

Mobility in a Mega-city

**Shaping of a mobility landscape via informal transport
practices in Delhi**

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Abstract

India has been deemed as an emerging powerhouse of the globe in near future. It anticipates enormous development to sustain almost doubling urban population in the next two decades. Under this encouragement, cities are undergoing rapid transformations, especially in the field of mobility. In Delhi, while there is no mobility plan at present, aimless construction of roads and an expensive mass rail transit, since past two decades, attempt to compensate for the same. The fact that roads remain congested and the air alarmingly polluted today, renders traditional stance to be ineffective and unsustainable. Furthermore, a large segment of population in the capital depends on Intermediate Public Transport (IPT), or informal transport such as rickshaws, not only for travel but also to make livelihood. The unorganised and neglected IPT or paratransit, make up for at least 11.5% of total daily trips, almost three times to that of Delhi Metro. The apparent need for an effective policy and mismatch between transport attention and actual travel patterns forms the inquisition behind this research.

The questions lead to revelation of contentious mobility issues of Delhi, which contribute to inequity, conflict and an afflicting cost that the city pays. Elaboration of ubiquitous informal transport then brings the plurality of movements, practices and population to highlight. An empirical probe in a territory, Rohini, strengthens the premise in anticipation of an alternative policy approach. The study establishes the need to sense opportunity and harness the potential in native practices through analysis of cases involving informal transport. The case for institutional recognition of the diverse mobility patterns using reformative tools is further discussed to be able to resolve territorial conflicts. The research concludes with a way forward to inclusion of actors, reorganisation and re-prioritisation of resources for a responsive urban mobility landscape.

Keywords: mobility policy; paratransit; informal transport; plural city; Delhi; adaptive planning; urban planning

Riassunto

L'India è stata considerata come una potenza emergente del globo in un prossimo futuro. Si anticipa enorme sviluppo per sostenere la popolazione urbana quasi raddoppiare nei prossimi due decenni. Sotto questo incoraggiamento, città subiscono trasformazioni rapide, in particolare nel campo della mobilità. A Delhi, mentre non vi è alcun piano di mobilità allo stato attuale, la costruzione di strade senza meta e un costoso transito ferroviario di massa, dal momento che negli ultimi due decenni, il tentativo di compensare lo stesso. Le strade di onorabilità rimangono congestionate e l'aria inquinata in modo allarmante oggi, rende la posizione tradizionale di essere inefficace e insostenibile. Inoltre, un grande segmento della popolazione nella capitale dipende dal trasporto pubblico (IPT), o con i mezzi informali, come risciò, non solo per i viaggi, ma anche per fare sostentamento. Il disorganizzato e trascurato IPT o paratransit, costituiscono per almeno 11,5% di spostamenti giornalieri totali, quasi tre volte a quello della metropolitana di Delhi. La necessità apparente per una politica efficace e mancata corrispondenza tra il trasporto attuale e modelli di viaggio effettivamente costituisce l'inquisizione dietro questa ricerca.

Le domande portano alla rivelazione di questioni controverse della mobilità Delhi, che contribuiscono alla ingiustizia, conflitti e un affliggono che costò la città paga. Elaborazione di trasporto informale onnipresente poi porta la pluralità di movimenti, le pratiche e la popolazione per evidenziare. Una sonda empirica in un territorio, Rohini, rafforza la premessa in previsione di un approccio politico alternativo. Lo studio stabilisce la necessità di percepire opportunità e di sfruttare il potenziale delle pratiche indigene attraverso l'analisi dei casi di trasporti informale. Il caso per il riconoscimento istituzionale dei diversi modelli di mobilità utilizzando strumenti riformatrici ulteriormente discussa è quella di essere incendio risolvere i conflitti territoriali. La ricerca si conclude con un passo in avanti per l'inclusione di attori, riorganizzazione e ridefinizione delle priorità di risorse per un paesaggio mobilità urbana reattivo.

Parole chiave: politica di mobilità; paratransit; trasporti informale; città plurale; Delhi; pianificazione adattiva; pianificazione urbana

Introduction

Prologue

Mobility provides freedom, change and sense of control in human lives. These actions combine to result in interactions, opportunities and experiences. Considering city as an organism, mobility affects it in same way but on a much higher scale. If urban areas are the engines, then transportation provides the wheels to economic growth, especially urban mobility. As the engine gains more power, it needs stronger and reliable wheels to pull through, referring to the urban transport system. Urban transport forms top concern for the cities, big or small, and their planning institutions. Following the temperament, the capital territory of Delhi now has a mammoth road infrastructure footprint, which has exhausted scope for expansion. The streets are not walkable, whether it is for accessing public transport or short trips. The city bus service has been inadequate for a long time and continues to decline. A mass rail transit, received in year 2003, was hoped to be one-stop solution to the environment and transportation woes the city was engulfed in. However, after 13 years of operation and consistent upgradation of the system, the issues remain in Delhi

The rapidly growing Indian cities consist of a complex socio-economic fabric, especially Delhi. The capital comprises of vibrant mix of income and culture that manifests in mobility front as well. While the streets are taken over with private automobiles, about 50% of city's population (Census India, 2011) does not own any vehicle. "Aam admi", translating to the common man/woman of modest means from the middle classes, then typically looks for alternatives, which he/she finds or should find in public transport. However, dissatisfactions, unmet demands of mobility and the hunt of an undermined population segment for the right to city, together nurture an informal solution in the form of IPT or paratransit. Paratransit inhabits the vicinities of residents of Delhi and facilitates distinctive movements and interactions, sometimes native to the territory. The associated practices then weave intricately into the socio-economic fabric of the city, and shape an unorganised mobility realm of unprecedented scale. It is these vibrant travels and way of life that form the essence of mobility in a mega-city.

Motivation: an excerpt from experience

Being a resident of the city since birth, the transformations in Delhi have been nothing less than admirable for me. The admiration of the city life came with a cost that I had not realised until recent years. In earlier times, it was easy to reach anywhere either within neighbourhood or

across the city. The critical mass of populations would move on foot, on bicycle, city bus or informal transport to reach their destinations. With growing affordability, the mass on roads shifted to private vehicles and their owners. It led to expansion of existing roads and addition of new ones. The use of public transport became derogatory for the population who could now afford personal automobile. More private vehicles followed and then some more roads were built only to be filled again.

The worst affected of this trend have been neighbourhoods and local streets. The vicinity of my house (since birth), a low density residential neighbourhood, is now seized by parked and passing vehicles any time of the day. Footpaths have been long removed or encroached to accommodate on-street parking. It has become difficult or undesirable to access the daily supplies market without vehicle. The informal modes like cycle rickshaws often parked around the market always appear to be in conflict with and dominated by vehicles in the vicinity, even after being used extensively to replace faint walkability. The situation raises the question of right to justified mobility, considering what happens at the institutional front fails to reach the local scale. It is then, the inquisition of a planner began to look for ways to curb automotive infestation of the local streets since it tends to have a direct impact on daily life. It led to the idea of advocating equitable access to infrastructure, coexistence and inclusion centred at the most vulnerable contender active on streets. The approach anticipated to provide rational answers to the mobility problems and shared shaping of a policy scenario from bottom-up that involves wider population.

Ideology

Paratransit is the informal disruption of ordered urban space that exists from before the deployment of formal public transport in Delhi¹. Like many other developing countries, it carries a cultural image while coexisting with more advanced transport modes on the city roads. It is operated and used by a demography that is large in numbers and dissimilar in socio-economic characteristics. The number of modes involved are high too as these form a dominant part of unorganised economy. The non-stop supply finds way into the daily lives of people by assuring a power to move that the public transport falls short in. By now, paratransit has come to regard itself as an embedded force for, first, establishment and then maintenance of the mobility order in Delhi. As a result, it is becoming more marked and increasingly indulged by the

¹ Cycle rickshaw or auto rickshaw service exists before operationalisation of DTC bus service

state, common man, the civil society organisations and the political parties in some way or the other (Anjaria & McFarlane, 2011; Hariss, 2006). Meanwhile on ground, the paratransit modes compete daily for a right of way that technically expels them from the city roads.

A shift in city paradigms for urban mobility is thus required towards a more robust transport system. It includes a change in perception for policy to manage the demand and supply of mobility services. A perception that considers the people of the city and their choice of mobility as dissimilar as it is. The change would be to bring a reason behind the quality and quantity of infrastructure being provided, which has in fact been missing from the scene. The city needs to recognise mobility as a right, a basic need and a choice to be provided equitably to all parts of society. The institutions require to exercise on the plurality offered by the city dynamism and attempt to shape a mobility scenario precisely to suit a dissimilar population meaningfully. The research, in the same sense, views and weighs the scenario, the existing tools and dynamic movements, particularly on the subjects of inclusion, deliberation and enablement.

General objectives

Keeping in line with the motivation and ideology, the objectives of the research can be contemplated as:

1. To explore the agenda of mobility in Delhi to introduce its capacity, conflicts and shortcomings.
2. To establish a pluralist scenario by highlighting the multi-faceted aspects of population, movement and transport in the city.
3. To provide empirical evidences to support the ideology by probing into a local territory.
4. To look for the missing link between diverse mobility needs and institutional provisions in order to encourage a paradigm shift in planning.
5. To investigate ways for a responsive and efficient mobility policy landscape.

Research questions

The objectives formulated guide the conduct of research through answering to following questions:

1. What is the current situation, conflicts and critical issues of transportation in Delhi.
2. Who are the different populations moving in the city and how do they move?
3. What is the ground situation of mobility in a local setting?

4. Are the institutional and planning tools responsive or adaptive towards user behaviour to move?
5. What could be the appropriate strategy to sustain the future mobility scenario along with justified address to the vibrant population and its movements?

Methodology

The research started with compilation of general information on the city and transportation profile. The second step was to elaborate the contentious issues observed and academically documented. The issues span over the metropolitan area of Delhi, affect mobility and form top concern during the process of policymaking. It was followed by discussion of ideological ideas i.e. the pluralism present in populations, their movement practices and the transport. The informal transport scenario existing in Delhi was elaborated in this section to introduce its significance, institutional negligence, operational conflict and exclusion of population associated with the modes from institutional processes. An empirical probe in a territory, Rohini, was then made to strengthen the premise. It was followed with critical analysis of cases, one Indian and the other international, involving informal transport. Secondary data was utilised to understand the strength and weaknesses of actions in anticipation of an alternative policy approach. The research concludes with a way forward for a responsive urban mobility landscape.

1. City & transportation profile

Opportunity has brought many to the city today known as Delhi. The place has been sought after for centuries by men of different origin and for different purposes. Nestled in the fertile plains of north India, the city took many names and forms since history but was always marked by the river Yamuna on the east and the Aravalli hills on south-west. The territory today is bounded by 1483 square kilometres geography, which is divided into nine districts for administration as shown in Figure 1 (Census India, 2011). The districts compose of smaller administrative units ranging from sub-districts, statutory towns, census towns and villages. The sub-districts towards the periphery bear a rural character and have a large presence of agricultural land. The city overall is under a strong influence of urbanisation as well as in-migration. The pace of transformation is well beyond the reach of administration and results in haphazard and uncontrolled actions of development. The government strives to catch up but usually delivers short-lived and less effective policies.

Figure 1: Administrative boundaries in NCT of Delhi, 2011; Source: (Census India, 2011)

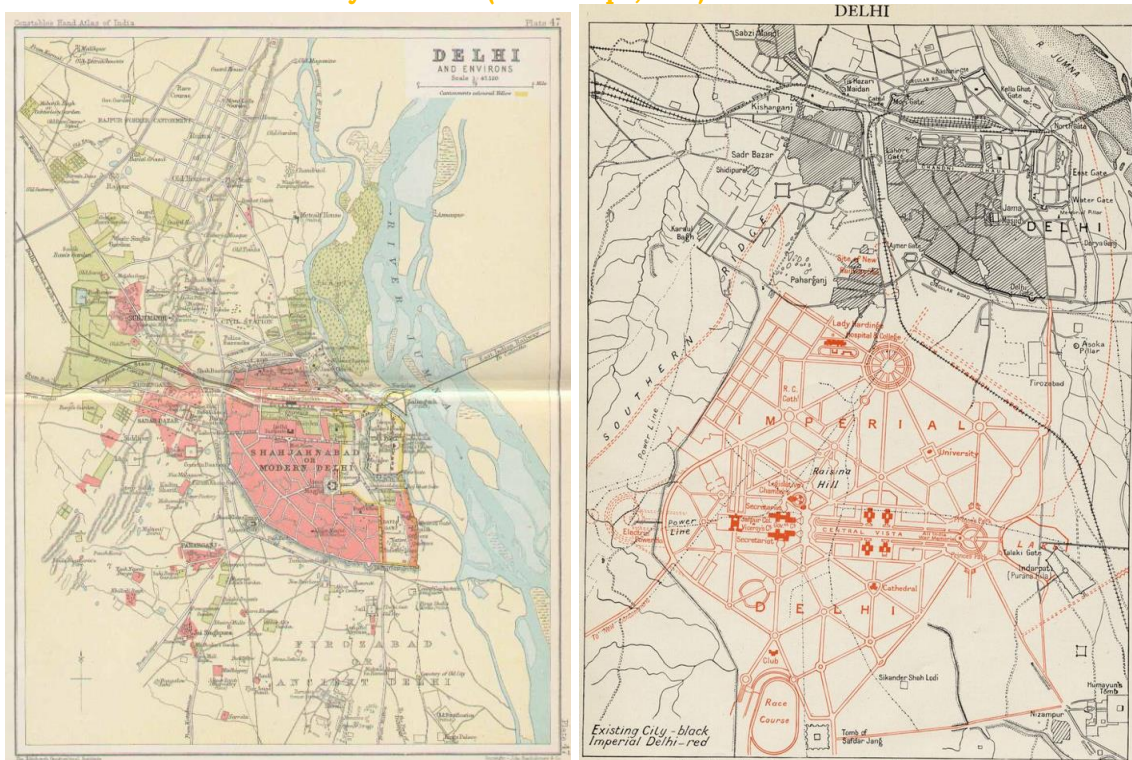


The city or the National Capital Territory (NCT) is inhabited by 16,787,941 people (ibidem), while the urban agglomeration of Delhi has a population of 25 million (Dept. of Economic and Social Affairs, UN, 2014). The population in Delhi exhibits an interesting mix of languages, cultures and traditions both national and international. Being the capital, there are people from other Indian states and different countries such as ambassadors, foreign delegates, expats, students and tourists. Even though their existence is not marked territorially, it is easily identifiable in a given space. A short distance movement in the city can easily result in a different experience. These experiences are reflected in the urban form and can be introduced as plurality in cityscapes. The situation becomes challenging when policymaking fails to recognise this evident plurality and address the peculiar challenges it displays. While the issue is explored more for the case of mobility in this thesis, business districts of Delhi provide appropriate example of the mismatch.

The Moghul ruler Shahjahan built the walled city, named *Shahjahanabad*, after him in 1638, which became the traditional business district known as Old Delhi. The district embodies cultural concentration and the vigour of traditional commerce alongside the heritage buildings and architectural embellishments from the medieval period. Further, the British empire, which remained for about 200 years, furnished most of the form and functions to the city that exist till date. The British India's capital was moved to Delhi from Calcutta (now Kolkata) in 1911 (Delhi Tourism, n.d.) and a monumental administrative district, designed by British Architect Edwin Lutyens, was inaugurated in 1936 as Imperial Delhi. The new quarter was put adjacent to the Old Delhi district and later came to be known as New Delhi.

The two districts bear completely opposite character in every aspect, such as Old Delhi has narrow streets, mixed use, high density, etc., whereas, New Delhi has expansive architecture, axial roads, very low density and mostly public buildings (Ram, 2014). While the web of organic streets in Old Delhi can be traversed on foot or smaller modes, the radial roads of New Delhi are engineered for fast motorised vehicles. Business takes place in both quarters together but in strikingly varied manner as both the people and their movements contrast. The policy provides the new district a redevelopment implementation, whereas, the old district degrades and turns into slum in the absence of the same. The old and the new puts forth a “dual city” to deal with.

Figure 2: Old Delhi (left) and New Delhi (Right) - contrasting territories in scale and form;
Source: Columbia University Archives (Delhi Maps, n.d.)



Transportation

Mobility in a city is shaped by a balanced composition of multi-disciplinary and multi-dimensional aspects. It involves integration of all such aspects to be effective and efficient. Nevertheless, transport infrastructure and services remain central to the mobility system. The concentration of socio economic, cultural and political functions make it an important node in the country and in Asia. It is also a major trade centre so it demands prolonged connectivity within the city as well beyond with the regional destinations. It relies on infrastructure and material abundance to work for the mobility needs. Delhi has undergone landmark change during the last two decades in the transport sector. However, it fails to complement mobility and a burgeoning transport demand. A need to go through crucial matters of re-prioritisation, coordination and institutional strengthening for an integrated urban transport system has been identified in the Master Plan for Delhi 2021 (DDA, 2007).

Airway

Delhi is the largest international gateway for north India with the Indira Gandhi International Airport (IGI). It is located 16 km from the city centre and plays host to a large number of airlines from different parts of the world. There is Palam airport, mainly for domestic flights, located five km away from IGI airport (Sarkar, Bose, & Ghosh, 2007). Both the airports

have regular shuttle services operating between them. The tables below present the passenger (Table 1) and cargo (Table 2) traffic handled during past six years.

Table 1: Passenger Traffic (in millions) at IGI Airport, 2016; Source: (Airport Authority of India, 2016)

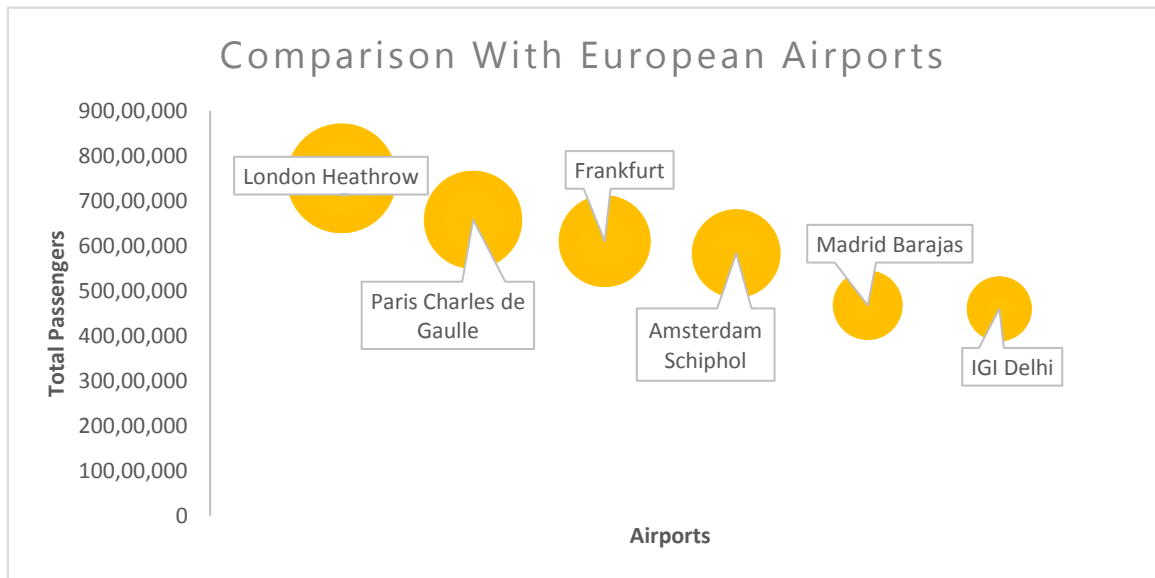
	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Domestic	20.7 mn	25.1 mn	22.8 mn	24.2 mn	27.5 mn	34.3 mn
International	9.3 mn	10.8 mn	11.6 mn	12.7 mn	13.5 mn	14.2 mn
Total	29.9 mn	35.9 mn	34.4 mn	36.9 mn	41.0 mn	48.4 mn
Growth (YoY)	14.6 %	19.8 %	-4.2 %	7.3 %	11.1 %	18.1 %

Table 2: Cargo Traffic (in thousand tonnes) at IGI Airport, 2016; Source: (Airport Authority of India, 2016)

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Domestic	209.1	200.2	188.2	215.8	271.8	296.0
International	390.9	368.2	358.1	389.9	424.8	491.2
Total	600.0	568.4	546.3	605.7	696.5	787.2
Growth (YoY)	20.6 %	-5.3 %	-3.9 %	10.9 %	15.0 %	13.0 %

An increasing growth trend can be witnessed for passenger traffic and a steady one for the cargo traffic handling at IGI airport in Delhi. Moreover, the airport caters to about 20% of India's total air traffic movements on average (Airport Authority of India, 2016). On a global level, IGI airport stands sixth in comparison with European international airports (illustrated below) and tenth with south, east and south-east Asian international airports (Airport Council International, 2015). The numbers highlight the infrastructure on the national and the global map of significance.

Table 3: Comparison of IGI with European airports; Source: Airport Council International, 2015



Railway

Delhi has a ring and radial kind railway network supported by five major railway terminal and a container depot. The city is a converging point for five major northern railway lines and has connections in all directions across the country (Sarkar, Bose, & Ghosh, 2007). The important stations for inter-city trips are Delhi Junction, New Delhi and Hazrat Nizamuddin Railway Station. Regional trips within the metropolitan and national capital area are facilitated by multiple lines extending to the suburban Delhi and further nodes.

Figure 3: National Capital Regional railway network; ring and radial rail lines of Delhi; Source: (NCRPB, 2009)



The aforementioned, three stations have registered remarkable growth in terms of passenger trains during past two decades. Suburban and commuter trips through railways are conducted by the eight radial lines that extend towards regional destinations. This radial link is formed by two dedicated lines known as the Goods Avoiding Lines (GAL) and Delhi Avoiding Lines (DAL) (GNCTD, 2006). This commuter network and lines are locally called Delhi EMU (Electric Multiple Unit). The daily regional passenger traffic originating at major stations is of the order of 724,467 passengers (NCRPB, 2009). Data on unreserved passengers and daily travellers for the year 2007-08 reflects that majority of commuters originate their journeys from the stations in immediate suburban and metropolitan vicinity of Delhi, such as Faridabad, Sonapat and Ghaziabad. These important stations, about 25 in number, account for a total of 4,30,750 passengers per day according to 2007-08 figures (ibid.).

The magnitude of commuter rail traffic is expected to increase in the coming years. While it was expected to carry 12% of the commuter load, it carries only 1%. As a result, the Functional Plan on Regional Transport for Delhi focuses on improvement of the lines and development of hubs at regional nodes (ibid.). Few priority corridors have been identified as part of the proposed regional rapid transit system. On the other hand, intra-city railway trips have shown a decline and low usage of the ring railway. One of the notable reasons, is the presence of non-compatible land-uses along the rail corridor & the over-utilisation of the corridor by goods trains (Sarkar, Bose, & Ghosh, 2007). The radial railway shows potential for improved mobility and sustained development for the city if given due attention and planned with appropriation.

Mass transit

The face of mobility changed in Delhi with the introduction of a mass rapid transit system known as Delhi Metro. Delhi Metro is the second urban rail transit operating in India after Kolkata Metro was inaugurated in 1984. The transit in Kolkata, however, does not portray a success story as it struggled through a series of financial crisis and faced delays². Also, the operation and implementation was transferred to Ministry of Railways. Delhi Metro Rail Corporation (DMRC) was constituted in 1995 for implementation and subsequent operation of the transit facility in Delhi (DMRC, 2014). DMRC has equal equity from the Delhi Government and the Government of India. An efficient process of implementation has

² It took 23 years to complete a 17km long underground railway in case of Kolkata Metro

resulted in construction of a massive network of 213 km and 160 stations till date, in record time (ibid.).

Earlier, passenger trips involved long waits for inadequate buses and lengthy distances to be traversed through the expansive city, making intra-city travel a tedious, time-consuming and nasty task. Commissioning of Delhi Metro altered trip pattern in the city significantly and later in the metropolitan area since its operationalisation in 2003. The underground, at-grade and elevated corridors are spread across the city with reference to land use (phases I and II), which was missing from the previous transport interventions. The approach certainly established a favourable direction for spatial rearrangement and urban development as it attempted to bind together scattered functions. Delhi Metro has been certified by the United Nations as the first metro rail or rail based system in the world to reduce Green House Gas emissions by cutting down on pollution by 630,000 tonnes every year. The same number of carbon credits have been awarded to the project as part of clean development mechanism (UNFCCC, Grütter Consulting AG, 2011).

Figure 4: Delhi Metro Route Map (In Blue: Existing Network; Dashed: corridors under construction)



The service essentially cuts down waiting time, travel time and other hassles related to public transport trips much to the relief of citizens in Delhi. Absolute ridership recorded for the month of January (2015) is 73,466,093, whereas, daily average stands at 2,369,873 (DMRC, 2015). Ongoing phase III of network construction will add 118 km of new lines (Figure 4), most of which are along the two ring roads (inner and outer). It will increase the total network length to 308 km, anticipated by 2016, along with a substantial ridership of four million. The network is expected to have fourth phase of construction in order to meet travel demands forecast in the Master Plan for Delhi 2021. On completion, Delhi Metro is promised to reduce congestion on roads by inducing a modal shift, save fuel, man-hours, and lessen atmospheric pollution and accident rates notably (GNCTD, 2001).

Bus

Buses form the backbone of Delhi's public transportation and have been plying since 1948 (Dave, 2014). Delhi Transport Corporation (DTC) is the main provider of bus service being a State Transport Undertaking (STU). While Delhi Metro has quickly embedded into the public transport system

of the city, DTC buses remain the preference of the masses. Reasons could be more route penetration, flexibility, accessibility, low fares, etc., for a modal share of passenger trips more than the metro at 41.5% during 2007-08 (RITES, 2010). There are a variety of fare concessions as well for the students, elderly, women, youth, state employees, etc. However, the modal share has been falling significantly from 2001 figures of 60% (DDA, GoI, 2015). The buses have been seeing a decline in service while losing largely to motorised vehicles. On the other hand, the city had set target of 70% and 80% modal share for bus for 2011 and 2021 respectively (ibid.). In order to support such passenger trips, four new Inter-State Bus Terminals (ISBTs) had been proposed in the Master Plan 2001. Only one of these ISBTs has been developed, at Anand Vihar (east Delhi), to decongest the existing one at Kashmere Gate (central Delhi). An ISBT was added to supplement bus infrastructure and overcome shortage by upgrading the bus station at the Sarai Kale Khan railway station (south Delhi).

Figure 5: DTC buses: Inadequate but primary mode of public transport in Delhi



The bus fleet of DTC is a little more than 4000 strong at present and about 3700 buses are deployed on the streets on usual days (Economic Times, 2016). A smaller fleet of buses used to carry seven million passengers in 2001 and six million in 2008 (RITES, 2010). Since then, the agency has attempted to improve the service with a series of interventions but failed. The interventions included fleet expansion to increase frequency, adoption of clean fuel technology to reduce pollution, addition of articulated buses to avoid overcrowding on busy routes, renewal of bus models to provide ergonomic comfort and bring safety and a number of fare schemes. However, it failed to re-instate the lost ridership and incurred heavy losses. This resulted in cutting down on fleet utilisation, by about 24% from 2010 to 2015 (Dasgupta, 2016). The reduction further induced a decline in ridership (four million in 2015) and put the agency into a deficit of approximately 14 billion rupees till date (Dave, 2014). The Delhi Government had planned to expand the bus fleet to 10,000 buses on the other hand to meet its travel demand targets.

The fact that Delhi Metro can never cover the city as the buses can do is well registered by the planners and even the citizens. It is known that the bus service lacks reliability and quality of service. The frequency is staggered and on an average 300 breakdowns take place every day due to old and less-maintained buses (Mishra S. , 2016). Anyhow, the lack of funds has disabled DTC to take any strong measure for a come-back. The pressure on DTC re-surfaced during January 2016 as a consequence of the vehicle rationing policy (odd/even registration number) introduced in Delhi. The restriction diverted users towards public transport and especially buses, as the Metro already runs on full capacity during peak hours. Bus ridership increased by about 700,000 during that period (Dasgupta, 2016). The situation was a good reminder to users of the available bus facility and provided needed attention to the cash-strapped agency. DTC now plans to augment the fleet in collaboration with the Municipal Corporation of Delhi (Mishra S. , 2016). Also, the transport plans for the city point out integration of Metro and bus service as top-priority. The service is expected to shift motor vehicle users towards a better quality and co-ordinated public transport.

Road

The mammoth number of vehicles in Delhi is facilitated by an extensive road network. The city has 33,198 km of road length plus 62km of grade separated corridors or flyovers (Delhi Government, 2015). It has seen tremendous increase during the past few decades where the same length was 28,500 km in March 2001 and 8,380 km in 1971-72, a more than threefold increase (GNCTD, 2006). The road network forms a ring and radial pattern with Connaught Place, the New CBD, as focal point. The rings are formed by the Mahatma Gandhi Road (Inner Ring Road), Outer Ring Road and Noida-Bund Road. Five National Highways (NH) pass through the city namely NH 8, NH 1, NH 24, NH 2 and NH 10. Out of these, three highways, Gurgaon Road (NH 8), G.T. Road (NH 1) and NH 24 bypass form the radials. These radial and ring roads serve as major arterials carrying the bulk of traffic in the city. being an important centre, Delhi has different categories of roads that are governed by different authorities. The road network is developed and maintained by National Highway Authority of India (NHAI), Public Works Department (PWD), Municipal Corporations of Delhi (MCD), New Delhi Municipal Council (NDMC), Delhi Cantonment Board (DCB), Delhi State Industrial Infrastructure Development Corporation (DSIIDC) and Delhi Development Authority (DDA) (Delhi Government, 2015). The agency-wise break up of road infrastructure is presented in Table 4: Agency-wise growth of road infrastructure in Delhi (in km): Source: .

Table 4: Agency-wise growth of road infrastructure in Delhi (in km): Source: (Delhi Government, 2015)

Sl. No	Agency	2008	2009	2010	2011	2012	2013	2014	2015
1.	MCD	27139	27139	27139	27139	26459	23931	23931	23931
2.	NDMC	1290	1290	1290	1290	1290	1290	1290	1290
	Public Works Deptt. (Delhi Govt.)								
a.	National Highway	182	356	356	360	360	360	360	360
b.	Other Roads	2230	2270	2300	2400	3180	5708*	5708*	5708* +62**
4.	DSIIDC	1250	1317	1317	1434	1434	1434#	1434#	1434#
5.	I&FC	40	40	40	40	40	40#	40#	40#
6.	DDA	-				435	435#	435#	435#
	Total	32131	32412	32442	32663	33198	33198	33198	33198 +62**

Source: - Delhi Statistical Handbook 2014.

*including 3208 lane Km Taken over from MCD

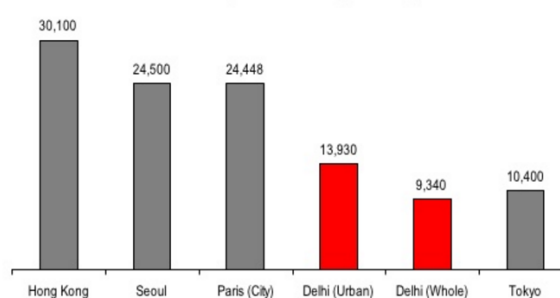
#as on 31st March 2013

**Flyovers of length of 62 Kms are added during 2014 & 2015

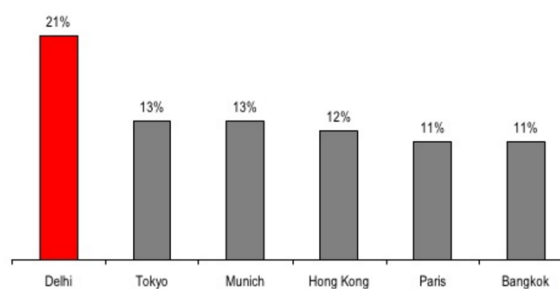
Lower population density and higher road space are indicators for smooth traffic conditions in the city. Delhi has one of the highest road land use share in the world at around 21% of the total area as shown in Figure 6 (Transport Department, GNCTD, 2008). But, even with comparatively lower population density and higher road space, the city faces congestion, speed delays and traffic jams during peak hours (ibid.). Major arterials witness travel speeds less than 30 km per hour in most areas during peak hours. The speeds remain similar during off-peak hours at 40-45% of these arterials. It is to be noted that ring roads are almost signal-free and still face congestion including the grade separated corridors. A very high road density at 20 km per sq. km has failed as a transport solution and limits the scope to develop any more roads.

Figure 6: Delhi vs World cities; Source: (Transport Department, GNCTD, 2008)

World Cities - Population per sq. km.



Road Space as Percentage of Total Area



Climate

Climate is an important deciding factor for the citizens of Delhi to plan their trip. The sub-continent sees a high range of temperature transitions between humid sub-tropical and semi-arid climate. Fertile plains of the river Yamuna and the ridge, known as the lungs of the city, constitute the geographic setting. Winters are relatively dry and most part of the year is taken over by hot weather. The summer months of April, May and June are extremely hot and humid, while temperatures stay between 40 to 45 degrees Celsius. Average annual rainfall stands at 714 mm, three-fourths of which falls in monsoon months of July, August and September. Temperature during winters i.e. December and January fall to 4-5 degree Celsius. February, March, October and November are the pleasant months (Indian Meteorological Department, 2010).

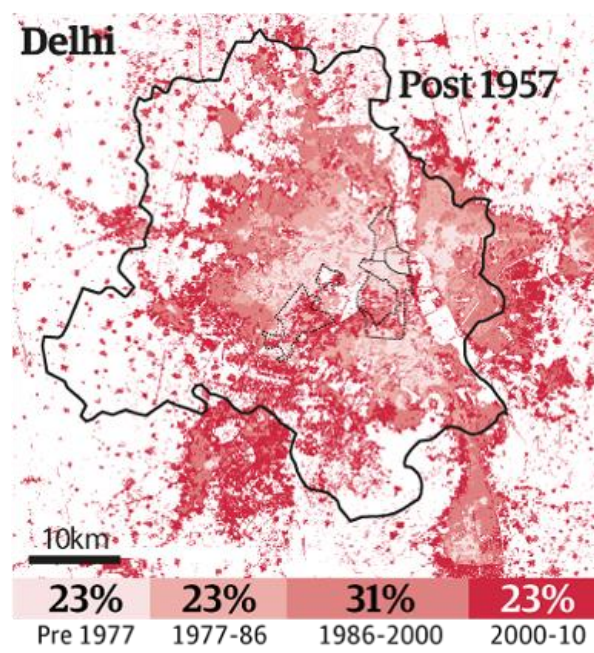
2. Issues of the metropolis

This chapter compiles the issues that affect mobility and have been recognised in literature or planning exercises on Delhi. The city exhibits a complex set of characteristics which are collectively responsible for creating challenges faced with the metropolitan mobility today.

Rapid transformation

Territorial transformation is a result of multiple processes taking place together. Marcuse and Kempen (2000) suggest economic processes such as globalisation, changes in form of production, declining state provision of welfare all influence a change in urban patterns. Similarly, the aspects of society, economy and environment have worked in a cyclic manner to transform the territory of Delhi. The upward development graph and increase in population have fostered a vast agglomeration and varying experiences that come with it. Some positive some woeful, rapid transformation has not allowed the policies to match pace with that of development. Mostly piecemeal, haphazard and short-lived, the transformative policies put forth the need to be checked, controlled and re-directed for a suitable present and future. Recalling the contrasting experiences provided by the two traditional districts, the walled city and New Delhi, the city has paved way for varied lifestyles, inequality and disparity. With presence of both extremes on the scale of liveability, and other conditions in between, Delhi presents a complex urbanity.

Figure 7: Built-up area in Delhi; Source: (Burdett, 2015)



In developing countries, the situation is peculiar as growth is concentrated in urban areas (Glaeser, 2011). That is why much of

urbanisation had traditionally been concentrated in the four metropolitans namely, Delhi, Mumbai, Kolkata and Chennai. Indian cities present vast economic opportunities in comparison to rural areas. The urban areas have increased contribution to the national Gross Domestic Product (GDP) to 70% in 2011 from 30% in 1951 (Verma & Ramanayya, 2015). A segregation of resources and services then gives birth to differences in socio-cultural composition in the two territories. India found its industrial vigour in Information Technology and Business Process Outsourcing (IT/BPO) during 1970's. These IT/BPO fuelled industries had been anchored in the South Indian cities that later became hubs of IT/BPO industry, such as Bangalore and Hyderabad. Delhi was the only centre in North India along with its metropolitan catchment to house the industry. As a result, it started undergoing intensive spatial changes that invited multitudes of population from across the country. The liberalisation of Indian economy in the early 1990's had fuelled the process only further.

Urban to Marginal

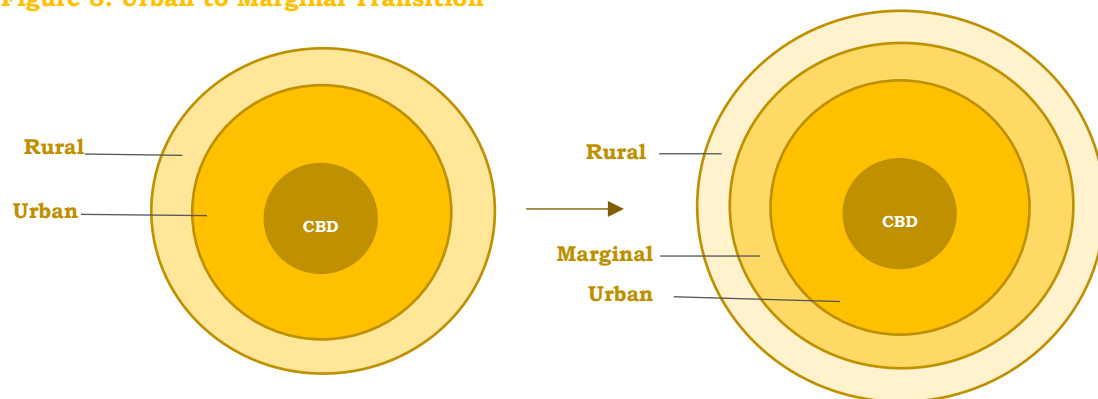
Although, urbanisation is encouraged as a far-reaching economic transformation, literature stresses on the social weight it carries. According to Drakakis-Smith (1986), urbanisation is a component of overall formulation of dependency theory and brings multiple features along. For instance, the service segment is often layered, where lower tiers support the upper tiers and the latter would not function without the prior. On same lines, he argues urbanisation and urban growth are not synonymous and are socially-complex. There are services beyond formal sector that have own layers, are produced by the economic shift but disproportionately with the formal sector. Where urbanisation is a concentration of urban population relative to rural, urban growth takes place in three ways: natural increase, net in-migration and changes in city boundaries to take in rural places for development. The case of Delhi becomes critical as it owes the spurt of population growth mainly to in-migration from neighbouring states and in the lower tiers of informal sector (NCRPB, 2010).

The decadal population growth rate of the city remained about 50% since 1951, against the national average of about 18% (Census India, 2011). The city has villages³ whose number from 300 in 1961 reduced to 165 in 2001 and 112 in 2011. (Delhi Government, 2015). While the numbers are a mere count, the change as 'growth' is quite questionable. The Economic

³ A village in India generally denotes a rural area and is the smallest habitable unit or administrative boundary in which majority of (male) population is involved in primary sector occupations.

Survey Report of Delhi (2015) informs the number of ‘urbanized villages’ has increased from 20 in 1961 to 135 in 2011. Castells (1977) interestingly interprets urbanisation as a phenomenon in which spatial forms are produced socially. These 135 ‘urban villages’ are the same spatial forms of a marginal truth generated by the overall growth in Delhi. As much ambiguity is suggested by the term, the same is exhibited by the territory as well (Figure 8).

Figure 8: Urban to Marginal Transition



This process of marginalisation has been well evidenced in the cities of Global South and actually is the beginning of more severe problems associated with urbanisation (Drakakis-Smith, 1986). The spatial forms of marginality in Delhi reflect in the habitations of more than four million people i.e. 25% of the conurbation (Sheikh & Banda, 2014). These habitations are distinguished by two types: Unauthorised Colonies (UACs) and *Jhuggi Jhopri* Clusters (JJC). While UACs are unregulated development and encroachment on otherwise planned zones, JJC are pockets of slums built with temporary materials on public land. The urbanisation in this case then puts forth a marginal life that is devoid of basic services but forms a crucial part of the local urbanism. Delhi portrays the duality of transformation that comes with ‘growth’ and the complexity that increases by the day considering the number of lives involved.

Metropolitan coordination

As discussed earlier, the territory of Delhi underwent intensive socio-economic and spatial changes corresponding to the force of urbanisation. The increasing population, purchasing power parity, motor-dependence, urban sprawl, etc. had been contributing to congestion and shortage of urban services (NCRPB, 2010). Delhi has always had profound network of roads, industries and jobs, but lack of supply in developed land, housing and office space triggered soaring of rentals and prices around the 1970’s. The real estate trajectory moved beyond the reach of investors which made it impossible to buy or lease properties in the city. The

developers and buyers were compelled to look for land and properties outside the National Capital Territory (NCT) of Delhi. However, the land was mostly agricultural and needed stringent administrative process making development a challenging task. The decision makers acknowledged the issue and responded with a first step for regional planning in the country.

The National Capital Region Planning Board (NCRPB) was setup in 1985 to nurture inter-state regional planning and development and cater to the demand-supply gap. The agenda has been to promote balanced and harmonised growth banking on the potential of the National Capital Region (NCR) with NCT at its core. The region constitutes about 28,795 sq. km and was split into priorities of development due to its vastness (NCRPB, 2010). For instance, central NCR, the top priority area, was renamed after

Figure 9: Delhi National Capital Region



earlier being identified as part of Delhi Metropolitan Area (DMA) and is composed of the cities adjoining Delhi border. It was intended to be developed at par with the service level and magnitude of development in Delhi. The drop in decadal growth rate of Delhi to 21% in 2011 from 47% in 2001 (Census India, 2011) acknowledges decentralisation of jobs and workforce post creation of NCRPB. The cities falling within NCR limits have been planned since then centred on the agglomeration benefits of Delhi facilitated with own industrial potential.

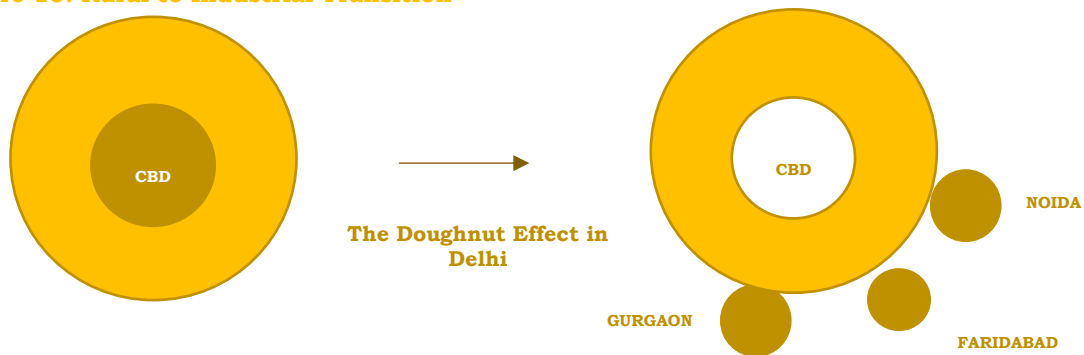
The socio-economic, cultural and territorial setup that has emerged in the central NCR is different than in Delhi. The central NCR mostly includes the seven cities forming the first ring earmarked for development by NCRPB, namely, Ghaziabad, NOIDA, Faridabad, Gurgaon, Bahadurgarh and Kundli (NCRPB, 2001). According to the National Capital Regional Plan 2021, this ring has been planned to be developed as:

1. Industrial centres, focusing on the growth and employment potential
2. Independent of Delhi in terms of planning, administration and infrastructure provisions but with strong socio-economic linkages.

3. Counter-magnets, to divert about a million of Delhi's population.

While the industrial vision anchored development, State Governments adopted a front to supply services against the escalating demand. The ring towns witnessed tremendous growth, for instance, Faridabad registered a growth of 774%, Ghaziabad 567% and Gurgaon 380% around the turn of this century (Babu, 2011). Policies, such as Industrial Model Township (IMT) by Haryana State government, favoured acquisition of agricultural land and setup of industrial anchors, mostly IT/BPO (Information Technology/Business Process Outsourcing) based in this case. The industrial employments summoned high density residential blocks, business parks, commercial centres, universities, schools, hospitals and other services.

Figure 10: Rural to Industrial Transition



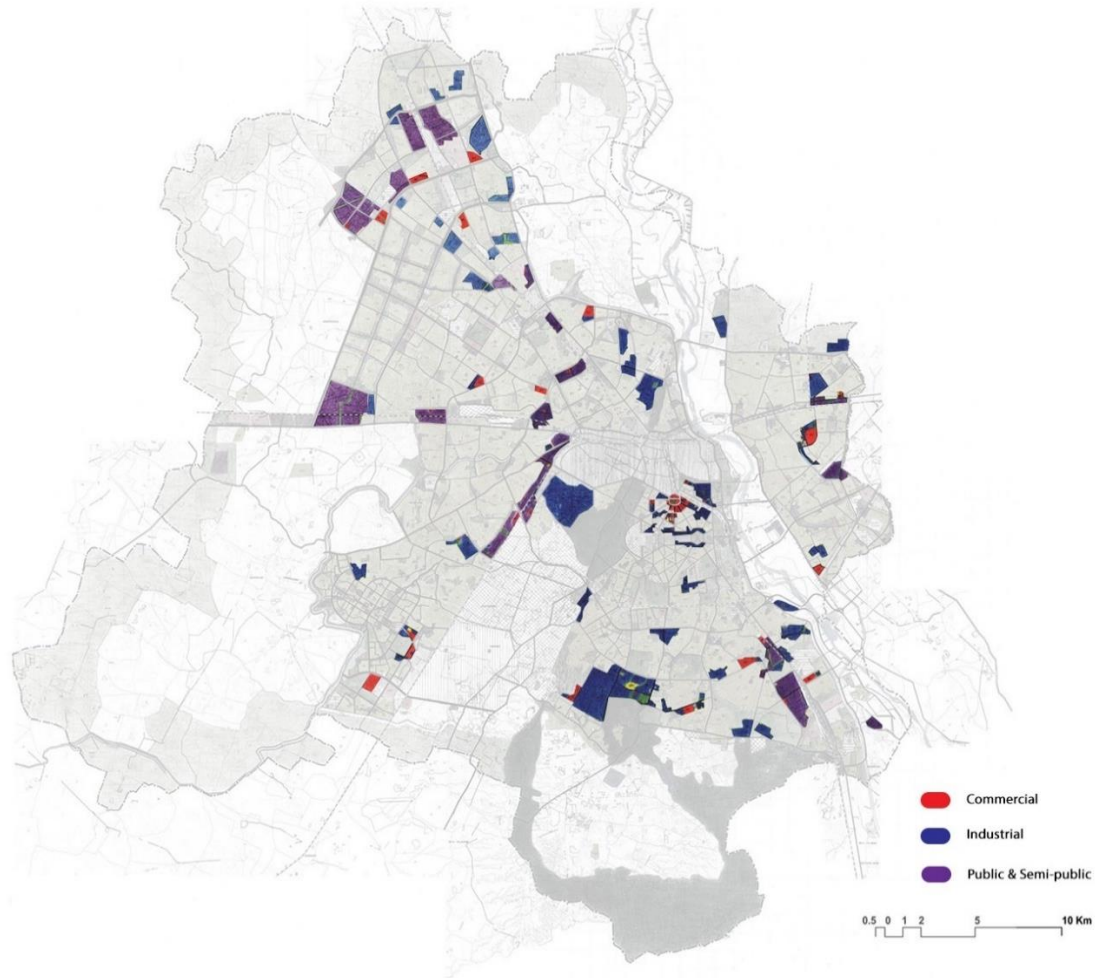
The investment targets of these developments have been generally expatriates. The infrastructure has to suit global market demand that runs with corporate code and needs equipped facilities. These areas soon became the new access to urbanism and attached benefits. The attractive lifestyle packages built greater demand and so have been highly capitalised by the real estate developers (Foldvary, 1994). As a consequence, more and more people have been moving to these cities. The jobs started relocating from Delhi due to lower rentals and added benefits, such as business parks and corporate clubs. The phenomenon relates with the 'doughnut effect' suggested by Cunningham-Sabot (2010) as shown in the figure above. The new job destinations, especially Gurgaon, Faridabad and Noida, now receive thousands of workers commuting from Delhi, concentrating a larger pool of workforce outside the city. Transportation facilities, however, could not flourish to support the travel demand with the change of administrative boundaries. The largest metropolitan mobility in the world then led to automobile dependence. Delhi Metro is only capable to cater to a portion of the intercity travel demand. While, the local transport authorities face the brunt of providing dispersal connection to commuters, trans-boundary integration presents a challenge for the metropolitan mobility system.

The lengthy trips bring along issues of congestion, pollution and loss of about 420 million man-hours every month for Delhi (ASSOCHAM, 2008).

Polycentrism

One of the significant issue in mobility in Delhi is the presence of multiple centres spread across a large area. Unlike most cities, Delhi does not concentrate jobs in the city centre. The Old CBD has been declared as special area and the New CBD at Connaught Place has prevalent land use as commercial. The large territory called for establishment of multiple district centres as part of land use planning. The railway stations and corridors have been industrial hubs traditionally and already concentrate significant workforce. The Master Plans for Delhi (2021, 2001 and 1962) have temporally allocated hierarchical commercial centres to serve the dominant land use in the vicinity. Characteristics such as density, street width, etc., suggests the thrust of business activity and number of jobs thus generated. In same line, retail/shopping/general business and commerce, district centres, sub-district centres and community centres form the polycentric destinations of Delhi. Combined with recreational use, these locations give the trip attractors of the city.

Figure 11: Location of major work centres in Delhi



Governance overlap

Another consequence of polycentric Delhi was observed in governance a few years back. The large territory presented provision gaps for social and physical infrastructure. Distribution of services was also noted as unequitable by the citizens. A reason of administrative and municipal boundary overlap has been brought up for this gap. Delhi used to have three municipal boundaries, namely MCD, NDMC and DCB, each with own territory to govern within the city. MCD covered 94% of the total area and lagged behind the other two administrations in terms of service efficiency. In 2011, the government of Delhi proposed to split MCD into smaller entities for efficient administration (The Indian Express, 2011). The proposal was approved by the Home Minister and the President of India as Delhi is a Union Territory and does not have a State mandate. Three new administrative areas, and a total of five jurisdictions came into existence in Delhi. North and South Delhi Municipal Corporations were given 104 wards each and East Delhi Municipal Corporation was given 64 wards for administration (ibid.). The split had put new challenges in front of administrators in Delhi, for instance during budget allocation

(Times News, 2015). The municipal areas are not alike in multiple characteristics and a lot of infrastructure is shared, especially related to transportation. The scenario sets to bring competitiveness and closer-to-ground response in sought of efficiency. However, synchronising growth and local interventions at city scale remain crucial.

Figure 12: Satellite night view for the agglomeration around Delhi; Source: (IBN News, 2015)

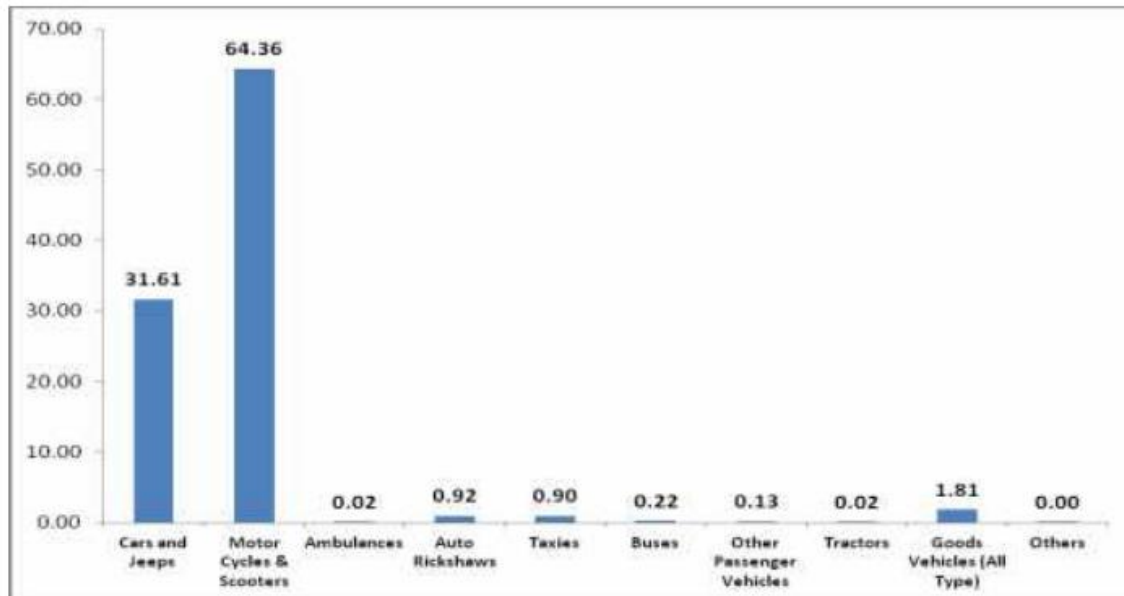


Congestion

Delhi has the largest vehicle population in the country with close to 8.9 million vehicles in 2014-15 (Delhi Government, 2015). It is more than the total number of vehicles registered in three of the six metropolitan cities of Mumbai, Kolkata and Chennai. Interestingly Delhi, which contains 1.4% of the Indian population, accounts for nearly 7% of the total vehicles in India (Bhandari, Peng, Alpkokin, Mukhopadhyay, & Gangopadhyay, 2007). Urban Delhi has been dependant mostly on road based transport systems as railways cater to only about 1% of local traffic demand excluding Metro. The widespread distribution of employment centres has ascertained the growth in length of trips and automobile dependence. However, short trips form a different vehicular agenda. About 33 per cent of total trips in the city are short trips (less than 15-minute travel time) (GNCTD, 2006). Walkability is highly compromised in Delhi due to poor infrastructure. It is dangerous to the extent that every hour a person is injured or killed in a road accident in Delhi as per 2012 statistics. More

than 50% of these persons are pedestrians (Directorate of Economics and Statistics, 2012). All these factors combined with inadequate public transport facility, there is a considerable preference for vehicular travel across the city.

Figure 13: Percent share of Vehicles in Delhi; Source: (Delhi Government, 2015)



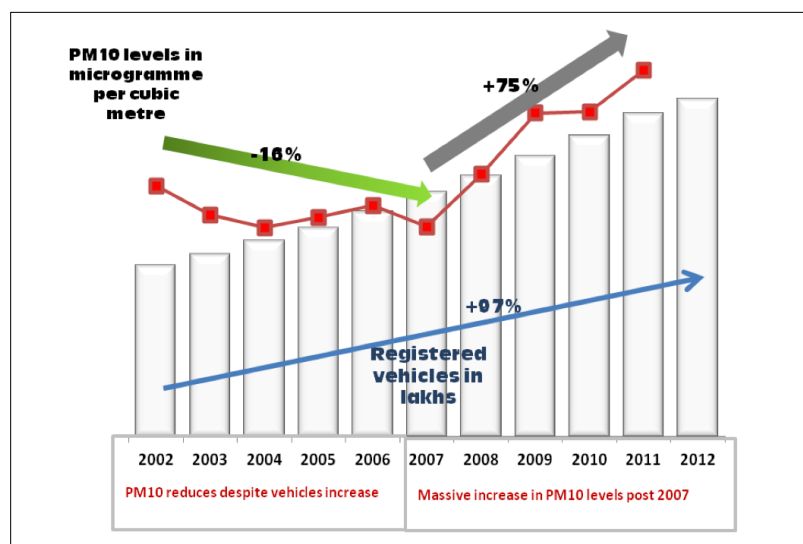
The percentage distribution of categories of motor vehicles in Delhi above shows the enormous share of motorcycles and scooters followed by cars. The growing middle class and newfound financial accessibility to expensive commodities fosters private vehicle ownership. The annual growth of vehicles in Delhi increased from 4.72 per cent in 1999-2000 to 6.89 per cent in 2014-15. The rate is quite high in comparison with other cities, also considering the absolute number of vehicles. Due to arrival of low priced small cars and easy financing mechanisms, two-wheeled vehicle riders shift to cars in lesser time now. The share of cars has increased from 22% in 1991 to 31% in 2005 (Delhi Government, 2015). The soaring numbers lead to various issues related to traffic and transportation management in the city. Parking space crunch leads to haphazard parking, which further adds to congestion and delays on major arterial streets. It was only thought to curb congestion by adding more road infrastructure. However, it has only elevated the severity of the issue.

Pollution

A recent study done by WHO (2014) has rated Delhi as the most polluted city in the world, in terms of air quality (PTI, 2014). The information comes at a time when air pollution is the fifth largest killer in India (0.6 million lives per year) (PTI, 2013). Automobiles in Delhi are contributing

more than two thirds of the total atmospheric pollution (Delhi Government, 2014). Commercial vehicles form the larger part of the phenomenal growth at an annual rate of 8.05% in 2011-12 (ibid.). From 2002 to 2012, vehicle numbers have increased by as much as 97%, pushing particulate matter (PM) 10 levels up by 75% after 2007 (CSE India, 2014). This situation brings inhabitants of the city under direct exposure to toxic fumes, especially on the roads. The problem became grave when the air quality dropped to alarming levels in 2014. The inability of the government to act on this matter urged citizens to file motion in the court. The group prepared EPCA Report along with CSE India on priority measures to reduce air pollution and protect public health.

Figure 14: Air quality as per registered vehicles in Delhi; Source: EPCA Report (CSE India, 2014)



Non-polluting modes of public transportation are jeopardized. Currently it is too dangerous to walk and cycle safely in the city. Car growth is explosive due to hidden subsidies for example the low cost of parking in Delhi when compared to parking in other international cities. Buses are taxed more highly than cars adding to bus operation costs. The Environment Pollution (Prevention & Control) Authority investigated Delhi pollution issue and reported to the Supreme Court the significant role of vehicles and vehicle emissions to rising air pollution in Delhi, stating that rapid motorization based on poor quality fuel and vehicle technology will make the air pollution trend irreversible. Delhi has only 20 buses per lakh of population, which puts enormous pressure on the public transport to curb pollution.

Figure 15: Aerial view in Delhi on one of most polluted days of the year; Source: (Anand K. , 2016)



3. Plural City

Delhi is the focal point of the nation and hence concentrates movement taking place at the national level. Within the city, a network of complex movements is thus generated. The spaces that accommodate these movements are beyond private boundaries and available for all. This is where the movements interact, and that too distinctively, considering the ingrained diversity in Delhi. The space defines interactions in the city and vice versa. The space reflects how individuals act, move and intercept the territory, as it has gradually conformed into the consigned shape. The same space further allows or restricts one to move in designation, shaping the interaction. This distinctiveness is apparent in Delhi. It is evidenced by the clear morphological, functional and socio-cultural differences existing since past. The cases (places) shown in Figure 16 represent the perspective in discussion. The three identified areas demonstrate the difference in spaces, movements and interactions, while existing adjacently around the central Delhi.

Figure 16: Differing morphologies (a, b, c) existing adjacently at central to southern Delhi



City of images

Being the nation's administrative centre, service sector predominates in Delhi. The city is home to the nation's premier, ministers, diplomats, bureaucrats and upper-class servicemen. Owing to British India's vision of imperial Delhi, this segment of population resides in the 'VIP area' located in the New Delhi district. The district has its own public administration the New Delhi Municipal Council, constituted in 1927 (NDMC, 2016). The council was entrusted with design, implementation and management of the district in place of the existing local government. The district that was then created, dissociates itself from the overall city fabric. The morphology is immediately distinguishable signalling power with its expansive roads and the lanes.

At present, the district is a space that delivers image of the post-colonial cosmopolitan Delhi, both to the local citizens and to people from outside the city. As most functions in the area are administrative, much of the territory is excludable. The ministries, federal offices, low-density

bungalows, high-streets and posh places of recreation do not allow many to traverse or inhabit the spaces of the district despite taking a substantial amount of territory and location. The interactions within the space mostly take place between movements akin and are not intercepted by distinctive movements. Raffestin (1983) rightly translates these interactions to display ‘images of power,’ visible or invisible, as network of exchange of goods, data, information and even ruling actors. The space is designed for and dominated by private vehicles, especially cars, which remain the prime or only mode of users of this network.

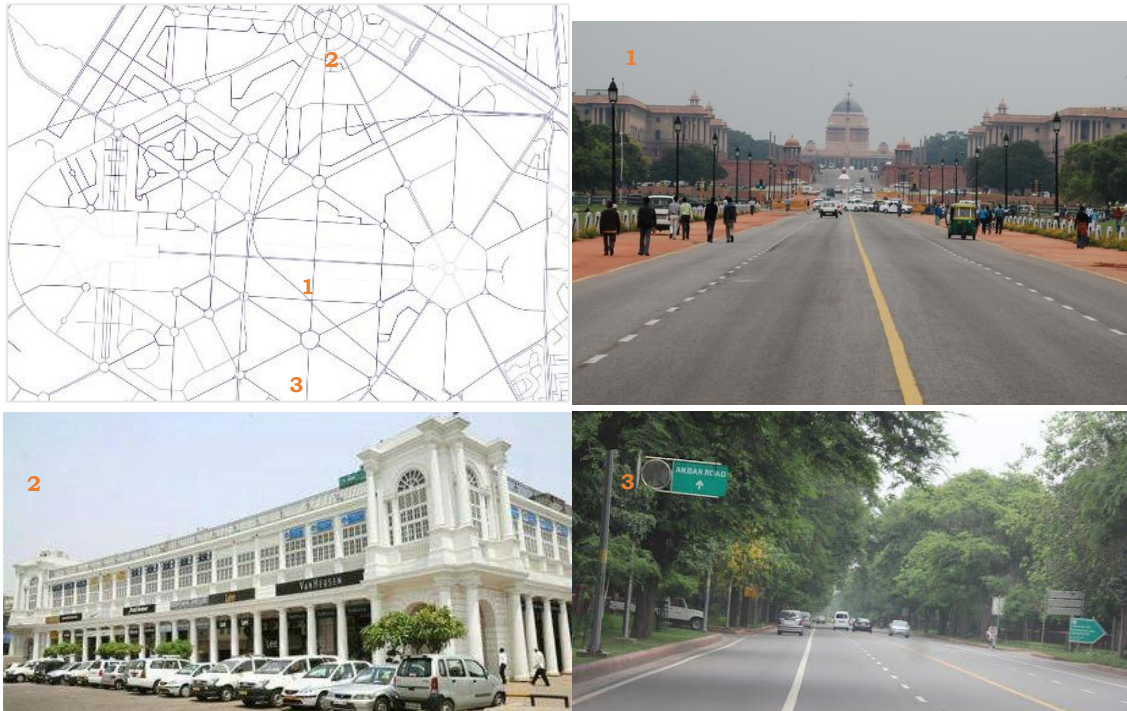


Figure 17: Image of the dominating administrative core of Delhi

The next largest employer in Delhi is the bulk of trade, finance, public administration, professional services, and various community, personal, and social services. It points to the salaried class that finds home in the city outside the centre, the ubiquitous middle class. This section of population inclines to dwell in spaces with fair affordability and suitability to raise family. There is a consistent demand of services like schools, health and community services. Whilst, other demands include likeness characterised by religion, occupation and income strata in case of Delhi. The residential colonies spread across the city are mostly rowed or plotted made available by the DDA through housing schemes launched time to time. A small portion includes developed housing disposal by the authority. The schemes have been part of the land use plans that were devised to sustain habitation at neighbourhood level.

The summary of movements is then limited to smaller distances and confined within perceived boundaries of the neighbourhood. The

movements trespass these boundaries occasionally and mostly for jobs which are located at employment hubs spread across Delhi. These spaces are generally the ground for most complex interactions. The residential colonies and the housing schemes always have a fair share of income mix. The typology of houses or the variation in lot sizes is classified in different blocks or rows based on income group in a scheme. Population which owns a car, two-wheeler, bicycle or nothing as primary mode dwells in a same neighbourhood but separated at the same time. The demography is widest in this segment. They avail the same services, constituting movements that bring them together and create intricate interactions. The case presented below in the images is of Chittaranjan Park neighbourhood which essentially inhabits Bengali community. While the housing is rowed or plotted, the markets center around the Bengali culture along with presence of a big temple, Kalkaji, which is of great significance to the community.

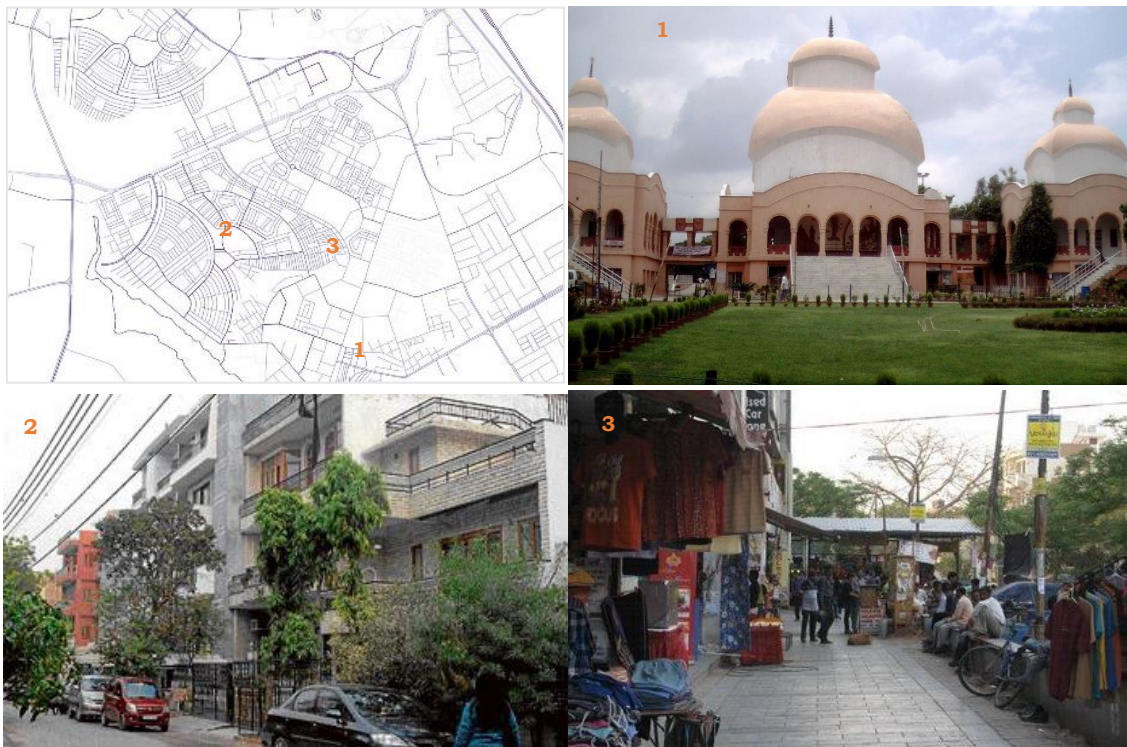


Figure 18: Image of a common neighbourhood in Delhi

The third segment is the most dispersed yet distinctive group in context. It tends to dwell in small pockets within and the outer vicinities of the city. Either setting has daunting living conditions as the presence of this group in the city is mostly unrecognised. The people in those settings belong to either the lower and lowest strata of income mostly occupied in informal work. Their movements are two-folded; first remain strictly assimilated in the webs of narrow lanes cutting through the dense fabric of squatters and the other is elaborated such as to traverse the entire city

to furthest possible destinations demanded by strenuous labour. The segment is the one most affected by public transportation or any intervention in it. Their movements rely on state provisions as they lack the power to interact on their own. Levy (2000) identifies the three components of movements: meaning, competence and capital. The capital is scarce for this segment and competence of the movement is high as its meaning is to support life in the city. What forms concern, is that these movements constitute the highest number in Delhi today (elaborated further), and yet their interaction is faint and highly compromised.

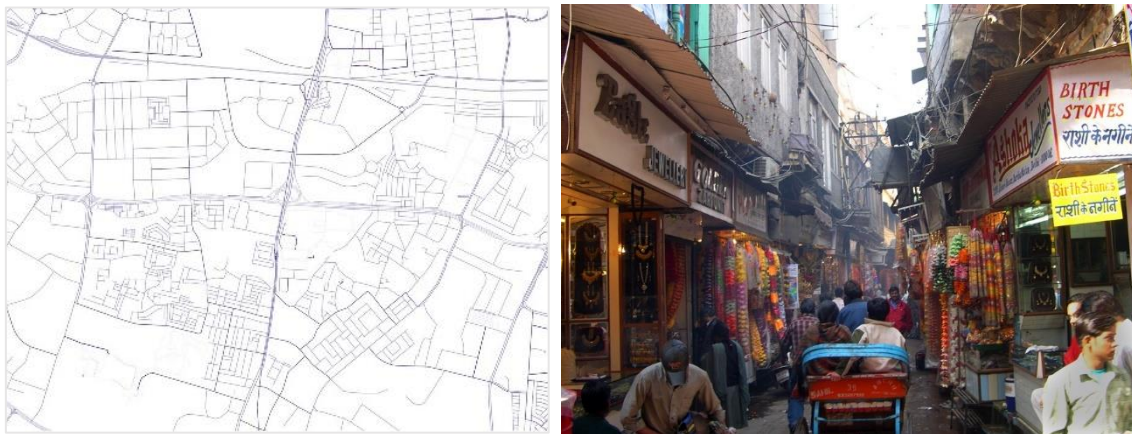


Figure 19: Image of the dense, organic and informal Delhi

The different segments tend to interact first in the spaces within their pedestals and then in the spaces in between them. The nature of these two forms of interactions is dissimilar. While, within the pedestal there is absence of vertical competence, in between there is each possible one. Now these competencies, determined mostly by their size and speed, recognise the movements and their claim to the spaces for interaction. Recognition and claim to the spaces remain crucial in determining the kind of interactions in Delhi. However, the interactions are in strife at spaces as the by nature the competent ones claim more and expel the less competent interactions either voluntarily or involuntarily. Referring to Levy's (2000) components, it would be safe to say that competence dominates the meaning and even capital associated with the movements that interact and constitute the metropolitan space.

Another set of interactions where meaning outplays capital and competence are the ones taking place at the permanent spaces with temporary circumstance. The airport, railway stations and bus stations collect meaningful interactions. It would be almost impossible to locate competence and capital amidst the interactions made at such spaces. However, all the discussed interactions, ever so homogenous but

distinctive on closer look, segregated but consolidated within the borders of the city, reflect spatially on the spaces or materials of a city.

Shadowed territories

The city of Delhi is home to very distinctive population that lives, works or moves in specific ways. About 25% of city workforce is involved in informal trade (Bhandari, Peng, Alpkokin, Mukhopadhyay, & Gangopadhyay, 2007), 30% population dwells in deprived conditions (Sheikh & Banda, 2014) and 10% is below the line of poverty⁴ (GNCTD, 2006). Although India defines urban poverty basing on consumption, it is generally noted beyond conventional definitions and certainly includes health, social and environmental aspects of deprivation (Rakodi, 2002; Wratten, 1995). The above numbers for Delhi also refer to a peculiar relationship between the substantial population segment and informal mobility that together shape existing urban patterns. This section highlights an urban picture and consequential mobility paradigm that has been taking place in developing countries in proportion with urbanisation and is often ignored or unrecognised.

The City Development Plan⁵ of Delhi (2006) informs the average monthly income of poor households is INR 1500-2500⁶. Their per capita monthly income is INR 245 and expenditure is INR 423. Moreover, about 50% of poor earn less than INR 1000. Their source of income is mostly casual labour which provides to 41% poor households. Around 52% households do not have a dependable occupation and secure income. The biggest segment of casual labour is in the field of construction for which the sites are located at the developable and far-off locations in the city. The Census (2011) records about 15.9% of the marginal workforce (5% of the total) stays employed for up to three months and 84.1% for three to nine months. The official statistics tend to underestimate the extent of hardship as marginal work does not include informal jobs. However, the numbers provide an idea of a livelihood pattern that relies on the daily struggle of long trips either to job or to look for one.

It has been found that most of the poor in Delhi are migrants from rural areas. Their number sums up to 38% of the total poor population

⁴ Below Poverty Line (BPL) is an estimate of poverty, provided by Planning Commission of India, based on minimum needs and effective consumption of 2100 calorie per capita per day in an urban area.

⁵ The plan is a territorial document consisting of information on almost every aspect of the city and actions to be taken for development. It is prepared and published by the government but is not considered as a legally binding document for development.

⁶ EUR 1 = INR 75 approximately as on June 2016

(GNCTD, 2006). A recent study elevates this number to 73% of the poor households in Delhi (PRIA, 2014). Also, many studies have established a close relationship between rural-urban flight and informalisation (Hart, 1972) (Kundu, 1997). The poor, constituting considerable proportion of migrants, typically inhabit unplanned or semi-planned developments. It is important to understand that these developments may differ in characteristics but have much in common. Large vote banks, high population growth rate, good share of informal workforce, lack of basic services, poverty, deprivation and exclusion are few notions shared by the developments. In Delhi these are classified as:

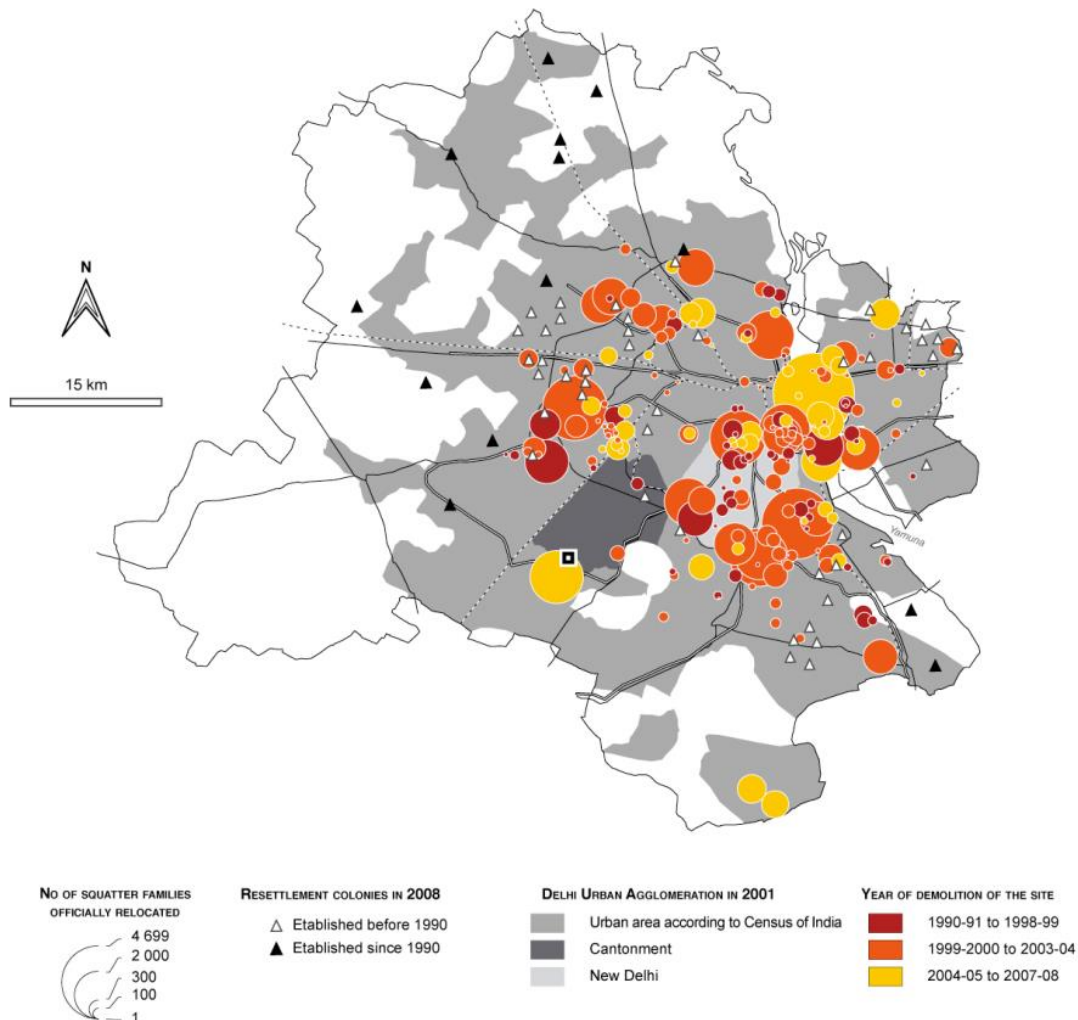
1. Notified Slums: These slums are properties located in the walled city area that are notified under the act. Out of 3000 there are 365 properties that are identified as dangerous and therefore require resettlement of inhabitants.
2. JJs: These are squatters encroached mainly on public land like along railway lines, roads, river embankments and vacant parcels near residential, industrial and commercial complexes. The dwelling type is the one most associated with urban poor. Around 80% of these colonies are present on land belonging to Delhi Development Authority (DDA).
3. Resettlement Colonies: Following the policies to resettle inhabitants of JJs and slums, the government had constructed housing colonies comprising of about 250,000 households past few decades. Due to intense population pressure and unorganised management, the colonies have turned into habitations devoid of basic services, relapsing to issues. It was revealed from a survey conducted in one of the colonies, about 50% of the dwellers were not original allottees. Since, the relocation sites are on the outskirts of the city (Figure 20), the identified population choose to develop another squatter close to the labour market or workplace and rents out the allotted property. Also, there is no security of tenure in most cases.
4. UACs: Unauthorised Colonies are built on the contravention of zoning regulations, developed either in violation of Delhi's Master Plans or on "illegally sub-divided" agricultural land. The process has been taking place since the 1970's, where there are no developed roads, drainage, sewage and water-supply network does not offer any basic services. The government has taken a range of efforts to legitimise and regulate them as the populations surpasses millions creating a political token (Sheikh & Banda, 2014). Following the same political motivations and support, the UACs expand and increase in number in hope to receive a secure land tenure and access to basic services in the city they are a part of and contribute to.

Unseen movements

An empirical study by Veronique Dupont (2000) reveals that the heaviest and most conspicuous concentrations of homeless people or 'pavements dwellers' are found in the Walled City area and its extensions. The district accounts for one-third of the total night shelter establishments in the city. The area is characterised by extremely high residential densities and even higher economic activity densities. These activities include commercial establishments and manufacturing workshops. Many of them include noxious industries and hazardous trades that demand exploitable labour. The 'shelter-less dwellers' of the old business district transform into the foremost workforce during the daytime. The webbed bye-lanes burst with cycle rickshaws, hand-pulled carts, makeshift trolleys, and even men carrying loads over their heads. These people then become the population that gets the work done. They are indifferent of what happens outside the district, for their everyday life is locked within these movements. This scenario is not limited to the old CBD of Delhi. The centrality of work creates a large pool of informal jobs. Delhi is full of such productive territories and has been attracting migrant workers (mostly unskilled) to dwell in these uncountable pockets informality for years. The study supports the notion by revealing 96% of the surveyed workers were migrants and they choose to live in the CBD, as 80% stated that they walk 15 minutes or less to work (Dupont, 2000).

Proximity to work is something that is desirable by every worker regardless of the income group one belongs to. Such cases not only compel to look at the failure of provision but underlying criticalities of a population that is part of the city with unprecedented numbers. Usually, mobility is associated with freedom, power and opportunities. It is interesting to see the different faces of mobility that on one hand provides intercity or rural to urban migration to open opportunities, and on the other, can become unwanted but needed liability, also a bond to deprivation. The image below shows slum concentrations (near informal labour markets) in the city and their relocation sites on the outskirts with strained transport connectivity. Dupont (2000) stresses on the life of hardship as a dimension of metropolitization. Correspondingly, she suggests people from this segment should not be considered merely as pawns pushed and pulled by macro-economic forces but also as actors in a position to shape the urbanisation process.

Figure 21: Location of slums in the city and resettlement sites on the periphery; Source: (Dupont, 2000)



Capacity and conflict

Informality and mobility have a close-knit connection in Delhi. The city is home to inhabitants dwelling in the deprived settings that constitutes about 40% of the city's population i.e. an unprecedented number of 6.4 million approximately (Delhi Government, 2015; GNCTD, 2006; Sheikh & Banda, 2014). These settings are not just habitations, but are characterised for 'supplies' that the city needs and is aware of as well. The dwelling population works for, drives (paratransit) and supports the people of Delhi substantially. It forms part of the city dynamism by contributing to economic system in a way that the system would collapse without them. The issue arises when the dynamics of the city only take supplies and do not return anything against their demands. In that case, the city has developed a habit of exploiting their capacities. The city here includes both the citizens and the elected administrative interface in charge of providing.

It is often presumed that urban poor are unaware of the political scenario. Instead, the demographic group forms an informal type of power structure and leads to shape the governance and policy agenda as it is (Hossain, 2011). They are the biggest, most vulnerable and assured vote bank, but are not considered for contribution in planning and policies, especially mobility. Their needs do form development agenda and occupy political manifestos, but are not prioritised or even included in the policies leaving them unheard and unseen. The substantial population has distinctive travel behaviour and mobility needs around which their livelihood revolves. The issue elevates when rising population puts burden on the already strained public transport. Development pressure deviates policymakers and the most vulnerable movement needs remain unfairly unrecognised. The situation then gives rise to insurgent practices that form from the bottom-up in lack of top-down solutions.

Governing in-between territories

Humans create networks of movements which they perform as part of their habitation the city. Transportation supports those movements in various forms and scales. The movements are distinguished easily on different networks and can be territorially distinctive. It is up to the discretion of policy making institutions as to what form and scale the movements can be intercepted in. In Delhi, the movements only apparent on the city scale catch attention for policy address. A hierarchical road planning dissociated from territorial interactions confirms the point. The Master Plan of Delhi discusses briefly the need to integrate land use with transport infrastructure. The zonal plans fail to be mobility responsive as well. While, the aim of the tools is to reach the breadth of populations, and the depth of their movements, the plans fail to do the same. The above sections discuss the substantial existence of populations in shadowed territories and making unseen movements. The tools such as in Delhi show effect only at city scale and become bound to lose meaning for the subset practices. The singular model then tends to govern places located in-between the territories of inhabitation. It results in an engineered infrastructure that supports engineered movement unsuited to the natural impetus of a plural city.

Informal mobility

Informal transport emerges as an intermediary transport solution between the governed public transport system and personal automobiles. It can be defined in a number of ways characterised by the vehicles, users (group, if any) and political geography of the city, where it operates. In India, it is referred to as Intermediate Public Transport (IPT) formally or simply paratransit (Wilbur Smith, 2008). It particularly works in

conjunction with public transport to provide last mile connectivity, although few modes can also be used for the full-length trip. Predominance of auto rickshaws and cycle rickshaws has associated itself to the term paratransit more closely in Delhi. In the earlier decades, inadequacy of state bus services i.e. Delhi Transport Corporation (DTC) bus service, had also involved operation of contract carriage bus-services in Delhi as part of the paratransit. Recent years have seen more modes being added to the family of intermediate transport solution. The chapter introduces and discusses the agenda of paratransit in Delhi.

There is a range of modes plying in the mainstream transport connectivity of Delhi. The modes constitute a substantial share of the network. While, certain modes have homogenous users, few may be distinctive with user characteristics. Each mode forms an integral part of the route and territory it covers and is significant for citywide mobility.

Private Buses

Bus forms about 79% of passenger dispersal in Delhi as per a primary survey conducted by GoI (RITES, 2010). This share includes all buses operating in the city including the metro feeder service. Private buses are the regular 12.5m long vehicle with a seating capacity. Intra city private bus services are owned and run by private individuals belonging to two operational categories. First, stage carriage buses hold a permit to stop at the bus stops on the route they run on. Second are the contract carriage buses that provide point to point service and are not permitted to stop at bus stations. These are usually fleet of buses owned and operated by contractors under covenant conditions similar to school buses or chartered buses.

The buses were granted operation license by the State Transport Authority (STA) that is the nodal agency for handling permits. It also drafts routes, time-tables and fares for private buses. The earliest scheme was launched in 1970's to provide livelihood to unemployed citizens, especially youth. DTC introduced a Kilometre Scheme known as KMS in the 1980's, where it conducted the service and owners were paid for the kilometres serviced. Later when the corporation could not sustain conductors and ticketing for private buses, the KMS evolved into Earn and Keep Scheme (EKS). The buses were fully operated by private individuals and they retained the fare-box revenue, while DTC only issued formal service pass. The qualifications were mostly operational experience and economic orientation. The numbers of contracts rose during the 1990's and developed an industry. The permit holders started leasing out the permits to middlemen in exchange of a fixed daily sum of money. The middlemen took care of the operations and also appointed

drivers and conductors, but observed least liability as the agreement with permit holder was loosely written. Soon, the setup landed into a spate of incidents including accidents, rash driving, violation of multiple traffic rules due to profit maximisation and less regulated nature of the service.

The operation of buses turned into a menace for the citizens with wide range of problems. The nicknamed 'Blue-line' buses started being called 'killer buses' (Times News Network, 2011). Lack of operational mechanism, such as allotment of routes was based on draw, triggered a series of complaints and dissatisfaction from operator side as well. The private buses had been expensive than the public bus service due to their more network coverage. Until 1999, many users have already moved to alternative modes such as bicycle or two-wheelers (Tiwari, 2003). Numerous, appeals and complaints followed Supreme Court ruling for strictness and later phasing out the bus service by the government during early 2000's. The situation became challenging for DTC as the supply pressure increased and the share of bus service declined continuously (ibid.). The last stage-carriage permit ended on 28th June 2012, marking the end of private bus operations in Delhi (Mathur, 2012). While Delhi Metro has been making up for public transport, bus use had lost integrity for majority of population. The state transport agency currently strives to win back the lost ridership with a number of bus schemes.

Auto Rickshaws

Auto rickshaws are three-wheeled scooter taxis that are hired for a lesser fare and almost origin to destination connectivity. The vehicle operates in many Indian cities where metropolitan cities exhibit a higher share of auto rickshaws ranging between 7-13 units per 1000 population (Wilbur Smith, 2008). While, they operate intermediately with the public transport services in large cities, small cities have comparatively more reliance on them for complete trips. Auto rickshaws have been supporting door to door trips in Delhi for more than three decades now. In 1996, the registered number of vehicles was 80,208, 87,785 in 1999 and 86,185 in 2001 in the city. As the population grew by about 20% during this time period, the number of auto rickshaws rose only by 7% (Mohan & Roy, 2003).

Rising pollution levels in the city had led to a ruling by the Supreme Court of India to convert fuel engine to cleaner Compressed Natural Gas (CNG) and scrapping of auto rickshaws older than eight years (Faruqui & Sud, 2001). The ruling came out in 2001 and since then there has been a continuous conflict among auto rickshaw operators, users and the government explaining the decline. Moreover, the government has stopped issuing new licenses. The mode provides livelihood to a

considerable number of people. They are mostly from a weak socio-economic background and about 61% support a family of five to eight members in the metropolitan (Mohan & Roy, 2003). The ruling threatened their source of income and imposed a series of expensive formalities further increasing their troubles. A study (2003) revealed that majority of auto rickshaw drivers are the owners of the vehicle, while remaining operate on loans. The permits, clearances, registrations, insurance, taxes, etc. together make a complex procedure that hits hard the drivers. There is no norm for transfer of the vehicle or the permit. The vehicle needs to scrapped with the STA after every eight years and each permit renewal costs another series of formalities to the operators.

The costs of owning the vehicle including the permits, etc. is higher than the price of the vehicle due to involvement of agents and middlemen. They charge as high interest rates as 24% against the finances incurred. The formal procedure to commercially run the vehicle can take up to a year. Also, each new regulation comes with a new cost to the owner or operator of the vehicle such as installation of CNG kits, digital meters, GPS trackers, etc. Since the earnings, post operation and maintenance, do not fall sufficient, there is the issue of overcharging and arguments involved in taking a ride. The government fares are set considering the socio-economic average of the city and could not be elevated beyond a point. This has led to a constant dissatisfaction among users as well as the drivers, especially on the routes not well connected by public transport.

Apart from the permits and fares, there is the problem of no recognition by the local government that results in spatial issues. There are no regulations for parking of the vehicle on-street neither dedicated. There are no formal auto-rickshaw stands or route assignment by any authority. This results in the drivers operating on their own in a haphazard way on the streets. There are pre-paid booths at the railway stations and airports but these form a minimal part of the service in the city. The drivers need to wait for their turn in a queue which may take hours and is not economically feasible. The situation gets peculiarly strained at the transit stops during peak hours, where a flock of auto rickshaw drivers would fight for the passengers to take a ride with them. The individuality triggers a heated-up competition in the middle of the streets resulting in congestion, traffic jams and sometimes even accidents. There are cases when an informal drivers' union would control the fare in their local setting, especially for last mile connectivity. This monopoly and misbehaviour on the roads often receives lashing from the police. The situation is condemned by citizens, drivers of other modes and the government, but has become a part of routine now. There is no denying that the auto rickshaw service has a substantial demand.

However, there is a need to recognise and regulate their operation in an attempt to minimise hassles to the users and the drivers and to support mobility in the city.

Cycle Rickshaws

As the name suggests, cycle rickshaw is a non-motorised tricycle designed to ferry about two passengers over a short distance. The mode is very popular in India and has been existing since the 1930's in the villages as well as metropolitan cities (Bose & Sarkar, 2002). A study approximated about 400,000 cycle rickshaws plying in Delhi in 2000 (Anand Y. P., 2000). The licensing or permit has been there since Cycle Bye-Laws of 1960 Act but the informality takes over making it very hard to find their exact number (George P. T. , 2013). However, Municipal Corporation of Delhi is the agency for their so called control and it puts time to time maximum capping on their number (ibid.). Cycle rickshaws ply only in Municipal jurisdiction areas in Delhi, with certain spatial and socio-economic characteristics. These are banned in the New Delhi Municipal Council area and constitute a small number in Delhi Cantonment Board area. Considering the pollution havoc in Delhi, cycle rickshaws offer reasonable solution to short length mobility of the society.

The study suggests number of cycle rickshaws in Old Delhi district forms between 26% and 35% share of the total traffic flow (Bose & Sarkar, 2002). Since the mode does not match the speed of remaining motored vehicles, there are safety concerns and daily clashes among drivers, especially on the narrow streets. The police and municipal corporation impound and scrap many cycle rickshaws daily as a result. In the same view, cycle rickshaws in the walled city have been driven once towards a court ban in 2006 following a litigation by the traders (Sudworth, 2006). Advocates of this environment friendly mode see the situation in a moral dilemma where a parked car in congested city centre is dead use of space, while a rickshaw ferries about 100 people per day. The old CBD functions with about 2,500 cycle rickshaws (ibid.) and provide employment to more than a million inhabitants of the city (George P. T. , 2013).

New road development policies are technically engineered only to cater automobiles. But when it comes to a trip beyond 750m, walking trips convert into a cycle rickshaw trip where users are happily willing to pay the fare (Bose & Sarkar, 2002). Their estimated number in Delhi stood at 600,000, making ten million short trips per day that in a way saves motorised trips made otherwise and government investments on parking and curbing pollution (ITDP, 2006). While there are concerns over slow speed catering to congestion, cycle rickshaws still remain a popular low-

cost, pollution free alternative for short trips in middle and lower-middle income residential areas.

Unfortunately, there is no recognition by transport planners and policy makers on the mode and the Master Plan of Delhi 2021 makes a very weak statement. The National Urban Transport Policy (NUTP), 2006, emphasizes on infrastructure development for safe use of Non-Motorised Transport (NMT). The statement remains vague as no specific projects are currently aimed at the same. The issue was acknowledged by GIZ's Sustainable Urban Transport Project reform agenda for a Non-Motorised Policy for India. It laid down short, mid and long-term recommendations aimed at incorporating cycle rickshaws into multi-modal transport system as 24% of metro rail trips depend on cycle rickshaws for feeder service (SUTP, 2015).

e-Rickshaws

The speed and safety issues of cycle rickshaws have metamorphosed into a battery powered rickshaw. The three-wheeled vehicle is an evolution of cycle rickshaw that first came into operation in 2010, and has a handful modifications over it. It has a low-floored sturdy body and can carry up to four passengers. It receives traction energy supply from four rechargeable lead-acid batteries with a power output of between 250W-850W and is capable of speeds of up to 30kmph. The battery takes six to eight hours of charge to run for about 40-60 km (Harding, 2015). While introduction of e-rickshaws can be seen as a result of frugality and innovation in transportation sector (Chandran & Brahmachari, 2015), it is also a move by the government of Delhi to minimise environmental impact on the long run. Whilst, it also acknowledges the city concerns on last mile connectivity post transit, cost-effective feeder solutions and informal labour segment that needs attention.

A study characterises e-rickshaw over other operating paratransit in Delhi by motivational factors namely 1) Economic factors 2) Time factors 3) Environmental factors 4) Innovation factor (Laheri, Dangi, & Vohra, 2013). With this motivation, the number of e-rickshaws plying in Delhi has reached the 100,000 mark while it does not need operational permit (Harding, 2015). Regulation of motor vehicles in Delhi is based on the Motor Vehicles Act (1988), which stipulates any vehicle with a power output of more than 250W or a top speed exceeding 25 kmph would fall under local Transport Department's domain (Times News Network, 2013). E-rickshaws can go up to 35 kmph and the batteries generate power output of 650-850W. Even though the vehicle qualifies this guideline, the authorities could not register e-rickshaws as they could not classify it according to available designations.

Classification of a vehicle is prerequisite for imposing transport regulations. The Vehicle Research and Development Establishment of the Ministry of Defence (GoI), the Automotive Research Association of India in Pune, the Machinery Testing and Training Institute in Budni (MP), and the Indian Institute of Petroleum in Dehradun (Central Motor Vehicle Rules, 1989) are the institutions that assign a classification to the vehicles after testing performance. The e-rickshaw had already begun operations on the streets of Delhi and would be unlikely to pass the test due to its low build quality (Harding, 2015). The situation created a paradox as demanding test would push the vehicle away from being legitimised and strip people from livelihood and the 'eco-friendly' service upfront.

However, the Ministry of Road Transport & Highways banned the sale of vehicle citing non-compliance with the available legislations (Times News Network, 2013). By that time, the number of e-rickshaws had risen substantially and it was logistically impossible to confiscate each of them. The Traffic cops and other civic bodies could not prosecute them due to lack of authority and legislative actions on the vehicle (Times News Network, 2013). The scenario took form of a political agenda in the city during the national and state elections in 2014. A series of litigations had resulted in issuance of identity cards-cum-temporary permission to drive e-rickshaws along with creation of an insurance corpus by the vehicle associations (IANS, 2014). Also, draft guidelines submitted by the central government 'incompletely' brought the vehicle under the ambit of Motor Vehicles Act (1988). The proposal allowed the vehicle to run in the city on loose legal but strong political terms.

The supplier market did not follow the ban as well as they continued retail and import of the vehicle on collusion grounds with the government (Harding, 2015). The suppliers still await amendments on the Motor Vehicles Act (1988) on vehicle characteristics. The fact that e-rickshaws did not undergo any performance test leaves safety concerns, confirmed by many citywide. No performance classification and legal acceptance in the Motor Vehicle Act (1988) confirms illegitimacy of e-rickshaw services in Delhi. Delhi High Court later criticised Delhi Government's allowance for an 'unregulated vehicle' to operate in the city and tightened the ban (Harding, 2015). The vehicle was later 'partially' recognised with E-rickshaw Sewa Scheme launched by the Government of Delhi (GNCTD, 2014). The policy permits operation and ownership of the vehicle under Contract Carriage Permit and a valid license respectively (ibid.). However, there are still many loopholes including lack of data, parent authority, clear guidelines for control and safe operation, etc., rendering the fate of e-rickshaws hanging with uncertainty (Harding, 2015).

Gramin Sewa

Delhi is full of scattered and disconnected territories, mainly occupied by a weaker economic class like the unauthorised colonies, JJ clusters and urban villages as described earlier. These areas possess a weak or no standard road infrastructure and/or transport connectivity. The transit network remains mainly on the arterial streets and it is difficult for the buses to reach within these narrow bye lanes. While these areas were being served only by paratransit, the government launched semi-public transport service to connect population residing in these deep territories to the main streets. The service involves a three-wheeled minivan to run on clean fuel, with a seating capacity of seven persons including the driver, and is known as Gramin Sewa (Hindi term for rural service). The scheme was launched in 2010 to ply under a contract carriage permit in the rural areas, unauthorised, resettlement colonies and JJ clusters of Delhi (GNCTD, 2010). The vehicles are not permitted to run on the arterials like the Ring Road.

The capital spreads over about 1484 sq. km with an even larger urban agglomeration (Census India, 2011). The city bus service had been incapable to reach remote locations in the city. People living in outer areas rely heavily on this service. High demand had triggered even higher supply post resorting to violation of norms. The service initiated with roughly 6000 vehicles (Hafeez, 2015) and within its first year about 10,000 challans (fines) were issued for permit violations alone (Kant, 2016). Private players, who are mainly well-off residents in outer areas, sneak in and monopolise the service locally (Hafeez, 2015). The situation has been giving transport officials a hard time as 5,671 vehicles were booked for plying without registration; 4,920 fines to owners for employing underage drivers; 11,436 for dangerous driving, and 810 cases of overcrowding in vehicles, all only in 2011 (Kant, 2016). 1,194 drivers had been caught driving without license and 9,578 vehicles were impounded in the first year of service (ibid.). Moreover, drivers create their own service routes to maximise profits and take on to the arterials jeopardising on-board and other passengers' safety.

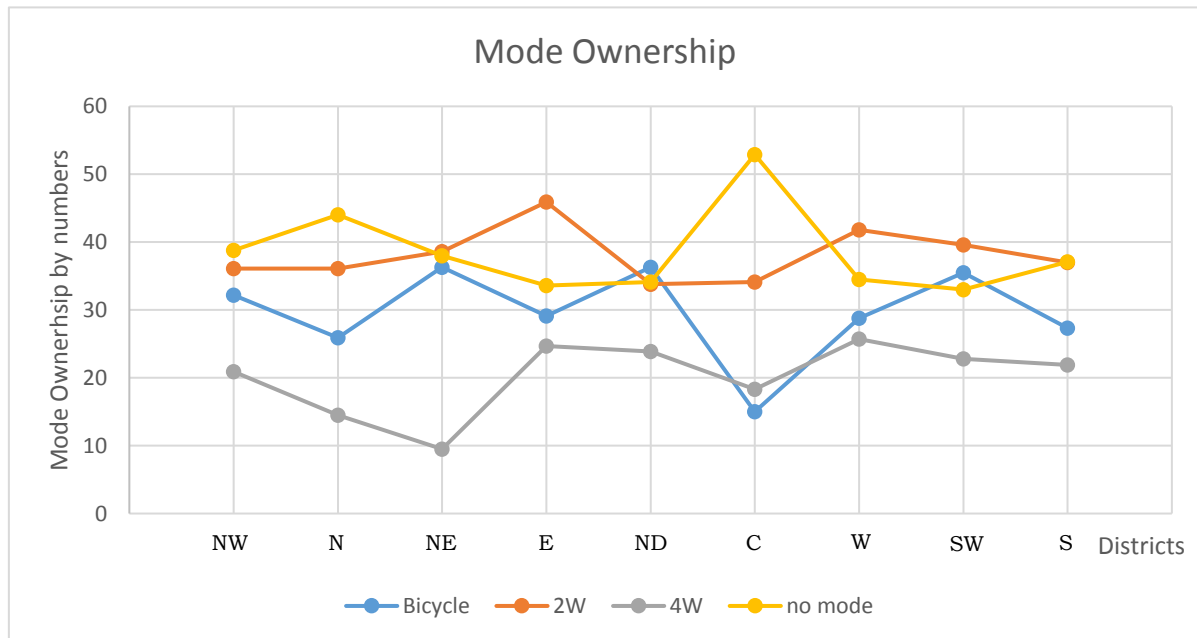
Transport authority had announced to take policy measures to tighten loose ends and ensure a better service as it remains vital for citizen mobility. The measures include formation of special enforcement cell with Traffic Police to contain errant drivers and installation of GPS device in permitted vehicles for improved monitoring and control (GNCTD, 2015). Despite strong efforts there has been less improvement as about 37,134 challans were issued from August to November 2014 alone (Mishra A. K., 2015). The number of these vehicles has exploded in the recent years making it logistically impossible for the authorities to control. The

demand has established a balanced market and the service has attached a source of livelihood that comes with it. The drivers and owners' association has become visible as they continue to demand changes in the current policy such as redefinition of routes (Times News Network, 2015). The overall issue has seen a number of litigations in the court filed by citizens distressed with several violations and misbehaviour on the streets. This cycle continues and there has been no concrete solution so far. There is recognition in this case but regulations fall insufficient to ensure a safe and efficient mobility via this paratransit mode.

4. Territorial Investigation: Rohini

It is understood by now that Delhi composes of diverse localities. The diversity is expressed in the movement practices of the inhabitants as well. Before analysing a local space qualitatively, it is reasonable to understand quantitative distribution of the same as per the institutions. Demographic data from Census 2011 shows that there is a direct correlation between share of mode ownership and population density of the respective district. The nine districts of Delhi are presented below following the order North West (NW), North (N), North East (NE), East (E), New Delhi (ND), Central (C), West (W), South West (SW) and South (S). The two charts reveal the district with highest population density has the lowest share of four-wheeled modes that include cars, jeep, vans, etc. The second densest district has the highest share for no mode ownership as well as the lowest bicycle ownership share. The least dense district shows a fair share of car ownership and the highest share of bicycle ownership. The situation is of the central districts of Old Delhi and New Delhi which have duality in characteristics and functions. Ownership of two wheelers follow a consistent share through the nine districts indicating the presence of a broader middle and lower middle class.

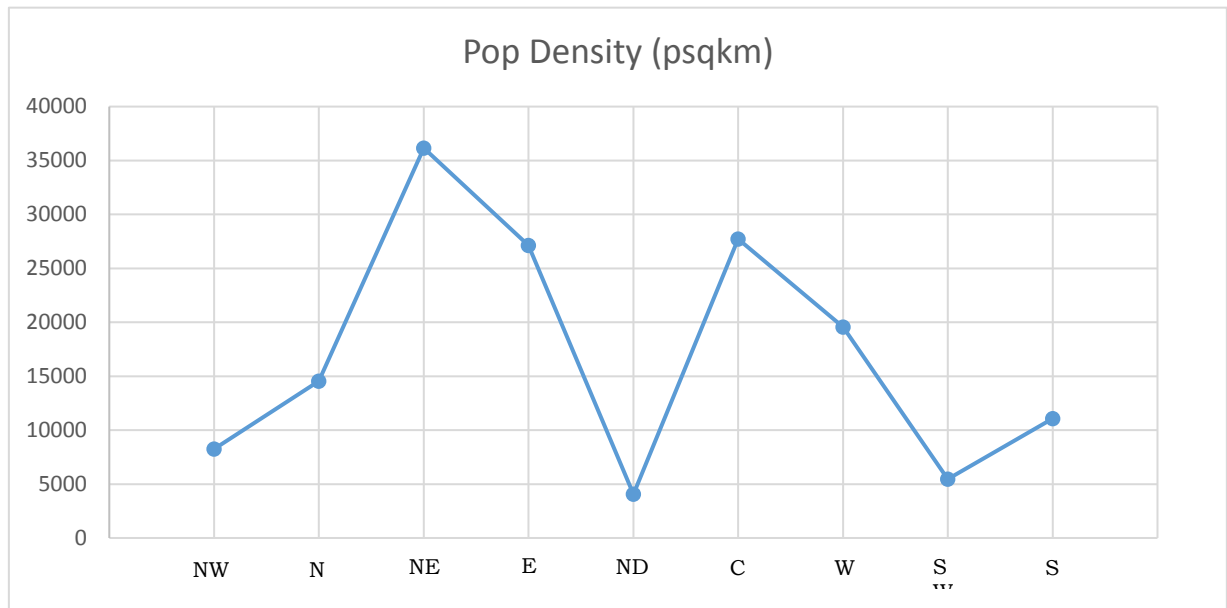
Figure 22: District-wise mode ownership in Delhi; Source: (Census India, 2011)



The central district spreads over the walled city and its extension areas. It shows presence of maximum population that does not own any mode among all districts. There is also least ownership of bicycles. This points to fact that inhabitants of the central district practice mobility through walking trips and public transport. Considering the citywide inadequacy of public transport, the scenario hints presence of informal transport in

the territory. The district had been notified as special area due its unique characteristics. However, for in-depth analysis, it is better to select a territory with wide presence of plural inhabitations. Mixed land use, varying typology of housing, diverse income group, settlements, etc. would add to the qualitative matter for research. This criteria points towards comparatively recent establishments of mixed-use neighbourhoods in Delhi, where there is possibility of the informal character to have remained.

Figure 23: District-wise population density in Delhi; Source: (Census India, 2011)



At-ground transformations

Delhi has undergone rigorous transformation around and since the turn of this century. The moderately dense inner city areas have seen intensive urban effects leading to complex problems that need time and special-focused policies to be overcome. Meanwhile, the DDA has intervened extensively so that the city does not succumb to the pressure of urban growth. It has targeted the periphery of the city to decentralise economic functions and provide housing to the citizens. The periphery acknowledges the above criteria of plural and informal presence. The authority has come up with multiple projects under the domain of Urban Extension following the unsettling figures of Census 1981. The first step in this direction was taken in the same year. A new Delhi Urban Area was notified in 1981 to increase urbanisable limits, which would facilitate population holding capacity of the city. This notification added up 44,777 hectares of area along with 5.4 million urban population. However, population growth in the following decade surpassed the anticipated numbers and DDA had to formulate a strategy to accommodate about 13 million people in the urban Delhi for 2001. The actions included updating

of Delhi Urban Area again where the Urban Extension Plans would be implemented (DDA, 2011).

The Urban Extension Plans became a priority for DDA so as to neutralise the soaring urban thrust and diverted development only at the exterior of the city. This is the reason major land cover changes during the past two decades were witnessed the most in the outer city (Mohan, Pathan, Narendrareddy, Kandya, & Pandey, 2011) as shown in Figure 25. It was also understood by the authority that there is a need to increase density in the new developments. The Urban Expansion Plans then entailed development of three sub-cities, namely, Rohini, Dwarka and Narela. The sub-cities were to be planned and developed as mega projects of Delhi, targeted to house jobs and housing for the composite society, consisting of all income groups.

Figure 24: The three sub-cities; Source: DDA, 2011

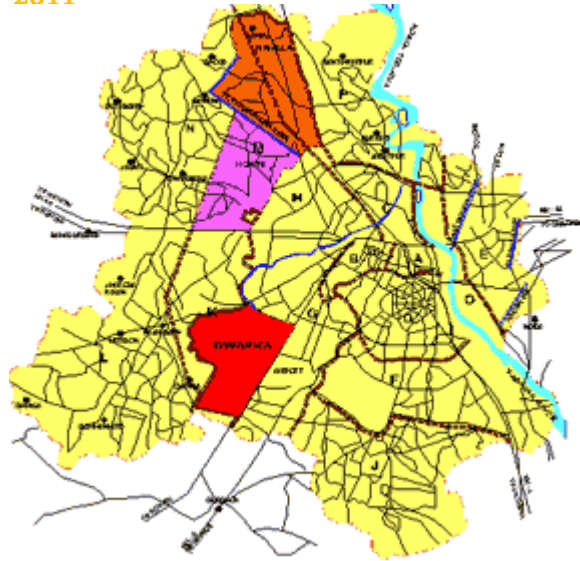
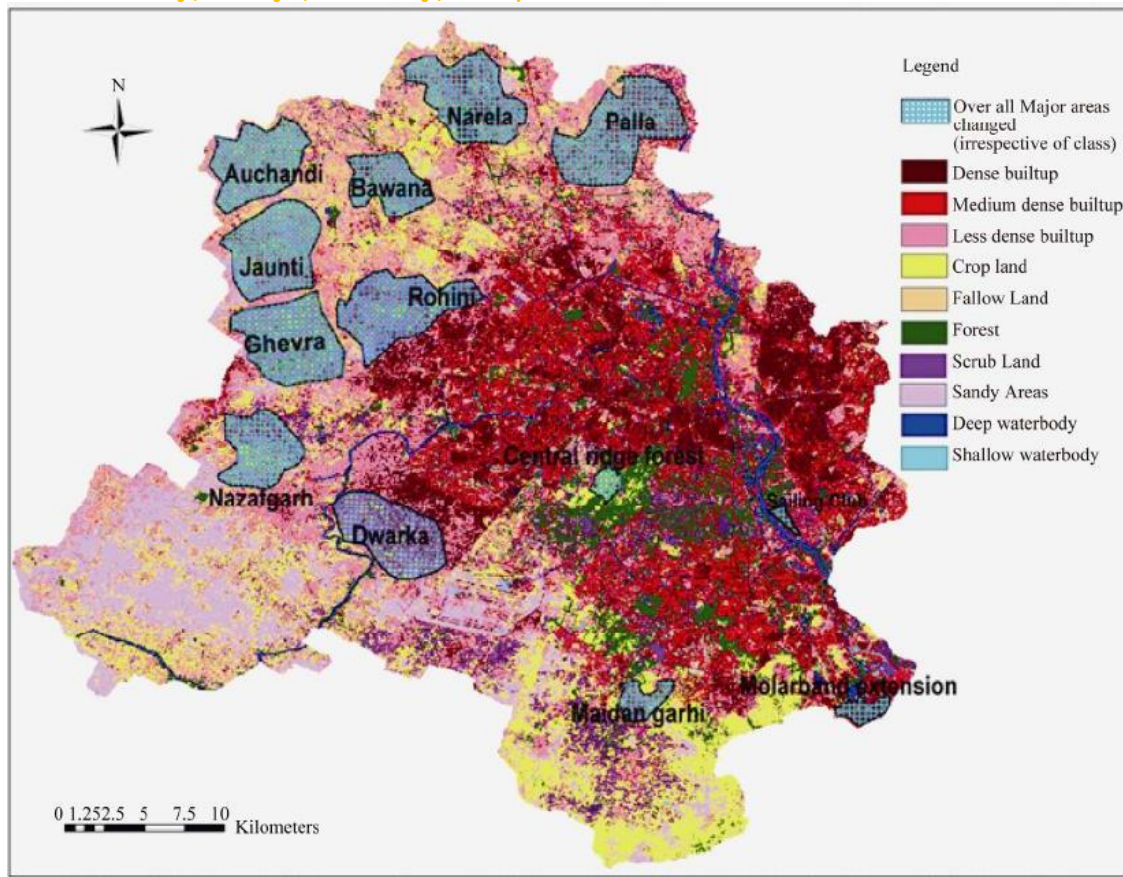


Figure 25: Major land cover changes in Delhi from 1997 to 2008; Source: (Mohan, Pathan, Narendrareddy, Kandya, & Pandey, 2011)



For the purpose of this study, Rohini sub-city has been chosen to demonstrate the mobility patterns of the people. The background of this scheme provides a fair overview of the pressure felt by the authority regarding sustained urbanisation. The rapid transformation has ceased to touch the rural or informal settlements and retained them within the development. Being a planned development, Rohini ascertains presence of hierarchical and balanced infrastructure that will support analysis for this research. as the city mostly involves land use planning, it might be uncertain to find a similar proposition from any other part of the city. The project manifesto points the sub-city is planned for all income groups and multiple uses. The diversity ensures capturing of varied perspectives and patterns of movement. The location adds another point in favour of detailing the analysis with Rohini. The sub-city is located at the periphery and has adjacency with urban and rural territories. This difference in character signals plurality in movements, their purpose, type and means, which will further enrich the investigation.

Rohini Scheme brief

The building of metropolitan Delhi has provided opportunities, by and large to all sections of people for their work, living and recreation. Rohini scheme combines in itself a comprehensive approach to town & country

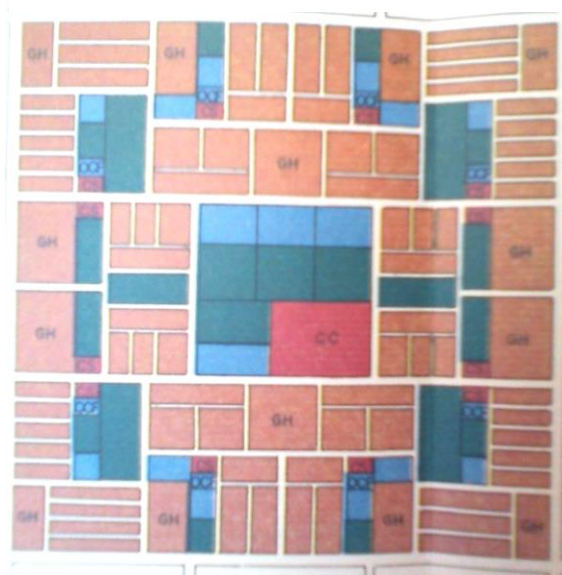
planning (for the rural area) and then to urban planning. Rohini Sub-city, promoted as 'a city within metropolitan Delhi', is located in the North-west district of Delhi. The scheme was launched in the 1980's with an aim to provide planned urban extension to the transition areas (rural to urban) of Delhi. A total of 2497 hectares of land was demarcated at a distance of 15 km from the city centre. The area is situated along the Outer Ring Road, between two major traffic corridors - the Grand Trunk Road and Rohtak Road which are regional industrial corridors along with good railway connectivity to regional nodes. This infrastructure has ensured easy access to rest of the parts of Delhi. The scheme was launched in two phases, Phase I & Phase II, comprising 19 sectors. Although, the sectors have supportive land-uses, 17 are primarily residential and two completely commercial. These two commercial sectors are the first organized and planned twin-district centres of the city. The estimated number of households which will find shelter in Rohini are 170,000. Some more important features of the area are:

1. It is predominantly a residential area planned to accommodate about 850,000 people.
2. Work Centres provide for employment opportunities for 3 Lakh workers.
3. Major facilities of health, education, social and cultural have been judiciously distributed on the main transportation spines within the scheme to ensure easy access.
4. Intensive utilization of land has been achieved resulting in compact development to conserve land and energy resources without sacrificing the level of infrastructure.
5. Large recreational areas have been conveniently located to provide for a variety of recreational facilities in addition to playgrounds at neighbourhood level.

Nuclei model of development

1413 Hectares of gross residential area has been planned in multiples of a module of 100 ha. This one module or sector provides housing for about 60,000 persons and is self-contained in terms of essential facilities and amenities. The peripheral roads provide the public transport routes which are planned to be not more than 500m distance from any part of the sector. The community centre and four higher secondary schools grouped together from the nucleus of each residential sector. The sector layout

Figure 26: One residential sector (100 Ha.) in Rohini; Source: (DDA, 2011)



is designed to optimize the service supply network and to ensure equal accessibility to all facilities. There are two major arterials of 100 feet road width passing through the area parallel from South-east to North-west direction. Metro line passes through one of these roads. Figure 26 shows the concept for nuclei development model of residential sectors in Rohini. A total of 5720 plots have been planned in one sector as part of the initial two phases of the scheme. While, most of the residential plots are row houses, group housing supplies about 3460 apartments to the sector, facilitating density.

S. No.	Features	Area (Ha.)
1.	Row-housing plots	48.40
2.	Group Housing (GH)	17.30
3.	Community Center (CC) - Retail shops, cinema, offices, services, industry, etc.	3.50
4.	Convenience Shopping (CS)	1.40
5.	Other Community Facilities (OF) - Community halls, religious sites, health centres, etc.	1.99
6.	Parks & Playgrounds	13.97
7.	Educational - Higher secondary, primary and nursery 2, 8 and 4 in number respectively	13.43

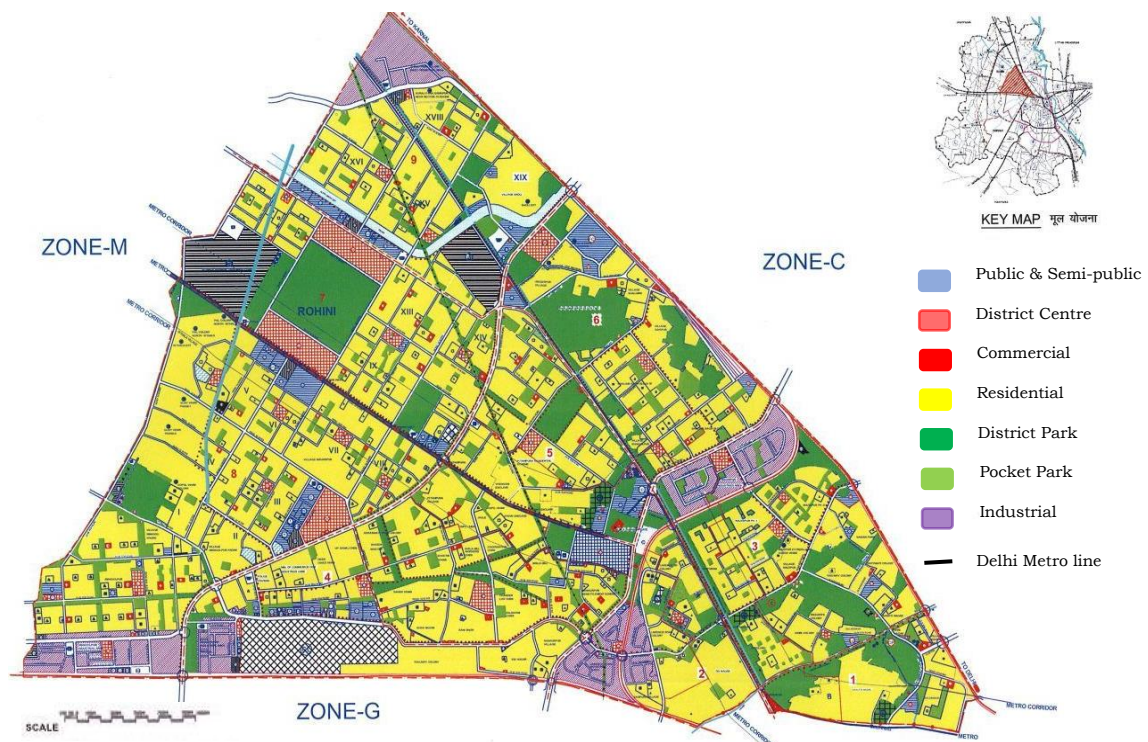
provides an overview of the area break-up in each sector.

Table 5: Area distribution for each sector in Rohini, Source: (DDA, 2011)

S. No.	Features	Area (Ha.)
8.	Row-housing plots	48.40
9.	Group Housing (GH)	17.30
10.	Community Center (CC) - Retail shops, cinema, offices, services, industry, etc.	3.50
11.	Convenience Shopping (CS)	1.40
12.	Other Community Facilities (OF) - Community halls, religious sites, health centres, etc.	1.99
13.	Parks & Playgrounds	13.97
14.	Educational - Higher secondary, primary and nursery 2, 8 and 4 in number respectively	13.43

The average gross density achieved in phased development is 600 persons per Ha. A residential sector has provided plots of sizes varying from 26 sqm to 120 sqm with a provision of four storeyed group housing. The local shopping arcades consist of built shops as well as platform shops. The distance of a shopping center from any residential part is not more than 250 meters. Open spaces have been provided in terms of parks and playgrounds and cluster level open spaces. These open spaces are accessible within 250 m distance. Local shopping centres and other community facilities are grouped all along the system of continuous open spaces. Figure 27 shows the proposed land-use distribution of the project, which falls in Zone-H of the DDA. The development and disposal of these facilities has been concurrent with the development of residential areas over all these years.

Figure 27: Land use for Rohini Phase I & II (Zone H) in Zonal Development Plan; Source: (DDA, 2011)



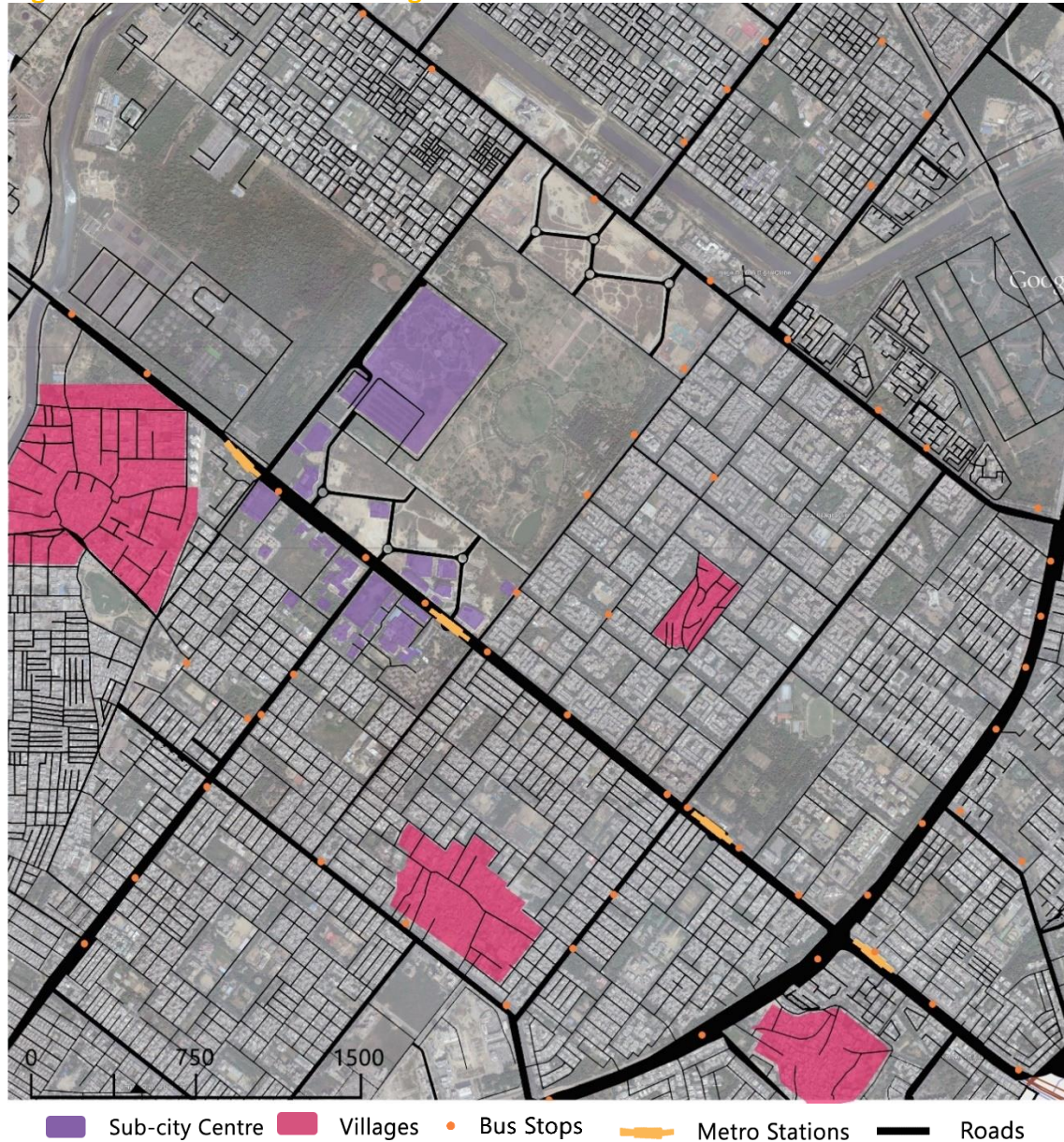
The cultural landscape

The investigations from bottom-up begin along the spine of Rohini i.e. the central sectors surrounding the Metro line. Considering Rohini expands to five Phases today, the territory for analysis should be such that could allow a check of ability of diverse users to move in a local dimension using multiple modes. The transit line passes through the southern one of the parallel arterials and offers multi-modality. Rohini has primary land use as residential but has been focused to bear mixed-functions. With the presence of scattered employment or district centres across Delhi, it has banked quite highly on the development of Metro line. The situation is clear from the fact that only one of the twin district centres could materialise and is still not complete. The district centre lies adjacent to the metro line and is functioned with a hotel, four shopping malls and a multi-level car park that was recently opened. The other planned counterpart still lies undeveloped after two decades of plotting.

Another reason of centring the research around the transit line is it provides a vivid landscape native to the city. Amidst the planned development, there are villages that function in complete isolation. The spine creates a point where the two faces of Delhi – the global city and the traditional – interact and combine to operate movements. The villages form a ground where last mile solution for connectivity resides. People commuting by Metro rely on paratransit modes to provide dispersal connection. Most of the cycle rickshaw pullers and auto-rickshaw drivers

live in the villages. Although, the villages have adapted to the urbanisation taking place around them. These pockets also function as labour markets for the informal workforce as suggested by Faisal, a young e-rickshaw driver interviewed on site. Local business-owners act as the nodal entity of this process as they invest and bring in the hardware and fittings for the paratransit vehicle. Mechanics and electricians assemble the bodies and work out the machinery. The vehicles are further sold under a brand and without any tests or inspection due to absence of recognition. These workers are not institutionally trained but have seasoned over years in search of a livelihood. The webbed by-lanes of these informal markets are also equipped with financiers and 'parking landlords', who the drivers are forced to depend on given their strained finances. The infrastructure provided by the government, the dynamism of economics and user practices that have arose in this area amalgamate to present a new cultural geography.

Figure 28: Infrastructure and villages in Rohini

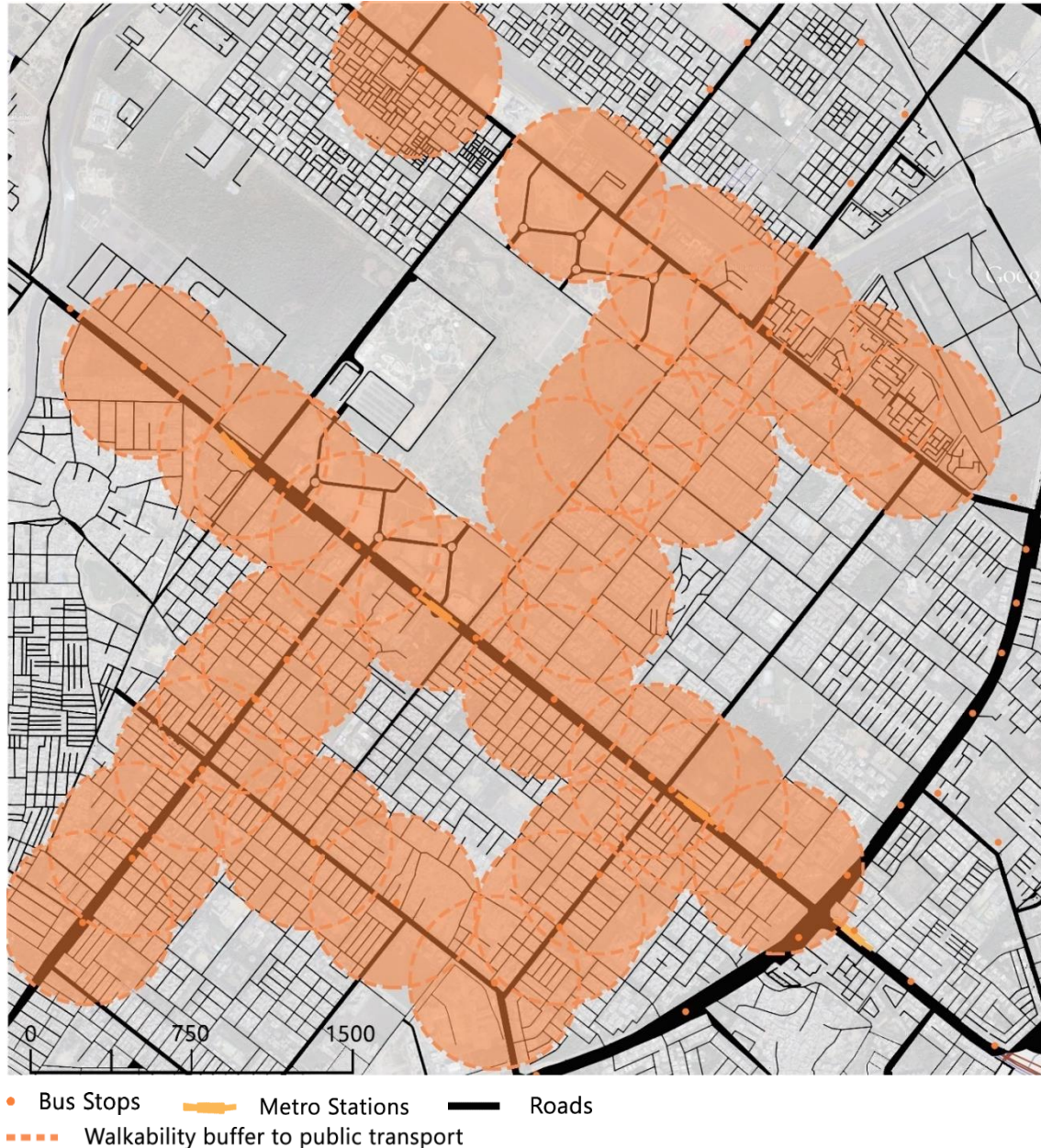


The native interactions

The scenario in Rohini tells a similar story. On putting walkability buffers of 400m around the bus and Metro stations, the territorial coverage of the public transport can be observed in Figure 29. It is understood the nuclei development model of Rohini attempts to allow equal accessibility to transport services. However, there seems to be voids between the catchment areas of transit service, especially the villages and recreational zone. The deficit in territorial coverage encourages paratransit service in the area. In fact, many a times local trips tend to prefer paratransit over public transport. It somewhat 'guarantees' availability of mode and a seat, considering at least the cycle rickshaw and auto rickshaw, which may not be the case with less frequent and overloaded public transport.

The demand triggers abundant supply of paratransit in the territory, which caters to the aspects of frequency, operating hours, routes and accessibility.

Figure 29: Territorial coverage of public transport in Rohini



Urban public transport is developed following (global) standards designed broadly to suit the average man. Litman (2016) suggests movement or accessibility to a mode depends on individual perspective as the policies attempt to be most inclusive. Each person has differing abilities, needs, means and purpose to compose their movements from. Practices of movement often involve preference to a mode for certain destination or purpose. These practices are shared between similar demography and can be grouped together based on such similarities. Investigating movements in a given, territory for these groups can allow to capture a

wider user perspective. The plurality in on-ground movements then realised can inform more effective transportation plans and policies.

Ethnographic elaborations

Litman (2016) classifies four aspects that may together or separately create a movement practice. These aspects are involved in a trip and can vary for particular locale, culture, society or environment. These are, a) User group b) Purpose c) Location d) Mode. User groups are defined basing on age, gender, income level, physical abilities and user designation. The user groups generally have common purposes as part of the society where they live. The nature of purpose may govern the intensity of movements. If the purpose is strong or mandatory, the movement is irrelevant of location, the trip is made nevertheless. Going back to Levy's (2000) components, purpose resembles meaning, which can elevate competence or capital associated with the movement. The purpose and location both tend to define a choice of mode for the movement by a particular group. In the same line user groups with respect to the setting of study area along with their movement brief are shown below:

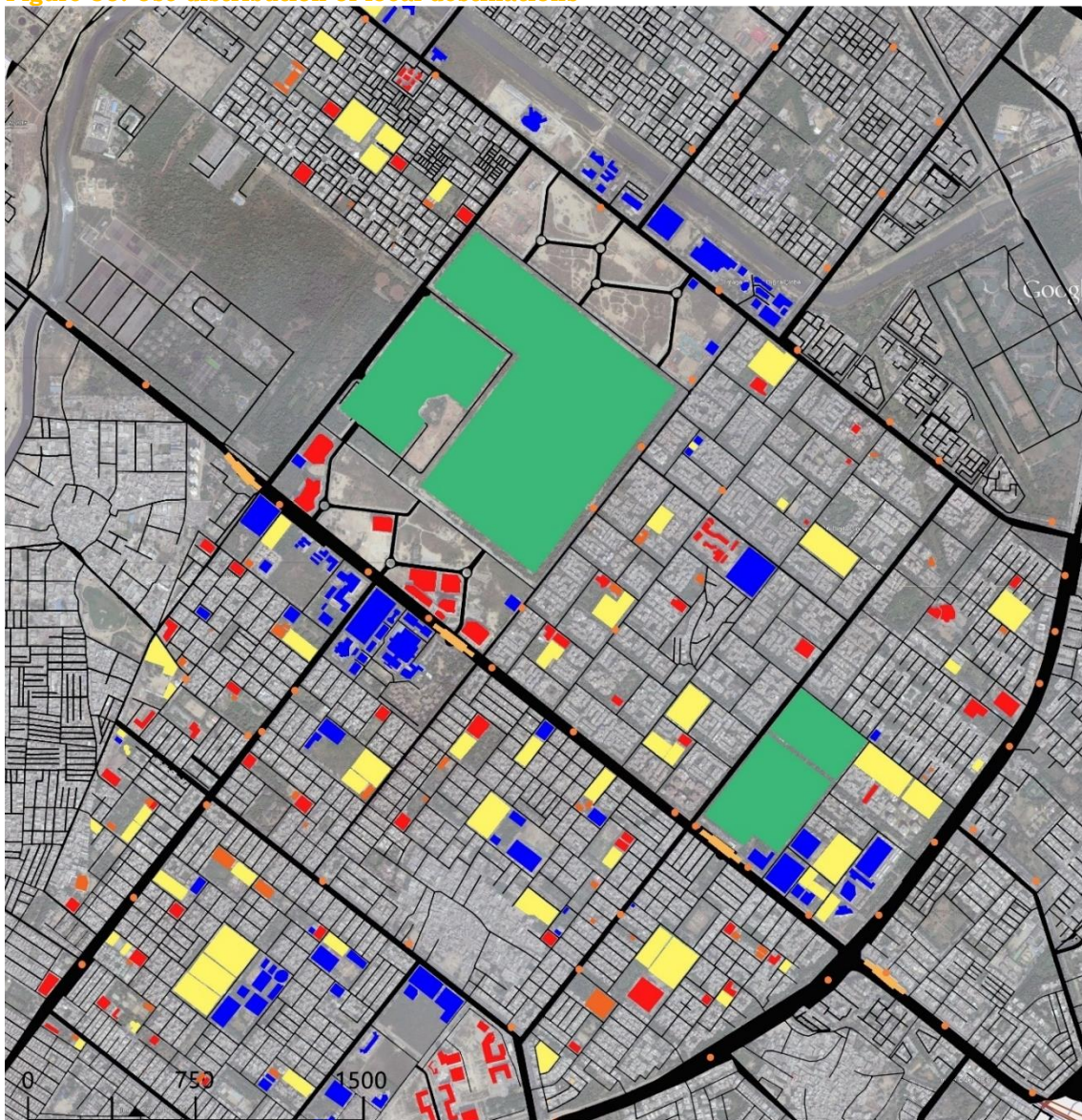
Table 6: Identified user groups for study area and their movement characteristics









S. No.	User Groups	Purpose	Location	Mode
1.	Commuters	Livelihood	Transit stops	Detailed further
2.	College students	Cognitive	Educational, Commercial & Recreational spots	Detailed further
3.	Local business owners	Livelihood & Cognitive	Commercial, Institutional, Recreational & Religious spots	Detailed further
4.	Business travellers	Cognitive	Commercial, Institutional & recreational spots	Detailed further
5.	Children	Cognitive	Educational & Recreational spots	Detailed further
6.	Senior citizens	Cognitive	Institutional, Commercial & Religious spots	Detailed further
7.	Low-income group	Livelihood & Cognitive	Transit stops, institutional & Religious spots	Detailed further

8.	Families	Cognitive	Commercial, Institutional, Recreational & Religious spots	Detailed further
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The discussed user groups suggest a mix of destinations that enables people to move in a local dimension. Rohini is a residentially prevalent area claimed to be sufficiently furnished with basic and allied uses. Fortunately, it is full of diverse uses that are qualitatively significant to attract different user groups. Figure 30 collects the destinations a local resident or a visitor would reach starting from their house in the study area.

Figure 30: Use distribution of local destinations

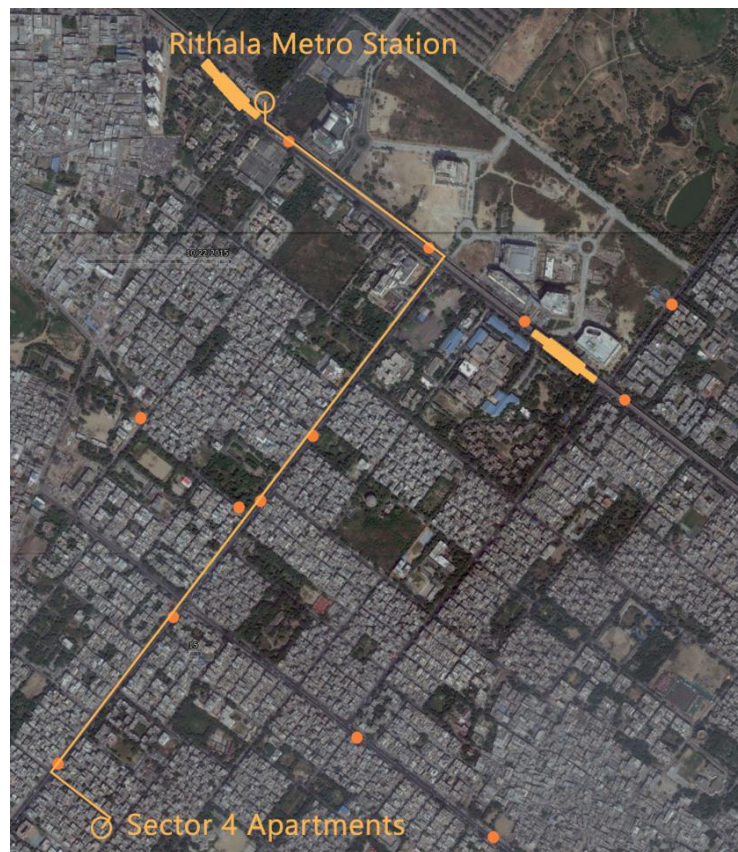


- | | | |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|  Metro Stations |  Commercial |  School & other Educational |
|  Bus Stops |  Institutional |  Religious |
|  Roads |  Recreational | |

Commuters

A newly employed engineer commutes to the employment hub in Delhi NCR, Noida. A resident of Sector – 4, the southern edge of Rohini, leaves her residence around half past eight every morning to catch the Metro. Her one-way trip generally stretches for one and a half hour, which the 25-year-old tries to reduce as much as possible. The employee has the Rohini West station nearer to her house but prefers to go to Rithala Station. Being the end point of the Red line, she banks on the better probability of finding a seat at Rithala Station. Also the modes available on the connecting

Figure 31: Movement for a commuter



sector road are more than the road to Rohini West Station. There is a bus stop at about 100m from her house, but the route makes for Rohini West Station. The bus route for Rithala Station is suitable after walking for a km, which the commuter does not want to rely on. Walking and then waiting for the bus forces time as a constraint. Also, that bus originates from the Rithala village and has crowd dissociated from the mental urban image. The commuter finds the idea of bus as

access to the metro station discomforting. She chooses to hire a cycle-rickshaw for a fare of INR 30. An e-rickshaw is the next mode of preference for this 2.5 km trip, but subjects to availability of a seat. To be safe with the constraint of time, the commuter depends on cycle rickshaw. Auto-rickshaw becomes the third mode of preference for faster speed and same fare as cycle rickshaw. On her way back in the evening, she alights off at Rohini West Station and take a cycle rickshaw. She

mentions of a pooling system in the auto-rickshaw, which is a private paratransit mode. People going in the same direction, unfamiliar to each other, tend to interact at the metro station. Two in number or three sometimes, they hire the auto-rickshaw together for the further or furthest destination and split the fare. The dispersal after metro then costs one-third (INR 10) the regular amount, but for a faster and weather-shielded mode.

College Students

A college student studying at an engineering institute located at the periphery of Rohini is interviewed for this user group. Standing with two other friends at the District Centre, he describes his satisfaction with the location of his college. They all seem pleased at the fact that Rohini is very well connected with their homes via public transport. There are many functions in the neighbourhood, which support their university life. The student reveals he primarily rides a motorcycle to college and sometimes uses the Metro. However, he does not use the same mode to roam locally in Rohini, due to parking issues.

Figure 32: Movements for college students



The groups of friends usually take an e-rickshaw or a cycle rickshaw to reach their places of interest. For instance, they go to Sector – 8 DDA Market for lunch about four days a week. They do not prefer to walk this distance of 1.2 km as the e-rickshaws are easily available and charge a minimal fare of INR 10 per person. Walking, instead is troublesome and unsafe according to them, considering the heavy traffic on the arterial road. They complain the Gramin Sewa minivan drivers drive rashly and

are quite dangerous. However, they add that they would not mind walking if there were pedestrian paths without barriers and encroachments. The group spends time at the District Centre during long breaks between lectures and prefers rickshaws for the same reason. The Gramin Sewa and the bus service connects their college to the District Centre. On asking why they do not choose these modes for the trip, the college students speak of the overcrowding and associated inconvenience even for this short trip.

Local Workers

It is often complex to synthesize workforce in Delhi into one vertical as the income gaps are wide. Rohini has abundance of economic functions due to dedicated land uses involving workforce. The villages add another dimension to the labour mix. The district centre, commercial and institutional functions indicate presence of upper tier workers. In other words, the 'white collar' jobs are present in the study area consisting of jobs in health care, hospitality, education and administration. The next tier includes local shop owners and traders. The characteristic of their work ranges within artisanship and retail. Informal jobs form the last tier of workers in Rohini. These workers are scattered across the study area, also in residential areas. Their numbers might be highest for street vendors or semi-skilled labour in the first look. The cycle rickshaw pullers and e-rickshaw drivers fall under this category, but they have been considered for low-income group as their movements are more relevant there. Other jobs from the unorganised sector exist as help in shops and support staff at institutions such as security guards, gatekeeper, janitors, etc.

Figure 33: Movements for local workers



For the purpose of describing movements for the local worker user group, three distinctive observations are compiled. The first one belongs to a doctor, as he parks his car in the parking area of Ambedkar Hospital. A middle-aged doctor of medicine responds on asking, that he lives in Rohini with his family. He owns two cars and lives less than two km away in Kadambari Apartments. He visits hospital for his shifts by car only and never thought of or needed an alternative mode for this trip. A security guard at one of the shopping malls in District Centre says that he commutes using his motorcycle to his residence in rural territory beyond Rohini. He adds that majority of tenants in the malls use two-wheelers to commute due to high parking charges for cars. A regular grocer in the DDA market of Sector – 9 describes he travels mostly by a scooter to his shop. Given direct bus connection to his residence in West Delhi from the District Centre, he avoids riding and avails the bus service during extreme weathers. He explains parking remains a problem for the market due to haphazard parking by the visitors and rickshaw drivers. The situation becomes worse during peak hours and school hours when the roads get congested and particularly noisy.

Business Travellers

The presence of Hotels in Rohini leads to investigate the movement patterns of the business travellers. The Crowne Plaza is a five-star hotel, opened in 2012, at the District Centre. The surroundings present a very unusual scenery, where a couple of upmarket cars are seen running to

Figure 34: Movements for the business travellers



the hotel porch and along the arterial façade, cycle rickshaws and auto rickshaws line up the service road. The gatekeepers at the hotel speak in response to this distinctiveness. The rickshaws gather near the hotel looking for passengers who are not hotel guests but shoppers in the mezzanine floor of the premises. As they refused to discuss the type of guests, they informally mentioned that most of the guests

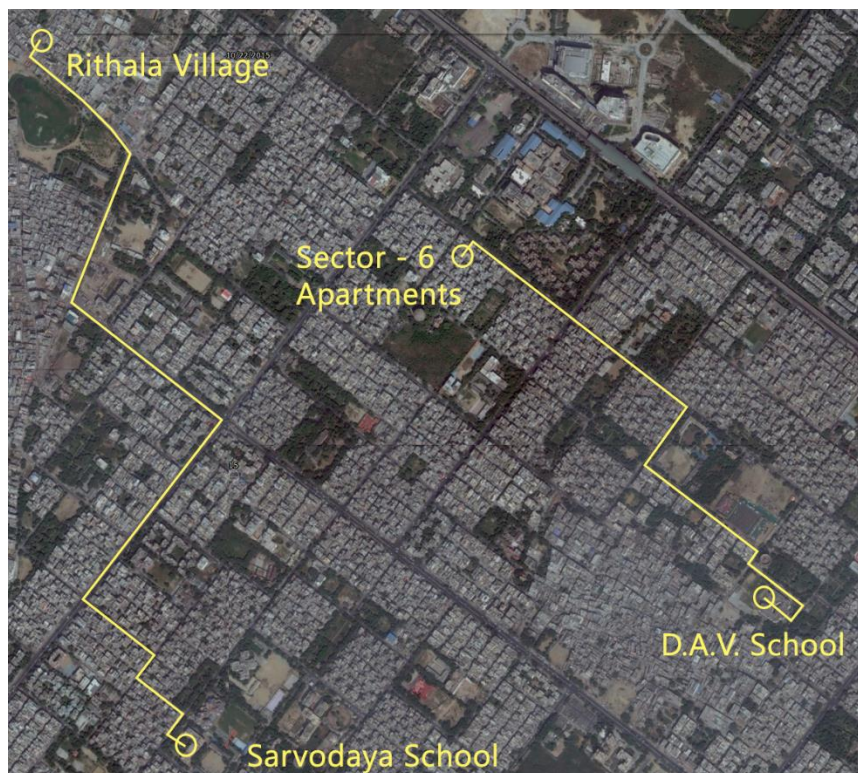
are corporate single travellers. They travel in company-hired cabs and are rarely seen exploring the surrounding territory. However, few decide to visit the adjoining amusement park and shopping centre. They use the cabs for this short trip as the distance is full of vacant lands, shrubs and dust. The District centre is not fully developed after 25 years of plotting and undergoes construction for a couple new buildings. The heavy vehicles in use therefore damage the inner roads and leave large potholes, which makes even the car-ride bumpy on this stretch. Any other vehicles or person is hardly seen on the road behind the hotel.

Children

Rohini is abundant with schools. The sectoral plan ensures at least two-three schools in each residential sector. The private schools are higher in number than the government schools. While, the income differences are stark, the students from both schools move distinctively. Sarvodaya schools are the local schools for each neighbourhood managed by the Delhi government. The Sarvodaya school in Sector -8 is located adjacent to one private school and another government school. The morning hour presents some homogenous movements to be described as children reach

schools scattered. Still, the movements can be divided into two categories. The first and the major includes walking and second drop-off on two-wheelers. The time when school is over, the movements become even more jumbled. As most school children walk, few are seen riding scooters, lesser on cycle rickshaw and least on e-rickshaw. A seventh grade student, resident of Rithala village, walks with three other students of similar age. They walk for about 500 m to the sector road and wait for a Gramin Sewa minivan. On asking about their trip, they reveal they like this ride home; firstly, because it is free and second, it is daring. Their meaning is quite understandable as it is common to see kids standing at the back of vehicle clinching an iron rail to avoid falling. All four of them do the same as an already full Gramin Sewa stops to alight one passenger.

Figure 35: Movements for children



To have better understanding of movements for children, an investigation on non-school movement indicates their pattern. Around five in the evening a twelve-year -old rides bicycle to a cricket academy located in D.A.V. School. The kid mentions he lives in Sector - 6 apartments and is usually driven by his mother or sister on a scooter. He is hardly allowed to use bicycle for this 1.5 km trip due to traffic safety reasons. He hires a cycle rickshaw for a fare of INR 20 if his family fails to drop off or pick him up from the academy.

Senior Citizens

The senior citizens are not easily visible in the first look during the visit to study area. However, a 68-year-old resident of Chetak Apartments, walks with her husband on the Sector - 8 road. She speaks how the couple, living with their lawyer son and his family of four, visit the Hanuman Temple every Tuesday⁷ without fail. They make sure to attend the special evening prayers on this dedicated of the week. Their household owns one car which is used by their son to commute. They prefer to hire a cycle rickshaw for this 1.6 km trip as they are able to find one outside their apartment gate in less than five minutes. For a fare of INR 30, it takes them about 15 minutes to reach the temple.

Figure 36: User route for senior citizen group



On asking, if they have ever tried to walk the distance, the husband replies instantaneously – “Are you crazy, I do not own health insurance and neither do we have a death wish.” They support their choice by pointing to a speeding motorcycle, that vehicles move in high speeds even on the inner roads. The road has bus route, so it especially makes them renounce walking for their trip. They add that the crossing near the metro station is dangerous as well. For their way back, they describe how Sector – 8 market is better than the one near their house. After the prayer they take some time in the market for weekly supplies. This time they hire whichever mode is available between auto rickshaw and cycle rickshaw, since a couple of auto rickshaws are always available at their dedicated

⁷ Tuesday is one of the busy religious days of the week. There is high activity at the temples.

stand in the market. In winters they prefer the auto-rickshaw, in the same sum of money⁸ or sometimes INR 40, to protect themselves from the lack of cover in a cycle-rickshaw ride. The couple had never considered choosing bus to complete their trip.

Low-income Group

The rickshaw operators form a significant number of population belonging to lower income group. There are endless rows of cycle rickshaws, e-rickshaws and auto-rickshaws waiting to find passengers along the arterial road. Their number follow the descending order for the three modes. A cycle rickshaw, especially can be seen waiting anywhere, near markets, schools, offices or at residential streets. It is generally understood by a resident of Delhi that most of informal workers working in certain area, live in the same locality, if there is an informal settlement nearby. As mentioned earlier, such settlements comprise of unauthorised colonies, slums and villages. Most of the rickshaw drivers in Rohini are residents as well. This applies to most of the informal workers. The duality comes from the presence of villages in the study area.

The interviewed e-rickshaw driver confirms the notion by saying that he lives in Rithala village. He came to Delhi six years back from the neighbouring state of Uttar Pradesh and is 23 years old. He started pulling a cycle rickshaw and shifted to e-rickshaw in three years. He starts the day at seven in all seasons by reaching the Rohini West Metro Station. At the station, he fixes spot in the queue of rickshaw drivers already in wait of passengers, with their vehicles facing opposite the station exit. Some rickshaws start bringing the office commuters to the metro station at nine and wait for their turn to disperse passengers coming to Rohini by Metro. The earning hours start at 10, as per the driver, and go on until noon. The next similar shift begins at five until the evening. The trips made during these periods are short and of about two-three km each. The fare is sometimes elevated to INR 15 per person per trip in this period. According to him, each trip carries up to four passengers, but on observing, most rickshaws can be easily seen carrying six passengers at a time. He covers most of Rohini in one day making short trips. Long trips are not frequent and are made when hired by an individual for appropriate sum of INR 70-100.

In his entire day, the most challenging bit is of parking. The conflict is faced primarily with parked cars, other rickshaws and then the gatekeepers of housing societies. While parking consumes a large amount of energy during working hours, it consumes money during non-working

⁸ Auto rickshaw fare is at INR 25 for the first two km and then INR 8 for every next km

hours. To park the vehicle during night, drivers pay INR 100 per day in a makeshift parking lot in the village. The lot where he parks his vehicle has a capacity of seven to eight e-rickshaws. The driver earns about INR 600-700 in a day, of which only 250-300 remains as gain. The need to pay such heavy sum in parking is safety. It is very common to steal the battery or the vehicle itself if not parked in such lot, says the driver whose vehicle was stolen a year back. Most drivers belong to age group 25-30 years, the youngest are 17 years in age and oldest 60 years. The driver speaks of satisfaction from e-rickshaw service as occupation. However, he points out the need of support from the government in terms of parking (on-street and dedicated) after it recognised the vehicle recently.

Another significant movement belonging to the lower income group is of a 37-year-old woman. She works as domestic help in Rohini and lives in Naharpur village. An average household in Delhi is highly probable to hire domestic help mainly for cleaning. One domestic help covers about ten to fifteen households in a day. The woman interviewed works for 11 households located in the nearby sectors. She starts the day at eight and mostly walks to the houses, covering those near the village first. After she finishes the furthest household, she walks the distance partially and then take the Gramin Sewa to her own house in the village. She adds that the bus network in Rohini is not good and her fellow maids face the same lack of cheap transportation. Cycle rickshaw is private mode and she would have to pay INR 30 for the trip back, which is not affordable for her family of seven. Gramin Sewa helps partly and walking remains the only mode for her tiresome job. She exclaims the summers are harshest, when dehydration and heat stroke are a routine for her. Her story is similar to many other informal workers, for who finding work near their dwelling is crucial. If the work is located far, sustenance is unfeasible in any aspect. Even though it is located nearby, the hassle of moving is not less and the claims of recognition often go unnoticed.

Figure 37: Movements for people from low-income group



Families

Families get very less time to spend together in an urban setting. They move locally together for very few reasons. The reasons are mainly for visiting relatives or friends, shopping and recreation. Basing on the same idea, the investigation is undertaken at a central DDA market, known as DC Chowk Market, during a

Figure 38: Movements for families



weekend. A family of four strolls in the market casually. On approaching, the mother responds they came to the market to shop some daily supplies but are thinking to dine at a restaurant they like. The family lives in Anubhav Apartments, some 900m away from the market, and made the trip by a car. On being asked why did they not choose to walk, the mother answered, they are coming from the DDA Sports Complex. The complex is within a walkable distance

of 1.5 km. The family spends a couple of hours every Saturday afternoon at the complex, either swimming or playing different sports. They rarely walk together locally and travel mostly by car. The reasons include broken or no footpaths, speedy vehicles, dust and pollution leading to poor walkability. The issues observed by them during their whole movement includes finding parking space, unsafe driving of Gramin Sewa vehicles, haphazard on-street parking resulting in congestion and delays. Another family of four with young children is seen alighting from an auto-rickshaw in the market.

Mode choice result based on observations

The choice of mode revealed by interviewed users are representative of the demographic group. It provides an ethnographic insight against the quality of movement.

Table 7: Behavioural choice of mode for local trips by user group

S. No.	User Group	Primary Mode Choice		
		Primary	Secondary	Tertiary
1.	Commuters	Cycle rickshaw	e-rickshaw	Auto rickshaw
2.	College students	e-rickshaw	Cycle rickshaw	Gramin Sewa

3.	Local workers	Two-wheelers	Car	Bus
4.	Business Travellers	Car		
5.	Children	Cycle rickshaw	Two-wheelers	Cycle rickshaw
6.	Senior Citizens	Auto-rickshaw	Cycle rickshaw	e-rickshaw
7.	Low-income group	Walk	Gramin Sewa	e-rickshaw
8.	Families	Car	Walk	Auto rickshaw

The observations taken above confirm the plurality associated with user mobility. The availability of a number of paratransit modes enable and support this plural demand. The dominant choice of modes points to the fact that walkability remains an issue of high severity. Lack of walking infrastructure, untameable traffic, disorganised spaces result in an environment unfit for walking. Although, walking constitutes about 35% share of total trips made in the city (RITES, 2010). The inability of the environment to encourage walking allows intensive use of paratransit for local mobility. A cost-effective and easily available solution captures the trips that would have been otherwise made with bus or walking. The shift is dangerous in well-off neighbourhoods, where the lack of walkability encourages use of private transport modes. The low-income and poor neighbourhoods, however, highly depend on walking primarily for their trips (Centre for Science and Environment, 2009). The situation, therefore, calls for redressal on multiple agendas through consolidated actions.

The local paratransit story

Paratransit is a service that usually exists from years, especially in developing countries. Still, it is not considered fit for a mainstream urban public transport system (Gauthier & Weinstock, 2010). It has a number of issues, discussed above briefly, but then why does it continue to exist and remain popular with the users? Putting aside the socio-economic subtleties of the city, the literature suggests that captive users are, in fact, satisfied by the frequency, regularity, service hours and overall comfort associated with easy access (Ferro, 2015). Public transport systems generally rely on subsidies or grants as they require quite some capital and fare box revenue does not suffice (Singh & Sharma, 2012). It reduces possibilities to improve system capacity or frequency. Operating hours and routes remain under a single directional control.

Paratransit on the other hand has flexibility over many operational aspects. In Rohini, there are modes which provide door-to-door services and the remaining operate on routes more or less fixed. Bigger modes tend more to operate on routes as they are unable to traverse narrow by-lanes to provide door-to-door services. Also, the higher number of

passengers would make it unfeasible to drop each one at a doorstep in a number of ways. Smaller modes like the cycle rickshaw overcome the aspect due to its size and non-sharing nature of ride. Cervero (2000) defines classes of paratransit based on the size and speed of the mode. The faster or bigger the mode, the higher the class it has by ranking. It is interesting that most of the paratransit functions as alternative to mass transit but is composed more of small-passenger carrying vehicles in Rohini creating a spectrum of modes with highly varying characteristics. The classes help the spectrum align to certain extent in order to understand their operation in a local setting.

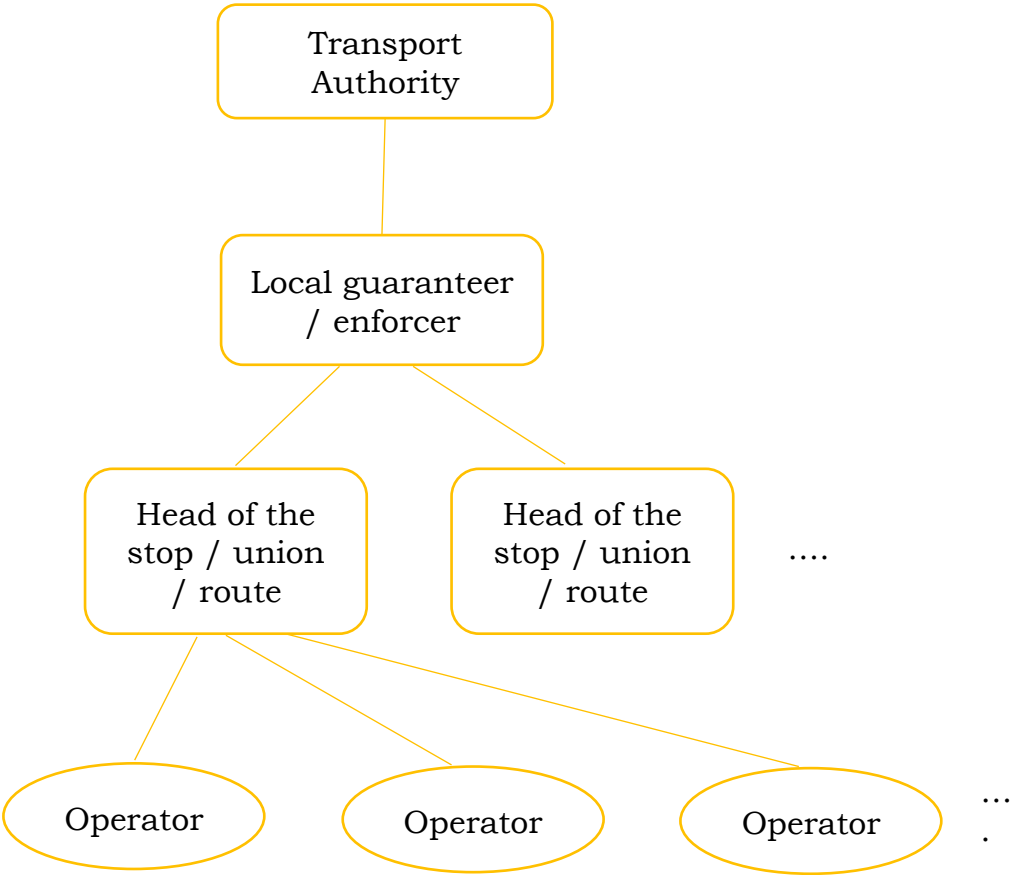
Table 8: Classification of paratransit modes in Rohini

Class	Mode	Routes	Schedule	Capacity	Service type	Coverage
I	Bus	Fixed	fixed	56-80	Line-haul	City
II	Gramin Sewa/ Minivan	Fixed	Semi-fixed	6-10	Line-haul / Mixed	Zone / district
III	Auto rickshaw	variable	variable	3-5	Mixed / feeder	City / zone
IV	eRickshaw	Semi-fixed	Semi-fixed	4-6	Mixed / feeder	Neighbourhood
V	Cycle rickshaw	variable	variable	2-4	Feeder	Neighbourhood

Organisation structure

The analysis of organisation of paratransit modes in a local setting is summarised in this section. Each mode has a set of distinct characteristics but shares the conduct of operations and networking with one another. The level of institutional arrangement regarding a mode varies as well. Few modes are more penetrated with organised provisions and certain, not at all like the cycle rickshaw. The chart presented below shows the hierarchy of actors involved in paratransit services. However, the relationships and networks are more horizontal than vertical in daily conduct. The hierarchy mostly appears at the time of initiation of operations or in any conflict.

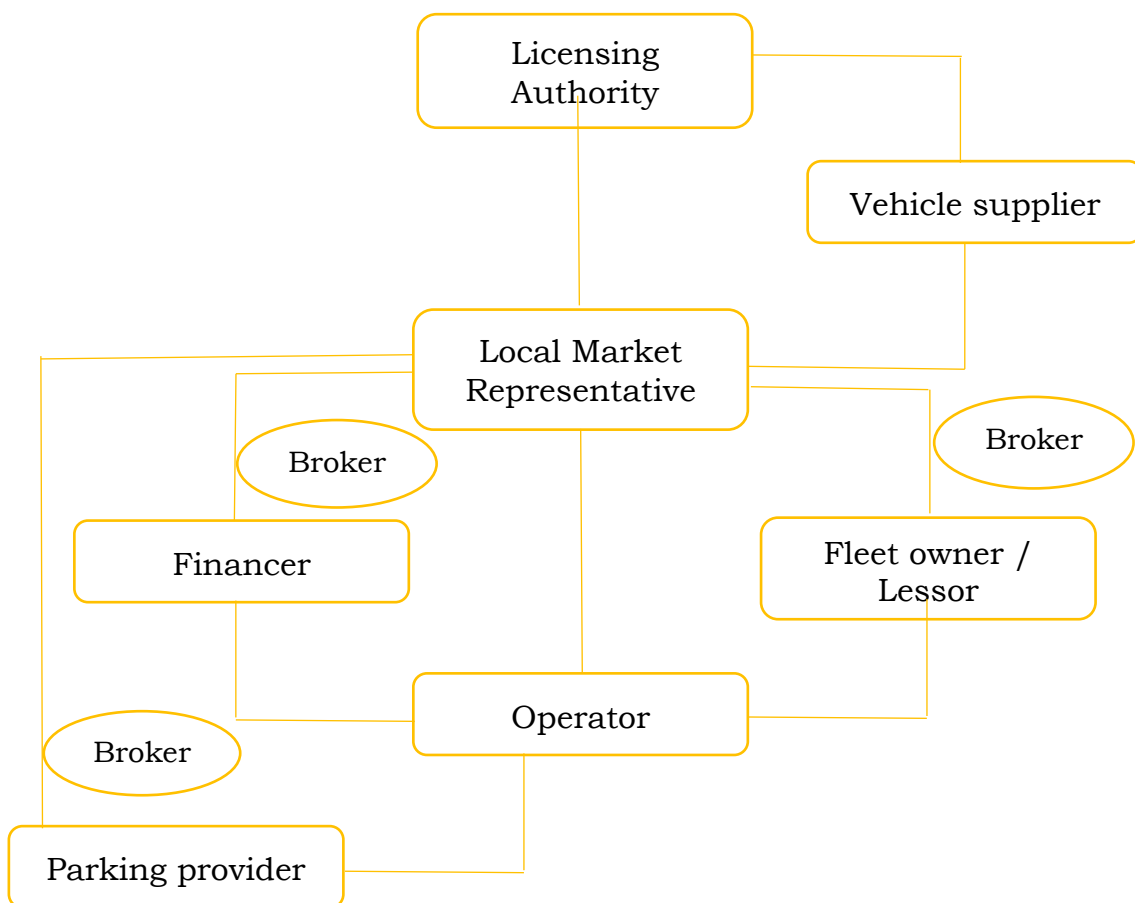
Figure 39: Hierarchy of actors involved in informal transport operations



Operation structure

The chart describes how the conduct of paratransit modes is organised locally. The operations involve and initiate from a local transport authority regarding registrations or licensing wherever required. They are proceeded with the help of contacts with either brokers or family and friends already in business. The operator chooses to conduct service according to availability of resources and becomes associated with the same string of the informal sector. The class IV and V modes, e-rickshaw and cycle rickshaw, orient locally due to their neighbourhood scale of coverage. The two modes should find attention for the conclusion of this research.

Figure 40: Operational framework of paratransit modes in a local setting



5. Practices around the globe

The paratransit or intermediate public transport emerges as the accessible solution for mobility favoured by the masses. The modes of paratransit spread into a threefold virtue - socio-cultural, environmental and economic. The modes are prevalent in developing countries since before the introduction of private automobile ownership and are an integral part of culture now. The popularity comes with cheap fare, high availability, and the fact that a significant number of people are employed. The modes run on either cleaner or no fuels in comparison to conventional urban transport modes. There is no doubt, their existence has been considered as a nuisance, complex and has remained devoid of formal integration into the urban transport system. Academics and relevant institutions agree to redressal on issues of accessibility, safety, inclusivity and efficiency of integration with formal public transport. However, there is more to paratransit than what appears on the surface.

Despite the many flaws, informal transport continues to operate on the city roads and provide mobility to people. It impacts the users, the operators and the whole city in long run. The diversity of the modes affects each group differently, sometimes even adversely. Various parameters work together to impart certain value to the paratransit ride. Depending on the perceived convenience, safety, quality and trust, the value is constituted (Sumaedi, et al., 2014), which satisfies the people in case. The greater the perceived value is, the greater is the reliance, and dependence, on that mobility practice. Several cases from across the world confirm the same, where the value attached to the informal modes is indigenous. Because of that value, it is only possible to reorganise the mode practice rather than abolishing it. These values are different for different places and often receive a place-based attention. Any intervention then intends to add more meaning to the mobility practice and elevate the attached value. The following practice demonstrates the attempt to positively exploit the potential of locally significant paratransit and provide seamless mobility to the citizens.

Fazilka Ecocabs

A transport engineer by qualification, Navdeep Asija, founded Ecocabs, a dial-a-cycle rickshaw service, in 2008. It is conceptualised and managed by the Graduate's Welfare Association, Fazilka. The entrepreneurial initiative improves mobility in multiple aspects in the city of Fazilka. It operates in favour of the stakeholders, such as users, drivers (traction men), and society, while reducing carbon emissions. The initiative has been awarded by many national institutions, like the Ministry of Urban

Development in 2011, for excellence and many other institutions worldwide, such as University of Michigan SMART initiative in 2012, for being the first of its kind and delivering fruitful results. The results have a strong impact on intra-city mobility and are being acknowledged well to be implemented in other cities by different institutions.

Fazilka is a small town in the Indian state of Punjab (Census, 2011). It is located near the Indo-Pakistani border, which is 11 kms away westwards. Now reinstated as a regional district centre, Fazilka was established during 1840's by a British officer as his residence. Located near the river Sutlej, the fertile plains offer cotton and rice growing lands. It grew to be a bustling market and later, a trade centre for natural produce due to the strategic location. The town was the biggest wool market of undivided Punjab before the two countries' partition. The town received a railway line in 1898 as it flourished to be a commercial hub. However, the growth could not follow due to 100% damage caused by a flood in 1908 and the independence wars during late 1940's (Government of Punjab, 2016).

The city today has a population of under 100,000. Extra-city connectivity is looked after by the rail connection at Fazilka Railway Station and the National Highway 10. Fazilka has 20,000 registered motor vehicles, majorly two-wheelers. It is estimated the residents take about 80,000 trips daily, where average trip length is under three km (IMaCS, 2015). There is no city bus transport service and cycle rickshaw constitutes 16% of the total trips. The statistics favour the cycle rickshaw to operate on a neighbourhood or even district level. It becomes a relatively more available means of transport for the residents of Fazilka.

The vision statement for the project goes as –

“to organize and improve scientifically, the existing or new cycle rickshaw operation by bridging the gap between demand and supply using modern management tools and real time technologies for its promotion as sustainable paratransit mode of public transportation as an alternative to car-centric development and its linkage as a feeder unit to any mass rapid transit, for the benefit of traction men, society-environment and cycle rickshaw at large to achieve the overall agenda of low carbon mobility and sustainability” (Asija, Fazilka Ecocabs: First “Dial-a-Rickshaw” facility (India), 2012)

The Ecocab venture began with partial funding from state loan and remaining from crowdsourced funds. Asija (2010) notes, the attention to cycle rickshaw comes from the fact that all modes of transportation have been improved following the industrialisation and development post-independence. The rickshaw has remained unnoticed and lacked any form of intervention. It is the quickest way of finding a job through

unskilled self-employment. The vehicle does not require any strong mechanical technique to work, so is easily manufactured in the city or a nearby hub. The first part of needed infrastructure is therefore not tricky and does not need intervention to begin with. The second part of infrastructure requirement is denoted by telephone or mobile phone. The concept targets phase-wise attention to issues surrounding rickshaw operation in the city.

The phase I of Ecocab project focused on accessibility by bringing the vehicle to the doorstep. Usually, cycle rickshaws are found on a busy street or spot, since residential areas have narrow by-lanes and less lucrative for the pullers. One should come out of their residential neighbourhood to the nearest market or a busy street in order to hire one. It may so happen that cycle rickshaw is not available and the person has to spend considerable time to look for it. The weather adds to the nuisance, especially summers, where temperature rises to 48 degrees Celsius along with dry winds. The issue is heftier for the elderly, women and person travelling with children. Recognising so, the initiative divides the city into nine zones and five call centres are established, while each serve about 1500 households (Asija, 2010). It takes a maximum of 10 minutes by a cycle rickshaw to reach pick-up point after a phone call has requested one. It helps cut down the time to access the mode, uncertainty of its availability and negotiation for fare, completely in the favour of user.

Figure 41: Zones of operation for Fazilka Ecocabs as shown in an advertisement flyer

डाज़िलका रिक़्शा जुनिअन (रज़िः), डाज़िलका
 Under Aegis of : **GRADUATES WELFARE ASSOCIATION FAZILKA** **ECOCABS**

Map showing zones: ZONE 100, ZONE 200, ZONE 300, ZONE 400, ZONE 500, ZONE 600, ZONE 700, ZONE 800, ZONE 900.

फ़ाज़िलका उदाए-पश्चिम	ज़ोन 100	डा. विजय स्वामी चौक / शास्त्री चौक
फ़ाज़िलका उदाए	ज़ोन 200	सूचना बस अड्डा
फ़ाज़िलका उदाए-पूर्व	ज़ोन 300	मल्लोट चौक
फ़ाज़िलका पश्चिम	ज़ोन 400	बाग बाजार
फ़ाज़िलका मध्य	ज़ोन 500	गाडवाल रोड
फ़ाज़िलका पूर्व	ज़ोन 600	संजीव सिनेमा चौक
फ़ाज़िलका दक्षिण-पश्चिम	ज़ोन 700	जुलतानी बुगी (इनुमान मॉडिरे)
फ़ाज़िलका दक्षिण	ज़ोन 800	महाराज अग्रसेन चौक
फ़ाज़िलका दक्षिण-पूर्व	ज़ोन 900	मिन्नी सैन्ट्रल

Download the **Fazilka Ecocabs** Android App

Android Phone **उपलब्ध** Android Market है
 Fazilka Ecocabs Application Download **सं** सकते हैं।
www.ecocabs.org
9530998-Zone Code

Dial-A-Rickshaw* सेवा के लिए फ़ाज़िलका को 9 ज़ोनों में विभाजित किया गया है। अपने ज़ोन में रिक्शा बुलवाने के लिए मोबाइल नंबर 9530998-XXX में आठिसे तीन अंकों की जगह उपर दिखाए गए नम्बर व दिए गए विभाजन के अनुसार ज़ोन कोड बना कर 10 अंकों का मोबाइल नम्बर डायल करें। 10 से 16 सिन्ट की दूरतार में आपके बताए हुए पते पर रिक्शा आपके पास पहुंच जाएगी। अनुश्रुति ना हो इस लिए क्विबा फ़ोन पर ही निर्धारित कर लें। जो रिक्शा चालक आपको लेने आ रहा है, उसके बारे में पूरी जानकारी आप वेबसाईट: www.ecocabs.org पर Ecocab Registration Number (जोकि 3 अंकों का है) डाल कर चेक कर सकते हैं।
 सुचारु व निरंतर के लिए SMS करें 9530998999 | Timing: 9-00 am to 6-00 pm *फ़ोन व कॉल चार्ज *हमारे कॉलसेवा द्वारा प्रेषित किए जाने वाले संदेशों के लिए व चार्ज से अनुमत

The second phase considered quality of the vehicle and service. The speed and size of cycle rickshaw puts it in a compromised position amidst the road traffic. It is pulled by the human strength in contrast with power of an engine. It demands to conform the design to utmost safety and comfort for both the users and traction men. Both the phases have been completed and operations are under expansion with local partners, involving relevant training and financing (Institute of Urban Transport, 2013).

Figure 42: The upgraded cycle rickshaw model Nano by Fazilka Ecocabs



Ecocabs is an organised venture and is very different from how rickshaws are operated traditionally. It becomes quite challenging to attract traction men under the umbrella of organisation, where the practice of operating independently has been existing from over a century. To make this decision easier, Ecocabs attempts to secure income and provide several welfare measures such as:

1. Digital identity card
2. Free winter wear and woollens.
3. Free of cost accidental insurance cover for INR 50,000.
4. Free medical consultation by 10 leading private hospitals and doctors with different areas of specialty, medicines by authorised medical stores and free required laboratory tests.
5. Free legal aid by leading lawyers.
6. Permanent distribution of mobile handsets at subsidised rates to the rickshaw operators.
7. Annual family trips for traction men with their families.
8. Ecocab parking stands approved by the Municipal Council Fazilka in all the operating zones.
9. Computer education for interested traction men at the two computer centres in Fazilka.

10. Eased financing options to own a cycle rickshaw through local NGO partners.

The facilities equate to some of the basic services needed by a city worker or inhabitant. These facilities have been able to attract and employ more than 500 traction men within Fazilka city limits. Following the success, the project has been implemented further in 22 cities of Punjab and Haryana, including the Union Territory, Chandigarh. Punjab Heritage and Tourism Board and District Administration Amritsar have implemented Ecocabs in the city of Amritsar and subsequently in Patiala with help of Patiala Foundation under the name “green cabs” (Institute of Urban Transport, 2013).

Figure 43: Places which received replication of Ecocabs model across the state of Punjab



The project has resulted in six million daily passenger trips in Punjab and 10,000 in Fazilka. Road fatalities related to cycle rickshaw have dropped down to zero in Fazilka and have been reduced to two in the state of Punjab for the year 2010 (Asija, 2012). Moreover, Ecocabs contribute significantly towards environment. On an average, one Ecocab saves about three litres of fuel per day which would have been consumed by a two-wheeler otherwise. In Fazilka about 1500 litres, while in the states of Haryana and Punjab, a total of 900,000 litres of fuel has been saved. The multi-faceted benefits have encouraged the government to consider policy related interventions (ibid.).

Intangibility returns opportunity

The cycle rickshaws across India employ very poor men with only a skill of pedalling. They are barely capable of securing basic physiological needs of food, water and shelter off their livelihood. In that scenario, the incentives and welfare facilities offered by the Ecocab venture do not remain trivial at all. Parking stands, insurance, medical & legal support, education and help with finances constitute to take away much helplessness from this segment of population. It is revealed by the Asija

(2012) that mere one to two calls per day increase the income of a traction men by 25-30%. The service reduces the number of empty trips as the traction men mobilise only after a pick-up has been requested. They stay at a dedicated spot, like parking stands or their house, with their vehicles and only moving on the streets after a pick-up has been requested. This reduces traffic burden on the road and saves traction men from a lot of possible conflict.

On a general note, people use cycle rickshaw as it is faster than walking. As a result, people are not in the habit of walking past a certain length of trip. A cycle rickshaw tends to save users time and effort in exchange of a very cheap price. On daily accumulation, the saving is considerable. With Ecocabs, the traction men save a lot of time and effort in return as well. Instead of roaming on streets looking for a passenger, they can use the time and energy saved for something productive. This gain is the opportunity cost that the pullers directly pay while losing valuable time and energy. Perhaps, the weak situation of this population segment is the result of opportunities lost while labouring inefficiently for years now. The fact that Ecocabs is able to return this opportunity back to them, it seems possible to empower and strengthen the socio-economic scenario of the city in longer run. The initiative then intangibly benefits the traction men and their family to improve their living standards and afford a better-quality life.

Figure 44: Dedicated Ecocabs stand provided by the municipal council of Fazilka



Two-way relationship

The positive environment created by Ecocabs has motivated rickshaw owners and operators to consider being part of organised paratransit system. Operating on a stand-alone basis assures freedom to traction men to seek passengers on a choice of route. However, it involves greater risk, inefficiency and conflicts, mostly to find space, in daily conduct. The poor and illiterate traction men with only the skill of pedalling are

incapable of understanding the same. They have been less willing to be a part of any organisation anywhere in India. The hesitation is very visible in Delhi where the sheer numbers only associate with the informal unions locally. Most of them are indifferent of NGO's and the actions taken by them.

With Ecocabs, the traction men have begun to understand the increased financial security, reliability, reduced conflicts and hassles in operation of the vehicle under an organisation. The incentives mentioned above helped them become part of the organisation, but the operational benefits observed later enabled them to stay and even increase in number. The citizens and users have also shown elevated levels of comfort, sense of safety and trust after reorganising of the cycle rickshaw around them. It is partly because of presence of an entity that can be held accountable. The incentives including medical and legal aids offered to traction men and their families, are in fact a deliberated action of the community in favour of the move. The parking stands denote somewhat recognition by the local government. The project demonstrates coming together of the government, community in general and the marginalised segment of population.

Leveraging technology

Infusion of technology in a traditional practice is the centre-point in this case. Till date, there is substantial advocacy for use of technology in daily operations ranging from shopping to governance. Cities around the world are rigorously trying to evolve by intelligently incorporating technology to different paradigms. Technology is used not only to answer complex problems of the urban realm, but also to restructure relationships and interactions among the members of it. Such use is more pronounced in the cities of developed nations. Nevertheless, Asija (2012) points to the notion that mobile phone infrastructure is more penetrated and abundant in comparison to the transport infrastructure per capita in developing Asian cities. The ratio of mobile phones per 100 persons to automobile per 100 ranges from a considerable four to a surprising 200 times in Asian cities (Asija, 2012). Therefore, it makes sense to leverage technology and put reliance on such infrastructure. In this way, Ecocabs have restructured community relationships and interactions with the informal mode using technology at its core.

More than a ride

Ecocabs initiative recognises that cycle rickshaw is not about conflict and compromise as it has appeared to be for more than a century. A little attention to the ignored and taken granted means of transport has in fact, resulted in a paradigm shift. Cycle rickshaws operate out of the

institutional radius, but have managed to find place in the socio-economic layers of the cities. The society has been familiar well with the service and is offered with certain level of comfort that is beyond mobility. Cycle rickshaw supports daily life, for instance by helping to carry bottled water, luggage, porting belongings while moving houses, operating as school bus for children and often transporting commercial goods. In this sense, the mode has more value in addition to that of just ferrying passengers, which is significant for an informal transport mode. It imparts direct benefits to the community comprising of pullers and users, since there are no in-between processes and transactions.

The society sees the mode in a very individual light, which is often contradictory. While the society claims the need and seamlessly takes benefit of the service, it disclaims any responsibility towards the mode. The inherent value attached to cycle rickshaw goes unnoticed. It is the main reason behind conflict on the roads, where the mode is denied space and expelled by the more competent vehicles. The non-acceptance appears to demonstrate hypocrisy of the society, making recognition more distant. Reorganisation of the familiar service via Ecocabs has helped to an extent in cutting this distance. It offers more than livelihood to the traditional transport service operators by providing them the missing security, space and recognition. It equips them with opportunities to build capacity and contribute to the community through constructive gestures, such as community policing. It allows them to gain dignity and a place as product of their diligent work over the years. A dedicated place in the hierarchies of urban arrangement signifies added value. The value, enhanced by restructuring of the service, then becomes more visible to the people who have failed to notice it so far. Not only it shows acceptance, a rather ethical response, but also assurance that the mode is and will remain a part of the community.

The institutional dimension

The operation of cycle rickshaws in the state of Punjab is governed by Punjab Cycle Rickshaw Act, 1976. It specifies guidelines and regulates the conduct of paratransit service. The Act recognises the mode and attempts to distribute socio-economic rights corresponding to the service. However, its existence is challenged by the fact there is no clear specification on a variety of problems that are faced in conduct. The Act only mentions the basic matter on licensing, ownership and operation. It fails to define issues such as the role, responsibilities, resources, extent of intervention, facilitation and monitoring for governing institutions and associated actors. However, the norms have become obsolete in practice. The informal arrangements, market and interactions have evolved to an extent much further from the scope of specified provisions. Incomplete or

no regulations have resulted in zero compliance to even licensing norms at ground situation. The founders of Ecocabs stress on the same fact and have proposed amendments in the existing Act. They attempt to encourage a closer adherence of formal provisions to the informal practices. The following table presents the existing mismatch and proposed amendments are:

Table 9: Obsolete legislations, situation at ground and proposed amendments

The Punjab Cycle Rickshaw Act, 1976	Situation at ground	Proposed amendments
Upper age limit for traction man is 45 years	Traction men of age 70 years operate cycle rickshaw	No upper age limit, physical fitness of the traction man shall determine
Licensing System	Most of the vehicles ply without any license but only an informal registration with the local cycle rickshaw union	One-time registration instead of licensing, fee can be deposited on yearly basis
Renting of rickshaw is not allowed	Majority of traction men rent the vehicles or loan on heavy interests from middle men	Renting is allowed with upper limit ceiling for fleets. This will encourage investments in this sector
Outdoor publicity banned	Substantial number of rickshaws currently have local advertisements	Five sq ft of area is permitted to generate additional revenue for the traction man
Enforcement, Confiscation/heavy fines	Cycle rickshaws form integral part of local mobility but are compromised when in conflict	Ecocab management committees to implement enforcement mechanism
Complicated registration procedure	Illiterate and poor traction men are exploited by brokers	Single door clearance system / outsourcing

Ecocabs initiative has not only supplemented transport demand and financial status of traction men in a sustainable manner, but has shown an efficient reality that can be worked out in favour of society, mobility and sustained future. It unlocks behaviour potential in paratransit movement. It recognises the plurality associated with mobility and attempts to recreate opportunities for the marginalised segment of population. The model has worked well for the small Indian city with lesser vehicle ownership and complexity on the roads. This highlights the

issue of local appetite for reorganisation of cycle rickshaws. Ecocabs demonstrate that close conformity to the local dynamics is crucial due to informal nature of the mode. Smaller scale of application has better chances of regulated conduct and institutional mobilisation. The initiative has also managed to bring forth the incapacity of existing norms to keep up with and regulate the situation of rickshaws plying on the roads. It has been successful to make the government intervene as enabler and society as collaborator for the compromised mode.

Bogota

Bogota is the Colombian capital city, administrative, commercial and political centre of the entire country. It is the third largest city in Latin America with a population estimated to 8.7 million inhabitants and the prime urban centre since the second largest city has barely the third part of its population (Kraul, 2015). The GDP of Bogota corresponds to 25% of the total Colombian GDP. It is also a hub of education as the most important universities and centres of academic and scientific research are in Bogota. The data sums up the importance of the city at national level in terms of economic activities, employment and education. Such setup has attracted a massive immigration of people from all regions in the country, looking for better social and economic circumstances. The rapid increase in population during last twenty years has been challenging for Bogota. It has generated an extensive demand of public services, the transportation system in particular.

Provision of public services is essentially the primary role of local government as a representative of the people. The chosen government in the past decade inclined towards social agendas and gave rather lower preference to infrastructure needs of the city. This had kept the city of Bogota from receiving any solution for the pressing issues of public transportation system. The inaction affected mobility in several ways, for which the citizens had to bear the most of brunt. The public transport system was unorganised, slow, unsafe, inconvenient and over all chaotic. This paratransit system in Bogota is traditionally constituted by contractual buses, owned and operated by private groups and individuals. Functioning as the sole 'public transport system', the service was devoid of any formal institutional intervention, except for issuance of permits by the local government. There was lack of safety, comfort, quality, environmental adherence and efficiency. The private bodies exploited their rights on determining fares and bus routes across the city and completely overlooked the responsibility of bus service.

To overcome these issues, the then mayor of Bogota, Enrique Penalosa, introduced and launched a Bus Rapid Transit (BRT) system in 2000. It

was hoped to deliver a sustainable transport policy to be coordinated with urban development. The project promised equal mobility rights, especially to the non-privileged, in an environment where human dignity is not compromised (Ardila-Gomez, 2004). Bogota is a city where the divide between rich and poor has been ingrained in the city's fabric, with many parts of the city suffering from economic and geographic isolation. Half of Bogotá, at 2,600m above sea level, has grown spontaneously and illegally, often on mountain slopes that are hard to reach. A stratification policy implemented in the 1980's classifies dwellings according to their environment, quality of the surrounding areas and the materials used for construction and finishing. On a scale of stratum one to six, 51.2% of Bogotá's population lives in stratum one and two (FENALCO, 2010). The move with BRT attempted to use transportation system and public space to bridge the social divide and create opportunity for all citizens.

Figure 45: Impoverished and far-located localities in Bogota



The system is operated by TransMilenio, covering 112.9 km today (three phases), making it the largest in the world (Cervero & Dai, 2014). It is admired internationally as a positive intervention in the fields of mobility, governance and urban development. It went on to become the backbone of public transport in Bogotá, but started to come up with multi-faceted issues during initial phases of the project only. A reformist project with social goals was noticeably being contrary to the intent of empowering the disadvantaged with equal mobility rights. The fares were highest among the public transport rates across Latin America. Operation route along the highly congested north-south axis of the city (Autopista Norte Road and Caracas Avenue) did not factor in the trouble of accessing the BRT from the dense and sloped outreaches. The decision to commence operations on the central roads did not have any public involvement. There is an extension towards the eastern Bogotá (Calle 80) which is one of the main entrances to the city with presence of high density housing, commercial and industrial activities. It results in congestion and delays

which further disturb the whole schedule and operation of the BRT. While the route suited the commuters to city centre and centrally located destinations, it missed to include the target group and consider mobility patterns of the city's population, resulting to some extent, in a disoriented policy.

Meanwhile, BRT was being operated as a non-rivalrous unique service in the principal corridors, the project had a direct repercussion on the informal bus system and the whole informal sector associated with it. The establishment policy did not allow participation of small scale bus owners, since a more sorted bid process, seeking technically and financially qualified investors to put in quality service, was conducted. The traditionally operating small scale bus owners were excluded from BRT corridors planned by Transmilenio. These high demand corridors contributed to the major share of earnings for the informal bus operators and their family. Moreover, the people living in Stratum one and two neighborhoods were hit hardest by a later rise in BRT fares (Bocarejo & Oviedo, 2012). High density residential neighbourhoods are located far-off from the stations, therefore, making a large number of BRT users walk long and uncomfortable distances to reach the station (Cervero, 2014). The fare of informal bus service taken to access BRT adds to the expenditure against public transportation. These conditions were deemed unfair to a substantial share of city's population and stirred the very foundation of mobility and mobility actors in Bogota.

Figure 46: Demonstration by Transmilenio users to reduce BRT fares



53% of the daily trips made in Bogota use public transport (Observatorio de Movilidad, 2010). Despite the 'success' of Transmilenio in during early phases, the paratransit buses constitute 50% of the trips made with public transport. The scale of conflict and lack of intervention initiated activism by multiple actors and bodies who are directly or indirectly affected by the changes in city mobility. Few groups are the league of Transmilenio users, Asociación de Pequeños Transportadores

(APETRANS, Spanish for Association of small transporters) and advocates in favour of informal labour and disadvantaged people. The consequence was informal bus strikes, hurling of Transmilenio service, extreme traffic jams, protests turning into violence, etc., paralyzing the city time to time.

A priority to formulation of Mobility Plan was presented in the city Master Plan, notified in 2003. It enlisted guidelines to sustainable and integrated mobility policy through attention on various aspects of mobility in Bogota. The ongoing mobility conflicts and the observed lack of coordination between Transmilenio and private operators compelled the authorities to come up with a solution, leading to creation of a new Integrated System of Public Transport (SITP, acronym for Sistema Integrado de Transporte Publico in Spanish). The core of Mobility Plan guidelines is contained in the SITP. It focuses on providing a much-needed institutional, operational and fare integration to organise mobility of the people in the city in an articulated manner. It proposes creation of a bus network to reach and benefit the population living in furthest and tricky outreaches of Bogota. Hierarchically-ranged buses, supported with intermodal, parking and toll infrastructure would ensure maximum coverage, accessibility, inclusivity and justified delivery of mobility services across the city (Roa, 2015). The implementation starts with division of administrative task and operational tasks. The responsibility to define policies, regulations, monitoring and control of the transport activities and the coordination of policy implementation goes to the Mobility Secretariat. The integration, evaluation and follow-up of the operation & management of the public transport system with due recognition to the existing bus system remains with Transmilenio. It is to be noted, the drafting of operational zones and routes, the first phase of the project, did not invite or involve public opinion, yet again.

Proposed to be coordinated with the BRT, SITP concludes the traditional bus service on implementation. The process started in June 2012, instead of 2009 as planned. Targeted size of bus fleet and driver crew was not achieved until 2015, when it was due in 2011. The delay was entirely a repercussion of displeasing the workers responsible for half of the public transport activities. SITP allowed some deadlines to make the retirement of paratransit buses effective. The time was to scrap the vehicles in operation and pay the corresponding sum of money to compensate the termination of activities. Naturally, a proposal threatening for loss of livelihood was not been well received by APETRANS. Their reaction took form of transit strikes in the recent years organized by people involved at all levels in the traditional transportation service. The last strike occurred on October 21st 2014 paralyzing a great percentage of people and city functions. It included not only the bus

owners, but their families as well as the people whose livelihood has been associated with this activity indirectly. On the other hand, the government failed in paying the promised compensation for scrapping of old buses. The compensation amounted close to USD two million.

As an outcome of the APETRANS conflict, the government took note of investing in soft skills of the paratransit bus drivers and conductors. It has started conducting programmes to provide education and training on the conduct of service. This is a noteworthy action as there have been no investments on capacity building of public workers by the government so far. The government attempted to reflect on the ongoing resistance through amendments in favour of society. These programmes are currently offered by the National Learning Service (SENA) in coordination with the national government and the local administration. It is necessary to emphasize that this kind of opportunities are not fully exploited by the members of the traditional service since their main concerns are to maintain livelihood. However, this is a surplus opportunity the population of Bogota has won through the conflict. It is also a slight recognition for the workforce associated with the informal transportation service.

Figure 47: SITP buses in Bogota, Colombia



Amidst the chaos, another practice took birth on the grounds of the city. A self-employed service called *Bicitaxi* comes as an intermediate solution for inter-modal travel. Cycle rickshaws are used to access public transport when the distance is beyond walkability. Using a bus service to

access another bus, especially Transmilenio corridors, turns out to be expensive for the economically weaker communities. People from the same community have seized business opportunity from the same issue. Bicitaxis came into operation shortly after the launch of Transmilenio. Their number has however swelled in the past decade, despite not being technically strong or safe mode. The situation is comparable to India as described in previous chapters. The government has denied any recognition to the mode. Grassroots organisations like *Bogotana de Tricimoviles* and National Federation of Bicitaxis strive to receive recognition by the Ministry of Transport considering the population connected with this mode. Unclear position of government on the status of bicitaxis had forced conflict between operators and local police. The mentioned organisations had reacted aggressively in form of organised demonstrations in the city centre. Their main claim has been the right to the make a livelihood from bicitaxis and recognition to operate alongside the integrated public transport system. Recently in 2016, the National Department of Planning, has approved the National Plan of Development, which shows a possibility to include bicitaxis in the SITP post their reorganisation. However, the stance remains unclear, leaving no direction for both reorganisation and operation of the mode.

Figure 48: The issue of Bicitaxis printed in a news article



Recognition of actors, their roles

The situation created by the resistance of APETRANS against implementation of Transmilenio BRT and SITP is noteworthy. In the whole process, local government had only considered to disseminate public information regarding the formulation and development of projects in case. The intent to do so was to prepare citizens for the upcoming service so that there are no conflicts in conduct of public transportation.

The BRT and Mobility Plan are much awaited urban mobility interventions in Bogota, since decades. However, both the policies show limitations from the early stages of planning. No actors were identified or involved in the process of policy-making.

Considering the intrinsically conflictual nature of planning activities, identification of actors and acknowledgment to their roles provide a window to the asymmetrical relationship of strengths between those actors and the government (Mazza, 2009). The failure to identify and reach out to the actors before implementation or formulation of policies cost the government significantly with cost and time overruns. Among public, there are always groups, who are in favour of the policy, those who are against, and the remaining are indifferent. Identification of actors and acknowledgement to their roles indirectly conveys the strength and weakness of policies in alignment with the weight of either group. It informs the policymakers of needed alterations to widen the scope of policy and increase its versatility. It allows them to assess further, if the impact of the decision is meaningful or for the public. In other words, it is precisely the effectiveness of a policy.

Collaborating the way to policy

There was no attempt to consider the actors falling in the policy sphere led a direct and negative impact on the mobility projects in Bogota. With the goal set in a perspective period, the policy found itself paralysed with the emergence of actors during the flow of implementation. It was after strong resistance by different groups, the government initiated dialogue with APETRANS members, the actor responsible for public transportation in city for years and the one affected directly. The actors not only made themselves visible through a conflict, but brought the city to dysfunction. The fact that conflict with APETRANS caused serious inconvenience to public and costly delays in the implementation of SITP, signals the need to reach out and find ways to create consensus with the actors. Imposition of policy without participation finds ways to displease at least one population group. The stance is rather irrational in a democratic setting, where it appears to be one-way or authoritarian. This is precisely what happened in the implementation case of Transmilenio and SITP, where the government made decisions behind closed doors.

Identification of actors, their roles and motivations allows the government to visualise probable impact on public. A good planning practice then leads to a dialogue with these actors, which creates the needed common platform beyond the government and public interface. The flow tends to bring the policy closer to the situation on ground. Lack of the same in their planning approach, has put the authorities under financial, legal

and administrative pressure. The SITP project has advanced to a point, where the government is under crunch from all directions. It costed the government more than resources i.e. accountability and reliance, which are the very foundation of good governance. In such situation, the policy, along with the resources put into it, becomes rather vague, meaningless and dis-oriented. Grassroots organisations like the league of Transmilenio users, Bicitaxi associations, etc. can prove to be an important platform to bridge the gap. These organisations have worked in favour of citizens and conveyed their voices through protests and appeals at the court. They present civic responsibility by exchanging information, bringing up issues of mobility and encouraging participation on internet media and social platforms. These platforms are capable of being considered by the government for inclusion of public opinion beforehand and collaboration for an effective policy.

Strategic stance

Many different solutions have been implemented in Bogota in the past decades, such as pico y placa, Transmilenio BRT and SITP. There are also ones which have sprung up informally like the bicitaxis. The efforts demonstrate the rigorous attempts to curb mobility issues and serve mobility needs of the city, whereas the ongoing conflicts denote that the attempts fall short nevertheless. Due to the lack of long term visions and budget restrictions those projects have failed in their purpose to resolve the situation. The government finds itself tackling unprecedented issues shortly after acting regarding policy. The Transmilenio BRT system was received well by the residents and showed promising effort in the field of mobility. It is internationally acclaimed for efficient service via a huge network. However, during implementation of phase I only, it was hindered by its incapacity to satisfy larger population of the city. Congestion on the streets, erratic bus arrivals, uncertain travel time, higher fare, overcrowding in buses, etc. were common for daily travellers. The issues persisted after launch of the SITP project. Conflicting opinions of political, social and influential actors did not allow the mobility policies to expand, improve and work cohesively for the city. Developing countries are on the path to rapid transformation. A perspective vision allows time and opportunity to address critical issues by delivering balanced actions in short-term. Lack of steady decisions is lethal for any entity and in this case, the city of Bogota. Presence of informal modes is a complicated scenario, where short-term actions will not suffice. It underlines the crucial need for the city to bear a strategic stance. It will allow envisioning of mobility with steady and meaningful solutions to on-ground problems.

Institutional evolution for inclusion

As described above, the mobility policies were implemented by local government without any invite for collaboration from citizen group. While it is a must to consider mobility patterns of the citizens at ground level, the policies simply came out as a radical solution. The intent was to solve the problems related to mobility in the city and reduce the impact of its rapid and worrying growth. Budget restrictions and political timings led the local government to put all their efforts in the construction of a BRT system which offers many advantages to the people of Bogota. Ironically, the people of Bogota did not include, the 51.2% of total, the poor population. It should be noted that the BRT as solution is comparatively affordable by the government and has shorter development period than subway rail system. The centrally placed corridors worked well for the commuters to centrally located business districts, but these increased hassles for a major share of population dwelling in the outer periphery.

A chance for inclusion or lack thereof does not appear explicitly in a decision-making process. It is more of a mindset that can find significance at any stage. It is a deliberate thought by a body with power to redistribute public resources equitably with an existence that often goes unnoticed. It is to raise that underprivileged existence upwards on the same level of citizenship as the remaining population. For instance, the land acquisition meant for construction of stations and development of corridors was done with 'urgency' clause. It removes any scope for challenging the acquisition procedure. The intent is rather contradictory to the 'public interest'. The unrest that followed in Bogota, which the city has not yet been able to settle, resounds the need of inclusion of wider population in policies and in general.

Place-based interventions

The BRT and SITP policies were implemented with a view to replace the traditional bus service and institutionalise public transport. The paratransit service was and is inefficient, but has provided transport solutions to Bogotá's people. The complex case of informal modes is as important as it is prevalent in the urbanised areas of developing countries. It is interesting how it relies more heavily than the formal transport on traditional knowledge and resources, family labour and ownership, small-scale operation, labour-intensive techniques, and offers low barriers to entry for potential participants (Rakowski, 1994). It has shaped a mobility related practice that is performed and shared by all populations of the city. Given the time and local presence, issues associated with the bus service have intercepted social, economic, political and administrative spheres of Bogota. Any intervention would

raise the questions of justice as the issues have inherited them intrinsically. With that bearing in mind, chasing away or outright termination of informal transit as in case of Bogota becomes an unjust action. The action has been reciprocated against institutions with claims from “below”, to be seen and to gather missing credit for the years of existence on behalf. The intensity of reciprocation corresponds to that of the action. The claims, rather aggressive, have robbed the projects of public consensus, and resultantly, invariable amount of time and effort. Such situation fosters the need of an approach that guarantees social justice, ethical soundness and technical efficiency.

Approach for coexistence

Informal transport services have been long existing in Bogota. Even the operation of bicitaxis is same age as the Transmilenio BRT. The SITP project comes in few years later to replace and cease the years old service. The question then arises, if the institutionally offered transport holds monopolistic powers over the traditional one? Formal public transport makes up for the many shortcomings of informal buses. But how is that comparable to a service with intrinsic values? In this sense, it is more rational to attempt for coexistence of the two. The current mobility scenario in Bogota is a product of years of evolution and conflict. Earlier stages of Transmilenio implantation had removed traditional buses from centrally placed corridors. It created tense situations with small bus operators who eventually had to accept operations in other routes. Soon, the observed lack of coordination between Transmilenio and private bus operators forced the authorities to come up with a holistic solution. It gave birth to the idea of creating a new integrated system of transport (SITP). While as a policy the project showed promise, it faced functional gaps in implementation and conflict as well. The scenario adds weight to the thought of efficient integration when the modes already have coexisted. Recognition and regulations help in bringing order and justified address to everyone and everything. These can provide focus on reorganisation of the informal interface and incorporation into the formal public transport. An integration strategy would then be a responsible and aware answer to the city’s mobility scenario.

6. Towards 'organised' urban mobility

The diverse practices of movement have been existing from long time. It encourages to look for opportunity in what exists in the city today to shape an optimal urban mobility.

Mobility Justice

Informal transport is the face of a dynamic reality etched into the lives of people of Delhi. It is a practice that surfaces the city for time longer than any other current mobility practice. Especially at a local scale, in the productive pockets of the city, it is an inevitable one for majority of population. Rise in financial reach in the past two-three decades had offered vehicular autonomy to a small segment of society. The rise continues to instil auto-centric dependence to a bigger segment today. However, the traditional mobility exists as is, for the other segment has grown in proportion. The situation is that each movement in the metropolis intercepts the informal way of mobility in some way. The interception rather portrays conflict, where the vehicular dominance refuses to accept the unheeded half of urban reality and attempts to nullify it. How justified is then the sole claim of the dominant counterpart to the shared spaces for movement?

The expulsion of traditional practices does not take place only in the spaces where movements inflect. The systems put in place for effective conduct of urban paradigms and equitable distribution of common resources fail to notice their presence as well. The system, denoted by gamut of laws and norms, then tends to work in favour of what is present in absolute (Lefebvre, 2004). The growing urbanity leading to explosive growth in private vehicular travel along with their demands had become the present in Delhi. A mammoth road infrastructure footprint, at 22%, in return to those demands over the years, precisely proves the point. After layers of in-city grade separation, when the roads exhausted scope for expansion, focus was redirected towards creation of heavily funded mass rail transit. In terms of enhancing pedestrian experiencing, foot over bridges were built on arterials and busy streets across the city. Both the developments are taking place extensively till date. The political representation of urbanism has insisted the institutions to chase the idea of an apparent mobility, while constantly overlooking the actuality of the territory. The approach takes institutional reality further away from the actual movements with every action and deprives citizens of substantial resources. The faint presence of informality, denied of attention time and again, then delivers meaningful movements for the society by coexisting. The compensation makes the case stronger for a justified response.

Localised discourse

Recalling the plural spaces of the city, the socio-economic and spatial mixite generates peculiarly distinctive modal combinations and mobility practices. For a city, as large as eight Milan's spread together, it is challenging for a trunk infrastructure to fathom the scattered travels and interlinked trajectories. A study carried out by CSE India, in a residential neighbourhood of Delhi, shows that over 60% commuters travel by DTC buses that use upto 8% road space, while cars move only 20% people and take over 75% road space. Bicycles move 20% passengers and use 18% road space in that area (ITDP, 2006). Another area with industrial use is bound to have a higher number of bicycles as the workforce tends to squat or dwell at a nearby location. While, a neighbourhood with bazaar or commercial function would have a lot many cycle rickshaws ferrying passengers through the crowded streets, a high-income residential neighbourhood (usually gated colonies) would have none with only cars instead and that too multiple ownership for same. The scenario then points to the need of two simultaneous addresses. First is to strengthen the faint presence of informal movements on ethical grounds of social and spatial justice. To return a right to mobility with equitable access to public resources, which these movements have inadvertently been denied of. The second is the need for the first address to be in a localised setting, to have more relevance and meaning. Informal modes of transport mostly operate within local trajectories, given their limited capacity. The modes function in close association to ground reality and relate to daily life with accurately. An experience of individual movement that shapes, then adds up and multiplies, given the likeness of habitation in each territory, to become collective situation at ground. Therefore, the actions towards coexistence take course to bring meaningfulness for majority amidst the urban complexity.

Catalysing institutions

Contemporary cities are made of intricate practices of habitation that evolve constantly. The practices often take place in territorial confinements created of likeness in claims of citizens to space. Numerous territories, fragmented and dissimilar with one another, portray an array of conflicts. Planners and urban policy makers attempt to address these conflicts through a singular model of solution. The institutional tools in case of Delhi, the two-tiered master and zonal plans, work on administrative boundaries, which certainly do not reflect these territorial claims. The broad guidelines these offer, chase the demands of a superficial 'mega-city', as the problems zoom out to the level of abstraction. The institutional efforts keep on investing in static set of instructions, maps and land use plans that is unable to capture what is

mobile. In that case, it is important to recall urban institutions are a setup devised to reinstate equitable distribution of resources in society. A formal recognition of economic and symbolic value attached to local space and return of citizenship rights as whole is the virtue of these establishments (Mazza, 2009). The current institutions in Delhi need to reach at par through reformative tools that reduce conflicts and enforce order in territorial space.

The crunch for space is embedded in the cities of developing world. Rapid growth in population and shift to urban way of life puts the city in struggle with the scarcity of land resource. This has led the mobility institutions to stick by the belief that infrastructure is the absolute solution. The rigid model has provided Delhi with extensive network of roads. Severe issues have taken birth from auto-centric frenzy, to the extent of diminishing walkability especially at a local level. The need in such scenario would then be to look beyond conventional planning practices on mobility related provisions. The case of road capacity reduction in San Francisco during 1996 presents a similar reformative model. Caltrans shut down the Central Freeway and the transport officials predicted miles of gridlock traffic (Cervero, 2006). State traffic planners warned that morning commutes would increase by as much as two hours. To everyone's surprise, these scenarios never materialized. The reasons were never clearly understood as there was no systematic probe into the post scenario. It was later learnt through survey that freeway users had shifted to alternative modes (public transport), routes and trip patterns (ibid.). The freeway was replaced with an award-winning Octavia Boulevard by 2005. Not only it helped in regeneration of the local area, but it cut the traffic by 52%, reduced accidents and returned the space dedicated to automotive movements to a diverse mobility (ibid.).

Similarly, a rational shift from the conventional model of mobility could catalyse the governance outlook, for it would open up and invite endless possibilities through the course of policymaking. The contentious nature of spatial planning combined with the political dimension would bring the groups defending interests and the entity with power to decide on the same surface (Mazza, 2009) open for debate. Conventional planning process in Delhi has remained devoid of participation from the public front. A reason is that infrastructure-bent transport planning has pacified majority of population against their long commutes involving hardship. Simultaneously, it has provided a consolation and fair acceptance of the local woes present in the territory of their inhabitation. The society in such situation gets accustomed to the inability of institutions to penetrate their practices. A new model is a much-needed flexibility to rearrange the local surroundings, suitable for the mobility

needs of today. The shift to relate with diverse segments of society comes with somewhat discretion, and so it pushes actors to emerge and make their claims. It becomes more likely to catch deliberation from below, since it involves the immediate surroundings of people, known best by them. Such pragmatic shift is capable to trigger transitive effects as well. In that scenario, it can anticipate to reach the overlooked informal movements in case of Delhi. The approach shall open doors for a new interaction between the institutional and informal interface.

The asset of (informal) non-motorisation

Environmental degradation and climate change have attention of the world, developed or developing. The issue takes top priority in the realm of governance and manifests itself in various fronts of habitation. It is reflected persistently in the transportation sector as it is responsible for a substantial proportion of damage. Various sustainable mobility policies deployed at national, state and local level have reshaped paradigms of demand and supply. For instance, the growing electric vehicles market, car-less or walkable approach to urban planning, stress on citywide strengthening of bicycle infrastructure, etc. are all effects of this shift. While, the western world attempts to retreat from automobile-dependent lifestyle, Asian cities have certain advantage in the scenario. However inadequate the infrastructure or inconvenient it is, a major modal share already goes to non-motorised travel (Goyal, 2014). It includes trips made through walking, cycling, cycle rickshaw and other informal modes. In Delhi, the number constituted 44% of the total daily trips as per 2007-2008 figures, whereas cities such as London, Paris and New York have the same for walking and cycling at 14%, 28% and 11% respectively (RITES, 2010; Goyal, 2014). This brings out informal transport as a bonus layer to sustainable urban transportation in the context.

Plying of cycle rickshaws and e-rickshaws provides Delhi an incentive of non-motorised mobility. These modes offer shared experience of travel, while constituting livelihood for the weaker section of society. In Indian context, the vehicles provide good alternative over walking due to comparatively higher user safety and speed. There is low cost for users, the vehicle and the infrastructure, which is embedded only in the existing roads and institutions. Moreover, the severe pollution of air and other associated issues that lead to ill health of citizens demand an embrace to such practice in the capital. The environment friendliness and zero emission functionality add to the operational benefits and strengthen the case for non-motorisation via informal modes. The practice surpasses automotive travel with its benefits in multiple ways, but it competes with the sheer numbers of two wheelers and the dominance of cars on road. A regulated conduct imparts capacity by elevating competence and

meaning in this scenario. It becomes something to bank upon institutionally, as the tools then manage conflict to some extent, streamline local movement and add mobility potential. In this sense, it is reasonable to anticipate switch from motorised vehicles, especially the two-wheelers and to target the 33% short trips that take less than 15 minutes. (Delhi Government, 2015; GNCTD, 2006).

Strategic resolve in governance

Urbanism is a phenomenon that often holds rational answers to the complex problems, but those subsist under the layer of contentious issues. Institutional will provides fertility grounds for policy formulation by lifting that layer. A strategic vision then supports to gradually realise this rationality. Regulated conduct of informal non-motorised modes is an issue that spreads through the dimensions of space, society and politics. The contentious nature has not allowed for much experimentation in Delhi, which has resulted in short termed interventions, like the makeshift e-rickshaw scheme. A shift to non-motorisation, inherent with informal modes, needs strategies that can create impact in the long run. More often than not, it is politics rather than policy that shapes opportunities for movements in a metropolis. Institutional actors tend to follow the lead while intercepting time to time, through the devised tools, within the framework of their roles. To be able to surpass the underlying contents and convey the rational intent of provision and service, a strategic resolve is what institutions need.

A stance that addresses alternatives, presents opportunities for renegotiations and attempts to balance the different inclinations of the actors involved is crucial. Such framework does not only establish constructivism in governance but restores the lost faith of public in institutional capacity through fruition of objectives in near as well as distant future. The city of Copenhagen demonstrates a similar scenario with their parking strategy. Every year the city reduced 3% of parking space by taking it underground (mostly in the inner city) and raising charges. In turn, the parking spaces vacated were converted to green and open spaces. While 3% loss did not seem to catch notice, after 10 years, the city had reduced 30% of parking space. The strategy provided equivalent number of recreational places, while people automatically shifted to healthier way of living. Congestion problem came down with a steady decline in car traffic, especially in the inner-city area and public transport ridership increased from 24% to 33% (City of Copenhagen, 2009).

In Delhi, there is a lot of advocacy in favour of non-motorisation by encouragement of informal modes. The director of CSE India (a not-for-

profit organisation), Sunita Narain, makes a strong pitch in favour of cycle-rickshaws and other modes of non-motorised transport by saying - "It is a misconception that cycle-rickshaws cause congestion. It is the cars that are causing congestion. It is sad that in a socialist country like India, the poor rickshaw pullers are getting targeted for no fault of theirs." The academic front agrees and demands formal recognition of the mode. Dr. Geetam Tiwari of the Indian Institute of Technology, Delhi, claims - "The cycle-rickshaws are already providing feeder services at 50 metro stations, including the Delhi University station. Redesigning the roads is all that is required to allow the cycle-rickshaws to ply on the arterial roads. Then they will not come in the way of fast-moving vehicles (ITDP, 2006)." While the academic, research, activist and other organised fronts persist to support rational movements and practices, the institutions of governance and planning in Delhi, entangled in political inclinations, have become paralytic. There is a strong need to recognise the issues through a meaningful strategy, where the resolve would be to lessen automobile dependence in a local territory that drives the city towards sustainable urban mobility in the longer run.

Mobility entrepreneurialism: Disruption to innovation

It happens often amidst the complex urbanity that the demands of the population are not met with and dissatisfaction from the provisions becomes prevalent. The scenario pushes for innovation in various urban paradigms such as service delivery, policy, governance, society, etc. Mobility provisions seem to dissatisfy the citizens of Delhi for a long time and this has given birth to innovation in the same paradigm. The rising entrepreneurial initiatives have captured substantial demographic share as they sense the exact urban demands. The service delivery ventures respond to the already existing contentious problems intelligently with use of technology. The initiatives arise following the ambient structure of business and urban trends at local, national and even global level. In India, the atmosphere bears ubiquitous scope for information & communication technology (ICT) and allied endeavours at present. It results in a vigour that uses disruptive force of technology to innovate and respond to the not-catered demands. The response is often outside the sphere of traditional practice and institutional framework, but manages to find place somewhere in between. Aligning with the impact and acceptance received from public, these solutions sooner or later incorporate themselves into mainstream practices.

Ola is India's dominant ride-hailing service, which has consistently expanded the number of vehicles and drivers on its network by involving people who have had no experience in driving before. It started with car and gradually expanded to auto rickshaw, e-rickshaw and even cycle

rickshaw in Delhi. Later, it launched the feature of shared ride or car-pooling. It has managed to engage with local authorities raising funds globally. Ola, backed by Japan's SoftBank Group Corp., DST Global and Tiger Global Management LLC, last raised \$500 million funds in December 2015 (Ghosh, 2016). It has since moved aggressively into training drives for its new e-rickshaw network in Delhi and employment hubs of the NCR, i.e. Gurgaon, Noida and Faridabad. It is interesting to note the drivers are not former auto rickshaw drivers or those who have experience in generic modes of transport (Ghosh, 2016). Most of them owned cycle rickshaws, and have undergone complete training after collaborating with Ola. The Senior Director, Anand Subramanian, says - "With battery powered vehicles, cycle rickshaw drivers can upgrade to e-rickshaws and be available for customers around them within minutes. In larger cities, e-rickshaws can come in handy for last mile connectivity whereas in smaller towns, they will be an integral part of the intra-town transportation ecosystem. We have begun to roll out the e-rickshaw category with licensed driver-partners in a phased manner across NCR (Ghosh, 2016)." Currently, more than 5,000 e-rickshaws are being launched in the metropolitan region of Delhi. Ola is hiring several women as part of this programme and training them to become drivers.

Innovation to societal demands

Another venture targets the public transport users amidst the deteriorating air quality. Shuttl, an app-based service provider for air-conditioned buses banks on the shortcomings of public transport options and feeder services. This along with severe air pollution in Delhi has pushed people to opt for air-conditioned buses for their commute. Against an average booking of 10,000 passengers a day, the App saw an additional 2,000 people queuing up to ride AC buses to their work in November 2016, when the pollution reached emergency levels. The service provider, who could not meet the demand on the first day, met the additional demand by sprucing up the buses in its network. The co-founder, Amit Singh, quotes - "We added some new buses. Some 20-seater buses were replaced by 40-seater buses. We also reworked the frequency of buses, by increasing frequency on routes with high demand, and lowering frequency on routes with lower demand (The Hindu, 2016)." Bikxie Pink is a two-wheeler taxi service only for women. It has women drivers, working along the fact that many women do not feel safe travelling at odd hours in the capital. Zoomcar, a carsharing service; Baxi, a motorcycle-hail service; and LiftO, a ridesharing network like BlaBla car have equivalently responded to the unique demands of metropolitan citizens.

Despite the initial success and growth, it is notable that ride-hailing giants like Ola and Uber are under legal dilemma due to hazy regulatory environment. It so happens that entrepreneurial ICT applications and institutional framework perform at different speeds (Concilio, 2016). For urban innovation, ICT solutions work at a very fast pace, whereas institutional support lags significantly (ibid.). At the point of conflict, which is the current case in Delhi, the two tend to evolve together. The fact that government is making efforts to find way through the disruption, is a sign for a proactive environment for policy. Such circumstance leads to a mutual emergence of the socio-organisational structure and disruptive force of technology along the time. It then becomes necessary for the new paradigm to stick to values to be innovative and meaningful.

Trails to a transport policy landscape

The metropolitan city of Delhi is on a spree to develop one of the world's largest mass transit systems. Operating since 2003, Delhi Metro is under frequent expansion (213 km in 12 years) as it transports more and more people each day (DMRC, 2014). It facilitates a practice to move across the national capital region and find more opportunities in different fields of urban life. Then there is a practice of informal movement, considered unsafe, nuisance and derogatory. It takes place in immediate surrounding of habitations in the city and works in conjunction with the fundamentals of mobility i.e. walking and cycling. It supports daily life and gets work done to the extent, without which the urbanism would suffer. Either movement has significant meaning for substantial populations. The claims of the two distinctive mindsets of mobility are legitimate, but how consistently these perform in space depends on the stance of urban institutions. The fact that these two work jointly in space is evident in the city and cannot be denied. Considering the inclination of priorities in a political reality and operational competence, the existence of the two practices is inherently in conflict and unbalanced. This summons the matter of equity, which can be sought in material, legal and administrative attention, to help establish fairness. It is only then the institutional tools can be aligned in support of conditioning the at-ground practices. The capacity that builds in the process of attaining mobility equilibrium, which is anticipated, can be expressed by following pragmatic ways:

Recognition by regulation

The people of Delhi move using a diverse set of modes, which from user perspective are either owned, hired for individual use or hired for shared use. Informal modes such as cycle rickshaw and e-rickshaw touch all these spectrums of relationship with humans. While, there are namesake

legislation or ineffective policy, like Delhi Municipal Corporation (Cycle-Rickshaw) By-laws, 1960 and e-Rickshaw Sewa Scheme, 2014, they fall short to cover the issues of use, operation and conduct. Policy response for informal transport tends to vary in stringency (Cervero, 2000). Acceptance is a lax response which is the current scenario in Delhi. Moderate responses include recognition, regulation or combination of the two. Last is a strict response in terms of prohibition (Cervero, 2000). It is clear from the case of Delhi that acceptance and prohibition are neither effective nor efficient. The current moderate response with legislation is weak and obsolete by now. A set of meaningful regulations can then provide recognition in form of directional support to practice. The regulations can be focused in three ways:

Management and organisational:

The regulations that control entry and exit to the profession, territorial placement, working hours, vehicle specifications and labour practices fall under this category. Such rules and standards allow organisation and management of the modes at institutional and union level. The operators are then encouraged to oblige to the rules under controlled circumstances. The services come under the umbrella of enforcement and are better monitored, increasing their efficiency and reducing the nuisance. However, it is important to note stringent regulations such as demanding operator qualifications, vehicle fitness, pricing, punitive charges, etc. can hit the operators and lead to virtual disappearance of informal transport services. The operators, usually poor, might get stripped of the livelihood option and the people, depending on the service, that of a cheap mobility option. Therefore, it is necessary for the standards to be somewhat realistic, aligned to the socio-economic fabric of the space, or else it could backfire.

Financial:

The population involved with informal transport is generally the weaker segment of society. Given the hardships involved with the profession, regulations that cover financial aspect of the service are to be noted. Cost of the vehicle, licensing and registrations could be supported with formal credit schemes. Currently, the operators face unnecessary brokerage charges at multiple steps of the system. Formal schemes can relieve them of substantial capital and operational costs. The other type of incentives could be tax holidays and fee exemptions, to stimulate productivity in free-enterprise transport and consequently improve efficiency.

Operational:

Operations of the informal modes have various risks at different levels. The issues of operator's safety, passenger safety and insurance coverage

form the top concern. E-rickshaw sewa scheme covers the aspect after facing a series of legal contestation in court, but cycle rickshaws are deprived of the same. The agenda extends to the insurance coverage of passengers. Currently, injuries suffered in a traffic accident while riding any kind of paratransit are not compensated to passengers due to illegitimacy of the modes. Behavioural conduct during and post working hours forms concern due to the sheer numbers of these modes. Clear norms for Regulatory address to the same can streamline enforcement of law and order.

Inclusion for fair response

The society is composed of vivid mobility practices which vary from place to place. The plurality of demography and transportation has not been intercepted by the institutional dimension in Delhi. Inclusion of various populations and transport service providers in the processes makes a strong case. Informal modes of transport and the substantial population associated with them at different levels, claim not only a right to use public infrastructure but be a part of the urbanity and its various formal systems. As the infrastructure upgrades, the social demands fall short of skill and a standing that keeps on distancing them even further. In such circumstance, the bridging of distance can be initiated with inclusion of those demands. With regulations in place, a fair response could be to start with making the population in case aware of their rights, mandates of the profession, traffic rules and incentives from the government. This would help uplift the skill and standing against the materials present today. The process provides capacity and opportunity as it gives a much-needed peek into the unnoticed world. It increases chance for the two interfaces to familiarise with the urban practices and dimensions, which is constructive for overall policy perspective. The scenario is similar to how the case of Fazilka demonstrates two-way relationship between the society and rickshaw operators. Such approach shall deploy informed conduct of paratransit modes, which in turn could receive positive acknowledgement from society. Asija (2012) notes that the operators are able to perform community policing being on the streets for largest part of the day. They become eyes on the streets and indirectly encourage non-motorised mobility. This contributes to elevate quality of public spaces and create liveable places. The positive environment uplifts the image of the sector and makes way for further inclusion in the long run. The redeemed operator then somewhat gains eligibility to be included in the urban paradigms and received a just response.

Integration for accessibility

Accessibility is affected by several factors and directly by integration of different transport modes (Litman, 2016). It determines performance of mobility and transport infrastructure landscape in a territorial setting. In Delhi, automobile accessibility is generally well and integrated, with abundant roads and freedom to park almost anywhere. The problem arises with integration of public transport and paratransit. The latter provides feeder services to the prior evidently across the city, where the informal ones dominate in dense, middle income and productive territories (like commercial, industrial and mixed use). A diverse ridership uses the two services collectively on a daily basis, which makes peak hours the most lucrative for informal transport operators. While the movements are citywide and regional, the connection (or interchange) of the two takes place in a local scale. The crunch for space creates clashes on the streets with other vehicles, passengers and operators in queue. The trouble generated is bothersome the most for local inhabitants and demands attention towards these connection hubs. Integration could take place at different levels, i.e. operation of modes, practice of movements, official plans and public resources that together contribute to accessibility and mobility. A response that surfaces all these levels and improves user accessibility is reorganisation of attributes of movements as per the territory. Informal modes form the centre piece of this rearrangement due to their significant collaborative role in feeding to the public transport. Dedicated lanes (non-motorised vehicle lanes for bicycles, cycle rickshaws and other such modes of similar speed-size characteristic), parking stands/ depots, curb-side reserved waiting space near transit and all these incorporated in the formal plans demonstrate a way for integration. Such action could ease out a lot of daily conflict between different actors. It would extend mobility for wider demography by making the option of informal transport more accessible. Smooth integration of informal modes with public transport shows a way to enhance user experience, transport efficiency, and quality of the suffering space all together.

Enablement

The above aspects present a governance outlook with respect to the informal modes and user practices. The discussed aspects are nothing but pieces that attempt to furnish a mobility circumstance, which used to exist in the historical city of Delhi. To be able to support movements at the very local level, a model that incorporates the pieces would be distinct from the traditional one. While, the traditional model in case of Delhi presents the governance interface as provider, the discussed trails combine to portray enablement. The prior is somewhat top-down

imposition for an 'apparent mobility', whereas the latter is bottom-up 'truth of movement practices'. For same reasons, interaction between policy and practice; institution and population has been absent. The strategic stance on informal modes, their regulation, inclusion and integration with urban paradigms is henceforth, necessary, given the possibility and need of coexistence. The formulation of these ideas has potential to let a wider demography exercise the right to city and choice of mobility. When put in motion, the gradual steps of involving actions illuminates the virtue of long-lasting practices, for further institutional and behavioural reference. The approach attempts to restore the broken affiliation between the citizen and government counterpart of the urbanism. It then generates a synergy that leads to experimentation in the enabling environment.

Shared creation of value

Ben-Joseph (2005) looks for historical evidence to show that order can emerge not only from centralized decision-making, but also from autonomous interactions of individuals in a community. The autonomous interactions can be related to the diverse user mobility practices involving informal transport. The practices have been taking place in local spaces traditionally. The ethnographic elaborations compiled for this study reveal the territories tend to have their own centralities. The hierarchical street structure in Delhi transverses the local activities and creates nodal points. The nodes collect certain mix of the autonomous interactions. A balanced address to those interactions through the discussed trails can enable experimentation in these centralities. When the elements of mobility are in equilibrium, the cost of failure would be inconsequential (Cervero, 2000). With that taking place in a local setting, it is easier to engage community and let them reorganise their space

Projects like 'Aapki Sadak', translating to 'your street', is a community exercise to find alternative mobility solutions and pedestrianisation of neighbourhoods in South Delhi. The project was initiated by Shakti Foundation in collaboration with other academic and professional institutions. The product of exercise, actions and strategies for local mobility, were advocated by the organising committee to local government, but still await formal recognition (IMaCS, 2015). Other than this, it has been almost impossible to engage citizens in processes of mobility planning in the society of Delhi. The stringent bye-laws and interventions, such as the draft Transit Oriented Development policy are presented to the bureaucratic interface for opinions before final approval in place of citizen bodies. A city under such habit has remained devoid of participation and forgotten to find time in this direction. An advocacy for

coexistence would provide necessary guideline and motivation in this sense. The attempt to reorganise the space in immediate surrounding of habitation, where individual movements meet daily, would result in place-based interventions. Induction of these attributes in mainstream planning processes then facilitates a way forward to shared creation of value in the contemporary society.

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