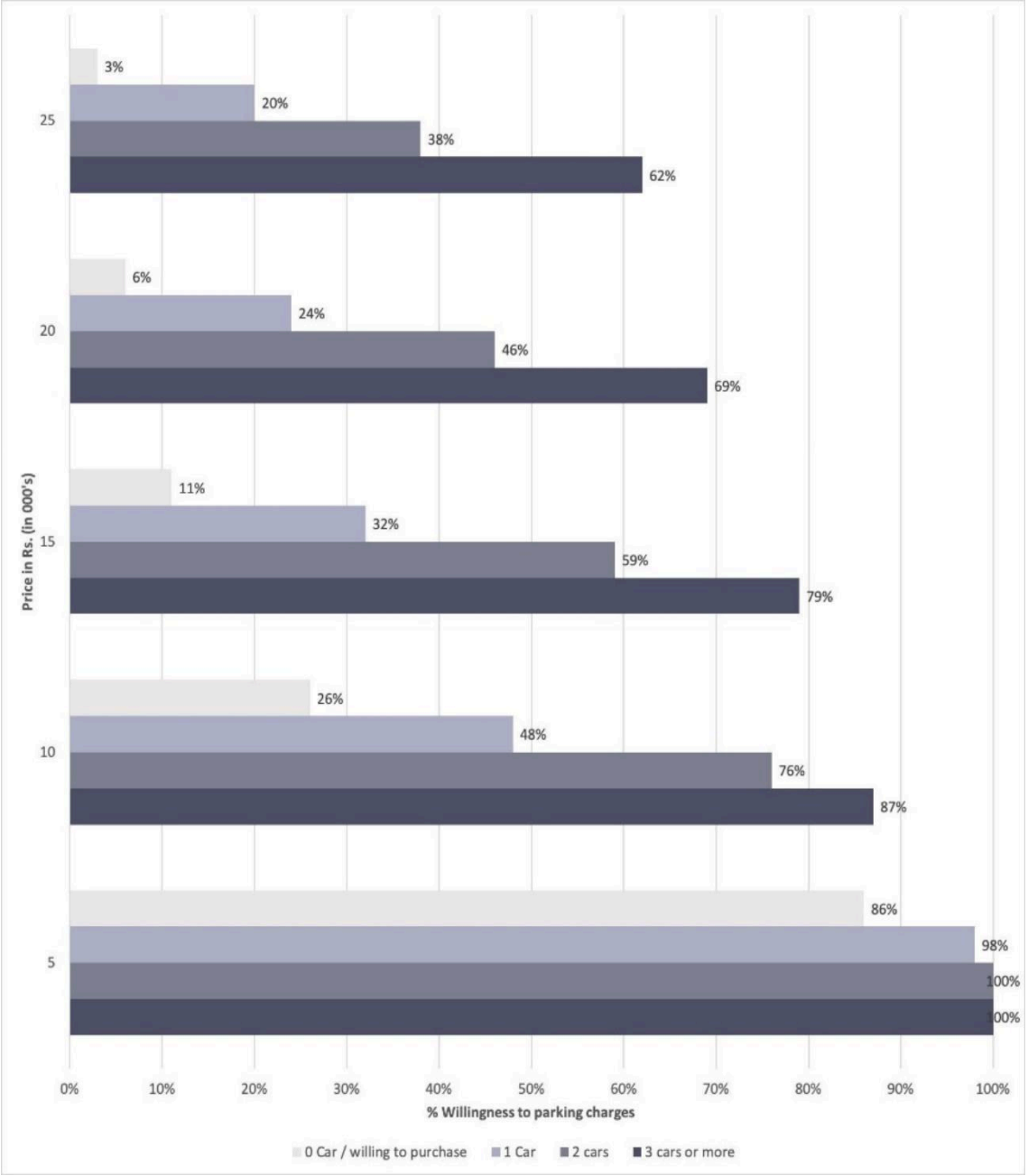


Figure 43: Relationship between wealth/income and willingness to pay Parking charges at different price points

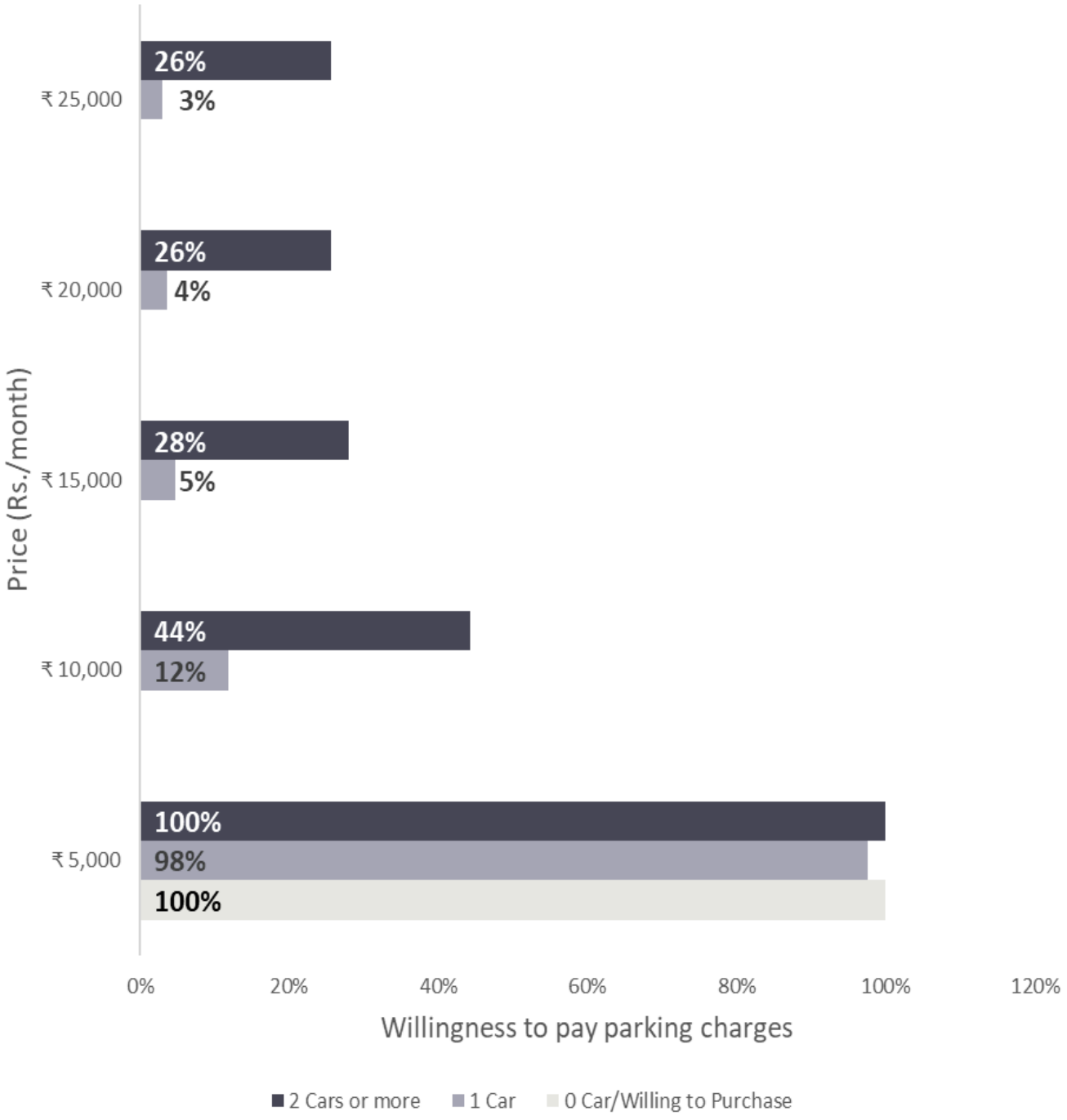


Figure 44: Willingness to pay with car ownership Kalewadi

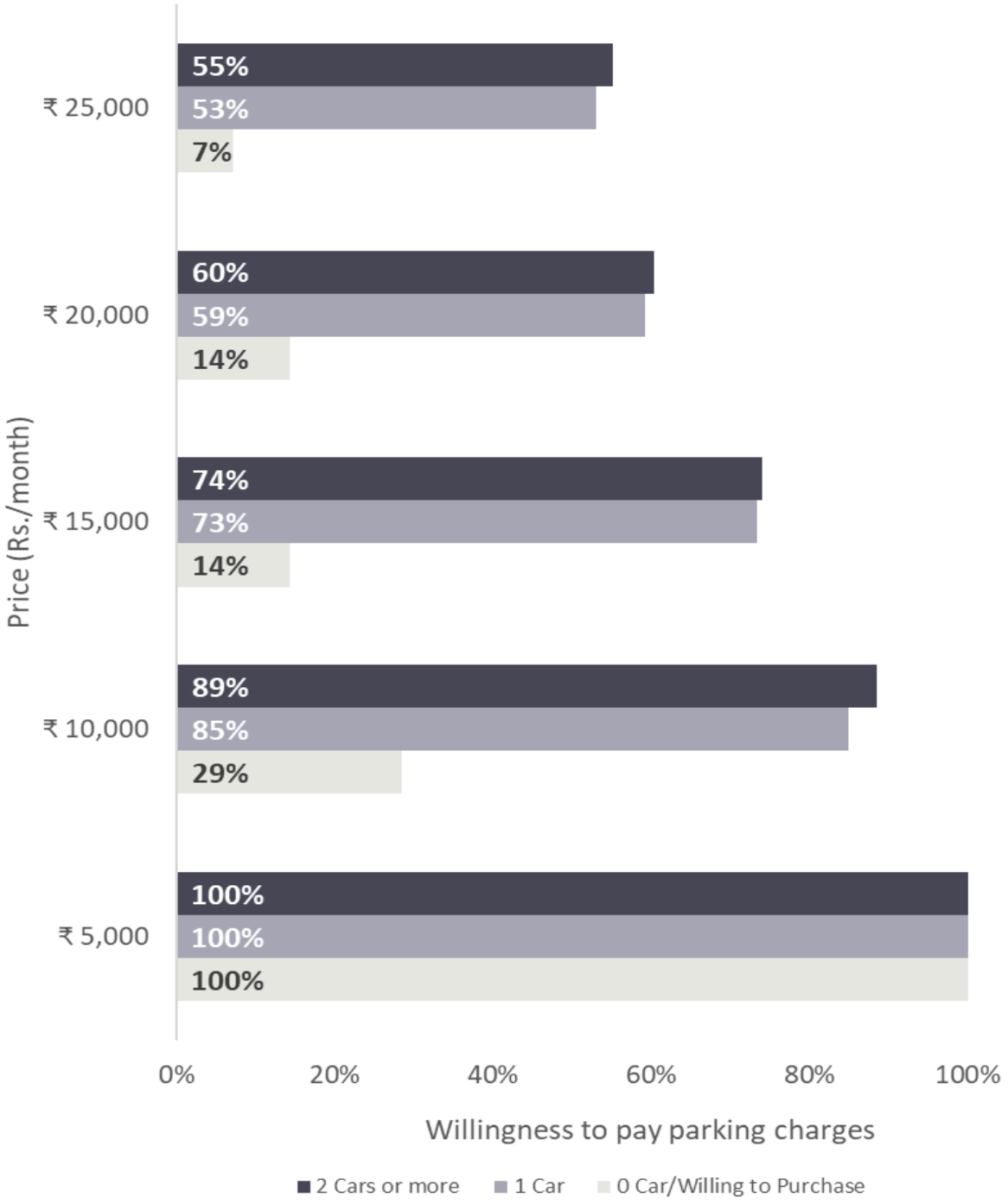


Figure 45: Willingness to pay with car ownership Pimple Saudagar

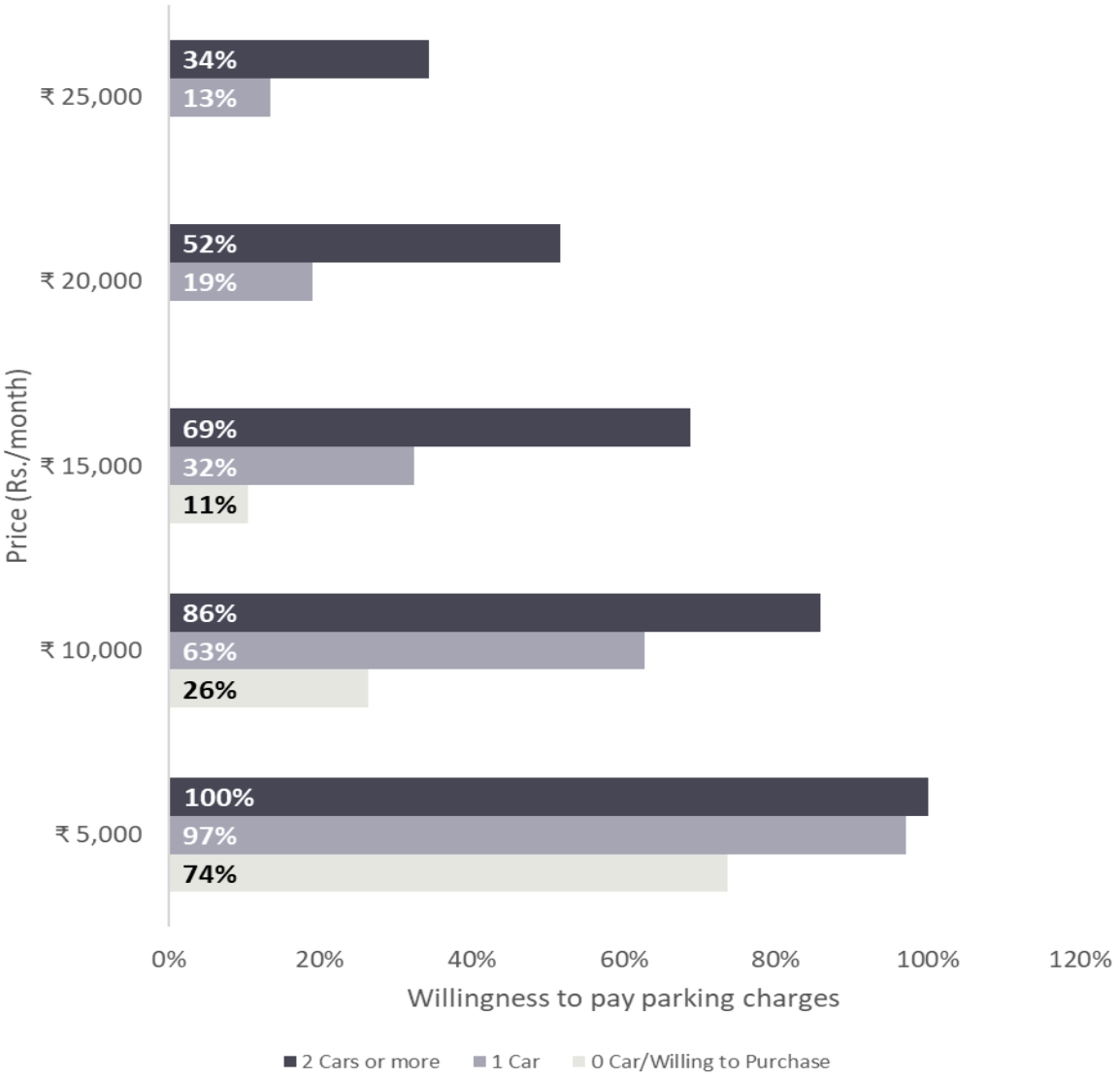


Figure 46: Willingness to pay with car ownership Wakad

- All respondents in Pimple Saudagar area are willing to pay first price point whereas in case of Kalewadi and Wakad area, only respondents owning 2 or more cars are willing to pay first price point. This could be because people residing in Pimple Saudagar area fall under the high-income category and therefore the affordability appears high.
- As can be seen in the graph above, the parking demand is moderately price elastic even in the case of high-income group respondents (owning 2 cars).

- Survey outcome indicates considerable scope for increasing prices from prevailing charges per ECS per month calculated to be INR 3,000 per month (INR 10 per hr x 10 hrs per day x 30 days).

5.11.1. Key insights

- The figure above shows the willingness to pay different monthly parking prices by a proportion of respondents owning no cars, one car, two cars and >= 3 cars, respectively. For instance, 86% of respondents owning no cars are ready to pay INR 5,000 per month for car parking, whereas 100% of respondents owning >=2 cars are ready to pay INR 5,000 for car parking.
- Total of 98% of respondents (648/661) are ready to pay INR 5,000 per month as parking charges, indicating higher critical mass for this price point.
- All respondents owning two or more cars are willing to pay the first price point owing to affordability.
- All respondents in the Pimple Saudagar area are willing to pay the first price point, whereas, in the Kalewadi and Wakad area, only respondents owning two or more cars are willing to pay the first price point. This could be because people residing in this Pimple Saudagar area fall under the high-income category, so affordability appears high.
- As seen in the graph above, the parking demand is moderately price elastic even for high-income group respondents (owning two cars).

The survey outcome indicates considerable scope for increasing prices from prevailing charges per ECS per month, calculated to be INR 3,000 per month (INR 10 per hrs x 10 hrs per day x 30 days).

6. Business Models for Private Parking Market

In previous chapters, we observed that people are willing to pay for parking where the demand for parking is high and supply is limited (typically in old dense developments like Varachha in Surat). The potential for private off-street parking markets is highest in such areas.

We also noticed areas with excess parking supply compared to the demand (like Pal-Adajan in Surat). Willingness to pay for parking was seen to be low in such areas. Further, some areas have a demand deficit only during peak hours (like the New Textile Market in Surat).

As a further nuance, it is possible that in some pockets, excess parking is time-based. For instance, while car bays used by residents in buildings remain vacant as they go off to work, office patrons struggle to find parking in a neighbouring commercial building.

The presence of a demand-supply gap is a necessary but not sufficient condition for the emergence of such private markets. For efficient markets for any commodity, including parking, three conditions must be met:

- The product or the service needs to be sufficiently commoditised, meaning that it should be well-defined, and the expected benefits from its use should be clean and predictable. For example, it must be obvious whether parking payment includes security of the vehicle/ belongings (usually not), protection against any damage, covered/ uncovered, valet or self, etc. Defining the service parameters allows better management of customer expectations but, more importantly, allows the operator to cost the service well.
- Most, if not all, of the supply must be tradable and substitutable. Only then will the existing supply be good enough to meet any deficit.

For example, in the case of real estate, the product in terms of resident units/office/ commercial units can be purchased and sold. Therefore, it is a tradable commodity. Similarly, parking spaces at particular locations made available on a lease/license basis to the parking operator should come with the

right to transfer these spaces to another operator at market value. Thus, these spaces should be commoditised, tradable and market-priced, allowing markets in these services to exist, function, and eventually thrive. The buyers and sellers in the parking space market would be parking operators. For instance, a parking operator allotted parking spaces for a major hospital or railway station could "sell" these spaces to another operator. A residential co-operative society could sell a few or all of its parking spaces to an operator, whether parking payment to the residents on a monthly lease. (It may not be the same parking space every month or even every day). A price should be allowed to emerge that balances demand and supply.

Finally, as discussed earlier, a free market of well-defined parking spaces would emerge, with sale and purchase opportunities. Buyers and sellers would see some revenue and costs in each parking space bundle and be able to value it and arrive at a price for transfer. For example, when a municipal corporation bids out parking lots, bidding operators bid according to the business potential they see in that location. Thus, the price is discovered for that specific lot of parking spaces. Similarly, a residential society or a hospital might bid out its lots. The operators who win these bids might want to exit at some time; then it may do so because (i) it is permitted in the contract and (ii) there is both demand and supply in the market, transactions happen, and a price is available based on previous transactions.

In the case of parking, the product or service is fairly well-defined and commoditised, but the product is still at its nascent stage of development. The key benefit expected is space for parking around a specified location. Any value-added offers (valet parking, covered versus uncovered parking, etc.) seen only at more mature market growth levels are currently absent.

However, the parking supply is not sufficiently tradable. First, parking is a very local phenomenon, with a bay available even 150 m away, losing demand. Secondly, regulatory and jurisdiction-related restrictions do not allow privately owned off-street parking to enter the market. Such supply remains fully captive and available only to its owner. So, even if supply is in the vicinity, it creates an artificial demand-supply gap around a location.

Thirdly, pricing remains regulated, at least officially. At the same time, market dynamics have tended to find their own price. New development areas with plenty of off-street supply have relatively low supply constraints, while old city

areas have challenging parking situations. Such constraints are obviously reflected in the parking prices and willingness to pay. In many cases, regulated pricing is outdated, with market pricing exceeding the regulated price. Readiness to pay is high where demand is high and parking supply is constrained.

This shows that in Indian cities, markets exist at the local level for parking customers (take example of owners near stadiums allowing parking in their houses at exorbitant prices during sports matches), but the markets for trading in parking spaces at the operator level haven't fully evolved. Parking markets exist as highly local, fragmented micro markets with their own local demand and supply dynamics. These markets do not trade with each other. Thus, there is scope to evolve a private parking market that can merge with different local markets. This can be possible if barriers to supply traceability and pricing reforms are addressed through policy response. Further, the limited availability of parking on or off-street in any form (purchase or lease) has led to demand for captive parking spaces within buildings.

The policy response to this has been making parking provisions mandatory through building regulations. As a result, parking has come to be supplied as a commodity inseparably bundled with the home. The homeowner, unaware that the associated cost of bundled parking has been loaded onto him, continues to view captive parking at home or office as free. Perhaps the willingness to pay by the parker is also influenced by the availability of "free" parking at home or office, whereby he or she views free parking as an entitlement and hence any payment as nothing short of "coercion ."

The above supply tradeability and price balance barriers need to be addressed for successful business models to emerge. In this chapter, we would like to demonstrate the potential for parking markets in Indian cities to mature further, benefiting all stakeholders, particularly the parker herself, while leading to an organised parking scenario for the city. However, we must first understand the experience of business models around parking in Indian cities.

6.1. Business Models in Indian Cities: Experiences and Challenges

When faced with parking challenges, the typical response of cities across India has been to augment parking supply through various means. Other than mandating parking minimums in private buildings, residential and commercial, they have spent public funds to create public parking infrastructure and engaged the private sector in building public parking by giving them various incentives.

Engaging the private sector is a prudent choice for cities faced with many demands on their limited public resources. However, the private sector would be attracted only if parking becomes a viable business.

To attract the private sector, cities have adopted various business models mentioned below:

- Cities develop parking infrastructure (on-street and off-street) through public funds and outsource O&M to the private sector.
- Private sector develops parking infrastructure on a design, build, finance, operate and transfer (DBFOT) basis on Government land, with commercial development rights given to the developer to sweeten the deal.
- Real estate developers develop additional parking meant for public access on their parcel of land in return for additional FSI for residential or commercial use.

6.1.1. Model 1: The city creates parking infrastructure but outsources management

In the first model, cities spend public funds to develop parking facilities and thereafter lease these facilities to private operators against payment of annual licence fees, often called a "premium". Operators quoting the highest annual premium are awarded the parking management contract. The operator receives the right to collect and retain parking fees. These contracts are for a short

tenure of 1-3 years. In this model, parking is subsidised by the provision of public land and the expenditure of public funds to create parking infrastructure.

Both SMC and PCMC have adopted this first model to create parking facilities in their respective jurisdictions. SMC has developed parking infrastructure at 89 sites (as shown in the table below) and outsourced the management of these sites to private operators against payment of annual "licence fees".

No	Parking category in Surat City	No. of sites developed by SMC
1	On-street parking	23
2	Parking below flyovers	24
3	Off-street parking lots earmarked by SMC	31
4	MLCPs	11
	Total	89

Table 7: Parking sites developed by SMC

In PCMC, parking on one side of the road is allowed depending on odd/ even dates (i.e., P1 and P2 scheme) for on-street parking. Recently, tenders were floated for 20 such on-street parking sites. PCMC has also earmarked 5- 6 sites for off-street parking near schools, hospitals, etc. Presently there are no MLCPs in the PCMC area.

Lack of enforcement owing to a lack of resources is a significant challenge in Pimpri Chinchwad. The lack of resources for the traffic police also hinders good traffic enforcement. Recently, PCMC purchased and gave five towing vehicles to the local traffic police to enforce the parking rule better.

6.1.2. Model 2: Private sector creates and manages parking (with incentives from the government)

In this model, the private sector designs, builds, finances, and operates parking facilities for a predefined period, after which the facilities are transferred to the government. The goal of the government is to keep parking rates low. For this, the government gives private developers public land at no cost. The developer is also granted the right to develop and lease commercial properties on this land. This model encourages personal motor vehicle use and makes it challenging to initiate parking reforms.

SMC, as well as PCMC, have tried this model but with no success. There was a poor/ no response for the tenders floated for developing 3 MLCPs on a DBFOT basis by PCMC. Even SMC did not get takers for Gopi Talav MLCP even after increasing commercial area development rights.

6.1.3. Model 3: Real-estate developers create additional parking in return for additional FSI

The third model is prevalent in cities of Maharashtra.[6] Under this model, the city government provides additional FSI equivalent to 50% of the parking lot to any developer providing public parking for a minimum of 50 vehicles on his plot. The plot should be situated adjoining the busy road, and the developer must hand over the parking lot to the city government free of cost. While this model may have increased the supply of parking facilities, it also incentivised not to initiate parking pricing reforms.

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[6]https://timesofindia.indiatimes.com/city/mumbai/bmc-plans-to-give-builders-extra-fsi-for-public-parking/articleshow/1955963.cms

https://www.hindustantimes.com/mumbai/maharashtra-hikes-premium-for-fsi-under-public-parking-policy/story-bYsyppjyw2jxBkxb3FAI2N.html

6.2. Case Studies

A few case studies showcasing cities' efforts in creating parking facilities through private participation are summarised below.

6.2.1. Development of MLCP in Sarojini Nagar Market, New Delhi, on a BOT basis

This project represents the second business model described in the section above.

The MLCP in Sarojini Nagar Market was developed on PPP-BOT basis in 2012 by the New Delhi Municipal Council (NDMC) with DLF as a private concessionaire. The construction cost of this mechanised parking facility was Rs 80 crore. Under the terms of the agreement, the concessionaire had to build the parking facility and operate it for 35 years. The facility is completely mechanised with no ramps or staircases as a fallback in case of power failure or any other emergency. DLF was allowed to commercialise 25 % of the space.

The capacity of MLCP is 824 ECS. The ground and first floors have 105 commercial units, whereas the 2nd to 8th floors are dedicated to parking. The parking fee is INR 10/ hr.

The Centre for Science and Environment (CSE) study in 2016 found that the parking facility at Sarojini Nagar MLCP was operating at 20 to 40% of its capacity after it became operational, whereas the surrounding area remains gridlocked with cars.[7] The study found that the project was effectively reduced to being a shopping mall on free land, thus committing huge subsidies to car owners.

The CSE Study also found that the parking charges could recover 1.6% of operational costs even in the best-case scenario. If the developer tries to recover the full cost from parking charges, the parking rates will have to be INR 77/ hr.

As earnings from parking activity are very small, developers have little interest in ensuring full utilisation of parking space. In such projects, real estate

[7] CSE 2016, Parking Policy for Clean air & Liveable Cities – A guidance framework.

dominates, whereas parking is relegated to a secondary role as the bulk of the developer's earnings come from the real estate component.

6.2.2. Multi-Level Automated Car Parking (MLCP) at New Market, Kolkata

This project represents the second business model described above. The MLCP project at New Market Kolkata was implemented on a BOOT (Build, Own, Operate and Transfer) basis, where Kolkata Municipal Corporation (KMC) provided land on lease for 99 years. The project cost was INR 25 cr. The designed capacity of the project is 270 cars.

It is a mechanised underground parking project with a mix of the two technologies, i.e., a puzzle parking system based on Dolly shuttle and Palette shifting technology. The driver can leave after parking on a tray at the entrance lobby. The driver needs to provide his identity details and car number. Based on this, the system generates a smart card given to the driver, specifying the parking slot number and unique car number. It uses a SCADA system and parking software from the Dutch company EEV. Lifts on the ground elevate the car to the ground floor automatically to the carrier. This carrier moves to place the vacant space allotted by the system. The entire process takes approx. 5 to 7 min, in an ideal situation.

Under this project, the revenue to the concessionaire comes from the parking charges (INR 10 per ECS hr.) and sublease rental of commercial space. KMC decided the parking charges and a provision of a 5% escalation in the parking charges per year were kept, but the charges were not revised. KMC also provided the right to develop 40,000 sq. ft. of commercial space to the concessionaire and sub-lease it. The bidding criterion was the maximum upfront amount quoted to KMC. In addition, the concessionaire was also required to share a fixed portion of revenue with KMC annually. The concessionaire was also supposed to provide KMC with a subsidised land lease rental of INR 1 per sq. ft per annum. To increase the parking demand for this project, KMC declared no parking zone area falling within a 500 sq. m radius around the project to provide exclusivity to the concessionaire.

The project became operational in 2007. The project witnessed high occupancy initially. However, the occupancy was gradually reduced to 10% owing to poor

enforcement and poor maintenance of the mechanised parking system. The high operational cost of the mechanised system, poor maintenance of the system, the high replacement cost of equipment, poor enforcement, and low parking prices led to financial losses for the concessionaire. The facility was shut down in 2015 owing to financial losses incurred by the concessionaire.

6.2.3. Kankaria Multi-Level Car Parking System, Ahmedabad

This project represents the first business model described in the section above.

Ahmedabad Municipal Corporation (AMC) constructed a mechanised G+7 level multilevel car parking project near Kankaria Lake Front at a Project cost of INR 23 Cr. in 2013 through a construction and maintenance contract with a joint venture of Simplex Project Ltd and Gannon Drunkenly Company Ltd. Under this contract, the contractor was paid for construction and monthly five-year maintenance costs. The facility has a parking capacity for 250 four-wheelers and 250 two-wheelers. The project uses a mechanised system similar to New Market, Kolkata.

The project has witnessed a monthly income of Rs 30,000 against a monthly cost of Rs 4 lakh, leading to an annual operational deficit of Rs 45 lakh. Due to poor parking enforcement on streets, the parking occupancy in the MLCP was less than 10%. This led to insufficient revenue.

At the end of the maintenance contract of the previous operator, AMC appointed a new operator with rights to construct a restaurant on the rooftop of the MLCP and permitted other revenue-generating commercial activities to meet the operational deficit. The bidding variable was the highest annual Licence Fees quoted by the Bidder. Despite being allowed the right to undertake different commercial activities, the new operator has incurred losses due to low parking charges and law enforcement.

6.2.4. On-street Parking Management Bhubaneswar

Bhubaneswar Municipal Corporation (BMC) divided the area of the city into different parking zones to manage on-street parking lots. The parking lots in each zone are auctioned to private operators. The private operators are

responsible for managing and operating the parking lot and retain the right to collect parking fees. Operators are also mandated to help parkers to find parking spaces. ETM machines are being used to issue parking tickets. Each ticket has a validity of 2 hours. The parking users can use the same ticket in the same zone if the ticket's validity has not expired. There is a provision for charging penalties/ additional parking if parking tenure exceeds the validity period. Improper parking is penalised through enforcement.

Innovative localised low-cost on-street parking management solutions implemented in Bhubaneswar led to more convincing and non-parking parking users.

6.2.5. Lessons from case studies

The above case studies show that parking models have struggled to make the business viable even if real estate components/ other commercial activities are clubbed with it. Poor enforcement and low parking charges point to insufficient parking revenue. Poor earnings from parking activities leave little interest to the developer in ensuring full utilisation of parking space and committing huge subsidies to vehicle owners. This demands the urgent need for parking pricing reforms and strengthening enforcement mechanisms.

The next section discusses at which level a typical business could become viable.

6.3. Business Model Viability Assessment

To understand the economics around the parking business and to see the situations under which a business will make acceptable returns, we assess three different business models:

- Development of a standalone Multilevel Car Parking project (MCLP)
- Parking developed in an open plot
- Development of additional parking lots in residential/ commercial complexes for non-residents.

The above models envisage that a private operator would invest in parking infrastructure, operate and maintain it at its own cost and collect parking fees. Under these conditions, a Break-Even Parking Price (BEPP) is discovered in each model at which the project is financially viable for the operator. The BEPP so discovered is then compared to the pricing point in the readiness-to-pay survey in Surat and PCMC to understand the gaps. We look at each of the models separately.

6.3.1. Development of Standalone Multilevel Car Parking

Among all parking typologies, the MLCP model offers the best economy in terms of land use. To understand its viability, we take a hypothetical case of a 200-car bay capacity MLCP at any of the three surveyed areas in Surat and Pune. The land is assumed to be leased at around the prevailing market rates (INR 46/ sq. ft. for Surat and INR 58/ sq. ft for Pune), while the capital investment for building works out to be around INR 13.50 – 13.75 Crore including interest during construction. The project construction and O&M costs are estimated based on industry standards and prevailing practices in similar projects. Most importantly, 80% day-time and 20% night-time occupancy are assumed, supported by high demand-supply gaps in these areas much higher than the 200 ECS capacity. It may be emphasised that such occupancy levels in any MLCP typically would be possible only if unauthorised on-street parking is not tolerated and parking rules are well enforced.

Revenues and expenditure cash flows were projected over the 20-year project life period, and the pricing level required to make the project viable at an 18% Internal Rate of Return was discovered. The Break-Even Parking Price for the MLCP project was estimated to be INR 62 per hour of parking charge for a four-wheeler at the existing FSI level of 1.8 and Rs 53 per hour at a higher FSI of 2.5. Similarly, the BEPP, if the MLCP is used for two-wheeler alone @ five two-wheelers per ECS (0.2 ECS per two-wheeler as per the IRC standards) would be one-fifth at INR 12.4 per hour and INR 10.6 per hour at the different FSI levels respectively.

Given these pricing levels, how do they compare with what users are willing to pay as per our survey in Surat? The following exhibits showcase this.

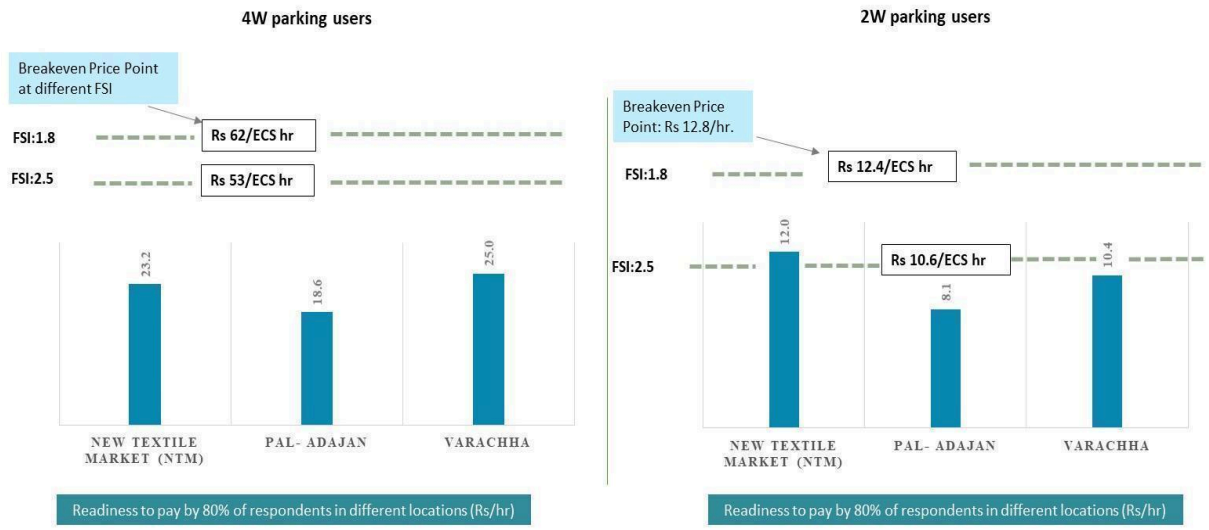


Figure 47: Comparison of Break-Even Parking Price (Rs/ hr) with the price parkers are willing to pay for car parking for hypothetical non-mechanized MLCP at Surat

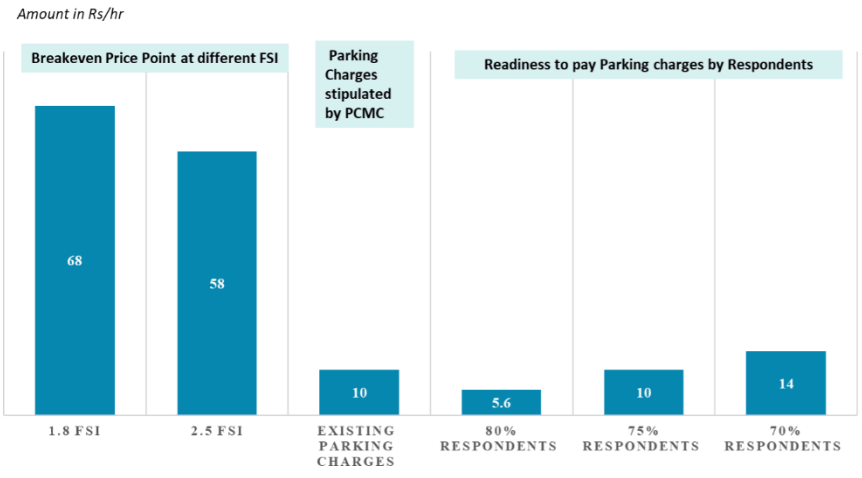
The above shows that for two-wheelers, the Break-Even price is equal to or close to the price parkers are willing to pay. In the NTM area, parkers are ready to pay the price, making it viable to run the two-wheeler-based MLCP for a parking operator.

It may be pointed out that the BEPP reduces (four wheelers) if the project is constructed on Government land provided at token lease under a Public Private Partnership Project. Another model, which is mostly the case in most Indian cities, is where the Government constructs the entire MLCP on Government land using budget funds and hands over the MLCP to the private operator for operation and maintenance. The results of BEPP for different arrangements are displayed below:

Particular	With Land Cost		Without Land Cost	
	FSI- 1.8	FSI- 2.5	FSI- 1.8	FSI- 2.5
Private Developer				
BEPP- 18% returns on investment	62	53	33	33
Government				
BEPP- 10% returns on investment	45	38	21	21

Table 8: Break Even Parking Price (Rs/hr) for 4-Wheeler for Non-mechanized MLCP – SMC

It can be seen that against willingness to pay INR 18-25 per hour, only a government-funded project with a lower investment return expectation of around 10% meets the bill. However, the same is not desirable, as we shall see later. A similar exercise for PCMC has thrown up numbers as follows:



Particular	Parking Charges (Rs/hr)
Break-even Price point @ different FSI	
@1.8 FSI	13.6
@2.5 FSI	11.6
Parking charges stipulated by PCMC	5.0
Readiness to pay Parking charges by Respondents	
By 80% resp.	3.0
By 75% resp.	3.4
By 70% resp.	4.1

Figure 48: Comparison of Break-Even Parking Price (Rs/ hr) with the price parkers are willing to pay for car parking for hypothetical non-mechanized MLCP at Pimpri Chinchwad

It can be seen that a viability gap exists for the MLCP in terms of what the business demands versus what the users are willing to pay. In the case of

Surat, around 23% are ready to pay INR 50/ hour and upwards, while in some areas of Pune, like Pimple Saudagar, over 40% are prepared to pay INR 50/hour. This provides direction and hope that if parking becomes regulated and enforced, organised parking demand will increase. The willingness to pay could increase to viable levels. The results of BEPP for different arrangements are displayed below:

Particular	With Land Cost		Without Land Cost	
	FSI- 1.8	FSI- 2.5	FSI- 1.8	FSI- 2.5
Private Developer				
BEPP- 18% returns on investment	68	58	33	33
Government				
BEPP- 10% returns on investment	51	43	21	21

Table 9: Break Even Parking Price (Rs/hr) for 4-Wheeler for Non-mechanized MLCP – PCMC

These subsidised models under which land is provided by the Government, or even the fully blown MLCP, are quite popular models for policymakers, as they are the low-hanging fruits that allow for seemingly sustainable models. Some models even allow the private operator to exploit part of the project as real estate, thus cross-subsidizing the parking costs. These models are seen as "successful." But they are successful only in terms of saving the recurring expenditure for the Government on meeting a potential viability gap, but surely that cannot be the policy goal. These models do not allow for the owner to bear the total costs of car ownership and subsidised car use. They inhibit the development of a non-subsidized, market-based parking industry.

6.3.2. Open plot for Parking

Given that MLCP involves significant capital costs, the open plot for parking is a low-cost and flexible model. Under such a model, the operator will manage parking facilities on leased land. Its main expenditure thus involves monthly lease rentals for land and management costs. There are few upfront investment costs for the parking operator. It may be noted that the land area required to accommodate 200 ECS now increases to 5000 sqm compared to the 2778 sqm required under the MLCP model. With these assumptions, the BEPP for all three typologies is estimated and placed in the table below.

No	Typology	Willingness to pay by 80% of respondents (Rs/ ECS hr)	Breakeven Parking Charge (Rs/ ECS hour)
1.	New Textile Market (NTM)	23	42
2.	Pal- Adajan	19	
3.	Varachha	25	

Table 10: Breakeven Parking Charges for Four-Wheelers in an Open Plot Business Model – Surat

The corresponding BEPP for PCMC is INR 52/ hour while the willingness to pay at the level of 70% of respondents is INR 14/ hour. However, as mentioned earlier, the willingness of 40% of respondents is to pay INR 50/ hour in PCMC.

It is unsurprising that the Break-Even Parking Charge is lower than the MLCP example due to savings in construction and maintenance costs.

6.3.3. Long-term lease

This model envisages that developers could build additional parking lots/ ECS in a residential/ commercial complex beyond the requirement of the residents. The additional ECS thus constructed would then be leased to outsiders for a price. This model tries to capitalise on some savings that could accrue due to common expenditures with the building, such as land costs, other property costs, and some common building-related costs.

During the stakeholder consultations, private developers indicated an average construction cost of INR 2.5 lakh per ECS in residential/ commercial property. Considering the additional maintenance cost of 1%, BEPP was calculated to be INR 3,200 per month per ECS. As against this, the long-term parking user surveys showed an average willingness to pay up to INR 3,400 per month per ECS in Surat and Rs 5,000 per month per ECS in Pune. Against this, monthly parking charges charged by MLCP are between INR 1,800 and INR 3,500 pm per ECS in Surat. Thus, this model points to business viability.

6.4. Revenue for the city: Towards sustainable business models in the parking

We have observed that the price parkers are willing to pay under the BAU scenario is lower than what is required to make the parking businesses viable, except in certain situations. What is the answer to a sustainable private market to emerge for parking provision?

The answer lies in the direction of what was discussed at the beginning of the chapter, addressing the barriers of supply tradability and price balance. We discuss this as a step-by-step approach. However, all steps will not happen individually but would rather overlap.

6.5. Steps to bring existing parking stock into the market:

Step 1: Bring all existing unregulated on and off-street municipal supplies into the market by authorising parking where possible based on street width feasibility.

Step 2: Encourage Model C, which allows additional building parking lots. Arranging their handover of these "additional" parking stock created to parking operators.

Step 3: Encourage building management to contract out operation and maintenance of their existing parking to parking operators

Steps to encourage the use of these assets and discovery of real price.

Step 4: Bring in enforcement so that unauthorised parking is reduced and parkers must pay for any off-street or on-street parking.

Step 5: Ideally, parking prices should not be regulated, and should be market-determined. However, in the development stage of the market, it is possible that unregulated pricing may be misused. Hence, pricing controls should only provide ceilings and be periodically raised (annual increases). Experiments around pricing, such as differential off-peak and peak pricing, should be tolerated.

Subsequently, in additional stages, with stricter enforcement, parking rates could be raised even further based on principles of pricing discussed separately. This could lead to a significant shift to alternative modes, leading to decongestion. Eventually, parking prices could reach near levels where private parking business models discussed earlier start becoming viable, leading to the supply of privately run parking facilities. A market for parking operators could thus emerge and, with consolidation, reach a larger scale for operators as opposed to the small fragmented market that exists now. The use of technology could reduce staffing costs and increase compliance.

Educating the cities on the benefits of organised parking and the emergence of parking markets is essential. The development of private parking markets can help city governments channelise scarce resources towards competing

projects, help augment revenues, decongest streets, and spur the growth of off-street parking lots. Such development could help the city government treat private parking infrastructure projects as real estate, generating additional revenues by collecting fees towards granting building use permissions and property taxes.

Moreover, the user survey outcome indicates that parking is currently under-priced even without significant enforcement. There is scope for an increase in short-term parking charges to INR 10/ hr and INR 20/ hr for TW and four-wheeler parking users from existing parking charges of INR 10 from 0-3 hrs. of parking for TW (i.e., INR 3.3 /hr) and INR 20 from 0-3 hrs. of parking for four-wheeler (i.e., INR 6.66/hr) in Surat. Upward revision of parking charges would also likely increase revenue for Surat Municipal Corporation.

Further, per the prevailing business model, SMC invests in building parking lots and MLCPs (land and infrastructure), and SMC's management is outsourced to private operators through bidding. The bidder quoting the highest annual premium/ licence fees is awarded the parking management contract. The operator receives the right to collect and retain parking fees. Therefore, all present parking management contracts are premium/ licence fees based. There is a scope for revenue enhancement to SMC parking if the parking management contract structure is changed to a revenue share basis instead of the present licence fees based. Using technology, leakages could be minimised, and upward revision of parking charges could lead to higher revenues for operators and SMC.

There is also scope for generating additional revenue by augmenting the on-street parking supply. Presently, in many areas of Surat city, on-street parking is rampant and not regularised. This causes inconvenience to citizens. With the proper street design, an additional supply of 2.07 lakh ECS (as calculated by extrapolating the designed parking supply in a scenario all streets are designed) bays can be created as against the existing on-street parking demand of 4.16 lakh ECS for two-wheelers and four-wheeler parking users. The remaining demand of 2.09 lakh ECS can be met through privately run off-street parking provision development of a private market for off-street parking. Additional on-street parking supply of 2.07 lakh ECS can generate annual revenue of INR 1087 cr. The calculation is presented in the table below as a broad estimate.

Particular	Revenue with Enhanced Parking Changes (Rs 20/ECS hr.)
Citywide on-street parking supply after redesigning streets in PCMC area (no. of ECS)	2.07 lakh
Daily ECS hours occupied @ 60%-day time occupancy (12 hrs. x 2.07 lakh ECS x 60%)	14.90 lakh ECS hours
Daily Income from Parking (Rs cr)	Rs 2.98 cr
Annual Parking Revenue (Rs cr)*	Rs. 1087 cr

Table 11: Potential revenue from parking to Surat

Note *: Figures indicate total revenue potential from Parking. Revenue to SMC would be lower as the operator shall share revenue after considering its O&M costs and profit margin.

A similar exercise for PCMC has shown that an additional supply of 1.2 lakh ECS bays can be created with proper street design to counter the existing on-street parking demand of 2.8 lakhs ECS for two-wheeler and four-wheeler parking users. Moreover, user survey outcomes in PCMC areas indicate that the parking charges in Pimpri Chinchwad are presently underpriced. Around 68% of 4W Parking users are willing to pay Rs 20/hr. Therefore, there is scope for an increase in short-term parking charges to Rs 20/hr for 4W parking users from existing parking charges of Rs 10/hr. A lower price demand elasticity in Pimpri Chinchwad also shows a high scope for increasing the parking prices if necessary. The calculation for additional revenue due to additional on-street parking supply is estimated broadly and presented in the table below.

Particular	Revenue with Enhanced Parking Changes (Rs 20/ECS hr.)
Citywide on-street parking supply after redesigning streets in the PCMC area (no. of ECS)	120000
Daily ECS hours occupied @ 60% daytime occupancy (12 hrs. x 1.2 lakh ECS x 60%)	8.64 lakh ECS hours
Daily Revenue (Rs cr)	1.72 cr
Annual Revenue from Parking (Rs cr)*	630 cr

Table 12: Potential revenue from parking to Pimpri Chinchwad

Note *: Figures indicate total revenue potential from Parking. Revenue to PCMC would be lower as the operator shall share revenue after considering its O&M costs and profit margin.

Thus, parking reforms could lead to significantly higher revenues for the municipal body, which can be used in enforcement.

7. Socio-Economic Benefits

The objective of the economic analysis is to quantify the benefits to society. It informs whether the project is worth the resources society is willing to invest to gain expected social benefits. In the present case, an attempt has been made to quantify benefits to Surat due to implementing the proposed parking reform roadmap.

7.1. Approach and methodology

The economic analysis has been carried out for the parking reforms planned for Surat. The analysis was carried out within the broad framework of Social Benefit Analysis. The social benefits were estimated by comparing the "Business as Usual (BAU) Scenario" meaning base case situation, with "With Parking Reform Scenario".

Business-As-Usual Scenario	With Parking Reform Scenario
No restriction on on-street parking	Restricted on-street parking, resulting in a shift to off-street parking or shift to alternative modes

The economic benefits shall accrue to society due to the impact of parking reforms on following user groups.

- Parking users - who already use the on-street parking and would continue to use parking services by paying parking charges
- Users willing to shift to alternative modes if parking charges are increased to the first defined price point.
- Non-Parking users – Owing to the reduction in on-street congestion.

The economic benefits accruing to parking users were estimated by comparing BAU with "with parking reform scenario". The economic benefits of parking reforms due to the impact on user groups specified (ii) and (iii) were not estimated. In the former, the data/ information on total shifts towards

alternative modes in the city was unavailable. Due to size limitations, such proportions could not be taken from the survey sample. Thus, the city-wide benefits to the users willing to shift at the lowest price point were not attempted, given the constraints. In the case of later, the survey scope did not involve traffic counts and V/C ratio. Due to the absence of such information, we could not estimate the congestion reduction benefits to non-parking users.

Following points were considered for calculating citywide economic benefits:

- Determination of vehicle population two-wheelers and four-wheelers was determined by obtaining cumulative registered vehicles in the last eight years, considering the standard vehicle life of 8 years for two-wheelers and four-heelers.
- No of parking attempts per vehicle (2W and 4W): The survey analysis of the three typologies areas had shown that 2W parking users and 4W parking users were spending an average 4 min. and 5 min. of time in cruising for search of parking for each parking attempt, respectively. The parking reform is expected to reduce cursing time for parking users. To identify the number of daily parking attempts made, the motorised trip rate of 0.93 of Surat as no of parking attempts was adopted.

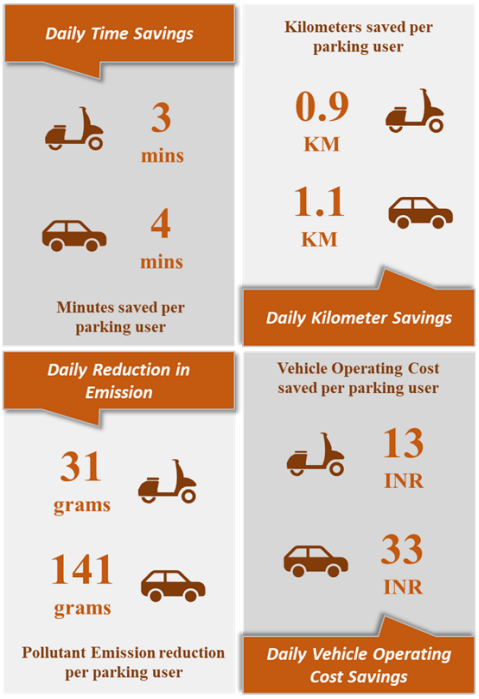


Figure 49: Daily benefits to four-wheeler and two-wheeler parking users

Estimating Economic benefits: Following three citywide economic benefits were estimated by comparing BAU with “With Parking Reform Scenario”.

- Time-Saving benefits:
    a. Weighted average cruising time derived from surveys conducted in three locations were adopted in the BAU scenario. It is assumed that the parking reforms shall help in reduction of cruising time by 80% by restricting on-street parking and making available supply for off-street parking.
- Savings in Emission and Health costs
    a. Parking reform shall help reduce Vehicle KM, leading to savings in Emission reduction
    b. Volume of pollutant emission per Vehicle KM run as per the MoHUA guideline was adopted for the analysis.
- Savings in vehicle operating cost
    a. Parking reform shall help reduce Vehicle KM, leading to savings in VOC.
    b. Value of unit VOC/KM for TW and 4W as per the IRC SP-30 was adopted for the analysis. This included repair and maintenance costs, fuel costs and depreciation costs.

7.2. Benefits to Surat

The parking reforms in Surat will accrue direct benefits to the parking users and those who are willing to shift to alternative modes. Owing to the shift of on-street parking users to off-street parking, there shall be a reduction in cruising time and cruising km spent in searching for parking spaces. The reduction in cruising km will result in reduced vehicle operation, emission, and health costs. Similarly, such benefits shall also accrue to users willing to shift to an alternative mode at the first price point. Moreover, economic benefits shall also accrue to non-parking users due to the congestion reduction of parking users cruising for parking. However, the economic benefits to non-parking users and users willing to shift to alternate modes are not attempted owing to the lack of information/ data points.

The results showed that four-wheeler and two-wheeler parking users will benefit from parking reform. However, such benefits shall be higher for 4W users than 2W users owing to higher cruising time, lower speed, and higher VOC costs.

Each 2-wheeler and 4-wheeler parking user are expected to save INR 65 and INR 97 daily towards reduction in emission treatment costs. The saving in time will lead to savings in productivity, whereas the emission reduction will also steer savings in health costs. Subsequently, per parking user benefits were extrapolated for the citywide vehicle population to arrive at the total daily benefits accruing to Surat city parking users. The outcome is presented in the table below.

No	Benefits	Two-wheeler parking users	Four-wheeler parking users	Total daily city-wide benefits
1.	Time saved (hrs.)	56,428 Hrs	13,566 Hrs	69,994 Hrs
2.	Time-Savings (Amount Rs lakh)	INR 20 Lakh	INR 5 Lakh	INR 25 Lakh
3.	Kilometre saved (Lakh KM)	8.9 Lakh KM	2.1 Lakh KM	11.0 Lakh KM
4.	Reduction in Emission (Lakh tons)	275 Lakh Tons	300 Lakh Tons	575 Lakh Tons
5.	Reduction in Emission treatment cost (Rs lakh)	INR 650 Lakh	INR 194 Lakh	INR 844 Lakh
6.	Reduction in Health cost (Rs lakh)	INR 0.9 Lakh	INR 0.1 Lakh	INR 1.0 Lakh
7.	Vehicle operating cost saved (Rs lakh)	INR 123 Lakh	INR 68 Lakh	INR 191 Lakh
Total Daily Savings (Rs lakh)		INR 794 Lakh	INR 267 Lakh	INR 1061 Lakh
Total Daily Savings (Rs crore)		INR 7.94 cr.	INR 2.67 cr.	INR 10.61 cr.

No	Benefits	Two-wheeler parking users	Four-wheeler parking users	Total daily city-wide benefits
Total Annual Savings (Rs crore)		INR 2898 cr.	INR 975 cr.	INR 3873 cr.

Table 13: Benefits to parking users Surat

Total daily citywide economic benefits are estimated Rs. 10.61 cr and annual benefits are estimated Rs. 3873 cr due to implementation of parking reform.

7.3. Pimpri-Chinchwad

For the inputs in Pimpri Chinchwad, the total vehicles on the road for years 2016 & 2017 was extracted from the details by the Department of Motor Vehicles, Maharashtra[8] (further it was extrapolated till year 2022), while the no. of parking attempts for 2-wheeler and 4-wheeler was considered as 0.88[9]. The economic benefits accruing to parking users due to the implementation of parking reform is shown in the figure below:

Figure 50: Daily benefits to four-wheeler and two-wheeler parking users

[8] https://transport.maharashtra.gov.in/

[9] Motorized trip rate as per Pune Comprehensive Mobility Plan 2008.

The introduction of parking reforms in the city will benefit both two-wheeler as well as four-wheeler parking users. It was observed that the daily time saving with the reduction in cruising time was the same for both the analysed user groups. Nevertheless, benefits due to reductions

in emissions and VOC shall be higher for four-wheeler parking users given different operational characteristics compared to two-wheelers.

Moreover, each two-wheeler and four-wheeler parking user will likely save INR 69 and INR 72 daily to reduce emission treatment cost. Furthermore, the saving in time will lead to saving in productivity, whereas, the reduction in emission will also steer savings in health cost. Subsequently, per parking user benefits were extrapolated for the citywide vehicle population to arrive at the total daily benefits accrued to parking users in Surat city. The outcome is presented in the table below.

No	Benefits	2-wheeler parking users	4-wheeler parking users	Total daily city-wide benefits
1.	Time saved (hrs.)	72,059 Hrs	21,338 Hrs	93,398 Hrs
2.	Time Savings (Amount Rs lakh)	INR 76 Lakh	INR 22 Lakh	INR 98 Lakh
3.	Kilometre saved (Lakh KM)	11.9 Lakh KM	3.0 Lakh KM	14.9 Lakh KM
4.	Reduction in Emission (Lakh tons)	369 Lakh Tons	424 Lakh Tons	793 Lakh Tons
5.	Reduction in Emission treatment cost (Rs lakh)	INR 997 Lakh	INR 275 Lakh	INR 1,272 Lakh
6.	Reduction in Health cost (Rs lakh)	INR 1.2 Lakh	INR 0.12 Lakh	INR 1.3 Lakh
7.	Vehicle operating cost saved (Rs lakh)	INR 167 Lakh	INR 99 Lakh	INR 266 Lakh
Total Daily Savings (Rs. Lakh)		INR 1241 Lakh	INR 396 Lakh	INR 1637 Lakh

No	Benefits	2-wheeler parking users	4-wheeler parking users	Total daily city-wide benefits
Total Daily Savings (Rs. Crore)		INR 12.4 cr.	INR 4.0 cr.	INR 16.4 cr.
Total Annual Savings (Rs. Crore)		INR 4530 cr.	INR 1446 cr.	INR 5976 cr.

Table 14: Benefits to parking users Pimpri Chinchwad

The estimated daily citywide economic benefits are INR 16.4 cr, and annual benefits are INR 5976 crore[10] through the implementation of parking reforms in the city.

[10] Considering 365 days in a year, as the trip rate applied in estimating city wide includes weekday as well as weekend.

8. Regulatory Barriers and Litigations on Parking Issues

This chapter will focus on regulatory barriers, policy gaps, and litigations around contentious parking issues. The aim is to understand what issues might arise while developing a progressive parking reform agenda to make the parking policy work in Indian cities. Apart from analysing the legislation and follow-up regulations, this chapter will highlight various litigations on parking issues. Various parking issues have been contested in different courts, both at the high court level and in the Supreme Court. This chapter highlights some of the selected long-running cases where various contentions with parking issues are highlighted as part of these litigations. This critical review of the parking-related litigations gives an overview of contentious policy outcomes and political and administrative outlooks toward parking issues in our cities.

8.1. Charging for parking on the streets

While the Gujarat Provincial Municipal Corporation Act, 1949 gives the power to provide, maintain and secure public parking spaces, and as all streets are under the Municipal Corporation, the Corporation has the sole right to charge for it[11]. While it is the Municipal Corporation that has been given the power to charge for parking, it is the Traffic Police that has the authority to fine for improper parking and has the power to determine the fee that can be levied in such parking facilities under the Motor Vehicles Act, 1988 and the Gujarat Motor Vehicle Rules, 1989[12]. Though the Motor Vehicles Act, 1988, and Gujarat Motor

[11] On-street Parking: All Public Streets Vest in the Municipal Corporation under section 202 of the Gujarat Provincial Municipal Corporation Act, 1949.

Off-Street Parking: The Commissioner has the power to acquire land for providing, extending or improvement of a place for parking vehicles under section 209(2). Section 458 (9A) of the Gujarat Provincial Municipal Corporation Act, 1949–casts responsibility and gives power to the Municipal Corporation to make by-laws with respect to the provision and maintenance of parking space. Section 458 (36) of the GPMC Act gives the power to secure and protect public parking spaces.

[12] The Motor Vehicle Act, 1988- Power to make rules for maintenance and management of parking places and stands and rules for charging fees; (e) the maintenance and management of parking places and stands and the fees, if any, which may be charged for their use;

Vehicle Rules, 1989 give the power to notify parking places or stands, the Traffic Police only ensure enforcement of the provisions of the Act and rules thereunder. The Traffic Police enforces parking and collects fines for various violations, from vehicles parked illegally to when the vehicles are towed away.

All off-street parking places like parking plots, MLCPs, and parking under the bridges are run and maintained by the Municipal Corporation. The rate of parking fees/ charges to be levied at these parking facilities, both on-street and off-street, is fixed in the various resolutions passed by the Standing Committee of the Municipal Corporation from time to time in Gujarat and Maharashtra.

However, charging for parking on streets is a contentious issue. Occasionally, there will be an uproar against such initiatives by various citizen groups and in the news media. Many people view on-street parking as an entitlement. Paying for on-street is understood to be a misapplication of public rights. With defined street space and the growing number of private vehicles across Indian cities, supply cannot be infinite. Demand management should be accepted as the solution to parking needs.

No significant litigations have opposed the charging for parking on the streets in Gujarat and Maharashtra. However, there has been a long-running PIL (Public Interest Litigation) in the Gujarat High Court about traffic congestion and management issues since 2017. A PIL was filed stating that “on a bustling road with heavy traffic and lack of space, multi-level parking on pay and use basis is an ideal solution; in fact, it is the need of the day.” In response, the Court ordered the State Government and the Corporation to study traffic congestion and bottlenecks and take necessary steps thoroughly. The Traffic Engineering Department of the Corporation and the Traffic Police Department were asked to cooperate to ensure smooth traffic movement. The Estate Department was asked to remove all types of encroachment on roads obstructing the free movement of vehicles and pedestrians, including on-street parking and informal vending. Different departments of the Corporation, especially the

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Gujarat Motor Vehicles Rules, 1989- Power to designate/notify parking places under M. V Act and the fees to be charged and manner of maintenance and management;

a. Rule 188- Parking Places and halting stations
b. Rule 207- Public parking place and stand- the fee that can be levied and collected by the local authority for such parking

Traffic Department, the Estate Department, and the Commissioner of Police, Ahmedabad City, were asked to ensure that vehicles are not parked on roads/ service roads surrounding commercial and institutional establishments like shopping centres, restaurants, clubs, hospitals, educational institutions, commercial/office complexes, malls, etc, and also make sure that these establishments provide parking facilities within their premises.

The Estate Department of the Corporation was responsible for ensuring that all buildings that come for Building Use Permissions have adequate parking space according to GDCR norms and have inspections to ensure that these parking spaces infringed have been encroached upon. The Corporation was to establish clear 'No Parking' zones, especially on crossroad junctions, and implement penalties for parking in these zones. This particular PIL is still under the High Court's purview, and the High Court continues to monitor the progress of the orders passed.

To conclude, the Municipal Corporations in Gujarat and Maharashtra (given the similar legislations) have the power to charge for parking on-street and manage the on-street parking. The Standing Committee resolutions are required to finalise the management mechanism or decide the charges levied. The Municipal Corporations are also mandated to provide public parking, such as parking plots, multi-level car parks, and parking under bridges. There are no legal contestations around charging for parking on streets. However, a city-level or state-level parking policy stipulating the on-street parking management and associate charges based on the actual demand for parking is desirable. The municipal standing committees tend to fix parking charges based on what they think is 'reasonable' rather than based on data on parking demand.

8.2. Litigations about charging for parking in buildings

In multiple states in India, there have been litigations in the respective High Courts around the issue of levying charges for parking in commercial properties in the last ten years. This section gives an overview of the status of these litigations and broad arguments on both sides around whether to allow private property owners to charge for parking inside commercial (or any other) properties.

In 2018, petitions were filed in the Gujarat High Court by the Gujarat State against malls charging for parking on their properties. The government's charges say that levying parking fees is against the Gujarat GDCR (General Development Control Regulations) and against building use permissions. It also states that malls do not have any authority to charge parking fees according to the law. The argument raised by the government was that charging for parking converts the use from “parking space” to “commercial use” – this violates the building use conditions. Secondly, the parking use mandated by the GDCR is free of FSI (Floor Space Index or allowable built-up area) and cannot be converted to commercial use. The State also blamed on-street congestion adjacent to the mall, on the mall owners stating it resulted from people parking on roads as parking in the mall was charged.

The mall raised points that no law prevented the malls from creating paid parking on their premises; the fees charged were nominal and used to maintain the parking lot. It was also pointed out that GDCR does not mandate free parking in malls, and the government cannot insist on providing free parking. Since malls are not “public spaces”, the police commissioner cannot issue orders on how to regulate parking on private properties. GDCR mandates that minimum parking is provided within a building unit falling in the “Mercantile” category. The GDCR provides that parking has to be provided mandatorily. However, it does not mandate that the parking area has to be provided free of charge.

The High Court and later the Supreme Court ordered the state government to formulate a parking policy to rationalise and regulate parking fees collected by commercial complexes, malls, and theaters at public places/ roads/ streets and appropriately amend the GDCR. Until the parking policy is framed, the

petitioners and other similarly situated owners are directed to charge a parking fee of less than INR 30 for four-wheelers and not more than INR 10 for two-wheelers as per the last judgment in September 2022.

This matter of allowing or not allowing commercial properties to charge for parking is a contentious one. Many High Courts have read ‘free’ in front of the parking provision in the building control regulations. In the Kerala High Court, a Public Interest Litigation (PIL) was filed on whether parking fees can be charged in commercial properties or not, and the High Court ordered that parking inside the buildings should be given free of cost. A similar PIL was filed in the High Court of Telangana on the parking fees charged by commercial establishments when the parking policy issued by the government caps the chargeable fees or is free.

The group of cases in the Supreme Court around parking charges on commercial property is important. The apex court has asked the state governments to formulate a state-wide or city-specific parking policy, which, apart from addressing the parking management issues in cities, addresses the crucial policy gap of reading ‘free’ in front of the parking provision in the building control regulations.

Off-street and on-street parking are intrinsically linked. It is crucial that the price of parking in buildings is less than the parking on streets to make the mechanism work. Apart from this, commercial (or even residential) properties should levy parking charges under different business models. Thus, it is crucial that private properties – commercial, residential, or institutional – are allowed to charge for parking as a demand-management tool. It is crucial that charging for parking is put forward as a policy directive as part of the city-level parking policy.

8.3. Private sector participation in parking provisions

According to the General Development Control Regulations, 2017, the Local Area Plan may identify measures for parking management in the area. GDCR identifies parking lots as public institutional buildings and multilevel parking as a public utility. Public utility is defined in the GDCR as a building or premise or part thereof constructed by Government, Semi-Government organisations, public sector undertakings, and registered charitable trusts for non-profitable public activities. The running of parking lots is also listed as one of the 18 entries of the 12th Schedule, which lists the provisions to be provided by the local government. However, no law prohibits a private venture's running parking plots or MLCPs. The GDCR also does not expressly prohibit running a parking plot or multi-level parking facility. Additionally, section 63 of the GPMC Act lists the matters for which the Corporation must make reasonable and adequate provisions and does not mention “parking facilities”.

Thus, a private developer can run multi-level car parking, provided they follow all the applicable rules, regulations, and laws. Currently, there are no privately run MLCPs in Surat, but they are built through the Public Private Partnership (PPP) model. To set up and run such a private pay and park, the operator needs to get a No Objection Certificate (NOC) from the municipal authority and can run the facility. The process of running a pay and park facility is the same for a private player and the public body.

According to the Unified Development Control and Promotion Regulations for Maharashtra State, specific guidelines are given for constructing a Public Parking Lot (PPL) near metro stations. Still, it is specific to the Thane Municipal Corporation (TMC) and not for all cities. In this case, a private developer can build PPL near a metro station on land belonging to a private owner/ leasehold government plot and then hand it over to the TMC free of cost with all amenities. In return, the developer gets “Incentive FSI.” The incentive FSI permissible under this regulation against the Built-up Area (BUA) of the PPL shall be 50% of the BUA of the PPL, such that the total permissible FSI, including the incentive FSI under this regulation, does not exceed the limit of the prescribed FSI in the zone.

8.4. Perspective on Unbundling Parking

Unbundling of parking has been considered a Transport Demand Management (TDM) measure in the parking market regime. This measure can reduce the cost of housing units, efficient use of available parking spaces and growth of private parking markets.

As per the existing practices in the real estate market, the housing unit price is bundled with the cost of the parking unit. Thus, surveys were carried out to understand the perception of city residents on the unbundled parking market. The results highlighted the change in choice of buying a house (with or without parking) concerning an increase in the additional price residents pay for each parking lot. The analysis herein exhibits the percentage of surveyed residents who prefer a house with parking and the percentage who prefer it without parking.

The perception of residents/ users was captured based on choices they made of buying a house under the following scenarios:

- Scenario 1: Each parking spot bought with an additional 15% cost of the price of chosen housing property
- Scenario 2: Each parking spot bought will cost an additional 25% of the price of chosen housing property

With both above-listed scenarios, responses were provided following options to select:

1. Buy the home of my liking—without parking—and live a car-free life.
2. Buy a smaller home (like one less bedroom) to be able to purchase parking for car.
3. Go to a cheaper but less desirable location to buy a house of the size as well as parking.
4. Increase my budget (by 15% or 25% per car) to get the house of choice as well as parking.

Based on the above options, the user perceptions (including users of all the three areas) on unbundling of parking from real estate were analysed and are presented below:

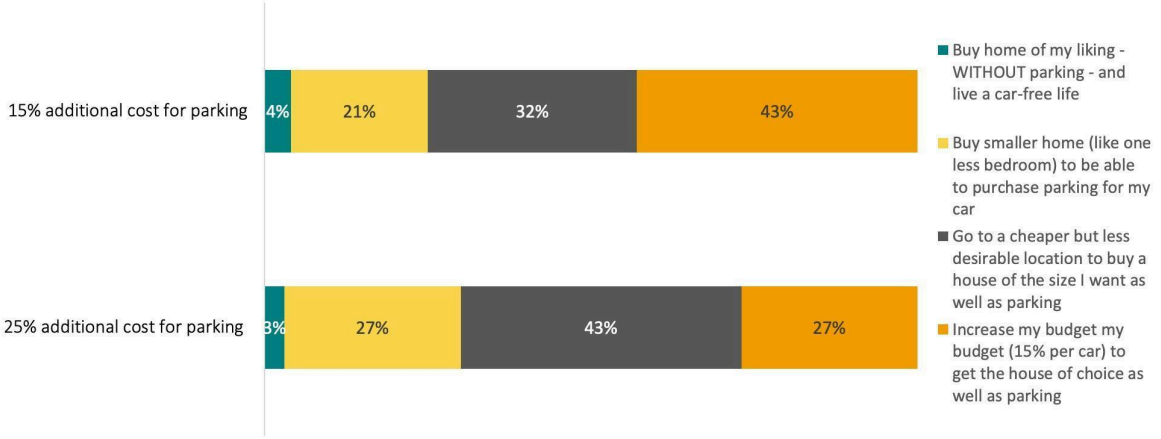


Figure 51: Overall user perspective on unbundling parking from real estate

5. More than 40% of respondents are ready to increase their budget by 15% to get the house of their choice with parking. This drops to 27% if prices increase by 25%.
6. A significant proportion (32% and 43%) of respondents are inclined to purchase either a small home or a home at a less desirable location to afford car parking.
7. Less than 5% of respondents are ready to live a car-free life if property prices are increased by 25% on account of parking. This is contrary to Surat, where around 43% of respondents indicated willingness to live car-free life if prices are increased by 25%.

8.4.1. Based on built form (area wise)

The area-wise (built form) analysis for all three areas to understand user perspective on unbundling of parking from real estate was carried out as set forth in the table below.

Area	Scenario	Buy the home of my liking—WITHOUT parking— and live a car-free life	Buy a smaller home (like one less bedroom) to be able to purchase parking for my car	Go to a cheaper but less desirable location to buy a house of the size I want as well as parking	Increase my budget (by 15% or 25% per car) to get the house of my choice as well as parking
Kalewadi	15% increase	0%	3%	68%	29%
	25% increase	0%	2%	83%	15%
Pimple Saudagar	15% increase	3%	22%	17%	58%
	25% increase	1%	35%	15%	50%
Wakad	15% increase	9%	37%	14%	40%
	25% increase	9%	42%	32%	17%

Table 15: User perspective on unbundling of parking

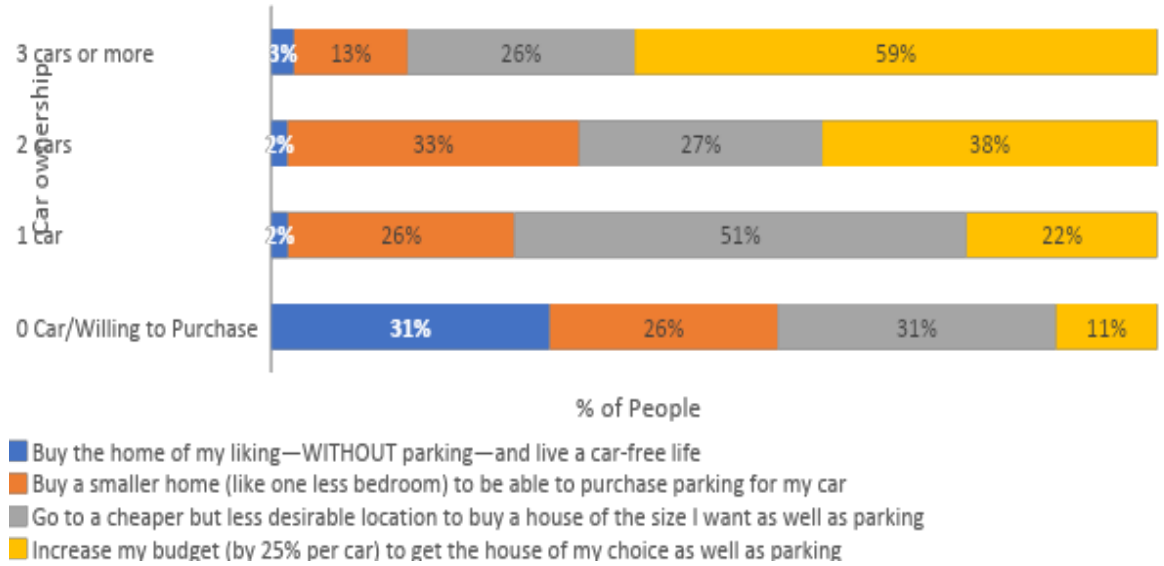
- Kalewadi: Kalewadi is a densely built area having narrow streets. The majority-built form is residents. It may be noted that a significant number of users indicated a willingness to shift to the cheaper but less desirable location to buy a house with parking. At the same time, no user is ready to live a car-free life in this area. This could be because a higher portion of the lower middle class resides in this area.
- Pimple Saudagar: More than 80% of users are ready to increase their budget to get the house of their choice and parking or ready to shift to a

smaller home to afford car parking. This could be because of this area's relatively upper middle class.

- Wakad: less than 10% of users are ready to buy a home they like and live car-free lives. The majority of users are ready to purchase parking.

8.4.2. Based on vehicle ownership

The vehicle ownership wise analysis to understand the user perspective on unbundling of parking from real estate was carried out as outlined in the figures below



.*Figure 52: Overall user perspective on unbundling parking from real estate Surat*

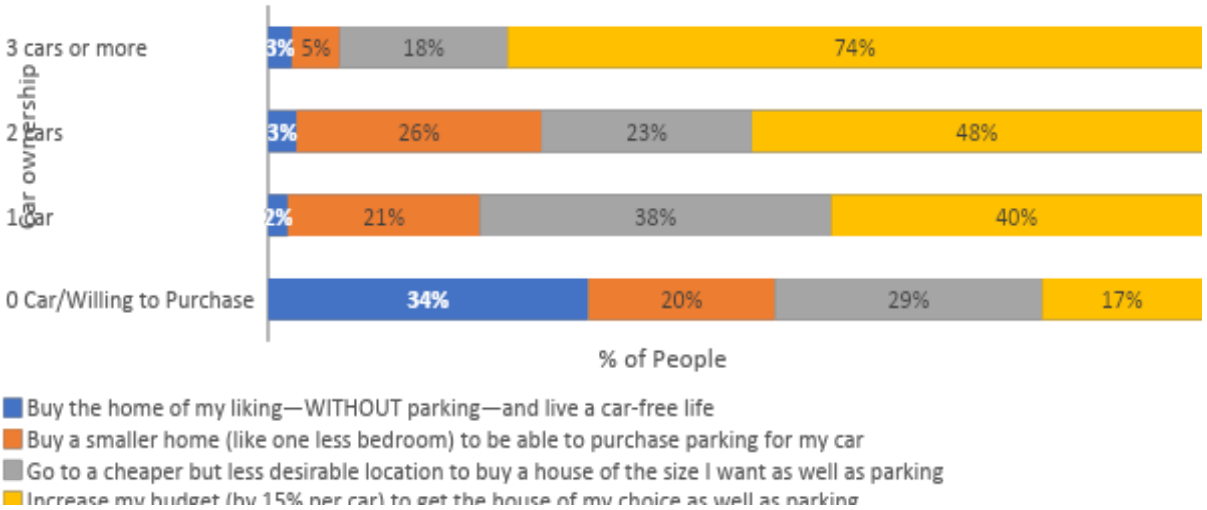


Figure 53: Overall user perspective on unbundling parking from real estate Pimpri Chinchwad

Nearly 40% of respondents owning one car preferred to increase their budget by 15% to get a house of their choice as well as parking. This proportion is significantly higher (74%) for respondents owning three or more cars. If the budget is increased by 25%, then the preference for getting a house of choice and parking drops to 59%, even for respondents owning three or more cars. A Significantly lower proportion of respondents owning one or more cars prefer a car-free life if the budget is increased by 15% or 25%.

9. Roadmap

The study's findings reiterate the need for parking to be priced, enforced, limited, wherein parking is transacted as a real-estate commodity and is managed by the private market. To achieve this, cities will need to implement strategies and reforms in progression to enable the uptake of the private market in managing parking. These stages encompass expedited initiatives for immediate impact (foundation), a sustained long-term approach spanning a decade or more (marathon run), and a visionary transformation to overhaul the parking market entirely (utopia). The proposed reforms within each stage are meticulously designed to attain specific objectives, ensuring a systematic and impactful evolution of the parking infrastructure.

9.1. Setting the foundation

The first set of strategies aims at achieving a vision wherein parking on-street is demarcated, priced, and enforced. The three interlinked steps to achieve this are described below:

9.1.1. Develop a parking policy and plan:

- Finding of the study highlights that the market for parking charges is dependent on the extent of demand and supply available in specific types of neighbourhoods. It suggests that less available parking supply results in lower demand and higher willingness to pay. The parking policy must outline the charging mechanism such that pricing is dynamic based on the location, time of the day, vehicle size, and parking duration.
- On-street parking must be predominantly used for short-term or visitor parking. Pricing mechanisms should outline higher parking charges in business district areas with high demand and parking turnover compared to other neighbourhoods.
- The policy must outline pricing revision methods for the city wherein the charges are reviewed quarterly to ensure that the parking occupancy at

all locations is a maximum of 85%. Prices where the occupancy is higher than the optimum occupancy must be increased. Alternatively, pricing in areas with lower than optimum occupancy must be reduced.

- The policy must outline the revenue-sharing mechanism between the parking operator the urban local body and the traffic police.

9.1.2. Manage on-street parking

- Cities must aim to implement parking charges across the city phase-wise. In the first phase, on-street charges should be implemented in high-demand and occupancy areas.
- Successful implementation of on-street charging is crucial in setting the foundation for shifting most of the existing parking to off-street locations. Cities will need to develop an enforcement plan wherein the roles and responsibilities of different stakeholders is outlined.
- The city must develop a communication strategy to inform citizens about the enforcement plan, potential penalties and purpose of enforcement. Harnessing citizen acceptance is crucial in effective enforcement. The communication strategy must be citizen-centric, wherein the narrative informs the benefits of pricing and enforcing on-street parking.
- Cities must set up a parking cell with the municipal corporation. The department will facilitate the development and implementation of management strategies.
- Through the parking cell, cities must develop ward-level parking management plans and appoint ward-level operators. The contracting model with the operator will be based on the revenue sharing outlined in the city's parking policy.
- In cities with existing parking operators appointed with net-cost or gross-cost contracting structures, they must be advised to transition to a revenue-sharing model.

9.1.3. Augmenting public transport

- The study's findings suggest that implementing on-street parking charges will lead to a 15-20% modal shift to sustainable modes based on the prices implemented. In addition to parking charges and management, cities must develop a public transport augmentation plan to cater to the expected increase in PT demand.
- Cities must set up an urban transport fund (UTF) for funding PT augmentation. The revenue-sharing model outlined in the policy should specifically outline the share of revenue from parking charges to be directed to this fund.
- If a minimum parking charge of INR 20 per hour for cars and INR 10 per hour for two-wheelers is implemented, the city can generate a revenue of INR 100-150 cr for UTF funds (calculations explained in Annexure). As per the calculation, parking revenue from each km of managed street is enough to add six new buses.

9.2. Marathon run:

The strategies proposed in the second phase aim to create an enabling environment for the private market for parking.

9.2.1. Enable privately run open-plot parking

- The parking policy should allow open parking lots to be converted to privately run parking lots. The policy must recognise the parking market by private players as a legitimate commercial activity.
- The policy should allow the market to decide parking charges. However, it must outline the mechanism for pricing off-street parking about on-street parking. On-street charges should be higher than off-street parking charges. The pricing mechanism must follow the rule of ensuring 85% occupancy. If the off-street parking occupies more than 85% of the space, then the policy must direct an increase in both off-street and on-street charges.

9.2.2. Enable shared parking practices

- The revised policy must encourage sharing private parking so that existing private parking stock is open for leasing/ sharing. It must outline the revenue-sharing mechanisms between stakeholders (building society, parking owner, and parking operator).
- The city can implement shared parking practices by developing an in-house parking app wherein interested society or parking owners can register their parking location for sharing. Alternatively, the city can appoint a shared parking operator to facilitate parking sharing. The app and the mechanism must consider safety and security protocols. The revised parking policy must have the mechanisms outlined.

9.2.3. Incentive for privately owned and operated MLCPs

- Enabling a conducive environment for the private off-street market will require incentives. The revised DCR must outline additional FSI of up to 3 to build privately owned and operated MLCPs. The study's findings highlight that a base FSI of 1.8 is not feasible for the business model of privately built and operated MLCPs. This will require changes in the state-level development control regulations and much consensus-building amongst all stakeholders, but this may not require any legislative amendments.
- The policy should further outline the additional FSI utilised for developing parking facilities only.

9.3. Utopia

The objective of the stage is that parking is built, operated, and managed entirely by the private parking market. The three key reforms proposed to achieve the vision are explained below.

9.3.1. Changes in DCR to unbundle parking for building unit

- The current development control regulations consider parking as part of the joint space and only mandate minimum parking requirements to be built based on the dwelling size. Parking is a real estate commodity and must be priced similarly to any other real estate entity in a futuristic scenario. To enable this, the DCRs must be revised to include parking as part of the FSI. This would enable the market forces to regulate parking based on the market demand.
- In a progressive scenario, all parking stock (existing and potential) in the city will be public to ensure efficient utilisation of the parking supply. This would mean that the design and provision of parking must enable easy sharing of parking buildings. The current DCRs provide a mandate for the distribution of parking supplies at different locations within the building premise, restricting the ease of sharing of parking facilities. The revised DCRs must facilitate easy access by removing mandates on the distribution of parking within the building premises. This could lead to the construction of stand-alone parking structures separate from building units wherein the access can be designed to ensure safety and privacy while allowing easy public access to parking facilities.
- Current regulations do not allow selling parking spaces separately, as they are considered part of the common open spaces for all and cannot be unbundled. Due to the existing RERA Act of 2016, an open parking space and a typical basement are considered a part of the common area that a developer cannot sell. The revised DCRs should allow parking to be leased. Unbundling parking treats parking as real estate like any other built space. This enables the developer to sell parking at a price to the people who require it, and for people who may have one or more private vehicles, buy the parking space according to their requirements. In

pre-existing developments, the unbundling of parking can also be carried out by renting unused or excess parking lots to people from neighbouring residential complexes who have a scarcity of parking, a widespread problem in cities today. The apartment complexes built 40 years ago might not have an adequate parking facility. People in such complexes tend to park their vehicles on the street. Instead, if parking is legally restricted, they could rent out parking spaces from the vacant parking lot in the adjacent newly constructed apartments.

9.3.2. Encouraging the private sector in parking provisions

- Currently, in most cities in India, parking is considered the responsibility of the local government. However, parking does not come under the Obligatory Functions of urban local bodies according to the 74th Amendment. This implies that private players can play an essential role in providing parking. It is thus perfectly legal for private developers to set up and run parking facilities. Although building, owning and operating parking facilities is legal, no specific provisions enable private developers to charge for parking. Hence, the new parking policy in the future must also enable private developers to charge and not just build private MLCPs. Only this would make building private MLCPs profitable to the private developers as current parking charges are too low for the venture to break even.
- Changes in parking reforms will happen as a three-step process. Firstly, new parking policies would enable charging for parking inside the buildings and on streets. Two, vigorous parking enforcement would encourage the use of pay and park facilities well and discourage street parking. Finally, there has to be a shift in people's mindset to reduce the use of private transport and ultimately rely more on public transportation to reduce the number of private vehicles on the roads.

9.3.3. Taxation

- Current Development Control Regulations (DCR) and planning practices tend to stipulate minimum parking supply, which should be made available. Excessive parking supply could lead to undesirable consequences such as reduced development density and street congestion. It could also encourage private vehicle use, lowering the total cost of ownership of the private vehicle while exacerbating congestion, roadway costs, accidents, and pollution emissions. To achieve various planning objectives, including increasing the use of public transport, taxation on parking is considered one of the instruments for promotion and reform.
- Taxation on parking facilities leads to a rise in the cost and hence its price. It helps in discouraging parking usage. It may also help in reducing supply that receives lower occupancy. From this perspective, we can explore two taxation measures: (i) the inclusion of parking space in the Property Tax ambit and (ii) imposing a parking tax at the incidence of a car purchase in line with other taxes like RTO tax. The former controls parking supply, whereas the latter dampens parking demand.
- As discussed in the previous section, the current DCRs consider parking as shared space; hence, it is not included as part of FSI. For this reason, despite being a real estate commodity, parking is not included in property tax calculation, depriving the local city government of an essential source of revenue. Including parking in property tax is a fair way to impose costs on car owners. These would help in reducing parking supply and encourage adequate parking pricing. It is suggested that property tax should not be imposed at once on parking spaces but should be done in phases, starting with a lower rate to allow parking markets to absorb the costs as they emerge.
- Currently, three taxes are applicable in case of car purchase, i.e., Road tax/ MV tax, Vehicle tax and GST. The State Government levies road/ MV tax through RTO to maintain state/national highways. The local municipal government levies vehicle tax to maintain municipal roads. GST is an indirect tax levied by the state/central government on the incident of transaction. Thus, Road tax and Vehicle Tax is imposed to create roads

and related infrastructure, which helps private vehicles more. However, in addition to these three taxes, imposing a parking tax on the incident of purchase of a car/other private vehicle could allow (i) recovering some costs of providing on-street parking and (ii) reducing vehicle demand and dampening excessive parking demand. Will this lead to a much higher tax burden on the car owner? We take the example of a Maruti Swift (VXI model), one of the largest-selling cars in India, and examine its prices and taxes for Surat. We notice that the total tax burden is around 21%, which is not very high, and there is scope for some increase. Also, GST (12%) and RTO tax (6%) are the essential taxes, but they are taken away by the Central and State Governments, respectively. The municipal tax is a mere 3%, even though it is very likely that the average car will travel and remain in the city for the bulk of its time. Thus, the city, which will have to spend the bulk of its infrastructure on roads, parking, etc and bear undesirable impacts such as emissions and congestion, ought to get higher revenue from car ownership.

In conclusion, there is a case for imposing higher taxes for parking, one on the space itself (property tax), and the other on the occupant of the space, i.e. the car, to discourage ownership and enhance city revenues which can be channelised to public transport.