TRANSPORT, CITIES, GROWTH AND ENVIRONMENT: A CASE STUDY OF KOHIMA

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DECLARATION

I, **Tumbenthung Y Humtsoe** declare that this thesis entitled **"Transport, Cities, Growth and Environment: A Case Study of Kohima"** is a bonafide work, the result of a research carried out by me under the supervision of Dr. Prajna Paramita Mishra at the School of Economics, University of Hyderabad.

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A paper related to this thesis has been published in the following:

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Abbreviations:

1.	BC	Before Christ
2.	BPL	Below Poverty Line
3.	CBD	Central Business District
4.	CDP	City Development Plan
5.	DCH	District Census Handbook
6.	DHDR	District Human Development Report
7.	DSM	Demand side management
8.	ESI	Economic Survey of India
9.	GDI	Gender Development Index
10.	GDP	Gross National Product
11.	GIS	Geographic Information System
12.	GKPA	Greater Kohima Planning Area
13.	GLTIH	Growth Led-Transport Infrastructure Hypothesis
14.	GNP	Gross National Product
15.	HDI	Human Development Index
16.	HIG	High Income Group
17.	ILP	Inner Line Permit
18.	IMF	International Monetary Fund
19.	INR	Indian National Rupees
20.	IT	Information Technology
21.	ITS	Intelligent Transport System
22.	JNURM	Jawaharlal Nehru Urban Renewal Mission
23.	KMC	Kohima Municipal Council
24.	KTC	Kohima Town Committee
25.	LIG	Low Income Group
26.	LPG	Liquefied Petroleum Gas
27.	MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
28.	MIG	Middle Income Group
29.	MP	Marginally Poor
30.	MSME	Micro Small and Medium Enterprises
31.	NAAQS	National Ambient Air Quality Standard
32.	NEC	Northeastern Council
33.	NEG	New Economic Geography

34.	NER	Northeastern Region
35.	NPCB	Nagaland Pollution Control Board
36.	NH	National Highway
37.	NLCPR	Non Lapsable Pool of resources
38.	NIUA	National Institute of Urban Affairs
39.	NSCN-IM	Nationalist Socialist Council of Nagalim-Issak Muivah
40.	NSIP	Nagaland State Industrial Policy
41.	NZG	New Zealand Government
42.	PTS	Public Transportation System
43.	RAP	Restricted Area Permit
44.	RSPM	Respirable Suspended Particulate Matter
45.	SACTRA	Standing Advisory Committee on Trunk Road Assessment
46.	SARDP	Special Accelerated Road Development Programme
47.	SHN	Statistical Handbook of Nagaland
48.	SHDR	State Human Development Report
49.	SPM	Suspended Particulate Matter
50.	SWOT	Strengths, Weaknesses, Opportunities and Threats
51.	TILGH	Transport Infrastructure Led-Growth Hypothesis
52.	TOD	Transit Oriented Development
53.	UK	United Kingdom
54.	UN	United Nations
55.	US	United States
56.	WTP	Willingness To Pay

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"I am doing PhD," and sporadically followed by, "I am preparing for 'Civil Service'," has been my prompt response to anyone pitching an apposite query to me. Eyes broadened, as I utter the first part; and with a limper voice, if the second part proceeds from my lips. From this, I wonder if people could perceive as to what I associate more with-of the two with which I employed my time and engaged my cerebral with.

It has been a journey through vales and hills, often giving way to a sea of sands, and wilderness. Through it all, the Almighty from whom all knowledge and wisdom flows has been gracious and faithful. All glory to Him, today, I am penning to say, "Thank you" to those He placed along the way who walked with me, some for a short while, some for a longer while, and still some I know will linger on till the final breath here; all the while imprinting footprints of warm memoirs.

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Tumbenthung

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Chapter 2

Chapter 1
Economic Growth, Urbanization, Transport and Environment

1.1. Introduction

Humankind has made a remarkable stride in material wellbeing. In this economic headway, transport and cities had been and continue to be key drivers and facilitators. The many positive externalities that technological innovations in transport caused, or an up-gradation in transportation infrastructure and services brought, had been of local, regional, national and international extent. From the simple bullock-cart, to the invention of steam engine, or the jet engine, by overcoming spatial constraints, improvements in transport have always brought new possibilities of 'division of labour, specialization, diversification of economic activities, scale and scope economies', and thereby growth and development. If trade has been an *engine of economic growth*, it is *transport* that has provided the road for this engine to ply. Port towns and cities, in ancient times, by means of sea haulage, were prosperous centers of cultural and commercial exchange, providing rich revenue to royal exchequers. Today, cities are the prime generators of the wealth of nations.

In a time when there is an increasing recognition and concern for the aggravating environmental crisis, the ecological impact of transport and cities has to be weighed in. Forests are being cleared and fragmented to make way for roads and cities; the air is being contaminated unceasingly by burning of fossil fuels; and likewise, the provision for mobility and urban space has been at the cost of environment. The time is thus ripe for sustainable and smart transport and cities. There has to be an accelerated push towards sustainability, so that *a green and inclusive transport and cities* for economic development becomes a reality the world over.

Increasingly cities are being recognized as *engines of growth*, and much attention is now being paid on making these engines *smart*. One of the key determinants of smartness of a city is urban mobility. However, several city-roads in India and world over are congested, causing huge economic loss and accentuating air pollution.

Today, *green urban mobility* is thus imperatively urgent, as argued by many scholars and activists in the concerned field domain.

Recognizing the opposing dual impact of transport and cities, the present study, in essence, is an attempt towards maximizing the contribution from transport and cities to economic development, while minimizing their contribution to environmental degradation.

1.2. Economic Growth, Urbanization, Transport and Environment in India:

India has grown rapidly in the recent memory, and at the time of writing this thesis, is the fastest growing large economy in the world. One concern in this otherwise commendable growth story is that jobs have not been created at the desired level, especially in the secondary sector. Infrastructural bottlenecks, particularly transport, had been one major hindrance for industries to come up and provide jobs.

Fueled by this growth, however, inter-alia, towns and cities are sprouting and enlarging at a rapid pace in India. The number of cities and towns increased by 3 times between 1901 and 2011. During the same time period, urban population swelled by 13 times (Mohanty and Mishra, 2017) suggesting an enlargement of the existing urban spaces, which is further projected to more than double between 2011 and 2050 from 377 million to 814 million (ibid). The expanding population, economy and urbanization have led to surge in mobility demand. However, urban mobility scenario in India is beset with many issues.

> "Increasing number of personalized vehicles, dwindling share of public transport, severe traffic congestion, fast deterioration in city environment quality due to increased air pollution, escalating risks to pedestrians and cyclists reflected in road accidents and fatalities, lack of integration between transportation and land use planning, fragmented institutional arrangements and chronic under-investment in transport infrastructure are the key challenges of urban mobility in India" (Mohanty and Mishra, 2017).

This sorry state of urban mobility has stood in the way of realizing the potentials of cities as engines of growth. Perhaps, "inadequate infrastructure investments in cities might have inhibited secondary and tertiary sector growth, leading to too few jobs being generated in the non-agricultural economy" (Mohanty, 2014). Moreover, Indian cities are going from bad to worse apropos environment. Thus, far from being smart, the cities are performing sub-optimally in India. Some of these issues are more pronounced in the grossly-inadequately connected northeastern region (NER) of India.

1.3. Economic Growth, Urbanization, Transport and Environment in Northeastern India:

Given the insurgency related internal security challenges in the region, for long, official and academic discourse on the issues of development in the northeastern region (NER) centered, perhaps justifiably, on the "security-development nexus" (Mishra and Upadhyay, 2017). The region is grossly underdeveloped, with the economies of the eight states in the region comparing poorly with other states in terms of broad macroeconomic indicators. This notwithstanding the fact that the NER fares relatively better in social indicators (like in literacy, health, etc.) due to cultural reasons. The relative discrepancy is more marked in the field of infrastructure, particularly in connectivity. The NER thus remains largely agrarian and inaccessible. Given this economic backwardness, on the whole, the process of urbanization in NER has been slow as compared to national average (Table 1.1), and the region is the least urbanized in India.

The urbanization that is occurring in the region is marked by a variety of problems, "from urban environment to security and from lack of infrastructure to social conflict" (Khamrang, 2012). Asian Development Bank (2004) reported that, "urban infrastructure and service are grossly inadequate in the capital cities of Northeast India". Urban roads especially are in poor condition, with the road networks and parking lots falling way short of the demand of current traffic volume that has increased rapidly over the past ten years. "Cities in Northeast attract large chunk of migrants from the surrounding areas but failed to provide basic amenities and services leading to urban involution, congestion and decay" (ibid).

With the much-hyped Act East Policy (previously called Look East Policy), cities of Northeast India are viewed as "centers for investment" (ibid), and hence engines of growth to propel the regional economy. Towards this direction, "investment in urban infrastructure [particularly in transport] and services will be the key to unleashing the potential of these cities to crystallize the growth of Northeast region" (ibid).

Table 1.1: Percentage of Urban Population of NER and India (1951 to 2011)

Year	Northeast	All India
1951	4.48	17.92
1961	7.61	17.97
1971	9.43	19.91
1981	11.75	23.24
1991	13.89	25.72
2001	15.51	27.78
2011	18.26	31.17

Source: Devi (2012)

1.4. Economic Growth, Urbanization, Transport and Environment in Nagaland:

Like the rest of its sister states in the region, the current state of Nagaland's economy is one marked by unutilized and underutilized potentialities. Notwithstanding the rich natural endowments, like forests, minerals, favorable agro-climatic and soil conditions, eco-tourism prospects, and educated human resource, the state has not been able to leverage those for economic development. "…Nagaland still remains under-developed and inaccessible" (Government of Nagaland, 2004). While concluding that, "it is necessary to stimulate the secondary and tertiary sectors," the Vision 2030 document (2016) does not foresee industrialization happening in the next 10 years until the necessary infrastructures and environments are provided. Reviewing the macroeconomic indicators of Nagaland from 1994 to 2014, Humtsoe and Walling (2016) concluded that the state's economic development is in a "doldrums."

Urbanization, however, is a given fact in this underdeveloped state. In 2001, 20 percent of the population lived in urban space (Government of India, 2001), which

has increased to 28.86 percent (Government of Nagaland, 2011). “The urbanization pattern is somewhat skewed as the urban growth is concentrated in few key towns such as Dimapur and Kohima” (Government of Nagaland, 2016). For instance, the difference in urbanization level between Kohima district and the state has almost doubled (8 percent in 2001 and 16.32 percent in 2011).

Given this “skewed” nature of urbanization in the backdrop of economic backwardness and stagnation, it is only natural to observe capacity deficiencies in the urban spaces. Unavailability and inadequate Public Transportation System (PTS), mushrooming private cars on static road capacity, traffic congestion, air pollution, water shortages, hazardous sewage disposal, and other issues plagued the cities and towns of the state. All these are observed at magnified proportion in the subject city, Kohima.

1.5. Study Area: Kohima City’s Development, Transport and Environment:

Kohima occupies an important space of agglomeration not only in the context of the state, but in the entire region as well. It is a critical transit point; hub of administration, healthcare and education; an important large market, and so on. It has been a driver of growth for the state and the region. However, it’s potential as an engine to propel state’s and regional’s economic growth has not been realized to the fullest, and thus presents an opportunity. More on Kohima city’s socio-economy is discussed in the ensuing chapter, in the context of Cities and Economic Growth.

Kohima, given the acute infrastructural shortages, looks as though it has “grown beyond [its] carrying capacities. ”The city traffic is “clogged,” the denizens face “acute water shortage problems along with problems of garbage”. Land and house rent are increasingly “becoming beyond the reach of the common man”. Air pollution is increasing. “In such a scenario…expansion of the mountain top urban conglomerations...and industrialization in the hilltop towns are not feasible from the practical or even from the ecological aspect” (Government of Nagaland, 2015). This undoubtedly presents a policy challenge, but also an opportunity to leverage the agglomeration that is occurring in the city as a *resource* for socio-economic development, trotting along a green growth path. The current study makes a case towards that, foregrounding on theoretical underpinnings.

It appears that the planning and development strategy of Kohima has not considered and incorporated key elements from the theories and applications of urban economics, transport economics and environmental economics. As a matter of fact there has not been any attempt of a comprehensive and integrated transport, agglomeration and environment strategy. Only recently, Kohima City Development Plan (CDP) (2006) under Jawaharlal Nehru Urban Renewal Mission was prepared. And Kohima Smart City plan is being prepared under the current central government's flagship program Smart Cities Mission.

Against this background of knowledge or research gap, and the corollary lack of informed policymaking and intervention, the current study is being undertaken. Foregrounded on lessons drawn from Transport economics, Urban Economics and Environmental economics, supplemented by a field study on Kohima city's transport, it is aimed to contribute towards evidence-based sustainable transport development and management strategy. Theory guides practice and practice enriches theory. "To convert the urban challenges into opportunities [highlighted in the forgoing discussion in the context of India, Northeastern region, Nagaland, and Kohima], policy makers and planners need to understand the economics of cities, [transport and environment]" (Mohanty, 2014). All the three sub-disciplines of Economics are basically applications of microeconomics principles.

1.6. Urban Economics Perspective:

Urban economics is the economics of urban spaces, precisely of cities. It explores locational choices of utility-maximizing households and profit-maximizing firms, by marrying economics and geography. The conception that cities come about and expand due to agglomeration economies forms the starting point in urban economics. These economies are the productivity benefits and cost-savings that spring from the co-location of firms, workers and different institutions within a particular spatial agglomeration center. Spatial proximity, contiguity, and density enable and foster face-to-face contacts, collaborations, and learning. Cities, in these ways, facilitate the *economies of learning, matching, sharing and networking*. Agglomeration in general lead to reduction in cost of transporting goods, people, ideas, information and knowledge. In essence, urban economics combines the conceptions of agglomeration

externalities from new economic geography and knowledge externalities from endogenous growth models to explain as to why economic activities cluster, and hence cities grow.

On the flip side, there are agglomeration diseconomies that act as centripetal force. These diseconomies include traffic congestion, overcrowding, house rent increasing beyond the reach of the masses, polluted ambient air, slums, etc. These negative externalities of spatial clustering beyond a certain threshold give rise to increased cost of production and reduced quality of life. However, this optimum threshold can be raised through effective implementation of an efficiently designed urban planning. It thus becomes imperative to maximize agglomeration economies and minimize agglomeration diseconomies. The quality of urban life hinges on the success of this optimization.

1.7. Transport Economics Perspective:

Transport flows occur in the entire stretch of supply chain, starting from the source of raw materials through the production and distribution processes till final consumption. Transport thus can be viewed as an input, or a *cost* in production and distribution, and thus requiring optimization (Batta, 2008). And herein comes transport economics. It deals with network externalities and 'wider area benefits,' or more generally the positive externalities linked to transport system. To producers/suppliers, there are benefits like economies of Scale and Scope, by means of access to new and larger markets (including previously inaccessible job markets for labour force) brought about by enhancements in transportation infrastructure and services. For the consumers, to the extent that the reduction/rise in transport costs are passed on to them, they feel the impact of such changes, as purchasers of goods and services. Besides, there are the economies of density (returns to traffic density), which refers to the fall in unit costs occasioned by expanding transportation services within a given size of network. From the consumers' perspective, it means the greater connectivity choices available to them (hence *convenience benefit*) with increase in the number of network links and conveyance services.

However, inept complex transport networks, or inefficient transport management, can create avoidable financial and environmental costs; say in the forms of traffic

congestion, accidents, air pollution, fragmentation of forest, etc. Sustainable transport is the way forward to minimize these costs, while harnessing the network externalities and other positive economies to the maximum.

1.8. Environmental Economics Perspective:

That economic and environmental systems are closely intertwined is an overt established fact. "To fully understand these systems, economics must incorporate the mechanical underpinnings of the natural sciences, and the natural sciences must incorporate the behavioral underpinnings of economics" (Hanley, Shorgen, and White, 2004). The behavioral underpinnings suggest that economic agents respond to incentives; that they weigh the costs and benefits while making decisions; and that they act in their own self-interest. Environmental resources are scarce and their uses have opportunity costs, or irreversible losses of ecosystem services and keystone species. Against this background, market failures and "government failures" (say by distorting market responsiveness to increasing scarcity) have resulted in too many environmental bads and too few environmental goods. However, markets, which have "proved to be the best way of allocating a vast range of resources" (ibid) (may not be theoretically, but practically) can be made to work for environment through proper pricing (ibid), and by converging the divergence between private cost and social cost.

After laying the broad contours of the context and motivations under which the present study is envisaged, and also the conceptual frame to approach the same, the objectives of the study are briefed below.

1.9. Objectives of the Study:

The study intends to look at the aspects surrounding the following objectives:

(1) To present an overview of the current scenario of Kohima urban agglomeration, from the viewpoint of *cities as engines of economic growth*;

(2) To draw lessons for urban transport development strategy by exploring the theoretical perspectives and policy implications from the nature of relationship between and amongst transport, cities, growth and environment.

(3) To assess the current scenario of transport in Nagaland and Kohima city, and then discuss mitigation of one severe Kohima Urban mobility challenge, i.e., traffic congestion.

(4) To develop a travel mode choice model, which will aid in developing effective transport management strategy.

1.10. Data and Sampling Strategy:

The study employs primary as well as secondary data; the former by means of an Urban Transport Sample Survey conducted in the subject city, and the later from official sources and existing literature. Kohima city is divided into nineteen spatially demarcated 'wards', for the purpose of election to the Kohima Municipal Committee (Government of India, 2011). The sample is proportionately drawn from each ward, according to the population percentage break up (See Table 1.2). The Urban Transport Survey Household Schedule contains questions on Socio-economic profiles of the households' members; Characteristics of automobile used-under which certain questions are asked only to those respondents who own cars; Trip Information; Bus Transit Information; Quality of bus services; and Congestion and Air Pollution (See Annexure 1). In all, data were collected randomly from 250 households.

1.11. Organization of the Thesis:

A broad introduction to the study has been laid in this prefatory Chapter 1, setting the tone for deeper discussion. After a passing emphasis on the increasing significance of cities as *engines of growth*, *Chapter 2* takes up the question as to how cities in general come about, before introducing the focused city of the study, Kohima city. A passing mention on the geography, demography and economic history of Nagaland state is made to set the stage for this. After tracing the history of the evolution of what was once a village into the now fast expanding urban space (the centripetal forces fueling this are also mentioned), a broad sketch of the geographical, administrative, demographic and socio-economy of the city and its residents is presented. SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the city is done. The picture that emerges of this agglomeration center is, as suggested in the foregoing section on Kohima, far from being 'smart', however, it does exhibit agglomeration economies, and has potentials to become a smart engine of growth. The discussion in this chapter is more of descriptive in nature.

The question on the nature of links between and amongst growth, environment, transport, and cities is explored in *Chapter 3*. There exist bidirectional causality or

interrelated relationship between the variables of interest in the current study. The policy implications that emanate from such links are also underscored. It is suggested that policy approach should be imaginative, integrated and comprehensive so that the gains are maximized and the negative externalities are minimized.

Table 1.2: Sample

Ward Number	Total Population	Percentage	Number of Respondents
0001	7082	7.15	18
0002	5207	5.25	13
0003	5692	5.74	8
0004	3568	3.60	9
0005	3197	3.22	9
0006	5381	5.43	14
0007	2721	2.75	9
0008	2348	2.38	8
0009	4808	4.85	12
0010	4820	4.86	12
0011	5267	5.31	13
0012	3848	3.88	10
0013	3228	3.26	9
0014	6101	6.16	16
0015	7970	8.04	20
0016	11603	11.72	30
0017	7775	7.85	19
0018	4809	4.86	12
0019	3614	3.64	9
Total	99039	100	250

Source: Census of India (2011) and author's calculation

The current scenario of transport in the state, and then in Kohima city is presented in *Chapter 4*. The myriad issues and challenges on the supply side that are plaguing connectivity in the state are examined. Congestion has bearing on growth and

environment, and hence the severe congestion observed on Kohima city road is discussed in detail. A simple theoretical model based on extended congestion cost function and travel demand curve is developed to show that in scenarios like that of Kohima characterized by acute supply side bottlenecks, supply side intervention may be the *first* efficient move. The discussion in this chapter solely employs secondary data.

The forgoing chapter looks at the supply side. This chapter dwells more on the demand side. To contribute towards informed and evidence-based effective sustainable transport development and management strategy, a travel mode choice model for Kohima city is built and presented in *Chapter 5*. The results from the same suggest that 'cost and time' considerations are important for commuters in Kohima city; thus, congestion-easing alternative mode that is cheaper and takes lesser time should be provided.

"Public policy through proactive regional and urban planning, timely development of key infrastructure, and good urban governance, can play a key role in augmenting agglomeration, mitigating congestion, and financing planned urbanization" (Mohanty, 2014). Giving a general contour of the various findings of the study, *Chapter 6* concludes the thesis reiterating the lessons (or policy implications) from theory and empirical study towards making Kohima city a robust and smart engine of growth with green urban mobility.

Chapter 2

Kohima as Nagaland's Engine of Growth: Challenges and Opportunities

2.1. Introduction:

Urbanization is justifiably the buzzword, today, and it is here to stay for long, both as a phenomenon and in terms of policy discourse. Cities are sprouting and enlarging at a rapid pace the world over, more so in Third World countries. This undoubtedly presents a policy challenge, but also an opportunity to leverage the same for socio-economic development, trotting along a green growth path. The comprehension of economic rationale of spatial organization of economic activities in urban agglomeration (or more precisely cities) is critical to counter the theses of 'over urbanization', 'hyper-urbanization,' or 'Urban hypertrophy,' and to appreciate and leverage urbanization as a 'resource'.

Today, the economic reality is such that cities are the prime generators of the wealth of nations. Nonetheless, cities of today are not without challenges. And in grappling with these issues, the salience of grasping the theoretical underpinnings on the economics of cities is unparalleled. The current chapter is thus motivated and an attempt towards that direction. Socio-economic profiling and SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of Kohima urban agglomeration are carried out to underscore Kohima as a potential regional growth centre.

2.2. Economics of Cities:

> **"**Cities are perhaps one of humanity's most complex creations, never finished, never definitive, they are like a journey that never ends. Their evolution is determined by their ascent into greatness or their descent into decline. They are the past, the present and the future" (UN-Habitat, 2008).

Urban spaces are chiefly defined in terms of the size and occupational structure of population inhabiting an identifiable space. Put it another way, "the definition of urban

area is based on population density because an essential feature of an urban economy is frequent contact between different economic activities, which is possible only if firms and households are concentrated in a relatively small area" (O'Sullivan, 2009). Census of India (2011) similarly defines and classifies urban area into three categories. First are the Statutory Towns which are notified under law and have a Municipality, or other such authority. Second are the Census Towns which are settlements with a minimum population of 5,000; a minimum population density of 400 persons per sq. km; and minimum 75 per cent of the male working population involved in non-agricultural pursuits. Third are the Urban Agglomerations or cities that are a continuous urban space comprising of one or more bordering towns, with or without their outgrowths. Such an "Urban Agglomeration must consist of at least a statutory town and its total population (i.e. all the constituents put together) should not be less than 20,000 as per the 2001 Census" (ibid). The decadal growth in the figure of cities, towns and outgrowths in India are given in Table 2.1:

Table 2.3: Number of Urban Spaces

Category	Number of Urban Spaces	
	2001	201
Statutory Towns	3,799	4,041
Census Towns	1,362	3,894
Urban Agglomeration	384	475
Outgrowths[1]	962	981

Source: Census of India (2011)

How do urban spaces in general come about? Sketchily, three conditions must precede for such a space to come about and flourish. Firstly, there should be agricultural surplus (more precisely food surplus) from rural areas to feed the urban dwellers. Secondly, urban dwellers must produce certain products to exchange for food from rural dwellers. Finally, a transportation system should be in place to make the exchange possible between the spatially segregated rural and urban spaces (O'Sullivan, 2009). The emergence of cities was thus made possible about 7000 years

[1]Examples of these include railway colony, or university campus, which are exterior to the legal perimeter of a statutory town but inside the revenue limits of a village(s) adjoining the town.

ago only after the increase in agricultural surplus (Bairoch, 1988, cited by Mohanty, 2014). Historically, factors like locational advantages (say, access to waterway, natural resources, suitable climate, etc., together called as "first nature geography"), defense rationale, and political patronage played central roles in the evolution of cities. However, only these exogenous forces related to geography and historical events cannot wholly explain the dynamics of cities. Apart from those, "spatial organization of economic activities [in cities] also made good economic sense" (Mohanty, 2014). The multifarious positive externalities can be appreciated through a kind of inverted pyramidal approach, starting with the spatial organization of production under one roof, and then in an industrial district, and finally in cities. These agglomeration economies (also referred to as "second Nature geography") are categorized as: internal scale economies (firm level), localization economies (industry level), and urbanization economies (city level).

Regarding Urbanization economies, Porter (1990, cited by ibid) observes, "successful firms concentrate in particular cities or states within a nation." Why? Jacob (1969, cited by ibid) opines that knowledge transmissions ensue between rather than within industries; and this transfer enables exploration and experimentation that lies at the heart of innovation. A greater diversity of economic activities in cities facilitates greater knowledge exchange across enterprises and individuals.

Any discussion on the economics of cities will be incomplete without citing New Economic Geography's (hereafter as NEG) perspective. Paul Krugman's "Geography and Trade" (Krugman, 2010) is generally considered the beginning of NEG.

NEG's models implied that the geographical arrangement of an economy depends on a few fundamental parameters like transportation costs, scale economies, and factor mobility. NEG's models consider location forms to be the outcome of the interaction between agglomeration or centripetal and dispersion or centrifugal forces. Centripetal forces or increasing internal and external returns may "push firms to locate their activities in regions with bigger markets to be able to serve more consumers or where, through concentration of suppliers, the firm‘s input costs are lower than otherwise" (New Zealand Government, 2014) and to reap Marshallian trinity. Likewise, agglomeration returns may push households to locate in regions of bigger

agglomeration, say to reap the benefits of comparison-shopping, more and better job opportunities, etc.

Operating against the centripetal forces are centrifugal forces. Agglomeration also brings with it after some point diseconomies, say, increasing costs of land and labour, which are observed in cities across the world, and traffic congestion in increasingly many cities. Such increase in 'costs' and dispersed availability of natural resources act as dispersing forces. Certain sections of the people who cannot cope with the increasing 'costs' are push out to the fringes of the city (say slums and poor people colonies on the periphery of cities). The increasing 'costs' also restrict people from moving in.

Urban economics theory thus suggests that cities come about and expand due to external economies of agglomeration and knowledge. The gains from 'integrated' organization of economic activities led to denser habitations. Spatial proximity, contiguity, and density stimulated "efficiency in manufacturing, commerce and administration, which would have been impossible in a dispersed pattern of settlements... It is primarily economic forces that made cities grow, stagnate or decline" (Mohanty, 2014).

2.3. Urbanization as a Resource:

The world has witnessed Industrial Revolution (18th and 19th centuries), and many economies including India have also witnessed Green Revolution (20th century), and according to Mohanty (2014), the 21st century will witness urban revolution, predominantly in emerging economies. Exploiting this rapidly occurring urbanization as a resource through agglomeration economies enhancing, congestion easing, resource generating cities will generate huge prospects for growth, poverty alleviation, and rural development. Justifiably, in recent times urbanization has been increasingly gaining prominence in the global policy discourse. Perhaps, urbanization will be the single most critical policy concern for national, state, and local governments in developing countries (Ibid).

For long, urbanization studies in Third World countries forwarded the views of 'over urbanization', 'hyper- urbanization,' or 'Urban hypertrophy.' It was contended that,

"urbanization in the Third World countries are outpacing industrialization" (Hoselitz, 1955, 1957; cited by Mohanty, 2014), and that the rate of urbanization in relation to GNP per capita growth rate is "excessive" when compared to the experience of developed countries (Bairoch, 1988; ibid). Hence, "Third World cities were cramped by too many migrants 'pushed off' from agriculture.... 'queuing' for industrial jobs while seeking shelter in slums" (Todaro; ibid). Together with this conception of "over urbanization" thesis, the "Urban Bias" theories (suggesting 'biased' government policies in favour of politically powerful large cities (Lipton, 1977; ibid) portrayed a somewhat negative view of urbanization in poor countries. However, this view is now substituted by a new thinking led by urban economists who regard the current trend of urbanization in developing countries as a welcome development, while emphasizing the need to mitigate the accompanying urban issues. They suggested that over urbanization thesis is a fallacy, as they ignored economic geography and agglomeration externalities in cities. Besides, "the precarious state of cities in developing countries...[indicate] an anti-urban bias" (ibid).

To further build up on the thesis being advanced, we shall take up the case for cities as the prime generators of wealth of nation. "... Among all the various types of economies, cities are unique in their abilities to shape and reshape the economies of other settlements, including those far removed from them geographically" (Jacobs, 1984). The recognition of the advantages of larger cities goes back to the time of the ancient Greek. In his work, "Cyropaedia", Xenophon (c. 440-c. 355 BC), a student of the great philosopher, Socrates, "tells of the advantage accruing to a large, as opposed to small, city in the opportunity for specialization by trade-for division of labour" (Galbraith, 1991).

It is now a familiar established fact that cities are the economic growth engines. "Theoretical and empirical research suggests that agglomeration externalities, in interaction with knowledge externalities, act as powerful drivers of growth" (Mohanty, 2014). Urbanization is historically correlated with socio-economic transformations, and the United Nation's 'World Urbanization Prospects' (2015) captures this fact, "The process of urbanization...have brought greater geographic mobility, lower fertility, longer life expectancy and population aging. Cities are important drivers of development and poverty reduction in both rural and urban areas... urban living is

often associated with higher rate of literacy and education, better health, greater access to social services, and enhanced opportunities for cultural and political participation".

Cities present four kinds of basic gains: Economies of "density, scale, association, and extension. Density results in a reduction in the cost of interacting, learning, organizing, producing, transporting, consuming, and providing services. Scale economies, emanating from the sheer volume of economic opportunities, spread fixed costs and risks over large number of agents... [Association economies] reflect collaborative efficiencies in devising joint strategies, undertaking innovation, and inventing solutions. Extension economies are associated with cost efficiencies of cities from extending their organized strategies to other cities and rural areas" (Mohanty, 2014).

Cities are subjected to the above agglomeration economies, which make them storehouses of skill and capital; sources of formal as well as informal employment; hubs of knowledge and innovation; hopes of millions of rural-urban migrants; and generators of public financial resources for socio-economic development including rural development. Nagaland Vision 2030 (2016) document recognizes that "in the present century the urban areas are emerging as the 'engines of economic growth' as agglomeration and densification of economic activities stimulates accelerated economic growth and better opportunities. They are not only strategic centres of economic activity and living, but they are also critical for achieving inclusive growth as they provide ample social and economic opportunities". In short, cities are examples that increasing returns and positive external economies play an important economic function (Krugman, 2010).

Numbers too speak of the economic significance of cities. Urban-based economic doings and undertakings account for up to 55 percent of GDP in low-income economies, 73 percent in mid-income economies, and 85 percent in high-income economies (Mohanty, 2014). According to Mckinsey Global Institute analysis (2010), cities accounted for 58 percent of India's GDP in 2008, and is projected to account nearly 70 percent by 2030 (Also See Table 2.2 on the same subject, and Table 2.3 on agglomeration economies).

Against the backdrop of the increasing significance of and call for cities to be *robust, green, inclusive and sustainable engines of growth*, this chapter introduces Kohima city, the subject city. It is the capital urban agglomeration of India's Northeastern state of Nagaland. To set the stage for this, a brief mention on Nagaland state's society, polity and economy is made. The ensuing discussion is more of descriptive in nature with the intention to present a broad picture of the geographical, administrative, demographic and socio-economic profile of the city and its populace. References will be made to the data presented in this chapter in later discussion as and when required.

Table 4.2: Urban India's Share of Population and National Income

Year	Percentage Share of Population	Percentage Share of National Income
1951	17.3	29.0
1981	23.3	47.0
1991	25.7	55.0
2001	27.8	60.0
2007	29.7	62-63
2021		75 (Projected)

Source: Government of India (2014)

2.4. Development and Urbanization: Nagaland Context:

Geographically located in the India's extreme northeastern region (NER), Nagaland is a scenic mountainous state. "The State has [a] rich variety of forest and natural resource cover due to its unique geographical location and climatic conditions" (State Human Development Report, 2016), and shares an international border with Myanmar in the East, and inter-state boundaries with Assam in the West, Arunachal Pradesh and a part of Assam in the North, and Manipur in the south. The state is mostly hilly, excepting the plain regions bordering Assam valley.

Nagaland is home to sixteen major tribes that are known for their distinctly colourful cultures. Although the different tribes do not have a common language or a dialect (and hence English is their official language, a legacy of British raj), they have similar

cultures and traditions. The State consists of twelve administrative districts, with 144 sub-divisions, 26 towns and 1428 villages (Census, 2011).

Table 2.3:Empirical Findings on Agglomeration Economies

Studies' Authors	**Findings**
Shefer (1973)	Doubling city size upturns productivity in a group of 20 industries by 14-27 percent across US metropolitan areas.
Sveikauskas (1975)	Doubling city size upturns labour productivity in an average manufacturing industry by 6-7 percent in the US.
Kawashima (1975)	Responsiveness of output in relation to city size measured 0.20 in US metropolitan areas.
Segal (1976)	Labour productivity is 8 percent higher in US metro areas with population above 2 million than in remaining metros.

Source: Mohanty (2014)

Extending over an area of 16,579 square kilometers, the state's population is 19,78,502. Of which 71.14 per cent of the populace reside in rural spaces and 28.86 per cent in urban spaces. However, the level of urbanization in the State exhibits a rising trend from 15.54 percent in the year 1981 to 17.28 percent in 1991 to 17.02 percent in 2001 and further to 28.86 percent in 2011. Dimapur, the commercial hub of the state is the most populated district (19.14 per cent), and the least populated is the recently declared district (2004), Longleng (2.55 per cent). Also, Dimapur has the highest urban population (34.26 per cent of the state's total urban population), while Mon has the highest rural population (15.33 per cent of the total rural population of the State). Nagaland accounts for 0.16 percent of the India's total populace (Census, 2011; State Human Development Report, 2016).

As per Census (2011), 79.55 percent of the population was literate, which is above the national figure of 72.98 percent. Male literacy stood at 82.75 percent and female literacy at 76.11 percent (with gender gap of almost 6.60 percent), which is also above

the national averages of 82.14 percent and 65.5 per cent respectively. Around 90 per cent of the state's people are Christians, mostly belonging to Baptist denomination. Table 2.4 presents the demographic profile of Nagaland at a glance.

Table 2.4: Demographic Profile of Nagaland

Particulars	2001	2011
Total Population	1990036	1978502
Decennial Growth of Population (%)	64.61	-0.58
Density of Population (per. sq. km)	120	119
Percentage of Rural Population	82.26	71.14
Growth of Urbanisation (%)	17.02	28.86
Literacy Rate (%)	67.11	79.55
Literacy Rate-Male (%)	71.8	82.75
Literacy Rate-Female (%)	61.9	76.11
Sex Ratio (Female per 1000 Males)	909	931
Percentage of Workers	42.74	49.24

Source: State Human Development Report (2016)

Pre-colonial economy of the Nagas was agrarian, which as a matter of fact remains to be so even today with 71.14 per cent of the populace reliant on agriculture (State Human Development Report, 2016). Colonial rule brought money economy to the otherwise barter economy of the Nagas. The monetization process of the economy was catalyzed by colonial policies like the introduction of house tax, which was to be paid in cash. And in it, the largely alien concept of taxation to a government was obligated upon the Nagas[2]. The dominant practice of shifting cultivation was sought to be replaced by the more environmental friendly and more productive terraced cultivation practice, with the British government even conditioning the advancement of agricultural loans on changing to the later farming practice. Likewise, concomitant to bringing modern administration and modern formal education, modern economy was gradually brought to the Hills. Post-statehood, notable progress has been made in

[2] In some parts of the Naga Hills, certain *break away* villages paid a kind of tribute to their ancestral village. However, there was no practice of paying taxes to a ruling authority. The Nagas lived in independent self-contained sovereign villages.

terms of certain indicators of development, however, as highlighted in the last Chapter, much is still left wanting.

2.5. Kohima: A Village then, Now a Bustling City

The history of many Indian cities, including the metropolitan cities of Kolkata and Mumbai, traces back to colonial settlements. Analogously, history, or to be exact, colonial legacy did contribute to the gradual evolution of what was then a village into the now bustling urban agglomeration, Kohima city. The British officially gave the name 'Kohima', as they could not phonate the Angami tribal name 'Kewhima' or 'Kewhira.' Then under Assam, in 1879 Kohima was made the headquarter of Naga Hills District. In the history of British administration in Naga Hills, Kohima thus occupies an important place in being the first seat of colonial administration. Post-independence, when Nagaland became a full-fledged state under Indian Union in 1963, Kohima was made the state's capital. That the making of the state's capital had an agglomeration of people effect can be seen from the sharp increase in population (19.73 percent) between 1961 and 1963. This initial condition has resulted in a kind of path dependency with the city continuing to be an administrative seat (of government, of religious institutions, of tribal institutions, etc.), but has also occasioned a large market for trade and commerce. Today, it is fast emerging as a critical agglomeration centre of salience to the state and to the region.

2.5.1. Kohima: Topography

Kohima, like the other districts of Nagaland (with the exception of Dimapur district which is largely a plain city) is a hilly district. It shares its boundaries with the state of Assam and Dimapur district in the West, Zunheboto and Phek districts in the East, the state of Manipur and Peren district in the Southwest, and Wokha district in the North. And hence, the subject city of Kohima that comes under Kohima district is strategically located and acts as transit route for intra-state and inter-state logistics. Along with Dimapur and Mokokchung district headquarters, Kohima city is one among the three with Municipal Council in Nagaland (District Census Handbook, 2011).

2.5.2. Kohima: Population Growth Trend

While for the state as a whole, the decadal growth rate is negative (-0.48 percent), the district recorded a whopping 21.47 percent (Census, 2011). The population trend suggests a consistent growth trend within Kohima Municipal Council (KMC) Area as compared to the rest of Greater Kohima Plan Area (GKPA) (basic details of KMC and GKPA are briefed below). This trend reflects the pull factor of the city due to its administrative importance, trade and commerce (City Development Plan, hereafter as CDP, 2006). The population growth of KMC Area shows a consistent growth up to 1971 and thereafter the growth rate declined up to 1997 and began to stabilize since 1991 (See Figure 2.1). Notably, there must have a marked increase from 2001 to 2011, given the much higher population growth rate as well as urbanization rate (discussed in the next section), as compared to state's averages.

2.5.3.Kohima: Urbanization Trend

In 2001, Kohima was more urbanized with about 29 percent as compared to about 20 percent for the state as a whole (Census, 2001). In 2011, the proportion of urban population increased to 45.18 percent, while for the state as whole is much lower at 28.86 percent (District Census Handbook, 2011). We see that the difference in urbanization level between those of the district and the state has almost doubled (8 per cent in 2001 and 16.32 per cent in 2011). This reflects increasing urban agglomeration of people in Kohima city. Besides, "the increasing urbanization of Kohima is also clear from the fact that in 2005-2006, Kohima accounted for only about 13 per cent of the state's GDP in agriculture" (District Human Development Report, 2009).

The District Human Development Report (2009) attributes two reasons for the high level of urbanization observed in the city. *One* is the government employee coming from all over the state to work in the capital. The largest service sector employer in the state is the government. In 2006, 54.5 per cent of the city's populace was occupied in government sector works (CDP, 2006). *Second* is the "influx of rural populace in search of employment, to access better education facilities for children and better prospects for livelihood." CDP (2006) noted that 24.2 percent of sample population belonged to age group of 0-15 years followed by 71.8 percent of 15-55 years age group, which is basically the earning group. This pattern of age group distribution was recorded to be almost same for various income groups. Prominence of the young and

earning age group can be ascribed to the in-migration of people from surrounding districts to the city for job prospects. Recent data on these aspects is not available. As there are no large industries, the migrants who are not government employees work in an informal sector consisting of traditional handicrafts, a service sector consisting largely of retails or in construction.

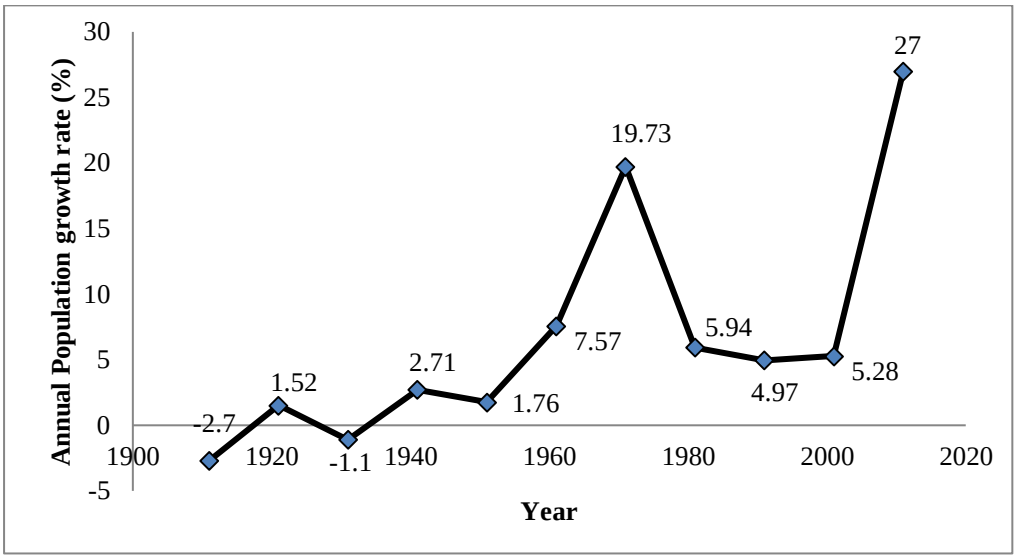

Figure 2.1: KMC Area Population Growth Rate: 1901 to 2001

Source: CDP (2006[3])

Kohima city, being the hub of administration, education, and relatively a larger job market, exhibit centripetal forces, and act as an agglomeration centre.

2.5.4. Kohima: Economic Profile

Kohima's economy is largely driven by public administration sector, and hence can be said as a services sector driven economy. This view is attested by the strong presence of retails and other small trading businesses and the virtual lack of any industries worth a mention. Poor urban infrastructure services continue to cripple the city from becoming an engine of growth.

2.5.4.1. Work Participation and Occupational Structure:

In 2005, around 43.6 percent of the population was reported to be in labour force, with the employment rate at 41.3, and unemployment rate at just only 2.3 percent. Such

[3] The last year is added from 2011 census, and pertains to the district as a whole.

high labour force participation was taken as the reason for the high per capita income at the city level[4] (CDP, 2006). The young, the old aged, and the housewives, and the other dependents constituted 56.4 percent of population who are outside the labour force. Table 2.5 shows the occupational profile of workforce under different income categories in 2005.

Table 2.5: Occupational Profile of Workforce in Percentage (2005)

Income Group	Occupational Profile					
	Agriculture	**Traditional Crafts**	**Hired Labour and Daily Wages**	**Own Shop/ Business**	**Government/ Private Sector**	**Others**
Below Poverty line (BPL)	25	5	45	25	0	0
Marginally poor (MP)	31.3	15.6	3.1	15.6	0	34.4
Low income group (LIG)	12.6	2.3	3.4	27.1	40.1	14.5
Middle income group (MIG)	5.2	0.9	2.1	18.3	52.6	20.9
High income group (HIG)	2.1	0.4	2.1	12.8	65.4	17.2
All	**5.7**	**1.2**	**2.5**	**17.5**	**54.5**	**18.6**

Source: CBD (2006)

As is evident in the table above, there were marked variations on the type of occupations the various income groups are engaged in. Among the LIG, MIG and HIG, maximum were engaged in government services, which reflects the fact that government sector was the main provider of employment. Notably, even today, Kohima economy continues to be a salaried economy. Within the BPL, 45 percent were engaged as hired laborers and daily wagers, which neither provide them assured source of income nor better wages (and hence poverty). The MP's were either engaged in subsistence agriculture, traditional crafts or small shops. The engagement of the BPL and the MP in these kind of marginal activities reflects the absence of any manufacturing based jobs within the city (ibid). Such absence continues and hence the employment profile may be more or less the same.

[4]This estimate is based on sample data, and hence may not be very accurate, especially the low unemployment rate, considering the fact that the state is facing a huge problem of educated unemployment.

The CDP (2006) reported that the labour force participation rate in Kohima dropped from 35 per cent in 1991 to 33 percent in 2001. However, though specific data on Kohima city is not available, in 2011, total workforce excluding marginal workers for the Kohima district had increased and stood at 37.09 percent (District Census Handbook, 2011). Thus, the rate may have increased for Kohima city as well.

The CDP (2006) further reported that there was an upturn in the percentage of overall marginal workforce (0.05 per cent in 1991 to 7 per cent in 2001). Notably, the rise in female marginal workers was more substantial (0 percent to 11 percent between 1991-2001). This growing marginalization of workforce was attributed mainly to the insufficiency of economic opportunities and the deficiency of requisite skill sets for the prevailing employment opportunities. However, there has been a positive turn in the trend with both the overall marginal workforce and that of female declining to 5.75 percent and 6.29 percent respectively in 2011 (the figure pertains to the district as a whole, but a similar decline in the city is tenable) (District Census Handbook, 2011).

Occupational profile of the city's populace shows that government sector is the largest employer with 54.5 percent of the populace engaged in the same. This is trailed by 17.5 percent having own shops and business (see Table 2.5). Table 2.6 depicts a similar situation even in 2011. What stands out from the stat is that the number under 'other workers' (most probably, mostly government employees) is huge, as compared to negligible numbers under the other three heads. Thus, the government sector continues to be the mainstay of the people.

2.5.4.2. Agriculture:

Kohima district as a whole accounted for around 13 per cent of Nagaland's agriculture GDP, reflecting increasing level of urbanization vis-à-vis the rest of the state (District Human Development Report, 2009). And more so, the share of Kohima city will be negligible (as reflected in Table-2.5 and 2.6 above), though in terms of market for agriculture output, the city might be the biggest. Like the rest of the state, paddy is the principal crop of the district. Crops like maize, jowar, small millets, barley; and pulses like arhar, moong and peas are also cultivated but their contribution to agricultural output is insignificant. Notably, the district produces more than 10 percent of all

commercial crops of the state. The district while being largely and increasingly urbanized, still has a significant agricultural sector (Ibid). Agriculture is still the mainstay for the district's rural populace (54.82 percent of the district's population).

Table 2.6: Occupational Profile

Classification	Number of Persons
Total Workers	34,935
Main Workers	32,770
Marginal Workers	2,165
Cultivators (out of Main Workers)	287
Agricultural Laborers (out of Main Workers)	72
Household Industry Workers (out of Main Workers)	261
Other Workers' (out of Main Workers)	32150

Source: (District Census Handbook, 2011)

2.5.4.3. Industrial Development:

The secondary sector of the city and for that matter the whole of the state is grossly underdeveloped and is limited to small-scale units. The government's new Industrial Policy (Nagaland State Industrial Policy, 2000), which was formulated to promote industrial development in the state has not been successful in its intent, and hence in enabling the investors to engender ample income and employment for the state's people. The CDP (2006) reported that in 2006, the city had 80 small-scale industries engaging on an average 6-7 employees. Most of the industries within the town were and continue to be mostly Micro enterprises like bakeries, auto-workshops, printing press, electronics-repair shops, wooden and steel furniture making, and likewise. As on 2012-13, Kohima has the second highest number of permanent registered Micro, Small and Medium Enterprises (95 enterprises) and generated 570 employments. Dimapur has the highest number of permanent registered MSME (146 enterprises) and generated 876 employments (Statistical Handbook of Nagaland, 2013). In line with the results from agglomeration studies, these two cities with the highest clustering of enterprises are the biggest agglomeration centres in Nagaland.

Raw materials, spare parts, and equipment for the workshops and small scale industries in KMC area is mostly supplied from Dimapur, Guwahati, Jorhat, Imphal,

Kolkata and Bombay. Some other required local raw materials are obtained from KMC area. The major constraints for industrial development include: Poor infrastructure (power, water and transportation) in the city; lack of storage and marketing facilities; lack of entrepreneurial skills and incentives; and high import cost of raw materials. The menace of unabated *levies* from underground factions, which is arresting the economy need to be checked in order to create a favorable business ambience. Then only private investment and sector will grow, which is badly needed to provide employment to the already high level and rising educated unemployed youths in the state. The demographic dividend should be put to use for the good of the economy and also to raise the living standard of the people, least the same become a social liability.

Kohima city and as a matter of fact, the industry deficient Nagaland state need industrial development, and hence the issues pointed out above merits immediate attention and intervention.

2.5.4.4. Trade and Commerce:

Although trade and commerce employed about 18 percent of the workforce in 2005, the activity was limited to and still continues to be in few wholesale and retail establishments selling consumable items of daily needs, hardware and other service shops. Most of the commodities sold here are imported from Dimapur, Guwahati, Jorhat, Imphal, Ludhiana and also from the four metropolitan cities in the country. Dimapur supplies rice, flour, edible oil, vegetables, sugar, tea, pulse, fruits, dry fish etc. besides automobile spare parts; Guwahati supplies plastic goods, stationery articles, books, medicines; Agra supplies leather goods; and shoes, whole cloths, woolen garments etc. are brought in from Ludhiana. The metropolitan cities supply luxury goods, synthetic goods, automobile parts, hard wares, machines, clothes, ready-made garments, stationery goods, medicines, etc. (CDP, 2006). This underscores the position of Kohima agglomeration centre as an important market (and hence economic growth) for the Northeastern Region (NER) and the entire country. This also calls for improvement in connectivity to further enhance this market linkage, especially to find outlets for the city products**.**

2.5.4.5. Tourism:

Endowed with natural scenic beauty and unique cultural heritage, Kohima along with the other districts attract several tourists from the country as well as from across the globe. The temperature in this beautiful and colorful state remains moderate and temperate throughout the year, neither too warm in summer nor too cold in winter. Thus, tourists can visit the state any time of the year making it one of the preferred tourist destinations in Northeast India. There are ample prospects for trekking, rock climbing, and jungle camping; and hence idyllic for adventurous travellers. It also offers limitless exploration possibilities in its lush and green sub-tropical rain forests where a plethora of flora and fauna is found. Besides, Nagaland has many places of tourist interests like Touphema Tourist Village, Riphym Tourist village, etc. The central government identified 51 tourism projects for Nagaland in the 11th Five Year Plan. This number is significant considering that Nagaland is second in the countrywide list after Jammu and Kashmir (88 projects). This speaks of the potential of the state in tourism sector.

Being relatively more accessible and the hospitality sector more developed than the other districts, Kohima draws larger number of tourists comparing to other districts. The major tourist attractions in Kohima district are the famous Commonwealth Second World War Cemetery, Second World War Museum, Sales Emporium, Khonoma village (the First green Village in the country), Dzukou Valley, Dzulakie and Japfu Peak. Besides, other tourist destinations in the state like Kiphere, Mount Tiyi, Doyang Dam and Ghosu Bird Sanctuary are accessible from the city. The best time to visit the city or the state is from November to April. Table 2.7 shows the domestic and international tourist arrival in the state in the past decades. The trend indicates a fluctuating trend. The CDP (2006) attributed this fluctuating and less than potential tourist in flow to travel restrictions such as RAP (Restricted Area Permit), as required by the Government of India, for foreign nationals and ILP (Inner Line Permit) for the domestic visitors to enter Kohima and other parts of Nagaland. Besides, connectivity issues, and the prevailing political problem act as dampeners.

2.5.4.6. Kohima: Quality of City Life

Cities are ultimately about people, and the quality of urban life is what actually matters. The quality of the lives of the people clustering in Kohima city can be gauged

from the Human Development Index (HDI) of the district. HDI value of Kohima increased from 0.64 in 2001 (revised figure, State Human Development Report, 2016) to 0.82 (a value comparable to developed nations, District Human Development Report, 2009) in 2008, and then declined to 0.66 in 2011, ranking second among the state's districts. Notably, Kohima was ranked second in 2001 as well. The 2008 figure appears an anomaly. Ignoring this inconsistent high figure, the data suggest that Kohima district has not registered any notable progress in the constituting indexes of HDI-economic development, health and education, and thus remains at *medium human development* category. It should be though noted here that the value will be higher for Kohima city, as the city pose of greater than 90 percent literacy rate, better healthcare facilities, and probably, higher income. Incase of Gender Development Index (GDI), though in terms of absolute score it registered a marginal increase from 0.54 in 2001 to 0.59 in 2011, Kohima registered a drop in rank (from second to third). A positive development is observed in case of Human Poverty Index (HPI), the absolute value of which declined form 33.13 to 27.84 reflecting headway in poverty reduction (its ranking at third place did not change). In all the three indicators, the district is relatively better off than most of the districts. However, as are evident from the index values, there is still a long distance to traverse in order to reach the maximum goalposts. Especially, the quality of life for those living in slums is deplorable.

Table 2.7: Number of Tourist Arrival (2000 to 2013)

Type	2000	2001	2009	2010	2013
Domestic	13268	29952	20953	21094	28945
International	451	920	1423	1132	2173
Total	13791	30872	22376	22226	31118

Source: Statistical handbook Of Nagaland (2013)

Six localities have been notified as slums, viz., North Block, Naga Bazaar, Kitsubozou/ Chotu Basti, New Market, Dak lane and Porter lane. In 2001, about 26 percent of the population of Kohima city lived in slums. Of the total BPL population of the city, those residing in the slum areas accounted for about 35 percent. The housing structure of this populace includes 'own House,' rented house and 'Kutcha

structure' (some of bamboo). Notable issues that the people here face include absence of physical infrastructure, vulnerability to landslides, choked drains (owing to dumping of waste), and frequent occurrence of diseases (reportedly high incidence of cholera and hepatitis) (CDP, 2006).

2.5.5.Kohima: Regional Setting

Being the capital city, Kohima is the key administrative, commercial (could be slightly second to Dimapur, which is the commercial hub of the state due to its rail and air connectivity), educational and religious center of Nagaland. Dimapur, the largest urban agglomeration of Nagaland, and sited 74 km to the west of Kohima, is where the closest rail station as well as airport are situated.

Kohima is well connected with all neighboring states and their capitals. Three National Highways, viz., NH-39, NH-61 and NH-150 connect the city. These highways traverse through, originate or terminate from the city. Kohima also has an immense potential to be an internationally connected agglomeration centre. The distance of Kohima from the India-Myanmar international border at Moreh is just 244 km. Furthermore, the city is located on the Asian Highway 1, the Transnational Highway envisioned to be India's gateway to Eastern Asia, ultimately connecting Delhi to Bangkok (Thailand) via Myanmar, Cambodia and Vietnam. Notably, Asian countries, in spite of their rich resources fail to utilize their vast potential for want of regional connectivity (Ivan Su et. al., 2011). Besides, studies (see Brooks 2008b; De 2008, 2008; Brooks and Hummels, 2009) have shown that countries with geographical proximity could benefit substantially from more trade, provided infrastructure and trade costs are improved. Thus, the proposed regional highway is a welcome development for the region, and also spells the regional importance of the district in terms of geographic location. The Figure 2.2 below gives an illustration of Kohima's regional road linkages.

2.5.6. Kohima: Transport

Kohima is neither connected by air nor rail. The nearest airport from the city is 74 km away in Dimapur district, the Dimapur Airport. The nearest railway station is also in Dimapur, the Dimapur Railway Station. An extension of the rail track from Dimapur to Zubza, on the outskirt of Kohima city was proposed and surveyed in 2009.

However, owing to compensation and other issues related to land acquirement, the rail line was resurveyed and a new alignment was proposed in 2013. Work on this finalized track has started.

Urbanization and development in Kohima spread across several hill branches interlinked by two major National Highways (NH-39 and NH-61) extending from east to west and north to south respectively crossway the city. And from the nearest airport and railhead, the city can be reached in about 2 hours. There are state government run bus services (Nagaland State Transport), and taxi services that are available from Dimapur at all times.

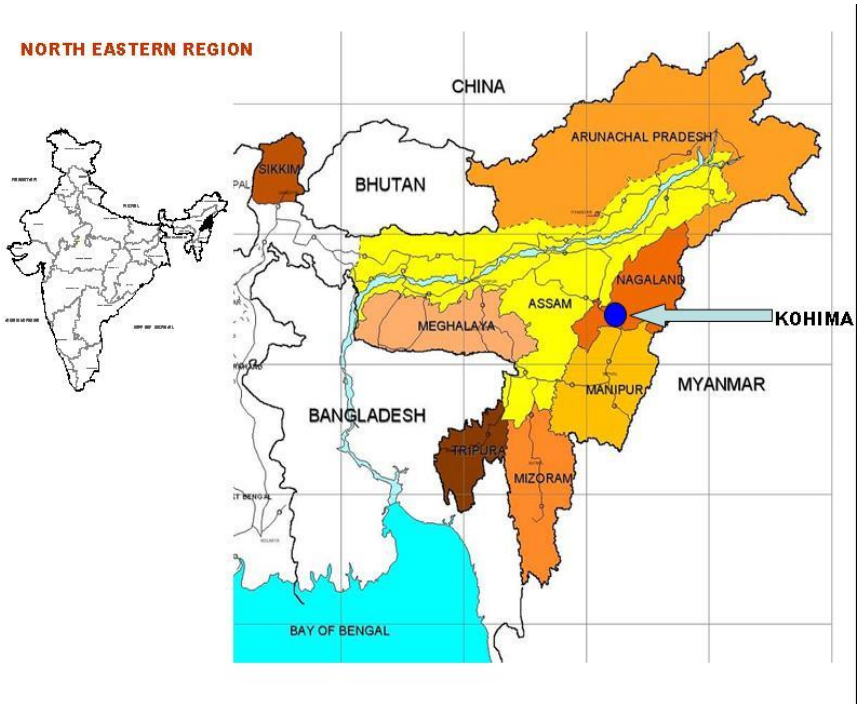

Figure 2.2: Regional Setting and Linkages

Source: CDP (2006)

The percentage total length of road of Kohima district in the State is 17.7 percent with a total of 2367.5 km as of 2003-04. More than 65 percent of the roads in the district are surfaced as compared to the State's average of 46.4 percent. Besides, the density of surfaced roads per square kilometers in the district (49.6 percent) is much higher than the State average for surfaced roads (37.6 percent). This indicates that the district is better off than other districts of the State with respect to road network and road

conditions. However, there are many issues that are crippling the districts' transport, some of which would be discussed in the next chapter (Kohima District Human Development Report, 2009).

The topographical setting of the city is such that very steep slopes and valleys separate each residential area from another. This creates problems for motor-able road infrastructure provision. Both Municipal operated buses (sanctioned under JNURM or Jawaharlal Nehru Urban Renewal Mission) and private operated buses provide mass conveyance service to the commuters in the city. Besides, there are taxis operated by private individuals. The traffic congestion observed on the city's road is of severe nature, and one of the issues that will be taken up in this study will be this and the resulting air pollution.

2.5.7. Greater Kohima Planning Area (GKPA):

For local governance, the Kohima city comes under Kohima Municipal Council Area (KMC). However, for city planning purpose, the city comes under Greater Kohima Planning Area (GKPA). The GKPA's extent is over a space of 63.36 sq. km. It encompasses Kohima Municipal Council Area (KMC), Capital Complex Area, Kohima Village (the second largest village in Asia), Mereima village, Ceisama village, Thizama village, and their adjoining cultivable and conservation areas. Notably, the GKPA's populace (2001) accounted for 33 percent of gross urban population of Nagaland (CDP, 2006). The same according to 2011 census is not available.

2.5.8. Kohima Municipal Area/The City of Kohima:

The Kohima Municipal Civic Body was formed in 1957, which was then a Town Committee, and hence named Kohima Town Committee (KTC). With the passage of time, its size and population rapidly increased necessitating the need for higher form of governance. Thus, in view of this and taking note of the fast urbanization trend in Nagaland, the government of Nagaland legislated the Nagaland Municipal Act in 2001. And under the provision of this Act, the erstwhile KTC was upgraded to Municipal Council in 2004.

KMC extends over a spatial area of 10.98 sq. km and accounts for 17 per cent of the Greater Kohima Planning Area (GKPA). However, even with the lower share of

planning area (GKPA), KMC consisted of 67 percent of the GKPA population (census 2001 figure) (CDP, 2006). As of 2011 census, the population under KMC was 98000- an increase of over 27 per cent from 2001 figure. The population trend suggests that the growth of population has been consistently increasing in the KMC area compared to the rest of GKPA probably due to the relatively better existing infrastructure facilities and livable condition compared to other parts of GKPA (Ibid).

The City is divided into different Colonies/localities. The colonies are enumerated below:

Table 2.8:Colonies of Kohima City

Sl. No.	Colony	Sl. No.	Colony
1	Kohima Town	20	Government High School Colony
2	Mission Compound	21	Rokabozou
3	Pezielietsie (Tinbatti)	22	Keziekie
4	Krouliezou	23	Porter Lane
5	Science College	24	Chandmari Colony (Upper and Lower)
6	Ministers' Hill (Old and New)	25	AG Colony (Upper and Lower)
7	Forest Colony	26	Lerie Colony
8	Electrical Colony	27	New Reserve Colony
9	Jail Colony	28	Aradhura Colony
10	Agri Colony	29	MohonKhola
11	Para Medical	30	BOC
12	Hospital Colony	31	Dzüvürü
13	New Market	32	P.R.Hill
14	Naga Bazaar	33	Kenuozou Hill (Upper and Lower)
15	Officers' Hill Colony	34	PWD Colony (Upper, Middle & Lower)
16	Dak Lane	35	Ziekezou
17	Kitsubozou	36	D Block
18	Seikhazou Colony	37	Keyake
19	Bayavü Hill (Upper, Middle & Lower)	…	…

Source: Authors tabulation (2018)

2.5.9. Kohima City as Cultural Centre:

Like the rest of the settlements of Nagaland, the indigenous tribals comprise the majority society in Kohima. An estimated 83.9 percent of the population in the city is Scheduled Tribes (2011 Census). Notably, since all the Naga population belonged to ST, 16.1 percent are migrants from outside the state. There are 16 major tribes in Nagaland and each tribe traditionally inhabits a distinct area of Nagaland. The mainstream indigenous hill-men and hill-women of Kohima District are the Angami and the Rengma tribals. Kohima city is the aboriginal homeland of the Angamis, and hence the Angamis comprise more than half of the city's populace. However, Kohima as the capital, is a cosmopolitan urban agglomeration with people of all the Naga tribes as well as mainland Indians dwelling here.

According to CDP (2006), more than 57.2 percent of the people were born within Kohima city followed by 37.4 percent of the people born outside the city but within the State. Also, the Middle and High Income Groups showed the maximum tendency of coming to the city from other parts of Nagaland to settle down (36.7 percent and 37.4 percent respectively). This shows the pull factor of the city for the MIG and HIG, which can be attributed to its administrative and commercial importance (Recent data on these aspects is not available). The coming of these groups contributes to market development and expansion, including those of high-income elastic retails of branded franchises, which are absent in smaller towns. This in turn creates employment opportunities and offers better wages, further accentuating the agglomeration process.

In 2005, 91.46 percent population of GKPA followed Christianity. The distribution almost followed the same trend among the various income groups. Only among the Marginally Poor (MP) income groups it was observed that about 71 percent of the sample population are Christians, 17.9 percent are Hindus and 10.7 are Muslims (CDP, 2006). This reflects that people migrating from outside the state to the city largely belonged to the marginally poor category. Of its population, 90 percent are Christians, 7 percent Hindus and 3 percent others (DHDR, 2009).

Given this multi-cultural and to some extent multi-religious social milieu, Kohima City witnesses a series of festivals year long connected to agricultural and religious calendar. The noted fiestas of the city are the Angamis' festival of *Sekrenyi* (celebrated

in the month of February) and the Rengmas' festival of *Ngada* (celebrated in the last week of November), and the fiestas of the People belonging to other tribes residing in Kohima, Hindu festivals like Durga Puja, Diwali, etc. Notably, since 2000, the annual Hornbill Festival celebrating the song, dance and culture of the entire state in a weeklong festivity is being celebrated at Kisama (on the outskirt of Kohima) as a State festival. This festival is now a major tourist attraction for both domestic and international tourists.

Kohima city by acting as a cultural centre promotes cultural interaction amongst people from different tribes, regions, religions, and cultures. This interface promotes national integration; and at the state level, helps lessen tribalism. There are direct and indirect economic costs that arise from tribalism or lack of social cohesion (say lack of labour immobility due to caste, tribe, etc.). With proper planning and policy intervention, thus, besides the agglomeration benefits, cities can help in nation building.

2.5.10. Existing Land Use Pattern:

The city that began its agglomeration journey as a colonial administration seat continues to be an administrative hub. Table 2.9 below shows the land use breakup in the city. Notably, 45 percent of the area was under administrative uses in 2006, which accounted for the highest, followed by residential at just 7.8 percent. The nature of land use within Kohima is mixed land use with the residential establishments having shops and business in the ground floors (CDP, 2006). Thus, the low percentage of commercial land use (0.25) will be a slight underestimation, and concomitantly, the percentage of residential area will be slightly lesser. Commercial buildings are generally of multi stories, consuming disproportionately lesser area of land. Besides, vegetable vendors sell their goods along the road, without putting up a proper structure. This is said to underscore that Kohima is a trade and commerce centre.

2.5.11. Central Business Districts in Kohima City:

Von Thunen's theory posits declining density of population and land rent with an increase in the distance from the city center. And standard Alonso-Muth-Mills model postulates that lower commuting cost offset the higher house rent in and around city centre (Mohanty, 2014). These theories can offer explanation to the spatial spread of

population in KMC. The population densities within KMC vary considerably from around 30 to 200 persons per sq. km. Areas like D Block, New Market, Midland, Upper Chandmari and P.R. Hill areas are the densest areas in the city. This is because the bazaars, shops, business establishments and government offices are mostly concentrated in these areas of the city (CDP, 2006). Or conversely, business establishments came about and expand because of agglomeration of people (hence demand and market), initially government employees trying to save on commuting costs, followed by others. Whichever direction the agglomeration happened and is happening, as suggested by urban economics, there is bound to be circular causation, until congestion diseconomies sets in. These denser habitations can be construed as the *Central Business Districts* in the context of Kohima city.

Table 2.9: Land Use Pattern

Land use	**Area (Ha)**	**Percent**
Residential	533.6	7.85
Commercial	16.83	0.25
Administrative	3065	45.07
Industrial	2.4	0.04
Recreational	3.37	0.05
Transportation	4.6	0.07
Paramilitary Forces, Nagaland Police	36.7	0.54
Agricultural land use	208.63	3.07
Cremation Ground, Burial grounds and water bodies	3.56	0.05
Jhum cultivation	28.6	0.42
Conservation Area	2897.5	42.61
Total	**6,801**	**100.00**

Source: (CBD, 2006)

As is usually the case of smaller cities where the *mall culture* has not yet taken root, the entire commercial area (Super Market, Tibetan Market, Khedi Market, KMC Market) extends along the main roads of the city, viz., NH-61 and NH-39. This suggests a linear *central business district*. The CDP (2006) without specifying the reasons observed that the said area lacked space for growth and expansion. And that, therefore, buildings with two to three floors have come up in the commercial areas.

This may be due to topographical (like steep slopes) or land inconvertibility reasons (say, refusal of residential house owners to re-locate). Notably, for geological reasons, the Urban Development Department and KMC have mandated that building height should not exceed 49 feet, i.e., 5th floor.

Congestion diseconomies have apparently set in, arguably due to inertia of policy formulation and intervention. Some of the issues in these market areas include traffic jams, lack of parking space, limited space available for warehouses, and "absence of well-defined framework for development of shopping and commercial areas" (Ibid). There is thus an imperative need to alleviate these issues through efficient policy intervention, so that agglomeration economies can be reaped.

2.5.12. Physical Growth Pattern:

Kohima city as described above is sited on a ridge with a number of hills and vales. Numerous areas are precipitous with cliff landform and hence not habitable. Besides, the entire city is vulnerable to landslides owing to its geology. Every year, landslides especially on the eastern and western slopes occur causing morbidity and mortality of lives and damages to property. Thus, the availability of geologically hospitable land has primarily commanded the existing physical growth pattern. The existent physical structure of the city is more or less "linear," with much growth concentrated lengthways the major roads, especially National Highways 39 and 61 (CDP, 2006).

The future direction of physical growth will also be controlled by geological characteristics such as availability of habitable land and accessibility. And based on these, CDP (2006) has projected that urban growth is likely to take place around the existing developed areas and in the northern parts along NH-61, where IT center and Nagaland University are located. The establishment of the New Secretariat in the northern side is also going to trigger development in and around it. Moreover, this portion of the city is more stable, and less vulnerable to landslides. Towards the southern direction, the reserved hill forests of *Pulie Badze* act as the de facto boundary. The CDP (2006) noted the following physical and institutional constraints to development and growth: military garrison area; woodland areas; privately owned land under customary laws (explained below); landslide areas and steep slopes.

The State Government is currently working to develop the city towards the northern direction, but is facing land acquisition issue-which is a major issue in Nagaland. The L-Khel clan of Kohima Village who owns the land is reluctant to sell it. Within the KMC jurisdiction, the natives of Kohima, Ceisama, Mereima and Thizama Villages own most of the land. The land value in the city is reported to be generally much lower than those in similar locations in Aizawl and Gangtok. These lands, however, cannot be acquired under Central laws, due to the constitutional protection of land and resources of land accorded to the Naga tribals in Nagaland by Article 371A. Hence, it becomes a constraint for the city's development (ibid). Government has been able to obtain only 50 per cent of the required land (2000 acres) for developing the New Capital Complex (Ibid), reflecting the huge hurdle of acquiring land.

2.5.13. SWOT Analysis of Kohima City:

Towards a relevant, comprehensive, integrated and an effective city development strategy, SWOT (Strengths, Weaknesses, Opportunities and Threats) assessment of a city is, if not indispensable, of immense utility for policy makers. Based on the detailed profiling of Kohima city done in this chapter, Tables 2.10, 2.11, 2.12, and 2.13 highlight the notable (and not in anyway exhaustive) Strengths, Weaknesses, Opportunities and Threats of Kohima city respectively.

Table 2.10: Kohima City Strengths

Sectors	Strengths
Location and Linkages	Transit point; Strategic regional setting; Centre of administration, education, culture, etc. National Highways, NH-29, NH-2 and NH-150 pass through the City; Kohima is only 244 km away from the India-Myanmar border at Moreh; Kohima is located on the only currently pliable road transport route to Manipur; all these make it a major transit hub in the Northeast Region.

Tourism Potential	*Cultural Heritage:* Kohima as a cultural centre of all the Naga Tribes; Nagas are known for their reputation of trust and hospitality; Good English Proficiency; Kohima hosts the now internationally known annual cultural festival, 'Hornbill[5].' *Historical Heritage*: The famous 'Stalingrad of the East', or the Battle of Kohima was fought in the City, which is today memorialized by the Commonwealth War Memorial (sited within the city); A World War II Museum has also been established at Kisama Heritage Village in the outskirt of the City; All these, with its *picturesque landscape*, draw tourists from across the world.
Trade and Commerce	Relatively large and expanding markets for goods and services (including locally made handicrafts and handloom products); export of traditional arts and crafts.
Human Capital	91 percent literacy rate in the city; Potential for IT sector (the State ranks second in terms of State Web Portal in India).
Institutions	Presence of a number of NGOs; Active community participation [6] ; Strong indications of improved service delivery from KMC[7];
Safety Perception	Towards a Safe City, steps have been taken[8].

Source: CDP (2006), DHDR (2008), Smart City Proposal (2017), Author's observation

Table 2.11: Kohima City Weaknesses

Sectors	Weaknesses
Infrastructure	On-street road parking leading to road encroachment; Poor Traffic Management and Inadequate public transportation, with unstructured and inefficient bus service system (long stoppages for passengers to board, etc.); Severe traffic congestion [9] ; Inefficient planning of Taxi stands and

[5] In 2015, 2.34 lakh tourists flocked to Hornbill (Smart City Proposal, 2017)

[6] Of the 91 percent of waste collection efficiency, 40 percent was achieved by community participation (ibid).

[7] Successful projects under KMC include solid waste management, city abattoir, mapping of households for property taxation, etc. KMC savings is growing at a rate of 10 percent annually (ibid).

[8] 8 high mast light has been provided at major junctions for greater security; 860 Street lights has been installed to reduce crime and theft in public place (ibid).

[9] Smart City Proposal (2017) reported that, "47 percent of the [city] citizens considered *poor road condition* as the major problem in transportation sector priority voting, followed by *traffic congestion* attaining 32 percent" (italic mine).

	inadequate amenities for the taxi drivers; poorly maintained drainage[10]; acute shortage of water during dry winter season; Frequent power outages; Insufficient mobile and internet connectivity[11]; All these adversely affect the productivity of economic activities in the city.
Regulatory and Governance	Poor implementation of the notified building byelaws, development regulation, fire and other norms; hence the observed haphazard, unregulated and unplanned growth of the city. Declining space for public utilities, public spaces. Lack of lung spaces/ open spaces. Negligible land ownership under the City administration, which can be converted into public utility or recreational spaces[12].
Trade and Commerce	Poor infrastructure; limited industrial base; lack of business capital in the community and from financial institutions[13].
Heritage Conservation	Lack of awareness among the people towards heritage conservation.
Environment	Vulnerability due to poor drainage and landslides; poor living condition; contamination of piped water with sewerage; air pollution.
Slums	Poverty; all Slums located in environment sensitive areas (vulnerability from landslides).
Institutional capacity	Lack of technical skills amongst KMC staff; non-implementation of 74th Constitutional Amendment Act.

Source: CDP (2006), DHDR (2008), Smart City Proposal, Author's observation

Table 5.12: Kohima City Opportunities

Location and Linkages	Potential for international trade center: geographical proximity to ASEAN countries; Asian Highway-1 (slated to connect India with South East Asia countries of Thailand, Cambodia, Vietnam, etc.) passes through the city.
Urban Renewal/Development	Prime land can be unlocked for development in the city centre by consolidating all government offices

[10]In an Environment Sector voting, 59 percent of the city citizens reported about storm water mixing with wastewater (ibid).

[11] Under the ICT sector priority voting, 78 percent and 22 percent of the citizens reported receiving poor telecom services and inadequate Internet facilities respectively (ibid).

[12]45 percent of the citizens were of the opinion that an *individual land right* is a major obstacle in road expansion(ibid).

[13]Credit Deposit Ratio of Nagaland is reported at 0.27 as compared to the national average of 0.78. From this, we can gauge that credit availability is low in the state and in the city (SHDR, 2016).

	in the new secretariat complex and relocating military establishments outside the city core; extensive geo-spatial mapping has been carried out by the city administration (this can be used for spatial planning, etc.).
Infrastructure:	The neglected pedestrian network of the city can be invigorated to create 'walk-able city,' easing traffic congestion and improving the overall environmental and residents' health in the city; the approved 4-lane bypass will also lessen the problem of narrow road along the highway and also congestion in the city.
Tourism	'Brand Kohima' can be created by implementation of visual enhancement codes and regulatory compliance. Kohima, being a hill city has vantages along the roads with picturesque views of the valleys and distant hills. Value addition can be made to these vantages, and transformed them into city landmarks for the residents as well the visitors. The rich historic and cultural heritage, especially the unique festivals of Nagaland can be further leveraged to promote tourism as a key economic driver. Transit tourism by leveraging the envisioned development of Asian Highway 1. Rich local crafts have the opportunity for attracting businesses and shoppers.

Source: CDP (2006), DHDR (2008), Smart City Proposal, Author's observation

Table 2.13: Kohima City Threats

Infrastructure	Increase in pressure on infrastructure from high population growth; unhealthy living conditions: poor quality of water, lack of adequate Solid Waste Management; absence of sewerage network; slums, etc.
Institutional and Fiscal Reforms	Inadequate capacity building contributing to non-implementation of reforms; inadequate fiscal reforms for implementing projects and provision of infrastructure in a sustainable manner.

Disaster Vulnerability	Kohima City is on Seismic Zone 5, and is highly vulnerable to structural collapse due to earthquakes; landslides, especially during monsoons, are another threat to the dense and haphazard urban growth; limited open spaces makes it difficult to create evacuation areas or shelter zones.

Source: CDP (2006), DHDR (2008), Smart City Proposal, Author's observation

2.6. Conclusion:

The State of the World's Cities Report (2008) elegantly brings out the salience of cities, and the critical function of governance and planning in making and keeping "their ascent into greatness":

> "Cities contain both order and chaos. In them reside beauty and ugliness, virtue and vice. They can bring out the best or the worst in humankind. They are the physical manifestation of history and culture and incubators of innovation, industry, technology, entrepreneurship and creativity. Cities are the materialization of humanity's noblest ideas, ambitions and aspirations but when not planned or governed properly, can be a repository of society's ills. Cities drive national economies by creating wealth, enhancing social development and providing employment but they can also be the breeding grounds for poverty, exclusion and environmental degradation" (United Nations, 2008).

What emerges from the above discussion is that Kohima city exhibits agglomeration economies, and is in terms of socio-economic indicators, relatively better off than almost, if not all the districts of the state. For varied reasons and potentials, the economic salience of Kohima as an agglomeration centre for the state and the region is immense. It is the administrative nerve centre; an important transit route for intra-state and inter-state logistics; a hub of education and healthcare; a market for jobs and goods offering better remuneration for the produces of the state's farmers and of other states. Notably, it has the prospects to become an important international agglomeration centre in the foreseeable future, with the fruition of Act East Policy. Towards realizing all these potentials, and to achieve a sustained economic

development and growth of Kohima, the urban policy should leverage the strengths and opportunities of the city (some of which are highlighted in Table-10 and Table-12), mitigate the weaknesses and threats (some of which are highlighted in Table-11 and Table-13), of the city.

It is quite apparent that the planning and development strategy of Kohima city has not considered and incorporated key elements from the theories and applications of urban economics, transport economics and environment economics. As a matter of fact there has not been any attempt of comprehensive and integrated transport, agglomeration and environment strategy. The upshot of this is the many urban challenges confronting the city (highlighted in the forgoing discussion), with urban mobility as one stark major problem, as will be perceived in the later chapters, that is keeping the city in a standstill; hence the focus of this study. To convert these urban challenges into opportunities, policy makers and planners need to understand the economics of cities, transport and environment (which are taken up in the next Chapter) and plan and act towards an agglomeration economies augmenting, congestion mitigating, and resource generating Kohima city.

Chapter 3
Urban Transport Development Strategy: Exploring Links Between Growth, Environment, Cities and Transport

3.1. Background:

Humankind, through out history, has been altering his environment to his comfort, or in economics lexicon, in the pretext of growth and development. Particularly, subsequent to the *industrial revolution*, the extraction and modification of nature have been ongoing at an ever-increasing proportion without any brakes. Roadways have made inroads to virtually all hills and vales; bustling cities have sprung up in nearly all islets, deserts, coasts, and other forms of landscape, with human-made structures touching the sky; humankind have been diversifying economic activities to myriad kinds. Humankind has shaped and molded the earth to such an extent that a new human-influenced geologic epoch-the *anthropocene* has dawned. No doubt, much has been achieved in terms of material wellbeing. However, all these are not without ill consequences. It is now cliché to hear, 'this year or this decade is hotter than the last; polar ice caps are melting rapidly; sea levels are rising; species are going extinct; extreme weather phenomena are now common; and so on'. Extension of transport networks and cities account to a large extent in bringing about this environmental change. We are living in a time of environmental crisis.

The increasing understanding and awareness of these new realities has led to a new discourse that try to shift away from the dominant anthropocentric view to a broader ecological perspective of looking at human material progress. "By the 1960s, the adverse environmental impact of unbridled economic growth was becoming clear. Books like Rachel Carson's Silent Spring set the tone for an environmental movement" (Rajagopalan, 2011). This was followed by an international action to address the emerging issue. The first such global initiative was the UN Stockholm Conference on Human Environment in the year 1972. The next highly significant step was 'The World Commission on Environment and Development' (1987). The Commission's report, 'Our Common Future' (1987), also known as Brundtland Report (after its chairman), "emphasized the need for an integration of economic and

ecological systems". Besides, the Report also "defined and supported the concept of sustainable development" (Ibid). The most recent significant development is the Paris Climate Accord (2015) to constrict global rise in temperature to well below 2 degree Celsius. A passing comment can be made of the current global policy discourse on urbanization, as the present study focuses more on urban environment. In the New Urban Agenda (2016) that we mentioned earlier, the threat of climate change to cities is acknowledged. The UN member states thus, under the Agenda, committed to preserve and promote the "ecological and social function of land in cities" (ibid), and to facilitate the sustainable management of natural resources in cities and human settlements in a manner that "protects and improves the urban ecosystem and environmental services and reduces greenhouse gas emissions and air pollution" (ibid). *Sustainability* as a policy objective has now being factored in almost every policy discourse and design.

It is now generally acknowledged that both an expanding economy and a clean-healthful environment are desirable. This entails that not all growth paths are *apposite*. To get to an apposite growth path, as close as possible, the need for prior exploration of the relationships and dynamics between economic growth and environment cannot be overstated. Along similar line, this Chapter attempts to survey the links and dynamics amongst the variables of interest for the current study, viz., transport, cities, economic growth and environment. For an urban transport development and management strategy that addresses growth and environmental concerns, the same is also warranted. We begin with economic growth and environment.

3.2. Economic Growth and Environment:

A review of the existing literature suggests that some scholars tend to argue in the line of 'environment versus economic growth (or development).' This implies that there is a tradeoff between environment and growth. As has been alluded above, more scholars hold the view that both an expanding economy and an uncontaminated and salubrious environment are desirable. This kind of thinking has presented a kind of dilemma for policymakers, as they often have to try and promote economic growth and pursue environmental protection simultaneously. The problem is accentuated by the possibility that the pursuit of the former objective may hinder the realization of the later goal, and vice-versa. However, some literatures are in the line of 'environment

and growth (or development)', arguing that 'growth versus environment' need not always be the case, and that growth and environmental protection through regulation[14] are both possible in certain cases. For instance, some scholars (Porter 1990; Templet 1995, cited by Feiockand Stream, 2001) have argued that looking at this problem as a trade-off is false. It must be noted though that to put all the literature under these two categories may run the risk of oversimplification. As must have been noticed, this section is titled 'Economic Growth and Environment' subscribing to the later line of arguments.

Economic growth, or the increase in the output of goods and services in an economy, comes about either because of an increase in inputs or technological progress (productivity enhancements), or both occurring simultaneously. Concurrently, these two factors can put a limit or slow down economic growth. A typical illustration of this is the Cobb-Douglas Production function, which can be expressed as:

$$Q_t = Ae^{rt} K_t^{a1} L_t^{a2} E_t^{a3} O_t^{a4},$$

Where K, L, E and O are capital, labor, energy, and other resources; A, a1, a2, a3, a4, and r are constants; and t is the current year. With an increase in inputs, if the sum of the 'a' exponents is equal to 1, constant returns to scale exists; if it's greater than one, increasing returns to scale exists; and if it's less than one, diminishing returns to scale exists. To bring out the role of technical progress, the above equation can be rewritten in the form of growth rates as:

$$Q'/Q = r + a_1 K'/K + a_2 L'/L + a_3 E'/E + a_4 O'/O$$[15]

It can be gleaned from the equation that the growth rate of output (Q'/Q) is equivalent to a weighted sum of the growth rates of individual inputs and r, which is taken to represent technical progress. Thus, as long as $r > 0$, growth can continue, even if the other independent variables in the equation remain constant.

Historically, in the economic growth process, that is, in the use of inputs and technology being employed, far too many environmental bads have been produced, with far too few environmental goods. Broadly, these environmental bads include "the extinction of species and varietal forms; loss of habitat and range; and destruction of

[14] Environmental regulation can be command and control type, or market based instruments. The efficacy, desirability, and practicability issues of the two broad methods are not looked at here, as this does not seemed required. Standards environmental economics textbooks deal with those aspects.
[15] The growth rate of any variable Y is denoted as Y'/Y

soil's function as a location of essential ecological and hydrological processes" (Sinha and Nongpluh, 2014). However, it's not always the case of economic growth but also the lack of it that has caused environmental bads. "Deforestation," for instance, "is caused in part by the migration of landless peasants into the forests, seeking a plot of land to work." Besides, the world's most polluted (air, water, and land) cities are not found in the rich countries, but in the poor countries (Tietenberg, 2003)."Dealing effectively with these environmental problems, and the human sufferings that lies behind them, will require raising living standards" (ibid), which is possible only with economic growth or development. This follows the view of 'economic growth and environment,' as opposed to 'economic growth versus environment.'

Going forward, the inputs substitutability and technological progress will determine whether the economic growth will trot a *green path* or a *brown path*. The inputs in the above equation can be either substitutable or complimentary. Of prime importance in the present context is the case whether capital and energy, or to be exact, fossil fuels (which has contributed much and continues to add to global warming) would remain complimentary or whether capital (a reproducible asset) will substitute fossil fuels, and 'fuel' the growth process with lesser emissions or without emissions. If environmental consideration, say global warming mitigation, requires a reduction in the use of fossil fuels, but the same is not replaced by cleaner fuels, and it continues to be a complimentary to capital, economic growth would take a beating (ibid).

If technological progress results in the productivity of energy (fossil fuel) input, say by means of more fuel-efficient machinery, then besides helping to solve the impending drag on economic growth from the finiteness of environmental resources, it will help mitigate environmental pollution. Against this backdrop, the fast technological innovations that is leading to cleaner technology, enhancement in productivity of conventional sources of energy input and other inputs, and in harnessing non-conventional sources of energy input and other inputs, is welcomed. Going forward, in them lays the hope for green growth path.

3.3. Transport and Economic Growth:

The principal role of transport is to provide access between spatially separated locations for the business as well as household sectors, for freight and passenger

movements. Transport plays a major role in the interactions between 'market size' on the demand side and 'specialization' on the supply side that leads to economic growth. In this context, it brings to mind Smith's (1776) famous line, "as it is the power of exchanging that gives occasion to the division of labour, so the extent of this division must always be limited by the extent of that power, or, in other words, by the extent of the market".

The questions apropos the link between transport and growth (or development) have been of interest to economists for sometime now. The significance of transport sector to economic growth has now been extensively researched, especially in the 1990's (Pohang, 2003). Today, studies abound asserting that transport and economic growth are correlated, at least at the aggregate level. Theoretically, four relationships are possible: (i) the causality runs from transport activity, i.e., changes in transport activity cause changes in economic growth, and concomitantly, poor access and travel conditions inhibit potential economic growth; (ii) the causality runs from economic growth, i.e., growth in the demand for travel depends on economic growth; (iii) the causality is bi-directional, i.e., both affects each other; and lastly (iv) there is no relationship, i.e., the apparent correlation does not imply that one causes the other (Ecola and Wachs, 2012).

The economic contribution of transport investments or policies can be assessed from various perspectives. Broadly, they can be categorized into two. First, microeconomic level, for example, productivity effects at enterprise or household-level. Or as in cost-benefit analysis done for transport policies or projects, effects on summative economic welfare i.e., the combine of consumer and producer surplus. Second, macroeconomic level; for instance, contributions to investment, employment, or Gross Domestic Product, and the spatial patterns of economic activity.

The same can be considered in terms of supply side approach or demand side approach. To grasp this, for instance, investment in transport infrastructure, by increasing aggregate demand for intermediate inputs from other sectors can stimulate *multiplier effects* and thus directly raise economic growth. Likewise, higher growth necessitates additional transport infrastructure. "So, two related hypotheses now exist in the literature about the nexus between transport infrastructure and economic

growth. These are, respectively, transport infrastructure led-growth hypothesis (TILGH), and growth led-transport infrastructure hypothesis (GLTIH)" (Eddington, 2006).

It is also true that demand for transport is a derived demand, and depends on the socio-economic profile of an economy. However, it cannot be treated solely as a derived demand, preceded by economic growth. For improvements in transport systems may themselves upturn the demand for transport via promotion of growth. The United Kingdom's Standing Advisory Committee on Trunk Road Assessment (henceforth as SACTRA, 1999) specified the following six mechanisms by which transport improvements could, in principle, improve economic performance through: (1) Reorganization or rationalization of production, distribution and land use; (2) Through effects on labour market catchment areas and hence on labour costs; (3) Increases in output resulting from lower costs of production; (4) Stimulation of inward investment (5) Unlocking inaccessible sites for development (6) Triggering growth which in turn stimulates further growth.

Now, the question obviously arises, of the two approaches alluded above, which one is better? Most macroeconomic studies investigating the relationship between transport and growth "omit the *wider economic, social and environmental impacts* not accounted for by the narrow definition of GDP" (Eddington, 2006, italic mine) Besides, a considerable extent of the benefits accruing from transport improvements "do not affect the market economy, but take the form of socio-economic benefits to non-business users of the transport system" (ibid). For instance, people making social and recreational trips value the benefits from reduced travel times and better access in socio-economic terms, but such are not counted in GDP terms. Such studies, therefore, understate "the true magnitude of the relationship between transport investment and the performance of the economy" (ibid). Thus, the link between transport and productivity is best demonstrated through the micro-economic approach. However, this is not to suggest that macroeconomic approach should be totally done away with. Such studies are also important, in fact, in some cases more appropriate in answering certain research questions.

3.3.1. Spatial Effects of Transport: New Economic Geography (NEG) Perspective:

Transport infrastructure structures space and determines mobility. In the light of this, NEG's perspective is also used to explore the links between the transport system and regional development. Krugman (1991; 1998; cited by New Zealand Government, 2014) showed that by reducing the cost of transporting goods between locations, which decreases the effective distance between two points, transport improvements could promote trade, increase competition and variety, and facilitate specialization in economic activities. Infrastructure does form an important factor in determining spatial location of economic activities and population centers. Production activities or industrial clusters occur because of visible and invisible agglomeration economies. The former refers to the economies derived from the interaction among scale economies, cost of transportation and market size. The later refers to the invisible external economies like information spillovers. Paul Krugman and those in his footsteps focused on the former.

NEG's models help support the claim that infrastructure policy is a form of industrial policy (Straub, 2008, cited by New Zealand Government, 2014). This can be understood from the fact that investments in infrastructure (including transport) do have effects on locations of economic activity. Technically, it means that infrastructure services are an input to both households' and firms' consumption and investment decisions. And thus, changes in this input, that is to say, variations in the availability and quality of infrastructure will crucially influence spatial decisions of households and firms, which are reflected in migration of existing firms and households, establishment of new firms or fixed capital investment in different locations (Ibid).

From the foregoing discussion, it is not difficult to see that NEG focus largely on tangible external economies, and not much on invisible economies, because, as Krugman (2010) puts it, "once you start invoking information spillovers to explain agglomeration, it's a bit too close to just assuming agglomeration". And this emphasis on visible externalities has made NEG less relevant to advanced countries of today, where invisible externalities are becoming more pronounced, although it did explain

the industrial locations of the 20th century, and basically this is one of its strong critiques. A critical appraisal of NEG is, however, not the intention here.

NEG perspective can be very useful for making a case for infrastructure development in less developed economies; in understanding industrial clusters in fast developing countries, like China and India; and certainly for the relatively much less developed state of Nagaland among the Indian states, where the tangible externalities argument stands quite relevant, and where transportation cost is certainly a determining factor.

For firms and households, locating in urban concentrations may mean neglecting distant markets. And this is where transport costs become "important in determining the balance between agglomeration and dispersion forces, as both forces diminish as transport and trade costs decline" (New Zealand Government, 2014). To put this into perspective, with the decline in transport cost, households and firms can take advantage of distant market, without relocating their economic activities. In passing, thus, the importance of transport in maintaining equilibrium between the two can be underscored here, and more so as this section largely emphasizes the gains from transport.

Against the backdrop of the discussion so far in this section, it is not hard to note one policy trade-off arising from NEG's perspective and growth model in the form of spatial equity as against efficiency. This trade-off between the two has two main implications. On the one hand, infrastructure investments that facilitate transport between industrial regions, say by building or improving major road corridors, may tend to increase both regional inequality and national growth. On the other hand, infrastructure policies facilitating transport within poor regions will have the opposite effect of decreasing regional inequality, but may also constrain national growth (Ibid). These two points will become clearer in the next paragraph. Thus, this trade-off is crucial in assessing the likely regional impacts of transport investment, and should be duly noted.

A corollary question to the above trade-off is then under what conditions transport investment will benefit the target region? Or to put it differently, under what conditions an outward flow of investment and jobs would occur? SACTRA (1999)

suggested the following key issues. First, scale economies; for instance, where these dominate, lower transport costs through improved accessibility may encourage an increased concentration of firms in core regions, until the point where diseconomies set in. Second, size of the local market; for instance, larger the market, larger the attraction. Third, local land and labour conditions; for instance, cost of land, Marshallian trinity case. Fourth, the nature of backward and forward linkages in the local economy. Lastly, the nature and scale of transport improvements. However, SACTRA (1999) also stated a word of caution, noting that the interplay of these factors is indeterminate. That is to say that it is impossible to predict outcomes using theory alone, and hence it concluded that the impact of improved transport links on regional economies is context-specific and must be assessed on a case-by-case basis. Thus, it is crucial to look at these aspects, while deciding to bring about regional balance through investment in transport. More on this subject is discussed in later section.

3.3.2. Mechanisms of Reduction in Generalized Costs:

From the standpoint of those using the transport system (say, general commuters for work, education, social commitment, etc.; and firms for business trips, etc.), a key aspect is the cost of using the transport system-monetary and non-monetary costs. While monetary costs include fares, tolls, fuel and other vehicle operating costs, and so on, non-monetary costs mainly include the quantum of time incurred on a journey, and the quality, i.e., reliability and comfort level of travel. Thus, any improvement in the transportation system is bound to cause reduction in these costs to the benefit of all transport users. And these reductions feed through to impact the economy through a variety of mechanisms. Eddington (2006) showed how transport interventions initially affect the generalized costs of travel for existing transport users, and then how such cost reductions translate into various downstream effects on the economy. He defined seven categories of downstream impacts on the economy, which he called "micro-economic drivers of productivity or Micro Drivers Mechanisms":

> "(1) Increasing business efficiency through 'time savings' and improved reliability for business travellers, freight and logistics operations; (2) Increasing business investment and innovation by supporting economies of scale or new ways of working; (3) Supporting clusters and agglomerations of economic activity; (4) Improving the efficient functioning of labour markets, increasing labour market flexibility and the accessibility of jobs; (5) Increasing

> competition by opening up access to new markets; (6) Increasing domestic and international trade by reducing the costs of trading; (7) Attracting globally mobile activity to the UK by providing an attractive business environment and good quality of life" (ibid).

Eddington (2006) also reported that the impacts that the transport system can have on economic performance would "be of *different magnitudes at different times and in different places*. For a developing economy whose transport system is not yet well established, the emphasis is on quantum leaps. But once a country's transport system is more established, the emphasis tends to switch to more incremental improvements to the transport system and its operation — as required by demand changes and as made possible by ongoing technological advances, efficiency improvements and regulatory changes. The links between transport and the economy then become more complex, with transport investment having to meet multiple objectives, rather than just solely to maximize contributions to economic development. These may include improvements in safety, travel conditions, accessibility, environment, integration and social inclusion." And in line with the above arguments, he concluded, "since most developed economies have well-established infrastructure networks, the relationship between transport and economic prosperity is likely, therefore, to be a more incremental one." And he added that, nevertheless, "it is a *relationship which is still of considerable economic significance*" (Italic mine).

3.3.3. Transportation and Productive Capacity:

Transport sector functions as an input in the production function of many activities. An efficient and smooth-running transportation infrastructure expands an economy's productive capacity by increasing the mobilization of available resources, and by enhancing the productivity of those resources. It can facilitate resource and employment mobility in response to shifting economic activity, say, in response to the forces of globalisation, new technological opportunities, and rising part-time and female participation in labour markets located in different space (ibid). Pradhan and Bagchi (2013) convincingly argued for this assertion. First, transportation infrastructure enters the production process as direct input and mostly as an unpaid factor of production. Second, transportation infrastructure makes other existing inputs more productive (For instance, a well-designed road allows goods transportation to

market in lesser time reducing the transportation cost in the production process). Third, a region with relatively better transport accessibility acts as a magnet of regional economic growth by attracting resources from other regions.

It is reported that the time that people spend travelling has varied very little in the modern era (averaging typically 60 to 70 minutes per day), but the distances travelled per person have increased substantially. This has allowed people to make "longer but faster trips", in order to "take advantage of destinations and opportunities that would previously have been too difficult to access" (Government of New Zealand, 2014). All these have resulted in increasing the productivity of the people and concomitantly enhance the economy's productivity directly or indirectly. Likewise, transport improvements can allow businesses to trade over a wider area, increasing competitive pressure and providing consumers with more choice (Eddington, 2006).

IMF (2014, cited by Economic Survey of India, 2015) noted that public infrastructure investment, "if efficiently implemented", positively affects the economy in two ways. "In the short run, it boosts aggregate demand and crowds in private investment due to the complimentary nature of infrastructure services. In the long run, a supply side effect also kicks in as the infrastructure built feeds into the productive capacity of the economy". In short, the backward and forward linkages of transport investment create multiplier effects. While analyzing India's productivity surge during 1980's, Rodrik and Subramanian (2005, cited by ibid) "acknowledge[d] a possible productivity boosting role of public infrastructure investments."

3.3.4. Transport and Agglomeration Economies:

Historically, the generalised costs of transport have tended to fall as a proportion of the total costs of goods and services, as transport technologies and efficiencies improved. The continual overcoming of the *tyranny of distance* that augmentation in transport system brings about lead to scale economies. In other words, a fall in transportation cost and a rise in the ease of movement contribute to market expansion including development of new market, and expansion of cities. In similar fashion, transport improvements can expand labour market catchments, improve job matching, and facilitate business-to-business interactions. And as Smith argued, this will lead to specialization, knowledge spillovers and other agglomeration economies. To reap

these economies (or attracted by these economies), more producers and consumers agglomerate in cities, increasing the land value in the form of agglomeration rent. Eddington (2006) reported that transport's contribution to such effects is most significant within large, high-productivity urban areas of the UK, London in particular. He also noted that such productivity effects extend across commuter catchment areas, dropping away after forty minutes of travel time.

Agglomeration economies refer to the benefits or increasing returns that accrue to consumers, firms, or industries, which may be either internal or external to them, resulting from spatial agglomeration of producers and consumers. Examples are like knowledge spillovers, comparison-shopping, sharing of common infrastructure, bigger markets, etc. To derive or to enhance agglomeration economies, and of course to minimize agglomeration diseconomies (e.g., congestion, pollution etc.), the need for quality and well-planned transport network is unparalleled. As noted above, it is the regions with relatively better transport accessibility (of course, ceteris paribus) that attract resources from other regions and thus leads to further agglomeration-a case of Myrdal's cumulative causation of growth. It is a fact that the most accessible lands are generally put to the highest and best use, and hence tends to be more developed. These accessible land gets what is known as accessible premium (say in the form of higher rent), which inaccessible land do not enjoy.

3.3.5. Investment in Transport and Private Investment:

Private investment generally tends to flow along quality roads and other transport modes (although private investment does depend crucially on other factors or other soft infrastructures). Thus, it is not surprising that underdeveloped areas lacking pathetically in private investment also lacks transport infrastructure. As noted above, transport network contributes to market development including development of new market, and concomitantly attracts private investment bringing employment opportunities and other benefits. Besides, improvements in accessibility can transform an otherwise unattractive location into an attractive location in terms of private investment.

Transport is a key component of public capital investment. And public investment in the short run boost aggregate demand and in the long run boost productivity.

Empirical evidence abounds as to the positive correlation between public and private sectors investments. The boom in private corporate investment during the high growth phase during 2004-05 to 2007-08 was accompanied by an increase in public investment by 1.5 percent. And a decline in public investment by more than 1 percent during 2007-08 and 2012-13 was accompanied by a general decline in private corporate investment by more than 8 percent. Further, after allowing for a lag of five years between infrastructure spending and economic growth, the former can explain around 1.5 to 2.9 percent of overall growth (Economic Survey of India, 2015).

3.3.6. Spatial Spillover Effects of Transport Infrastructure:

Transport infrastructure by its very nature has an important spatial impact, say on the location of households and firms. The role of spatial spillover effects associated with transport infrastructure has received increasing attention in the literature. Most studies have supported a positive spillover effect (Dundon-Smith and Gibb, 1994; Pereira and Roca-Sagales, 2003; Pereira and Andraz, 2004; Cohen and Paul, 2004; Cantos et al., 2005; Gutierrez et al., 2010; Tong et.al, 2013), while some have found negative spillover effects (Boarnet, 1998; Cohen and Monaco, 2007; Sloboda and Yao, 2008). Also, few studies have found mixed or no spillover effects of transportation infrastructure on economies in different sectors (Holtz-Eakin and Schwartz, 1995; Kelejian and Robinson, 1997; Jiwattanakulpaisarn et al., 2010).

To take a case of spillover effects from transport, for instance, the construction of an interstate highway could improve the network by connecting states efficiently, thus leading to the redistribution of existing resources for production (Cohen, 2007; Jiwattanakulpaisarn et al., 2009). Conversely, economic activities could be reallocated from states with poor transportation infrastructure to states with well-maintained transportation systems. Thus, the construction or improvement of transportation infrastructure in one state could adversely affect the output of private sectors in neighboring states with less developed transportation infrastructure (Boarnet, 1998). Interestingly, Yu et.al (2013) found out that changes in spillovers among regions are closely associated with the migration of production factors in China during the last decades.

On the question of spatial spillover effects of transportation infrastructure on a specific sector, Tong et.al (2013) concluded that "road disbursement in a given state has positive direct effects on its own agricultural output." Further, their analysis showed that "enhancement in road infrastructure in the states in the US central region has a larger positive spillover effect on agricultural output when compared to coastal or border states." This finding is of particular interest given the central location of Kohima vis-à-vis the other districts of the state and those of neighbouring states.

3.3.7. Transport infrastructure and Human Capital Accumulation:

Without adequate provision of transport infrastructure the targets of 'universal education and universal health care' would be practically impossible to attain for want of accessibility to interior rural areas. Transport is also indispensable to bring other socio-welfare services to people living in previously less accessible areas. In other words, to take development to previously poorly connected and backward areas, or to bring the fruits of growth to everyone, especially to those who are in the remote places, connectivity is required. In essence, transport is an indispensible infrastructure for a nation's socio-economic development (Esfahani and Ramirez, 2003; Phang, 2003; Sanchez-Robles, 1998; Shah, 1992; Short and Kopp, 2005; Wang, 2002; WDR, 1994; Pradhan and Bagchi, 2013).

3.3.8. Transport and Regional Development:

It is often the case that enhanced accessibility of particular areas brought about by building new or improving existing roads augments the attractiveness and hence increases land value in such areas, irrespective of whether the land is meant for residential, commercial or other private investments. Thus, good road access is a major factor influencing the location decisions of commercial or industrial firms. And herein lies the possibility of skewed regional development, which assumes greater salience in the milieu of economic *liberalization*, with the private sector being envisioned as the prime mover of the economy.

Improving access to underdeveloped areas with previously poor access does not necessarily increase the development of such areas relative to other areas. There may be employment gains in some sectors, losses in others (for example, the distribution sector). This is the *two-way road issue*. And hence, it is also argued by some that

improvements in accessibility to underdeveloped areas will not be a sufficient condition, and still some argue that it may not even be a necessary condition to stimulate economic growth in such areas.

Breheny (1995) argued that investment in road would bring about a significant difference only in cases where it is the only missing feature of a strong economy, where it removes a constraint to the spread of development pressures in the region concerned. Government of New Zealand (2014) report concluded that, "there is very limited evidence, from either theoretical or empirical studies, on the net effects (as distinct from the gross effects in the area directly affected) on the development /employment effects of enhanced access. In general, it is likely that most of the gross effects represent transfers from other areas." Nevertheless, when the objective is to bring about regional balance, certainly transport is too important a factor to ignore. Adequate and quality transport is a must to bring about regional parity, for infrastructure is one crucial factor in attracting private capital, which backward areas lack.

3.3.9. Transport as an Additional Factor:

Having discussed at length the gains from improved transport infrastructure and services, we can arguably (perhaps risking overestimation) conclude by regarding transport as an additional factor per se. For it is not hard to gauge the technological and knowledge diffusion potentials and other myriad positive externalities that can emanate from the same. Transport as a separate factor can be incorporated in different production functions. Econometric modeling on transport and growth proceeds in similar fashion. For illustration purpose, we return to the Cobb-Douglas Production function employed earlier, but now with one more specific input, transport:

$$Q_t = Ae^{rt} K_t^{a1} L_t^{a2} E_t^{a3} T^{a4} O_t^{a5},$$

The specifications are same as earlier, with T as transport input. Rewriting this in terms of growth rates:

$$Q'/Q = r + a_1 K'/K + a_2 L'/L + a_3 E'/E + a_4 T'/T + a_5 O'/O$$

In the above equation, with an increase in T'/T (increase in transport input), Q'/Q rises by more than the increase in T'/T, because the upsurge in T'/T also makes r>0. Here, r>0 captures the positive externalities that growth in T'/T occasions. In the traditional Neoclassical framework of growth, the r>0 will be regarded as exogenous, while

accounting for only the increase in T input. In the more recent endogenous growth model, marking a sharp departure from the former, r>0 is also held as endogenously determined within the model.

3.3.10. Transport's Contribution to Economic Growth and Development: Empirical Evidence:

Particularly, "since the late 1980s, research measuring the influence of transportation infrastructure on economic output and productivity at various geographical levels, i.e. national, regional, and less aggregated jurisdictional areas, has quickly emerged" (Tong et.al, 2013). In the past few centuries, the now developed economies around the world experienced step changes in connectivity through new transport technologies, beginning with the widespread use of canals in the eighteenth and early nineteenth centuries, followed by steam ships and railways in the nineteenth century, and then the development of affordable car travel and the completion of the strategic (motorway and trunk) road network in the twentieth century.

Eddington (2006) stated that there has been a compelling link between the transport system and economic prosperity throughout history. He commented, "History is full of examples of how transport networks have played a critical role in driving phases of particularly rapid economic growth. Step changes in connectivity, often associated with new transport (and more recently communications) technologies, have often been of particular significance."

It is noted by the District Human Development Report (DHDR, Kohima, 2009) that one significant factor that helped Angamis (the native of Kohima district) emerge as dominant tribe of Nagaland from early days is due to "its geographical character of the territory they occupied and the advanced technologies they imbibed." Geographically, Angami settlements are well connected with the region of Assam on the west and Manipur on the south. And from both regions they adapted and improved upon their use of technology in agriculture, craftsmanship, trade and other livelihood techniques including a highly advanced form of wet terrace rice cultivation.

Many studies have been done using econometric tools to further understand and quantify the nature of relationship between transport and growth. Mody and Wang

(1997) concluded that transport has had a positive impact on economic growth in China. Fernald (1999), using data from twenty-nine manufacturing industries from 1953-1989, found causality from roads to productivity. He further posited that the productivity decline in the US manufacturing after 1973 might be attributed to lower public spending on road infrastructure.

Llanto (2007), using data on road quality for both the total road network and local road network, finds that the quality of roads has a positive and significant effect on regional growth. Likewise, Canning and Bennathan (2000), using cointegration methods for a panel of forty-one countries, found that the length of paved roads is highly correlated with physical and human capital. But they also noted that the marginal return to roads declines rapidly if the length of roads is increased in isolation from other inputs. This implies that infrastructure investments are not sufficient by themselves to yield large changes in output. This finding is in line with that of Gannon and Zhi (1997), who also concluded that transport access is complementary to other services such as health and education.

Results from studies by Fan, Jitsuchon, and Methakunnavut (2004) in rural India, China and Thailand consistently showed the importance of road investments in promoting economic growth and poverty reduction. In India, public investment in rural roads was found to have had the largest positive impact on agricultural growth (Fan, Hazell, &Thorat, 1999) while in China and Thailand, road investments were found to have contributed significantly to growth in non-farm sectors in particular and overall economic growth in general (Fan, Zhang, & Zhang, 2002, 2004).

3.4. Transport and Environment:

In the production and provisioning of transport services, costs of both pecuniary and non-pecuniary nature are involved. The current section is concerned with environmental costs, which are of non-pecuniary social costs nature. Transport despite being an indispensable component of economic activity (as has been already discussed), has a number of negative environmental impacts. Broadly, these environmental bads can be categorized into two in terms of geographical and temporal incidence: (1) Pollution and;(2) Land-take (Tietenberg, 2003; Button, 2010). All these do not constitute as ‘costs’ from an individual point of view, and hence do not feature

in an individual's decision making. However, they are 'costs' of unmatched importance from societal point of view that need to be incorporated in the collective as well as individual decision-making.

In terms of scale of impact, Pollution emissions category can be further divided into three sub-categories. First, *local pollution,* which includes vehicular emissions (like SO_2, CO_2, PM_{10}, etc.,) that pollute city ambient air; disposal of obsolete cars that pollute soil and water; noise[16], etc. Second, *regional pollution,* for instance, pollutants from non-point mobile traffic source (like SO_2 and NO_2) causing acid rain; maritime spillages from oil tankers, etc. Finally, *global pollution,* for instance, CO_2, and CFCs (Chlorofluorocarbon) from transport causing global warming and ozone depletion respectively. These costs are not of opportunity costs type. They are costs incurred as a result of *by-products* that accompany the production process of transport infrastructure (say in the manufacture of cars) and services. Hence, they don't feature as 'costs' from individual producer or consumer points of view, unless consciously seen from societal perspective. Thus, divergence between private costs and socials costs generally arises, calling for environmental policy intervention. In case of pollution from transport sector, this can be illustrated in terms of private and social trip costs.

The private trip cost is the cost per commuter, and hence is the same as average cost. It is the sum of the money cost (say, Rs.10 per km.) and trip-time times the opportunity cost. For instance, if the commuter is a worker, his private trip cost will also include his trip-time times wage per unit time (say hour) besides money cost. Social cost on the other hand is the sum of private cost and external cost. It is associated with the last or marginal vehicle, and hence is a marginal cost.

An individual will commute by private car as long as his/her willingness to pay for the trip (marginal benefit) exceeds the private trip cost. From microeconomics, we learn that each point on the demand curve represents willingness to pay. Thus, the intersection between the demand curve and private trip cost curve will give the equilibrium traffic volume and equilibrium trip cost. Analogously, the intersection

[16]Not withstanding echnological advances in terms of acoustics from vehicles, as traffic volume and movements increase, noise levels increases, creating 'disamenity' effect. This 'cost' is now beingfactored in government compensation schemes (Hanley, Shorgen, and White, 2004, cited by Tietenberg, 2003).

between the demand curve and marginal or social trip cost will give the optimum social traffic volume and the associated equilibrium trip cost. Now using average cost and marginal costs analysis, the divergence between private and social trip costs, i.e., the externality cost is graphically worked out.

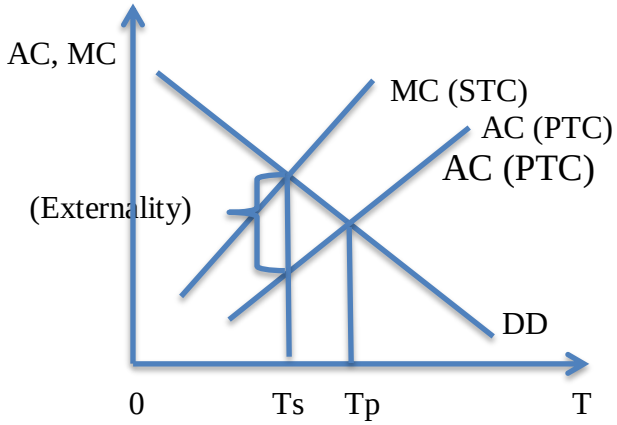

Fig. 3.1. Private and Social Trip Costs

In fig. 3.1 above, the x-axis measures total number of vehicles per lane hour (T), and the y-axis measures AC and MC. From the private individual point of view, Tp number of T is optimum. However, from the societal viewpoint, Ts is the optimum, and Ts<Tp. This divergence is because while the private commuter does not consider the externalities, the society has to consider in its reckoning the externalities that has been generated with additional T (TsTp). The portion in the diagram marked externality is the externality cost, and it has to be internalized or removed by bringing down T to Ts level. Here, it should be borne in mind that the reduction in T should be done considering development and welfare dimensions, in a manner suggested in the theoretical model on congestion mitigation (discussed in Chapter-4).

The second category of environmental costs, *Land-take costs* represent opportunity costs. The construction of transport infrastructure (like roads, railways and airports) results in social costs owing to the loss of ecosystem services in the form of aesthetic forfeiture from defaced landscape beauty, loss of wildlife habitat, islanding effects (disruptions to wildlife movement corridors due to fragmentation of habitat), loss of cultural heritage sites, archeological sites, etc. (Tietenberg, 2003).

It is clear that transport is a double-edged sword; it entails both benefits and costs. To eliminate the environmental costs attributable to transport itself entails costs, both mitigation costs and opportunity costs in terms of the forgone benefits from transport. Often to the angst of environmentalist groups, "economists tend to, therefore, think in terms of optimizing the level of pollution rather than 'purifying' the environment entirely" (Button, 2010). Arriving at an *optimum* is possible, as externalities can be 'valued' using valuation techniques (although not fully free from limitations) like Hedonic prices (revealed prices), travel cost method, stated preference, etc. Adopting from Button (2010) and refining over the same, the case of *optimal environmental improvement* can be graphically illustrated.

In fig. 3.2 below, the vertical axis measures money value of cost and benefits from environmental improvement, measured along the horizontal axis. The incremental costs of say, emission reduction, is likely to rise with the installation of more advanced cleaner combustion engines in cars or in production of cleaner fuels. Thus, the MC curve will have a positive slope. From the public's perspective, the incremental benefits are likely to fall with continual improvements, as they are "likely to be relatively less conscious of lower levels of emission and be aware that many of the seriously toxic material are likely to be among the first to be removed in the clean-up program" (Button, 2010). Thus, the MB curve will be of the shape depicted in the figure. In passing, note can be taken of the clearly anthropocentric approach being adopted in the valuation technique of this kind, in the sense that the extremely hard to quantify *costs and benefits* to the biodiversity at large are often not considered.

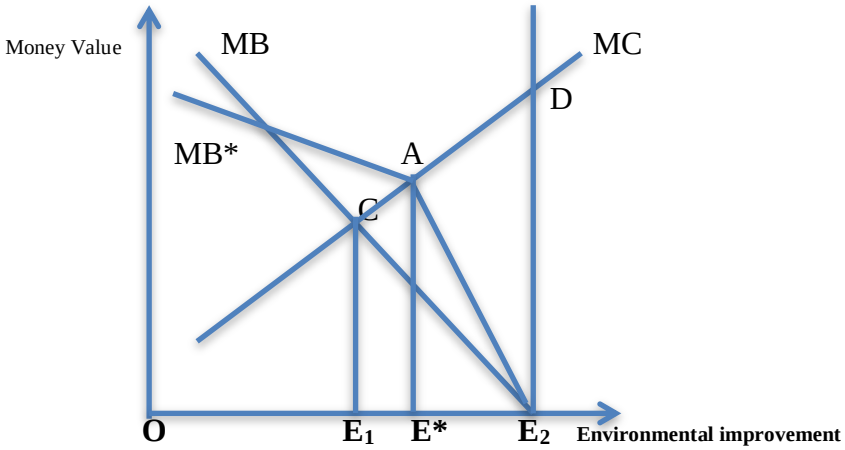

Fig.3.2. Optimal Environmental Improvement

The optimum level is that determined by the intersection of MC and MB curves, i.e., E_1, beyond which MC of further environmental improvements exceeds MB. Any improvement beyond OE_1 is sub-optimal, and if preceded up to OE_2, a net welfare loss equal to the area of CDE_2 in the figure arises. In essence, "when talking about the excessive environmental harm caused by various forms of transport it is important to remember that this is an excess above the optimal level of pollution, not above zero pollution or some perceived 'pure' environment" (ibid).

The value and hence benefits perceived by the people depends on their, inter alia, information and economic status. In essence, the likelihood of perceiving higher benefits as against the cost incurred on improving an environment goes up with an increase in information (say regarding ecosystem services) and economic status (poor people are relatively less likely to consider environmental issues). The MB curve will then take the shape of MB* (see figure 2), MC curve remaining unchanged. Accordingly, the *optimum* increases to E*, with the net welfare loss constricting to ADE_2 in the event of environmental improvement till E_2. This is mentioned to underscore the importance of information dissemination (through awareness campaigns or otherwise), and the case of economic development for environmental improvements.

3.5. Transport and Cities:

We have appreciated earlier (in Chapter 2) that one condition required for cities to come about and expand is *transport* to facilitate exchange. Given the enormous significance of transport in socio-economic terms, it is no wonder that in the history of human civilization, most economic centers flourished along riverbanks and coastlines. For instance, the Indus Valley Civilization (in Indian subcontinent), the Nile Valley civilization (in Egypt), the Yellow (Hueng He) River Valley Civilization (in China), to mention the prominent ones, where waterways supported the movements of raw materials, goods and labour. "The growth of many of the world's greatest cities is linked to their locational advantage of being along a waterway, facilitating movement of labour and raw materials as well as shipment of products to regional, national, and international markets" (Mohanty, 2014). Further, on the role of transport in the success of the New York City cluster, Paul Krugman summarized, "…there has been no important commercial traffic on the Erie Canal since 1850, yet

the head start that the canal gave to New York City has allowed New York to remain the largest US city to this day." With the dawn of new modes of transportation, cities with no water-related advantages also sprang up (Mohanty, 2014). For instance, mass transit railways played a significant role in the making of cities throughout the world (Government of New Zealand, 2014).

"Transport cost savings can be viewed as a type of pecuniary agglomeration effect, which may draw firms to a large city when both its market and suppliers are located there" (Brueckner, 2013). Even when the market for finished goods and suppliers of inputs are far apart, "transport costs will affect where firms locate and thus will influence the formation of cities" (ibid). The interaction between scale economies and transport costs determine the choice between centralized or dispersed production for any firm. Centralized production (in one bigger city) will take place if in the reckoning of firms, the sum of the transportation cost and production cost (i.e., total cost) in such arrangement is relatively lesser in comparison to dispersed production in multiple regions. In other words, the former "will be favoured when scale economies are strong and transport cost are low... since strong scale economies lead to a substantial production-cost saving advantage for centralized production, while low transport costs mean that this advantage isn't offset by the cost of shipping out the output" (ibid).

Transportation costs consideration also determines the location of production centres, depending on whether the production in question is weight losing or weight gaining. Given the fact that shipping costs exhibit economies of distance[17] (ibid), it will be most cost efficient to locate near the market incase of weight gaining production process, and to locate near the source of raw material incase of weight losing production process. *Where* the firms locate, there are the employment centres, to which the workers will flock; and in this way, influences the formation of cities. The current times of globalization of a scale never seen before, is made possible and continues to be driven by high-speed transportation (and communication), which presents "unique opportunities to cities to benefit from scale and network economies" (Mohanty, 2014).

[17] It refers to the fact that the shipping cost of a unit shipment per mile falls with the distance shipped, as the fixed terminal cost (say, cost of loading a shipment) declines with the same.

3.5.1. Urban Transport and Urban Land Use Pattern:

Historically, transport is one factor of prime significance that shaped the pattern of land use in urban space. Von Thunen's land rent model, explaining agricultural land rent differentials in an otherwise homogenous space, is perhaps the earliest work on the problem of land allocation to alternative uses. He argued that transportation cost savings account for the land rent differentials. Haig (1926, cited by Button, 2010) applied this thesis of Von Thunen in an urban context arguing that, "site rentals are charges which can be made for sites where accessibility may be had with comparatively low transportation costs." These site rentals are part of the 'price' that brings about locational equilibrium[18], wherein, ceteris paribus, the highest bidder (by outbidding his rivals) gains ownership of the most accessible land. This is how, in essence, accessibility costs enters or partly determines land use pattern.

Cities of the past, or in the initial stages tend to be mono-centric or exhibit "concentric pattern of development around the main rail (or occasionally port) terminal," because "local, distributional services evolved much more slowly" (Button, 2010). A stylized illustration of spatially mono-centric city, adopted from Button (2010) is given in terms of fig. 3.3. Today, cities are multi-centric with employment centers spreading across a city. However, to bring out the role of transport cost in the determination of the shape and form a city takes spatially, this perhaps over simplified illustration will do just fine. The wealthy having the willingness and ability to pay for the available transport and large plots of land, reside in the outer rings of the cities. Those industries and commerce for which the trade off between site rent and transportation costs works out to be more profitable in locating at the city core or within the inner rings (say, due to agglomeration economies, and hence higher revenue potential) bid higher and locate accordingly. Likewise, the poorer people or those without the ability or willingness to pay high transportation costs; and for economic reasons or otherwise, those with low preference for large sites bid higher for smaller sites and locate accordingly in inner area. What then emerges of a city's geography is the form depicted in figure-3[19].

[18] Locational equilibrium refers to a situation where there is no incentive for a firm or household to change its current location.

[19]For a similar illustration in terms of bid-rent curves, see Button (2010).

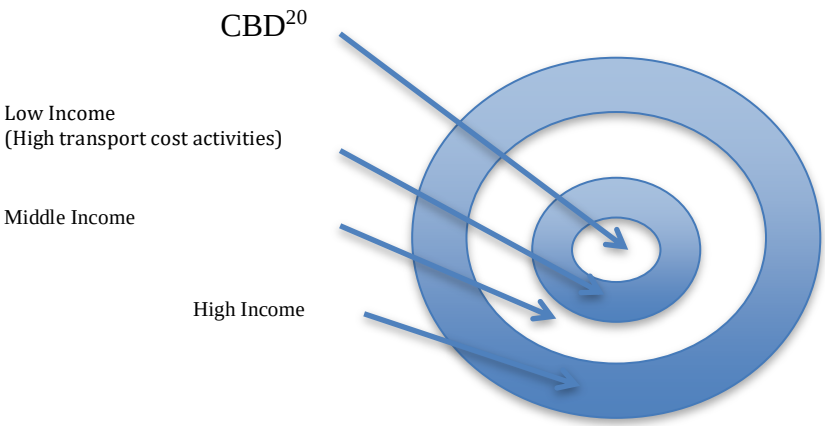

Fig. 3.3: Concentric Distribution of Population and Activities

The gradual advances in transport system and the availability of the same influence the spatial forms and shapes that cities take on. For instance, "the introduction of motorized public transport (initially the tramcar and later omnibus) followed by the motor car encouraged the growth of an axial pattern of urban land use…in ribbon development along the main road arteries" (Ibid). Kohima city represents a case in point of Ribbon development. Today, "the widespread adoption of the automobile, combined with improved road system, has led to the growth of multi-nucleus cities where there are numerous sub-centers and suburbs" (ibid).

As mentioned above, modern cities are multi-centric, with some extremely huge in terms of geographical spread. This phenomenon is the result of multiple factors. Economic growth (first in the form of agricultural surplus) contributed to the emergence and expansion of cities, with the later feeding into the former by acting as engines of growth, leading to a cycle of cumulative causation. The accompanying burgeoning of population, and the rapid urbanization that took place (and is taking place) accelerated the process of expansion of cities. For reasons of agglomeration economies, retails of similar kinds (in terms of products sold); related firms (in terms of raw materials, intermediate inputs, social overhead, or finished products); and households (sharing certain common attributes like income, culture, caste, etc.) cluster in distinct locations, leading to spatially segregated cities. As opposed to this organic evolution, Urban Planning authorities have also resorted to 'zoning' of cities

[20] Central Business District

(at times inefficiently, say by ignoring the benefits of Transit Oriented Development) into residential areas, commercial areas, or industrial areas. For health and environmental reasons, certain industry types (hence employment centres) are legally mandated to locate certain distance away from the cities. Employment and residential centres are spread across multi-nucleus cities, extending even to the suburbs.

All these have required long-distance intra-city travel and even reverse commuting (i.e., travel outwards suburban areas for work, as opposed to travelling towards the city core). In the light of all these, the prime importance of urban transport cannot be overemphasized.

> "Transportation is an input to all urban activities. A good network of roads, coupled with an efficient mass transportation system, contributes to the "working efficiency" of cities. Household benefit from [enhanced] public transportation through a reduction in commuting cost and travel time, expansion in housing opportunities, and [an] increase in accessibility to employment, education, healthcare, shopping, and recreation. Firms benefit from access to new markets, specialized inputs, knowledge spillovers, skilled labour pool, cheaper and more reliable fright services, and decreased inventories to 'just in time' levels…New Growth theory suggest that better transportation leads to larger factor productivity by facilitating human capital externalities in cities" (Mohanty, 2014).

For any city to be a *green engine of growth*, a key factor is green urban mobility, or sustainable urban transport. In the absence of which, a smart, economically productive, socially inclusive, and an environmentally livable city that is well placed to meet future challenges will be a distant reality. Instead, huge economic costs will be incurred owing to traffic congestion, other inefficiencies leading to high monetary and non-monetary costs of movement, environmental and the consequent health issues. To minimize the urban mobility sector's contribution to environmental costs, while maximizing the sector's contribution to growth, green urban mobility is the answer. From the foregoing discussion, a key policy implication emerges, i.e., integration of transport and land use policies.

3.5.2. Transportation and Land Use Policies Integration:

As can be understood from the foregoing discussion, there is a bidirectional relationship between transportation and space use. In other words, they co-determine each other, with transportation costs consideration influencing location decisions; and

household and firm locations necessitating transportation. This relationship is encapsulated in the conceptualization of 'land use-transport feedback cycle,' which posits that:

> "(1) Distribution of land uses in a region determine the location of human activities such as living, working, shopping, education, or leisure; (2) Geographic spread of human activities calls for trips in the transport system to overcome the physical distance between activity locations; (3) Distribution of infrastructure in the transport system creates opportunities for spatial interactions measured by accessibility; and (4) Differential accessibility co-determines location decisions and results in changes in the land use system" (Geurs and Wee, 2004, cited by Mohanty, 2014).

The policy implication from this is that land use changes envisioned by rigid master plans cannot be brought to fruition without an accompanying transportation planning. It is very likely that major new road schemes will induce changes in the patterns of land use. For instance, such schemes may lead to rezoning of land in the vicinity of new or improved roads; especially say in motorway intersections, which will be attractive to particular types of commercial development. It is important thus to consider such differential land use impacts when assessing the traffic, economic and environmental impacts of major road schemes. Likewise, to bring about a major alteration in the existing urban transport system to gear towards sustainable mobility often entails changes in land use. Thus, the integration of the two is called for.

For the fast urbanizing developing economies, "transportation-land use integration is perhaps the single-most important policy tool available to planners…to promote orderly urban development. It enhances efficiency, productivity, and the livability of cities… However, [this] can be used effectively only in a flexible planning framework as opposed to rigid master planning" (ibid). And for expanding cities, this assumes ever more salience. Empirical evidences from South Korea and Japan "suggest that the larger the city, the more important it is to invest in public transit and to integrate land use and transportation" (ibid).

3.6. Cities and Economics Growth:

We have already discussed at length in Chapter-2 on the theoretical underpinnings of cities as engines of growth. So, the same is not repeated here. Just to refresh, in essence, we have comprehended that the New Economic Geography and the Theory of

Agglomeration Economies emphasize the additional productivity gains arising from the agglomeration of households and firms. And that these agglomeration economies act as centripetal forces, causing self-reinforcing and cumulative process of clustering. Space does matter because much knowledge does not flow frictionlessly but "is embedded in the routines of firms, people and institutions" (Mohanty, 2014), notwithstanding the Information Technology (IT) revolution that has taken place. Likewise, certain positive externalities can emanate only when economic entities spatially cluster in close proximity.

3.7. Cities and Environment:

Economic entity of any kind interacts with the natural systems of the environment, directly or indirectly. Cities as a distinct economic entity are no exceptions. In fact, the *ecological footprint* of cities has always been high, and with fast-paced urbanization, it is increasing at an exponential rate. Urban dwellers have a 'higher consumption pattern' than those in rural spaces, in the sense that they consume comparatively much more resources (food, energy, land, durable goods, etc.). "This increased consumption is a function of urban labor markets, wages [income], and household structure" (Torrey, 2004), and urban lifestyle.

The burgeoning urban population is adversely impacting the environment through the consumption of resources and the generation of waste in the process. Firstly, lands with varying degree of biodiversity in them are being cleared to make way for cities to spring up or spatially expand; or to grow food, and extract resources beneath the land to sustain the cities. Secondly, urban consumption of fossil fuels (energy) has polluted the air-both locally and globally, and also created *heat islands*. Thirdly, urbanization unfavorably affects the weather and hydrologic patterns of wider regional environments. For instance, "regions downwind from large industrial complexes…see increases in the amount of precipitation, air pollution, and the number of days with thunderstorms… Urban areas generally generate more rain, but they reduce the infiltration of water and lower the water tables. This means that runoff occurs more rapidly with greater peak flows. Flood volumes increase, as do floods and water pollution downstream" (Torrey, 2004). Finally, there are the other *consequent* environmental problems like inadequate water and sanitation, lack of rubbish disposal, and industrial pollution.

All these environmental issues and the consequent health problems are a major drain on the economy by way of lost workdays, costs of treatment and other capital costs of cleanup activities. It may seem institutively logical to assume that the environmental bads and hence economic costs increase with the increase in the spatial extent of cities. However, what is to be remembered here is that, "many of the effects of urban areas on the environment are not necessarily linear. Bigger urban areas do not always create more environmental problems. And small urban areas can cause large problems. Much of what determines the extent of the environmental impacts is how the urban populations behave — their consumption and living patterns — not just how large they are" (ibid). Besides, cities improve their environmental health with growth (as resources available for *cleaning up* increases), the pace of enhancement being quickened if accompanied by good urban governance.

It is true that humankind's historic tendency has been to place the development of cities above environmental conservation. The need for economic growth and social justice (job creation, etc.) has often been cited as the rationale or justification. However, as opposed to the conventional notion that cities *normally* degrade the environment, there is a counter argument that 'cities can be good for environment,' qualified by the phrase, 'if managed aptly.' How cities can be good for the environment? First, cities, as we have been discussing, contribute to higher productivity owing to agglomeration and scale economies. This implies that output can be produced using fewer resources with urban agglomeration than without, thereby, reducing the ecological footprint. Likewise, for the same reasons, environment-friendly public infrastructure and services are much easier and more economical to construct, maintain, and operate in an urban setting. Second, density is a key determinant of energy use. Thus, high density of cities, if not negated by traffic congestion, reduces the length of trips, and makes public transport more viable, thereby reducing energy use. Third, cities, as already discussed, drive innovation, including green technologies, which is making *green economy* possible. Fourth, the higher standard of living associated with urbanization foster pro-environment stance, as mentioned earlier. Finally, cities generate revenues that fund research and development (including green technology) and green infrastructure projects, which

reduce congestion and other environmental bads, thereby improving public health (Wan, 2012).

To make cities *great*, or to make a city as a *green and sustainable engine of growth*, environmental thinking has to be incorporated in the planning and development of cities. Towards this, Wan (2012) suggested the following recommendations. First, improving energy efficiency and conservation through appropriate pricing, regulations, and public sector investment. Getting prices right is required to encompass the full social costs and benefits (thereby affecting the behavior of economic agents), and ensure the efficient allocation of resources. This can be achieved by means of market-based instruments like congestion and emission charges, carbon taxes, removing inefficient subsidies, introducing/increasing block pricing for water, electricity, and other public utilities. Regulations and standards should be framed on time to correct market failures on air, water, vehicles, and appliances; to build green industrial zones; and to reduce or prevent urban sprawl. Adequate and quality public transport systems should be planned and provided timely to improve connectivity, reduce pollution, ease congestion in city central hubs, reduce environmental degradation and improve the over all quality of life. Second, promote renewable resources and clean technologies. For instances, constructing waste-to-energy plants to reduce pollution and generate energy; acquiring green technology either by importation or innovation through research and development; building new towns and satellite cities using renewable energy as primary energy sources; tackling urban sprawl by reviving city centers and developing compact, walk-able satellite cities centered on efficient train, light rail, or subway systems, without heavy reliance on highways and major roads. Third, help the poor by reducing disaster risks and improving slum conditions. Building dwellings in safe areas, improving housing affordability for the poor, and investing in drainage infrastructure and climate forecast technology can achieve the former. While slum conditions can be improved by providing basic services and granting land titles or housing vouchers to slum dwellers. Fourth, strengthen public finance, transparency, and accountability. Public finance can be improved by broadening the tax and revenue base and by increasing the access of urban governments to capital markets in order to lower infrastructure and public service costs. Politicians should (incentivized by public opinion) disclose city government performance to the public and non-governmental organizations (NGOs),

and have healthy national competitions and campaigns to encourage a “race to the top” (say by rewarding high achievement).

3.8 Conclusion:

The links amongst different variables of interests that have been explored in this chapter can be summarized through the following stylized flow chart (Fig 3.4).

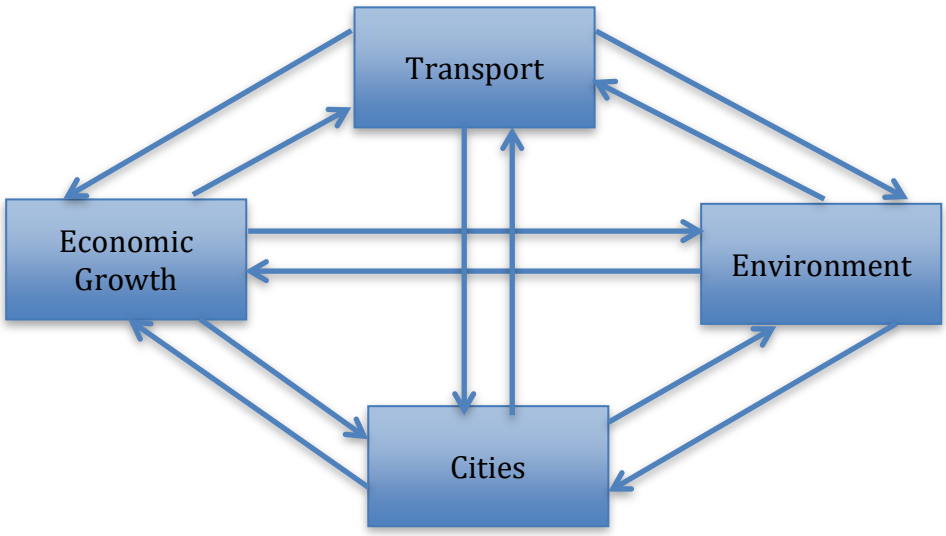

Fig. 3.4. Links amongst Variables

The arrows emanating from environment, which project and touch Transport, Economic Growth, and Cities respectively, indicate the flow from the former to the later. They represent the various forms in which the former has been employed as *input* in the *production* of the later. Thus, they also symbolize the depletion of environmental (read as natural) resources, and the associated opportunity costs. Conversely, the flows to the environment from the rest of the variables in the flow chart represent the production of varied environmental bads, and hence environmental degradation. A cursory inspection of the figure reveals that the flows between transport and Economic Growth; between transport and cities; and between cities and economic growth, are bidirectional. To put this into perspective, for instance, augmentation in transport contributes to economic growth, but at the same time, the converse is also true in the sense that, economic growth gives the necessary resources to augment transport infrastructure and services. Analogously, cities are engines of growth, however, without economic growth (say in the form of agricultural surplus), they would not have come about. Still, transport plays an important role in the genesis

and growth of cities; however, cities by contributing to economic growth provide the required capital to invest in transport.

The interrelated nature of the relationship of these variables should be appreciated in the policy formulation and intervention. The policy implication of this is that there should be an imaginative, integrated and comprehensive policy approach, so that the gains are maximized and the negative externalities are minimized.

Chapter 4

Transport in Nagaland and Kohima: Addressing the Challenges of Urban Mobility

4.1. Introduction:

The primary function of transport is to provide accessibility between spatially disjointed locations for the households (not only for economic reasons, but including social and cultural reasons) and firms, for both freight and passenger movements. Transport as a separate sector per se is a major component of the broader *advancing* sector commonly titled as 'transport and communications,' which now includes telephonic and internet-based communications of varied and emerging kinds (Email, Facebook, and relatively recent Whatsapp, etc.). In some instances the later offer an alternative to physical transport (today, it is possible to work from home like teleworking, or virtually attend a conference through teleconferencing, dispensing the need to travel for work), while in other instances they complement each other (say, internet based real data input to take less congested route to desired destination). Transport, along with other constituents of the 'critical' physical infrastructure (power, energy, financial institution, etc.), supports and promotes economic growth and development. The lifeline sector of any economy, it not only facilitates economic activities but transport per se is an economic activity, directly and indirectly employing large number of people. Thus, transport may be deemed as a vital sector of the economy in its own right.

As a corollary to the burgeoning economy and population, urban population across the developing countries is swelling, with economic growth and urbanization feeding into each other resulting in a circular and cumulative causation. Economic activities are increasingly being clustered in cities. All these have generated a spike in demand for basic urban services such as mobility, water supply, sewage treatment, affordable housing, etc., in the cities of every size and type. Of these, urban transport system represents a fundamental and critical 'pillar' that either keeps the city going and running, or slows down and holds back the cities, supposed to be engines of growth. In

other words, it can either augment positive externalities of agglomeration and knowledge spillovers, or accentuate agglomeration diseconomies.

"Urban transport provides mobility of people and goods and access to employment, education, shopping, health, entertainment opportunities" (National Institute of Urban Affairs, 2015). It affects the income levels of people for good or for worse; it enhances land values; and it adversely impacts environment. It thus contributes to the economic development of and hence quality of life in an urban space, which spills over to the entire economy (ibid). Against this backdrop, it is disheartening to take stock of the poor state of urban transport in India. Owing primarily to lack of planning and inertia of policy intervention, most Indian cities fail miserably in coping with the mounting demands for travel, which as shall be seen is the case for Kohima City. Urban mobility scenario in India is thus beset with many issues: "…dwindling share of public transport, severe traffic congestion, fast deterioration in city environment quality due to increased air pollution, escalating risks to pedestrians and cyclists reflected in road accidents and fatalities, lack of integration between transportation and land use planning, fragmented institutional arrangements and chronic under-investment in transport infrastructure…" (Mohanty and Mishra, 2017). Besides, grossly inadequate transport infrastructure and its sub-optimal use; imbalances in the existing modal split; no improvement or little improvement in city bus service; all these combined encourage a shift to personalized modes. Hence, in order that the engines of growth, the cities perform optimally, "it has become imperative to address urban transport issues on an urgent basis" (National Institute of Urban Affairs, 2015).

Transport as a means of providing access between spatially separated locations, has been advancing, driven by newer technologies. Nonetheless, this story of advancement is not the story of every region, or economies, however such classifications are spatially made, whether intra-country or inter-country. The case of Nagaland state is one of inadequate and poor transportation system, both in terms of infrastructure and services, both in urban and rural.

Nagaland, even after fifty-four years of statehood, still has only one railway station and one airport-both located in the plain valley of Dimapur. Nagaland has a railway length of just 12.84 km, and that too confined to Dimapur district. That the entire

NER is poorly connected by rail can be gauged from the fact that even with this meager rail length, Nagaland comes third in terms of railway length, after Assam and Tripura (Nayak, 2013). All important commodities-foods and other goods come into Nagaland, and to the neighboring state of Manipur through Dimapur railway station. And given the connectivity advantage, it is not surprising that Dimapur city has now become the main commercial hub of the state.

The location of Dimapur is such that it is in the extreme west of the state, and hence practically, all the intra-state connectivity is by road. Multi modal transport still seems a distant reality in the state. As such, this Chapter will henceforth focus on road connectivity.

4.2. State of Road Transport:

4.2.1. Road Capacity:

Road capacity in terms of road length has been more or less stagnant in recent years. In fact, total road length declined in some years, 2006-07 and 2007-08 (Table 4.1). The length of national highway has not extended over the period under consideration (2003-04 to 2009-10), when India as a whole saw an increase of 21 percent. There has been an increase of 59 percent in total road length from 2003-04 to 2009-10, during which period the national average growth rate was 37 per cent. At a first glance, this looks positive, but despite *low base effect*, this figure, or as the high road density 95.70 km per 100 sq. km. may seem to point, do not show the poor qualitative aspects of road conditions (discussed in the next section). The road capacity is still quite inadequate. Thus, more than 78 percent of the people from urban areas and 61 percent of the people from rural areas of Kohima district expressed the need for additional roads(Kohima District Human Development Report, 2009). This high figure is from the capital city, thus, although the mobility needs may be more here, it is not hard to imagine a higher figure if such a survey were to be conducted in other districts. “In terms of length of surfaced road, it is the second best state in the region after Assam, having 15,470 km [2010-11][21] of road of which only 7 per cent are national highways. In terms of population served for each kilo meter of surfaced road, Nagaland is the second best state in the region after Arunachal Pradesh but far behind all India

[21]Source: http://www.indiastat.com

situations" (Nayak, 2013). The High Level Commission on Transforming the Northeast (1996) "estimated that the infrastructure gap for Northeast was Rs. 97,000 crore. For Nagaland, the estimate was Rs. 11,000 crore. These figures reflect the extent of further investments required to come at par with other states of India" (cited by State Human Development Report, 2004).

Table 4.6: Road length (in KMs)

Years	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
National Highway	369	494	494	494	494	494	494
State Highway	398	398	404	404	404	404	541
Total Roads	20523	20647	26241	22085	21947	22304	32597
Total Roads in India	2601957	2669996	2962463	3014063	3119923	3174620	3571510
% of State's Roads in All India Total Roads	0.78 %	0.77 %	0.88 %	0.73 %	0.70 %	0.70 %	0.91 %

Source: RBI (2017), and Author's computation

4.2.2. Current Scenario of Vehicular Volume:

Against the backdrop of inadequate supply of roads, the trend of vehicular volume is discussed here. This may partially explain the congestion (discussed in the next section) being experienced on the cities' roads in the state. While the registered motor vehicles in Nagaland increased at a Compound Annual Growth Rate of 64 percent over the ten years period, it was 176 percent and 170 percent for NER and All India respectively (Table 4.2). However, given the lesser population of the state, in terms of number of registered motor vehicles per 1000 population, Nagaland has the highest in the NER with 128 vehicles. The average number for the whole region was 86 vehicles

(for more details, see Table 4.3). When looked individually at each states, the "number of vehicles is increasing at a faster rate compared to other sister states" (Nayak, 2013).

Table 4.2: Total Registered Motor Vehicles in Nagaland, NER and All India

States	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012[22]
Nagaland	177	162	172	172	184	210	226	240	254	273	291
NER	1034	1107	1140	1333	1506	1687	1840	2007	2264	2558	2860
All India Total	58924	67007	72718	81502	89618	96707	105353	114951	127746	141866	159491

Source: Northeastern Council (2015)

Table 4.3: Number of Registered Motor Vehicles per 1000 Population in NER

States	Registered Motor Vehicles per 1000 Population	Rank
Year	2011-12	
Arunachal Pradesh	121	2
Assam	58	7
Manipur	87	4
Meghalaya	75	5
Mizoram	100	3
Nagaland	128	1
Sikkim	70	6
Tripura	56	8

Source: Northeastern Council (2015), and Author's Computation

Now the relative situation of mass transport of the state in relation to the other northeastern states and All India is reflected in the *bus fleets* given in Table 4.4 below. Nagaland comes second incase of bus fleet among the northeastern states. Noting that Nagaland comes 5th in terms of population among the northeastern states (Census, 2011), the bus fleet is commendable. However, there are number of villages (especially in the interior places) which do not have bus services, and hence those villagers still walk for miles to get to the nearest bus point. In urban areas, only Kohima has a bus service for intra-city mobility. The statistic points to the poor level of pubic transport service in the entire NER. Bus services (read as public or mass transportation), thus, needs to be expanded and extended both in the state and in the region.

[22] As on 31st March 2012.

Table 4.4: Total Bus Fleet and Buses in Public Sector in NER

States	2012[23]		Rank
	Public Sector	Total	
Arunachal Pradesh	NA	NA	
Assam	600	17,035	1
Manipur	…	4,473	3
Meghalaya	50	4,326	4
Mizoram	47	1,141	7
Nagaland	…	6,047	2
Sikkim	…	2,097	6
Tripura	63	2,312	5
All India Total	131,824	1,676,503	

Source: Northeastern Council (2015), and Author's Computation

A broad picture of the state of transport has been painted. We shall now look at the problems from several angles, beginning with regional disparity in terms of road infrastructure**.**

4.3. Issues and challenges in Road Transport:

The state being largely a hilly state, there are geological and topographical related engineering challenges, leading to higher costs, both in terms of financial and environmental costs. For instance, when the hill slopes are made level to make roads, the removed mud and stones are usually discarded down hill, devastating the flora below. Besides such physical constraints, there are several institutional problems that act as hindrances in the provision of quality transport services in the state.

4.3.1. Regional Disparity:

Although Nagaland as a whole is marked by poor and inadequate roads, even within the state there exists regional disparity in terms of road infrastructure. The 'Eastern Nagaland,' covering an area of 36.37 percent of the total geographical area of the state accounts for about 29.80 percent of the total roads of the state. Its road share is thus lower than its area share, and the region has a lower road density of 71.07 km per 100 sq. km as against 95.70 km per 100 sq. km in the rest of the state. Mon and Tuensang districts, two districts in this region still do not have National Highways; and the other

[23] As on 31st March 2012.

two districts, Tuensang and Kiphire, although connected by National Highways, the roads "have been so far accorded low priority" (Government of Nagaland, 2016). Thus, the entire region is characterized by "deplorable connectivity" to the district headquarters and low quality intra-district connectivity. On the whole, regional imbalance in terms of road infrastructure is a major challenge that "has to be attended on priority basis" (ibid). This inequality is largely a function of two main factors. One, road infrastructure and, two, access to income and livelihood. "If one adds to this [poor rural roads] the poorer quality of rural roads it becomes clear why districts like Mon and Tuensang have not had the same access to means of livelihood as the other districts" (State Human Development Report, 2016).

4.3.2. Delayed Implementation:

One that has been a major issue is the undue delay in implementation of some vital sanctioned road projects. For instance, the Dimapur-Kohima highway four-lane extension, slated to be completed by 2015, has been initiated only in 2017. The *economic costs* involved in this delay, besides escalation of project costs, can be seen from the fact that freight and passengers mobility from the only railway station and air port to major parts of Nagaland and neighboring Manipur state is via this road. Likewise, the roads under SARDP–NE (Special Accelerated Road Development programme for North Easter Region)[24]have been embroiled in "controversy" leading to delay. The two roads projects under SARDP to connect the district headquarters of Mon and Tuensang districts with Kohima, the state's capital have been going on for over five years (Ibid). The "controversy" which the Vision 2030document only alluded, might be meant to indicate the *land acquisition problems, cost escalation*, etc. On the issue of land acquisition, compensation to land owners is a real hurdle as was the case in the decade long delay of the Dhansiri-Zubza rail line project. The Chief Administrative Officer of the project is reported to have stated that the project could meet the March 2020 deadline *provided the process of land acquisition poses no roadblock* (Walling, 2017). Likewise, the timely completion of such projects will crucially depend on how the state government handles land acquisition problems, under whose onus the issue falls.

4.3.3. Sub-standard Construction:

[24]This programme is meant to connect the district headquarters to the state capitals in NER.

Road construction is generally of sub-standard, with the contractors citing various reasons (at times excuses), prominent one being that they have to pay illegal *levies* to the different underground factions[25], and thus left with inadequate funds to ensure *standards*. Thus, quality and durability take a back seat owing to cited increase in transaction costs, real or inflated. Recognizing this problem, Nagaland Vision 2030 (2015) document has stipulated mandatory regular inspection and verification by the State Quality Control Board. However, it falls short of mentioning anything with regard to the political economy of *levies* from underground factions. It is important to recognize here that the current political problem has a bearing on the poor quality of roads in the state. As such, an early resolution of this political imbroglio, besides providing the long due conducive environment for over all development of the state, will also contribute to better building of roads.

4.3.4. Maintenance Issues:

In this mountainous, geologically unstable, high-rainfall state, it is challenging, both technically and financially to maintain created road assets. The reduction of road length mentioned earlier is an indication of the road falling into neglect and disuse due to lack of maintenance. Not only rural roads, but also district headquarters' roads are left without repair for years. For instance, in Wokha Town, which is just around seventy-seven kilometers from the capital city, Kohima, the main road was left without re-surfacing for more than five years. It was only partially surfaced in 2016, with greater part of the Town's roads still strewed with potholes, with no traces of *surfaced remainders* at major length of the roads.

Another dimension to the issue of lack of maintenance is brought out by the following instance. The recently constructed inter-urban road, referred to as "short-cut" (to Dimapur) by those who use the road, begins from the outskirt of Kohima, and cuts the travel time significantly for those travelling from Tuensang, Mokukchung, Wokha and other areas to the commercial hub, Dimapur. However, at the time of writing this Chapter, the road has not been in use for over a year, due to lack of maintenance. Thus, the vehicles have to take the old longer road (implying longer travel time)

[25]There are five main armed Naga insurgent groups fighting for a separate Naga nationhood, and almost all of them collect or *extort levies*. Recently, the Indian Government signed a Framework Agreement with one faction, Nationalist Socialist Council of Nagalim-Issak Muivah (NSCN-IM).

through Kohima city, accentuating the already 'clogged traffic' of the city, expending more fuel (and hence more emission).

Adding to the issue of sub-standard road is *overloading of vehicles*. In India, road pavements are designed as per IRC: 37-2001. This design has a prescribed maximum weight in terms of standard axle load (taken as 8.16 ton) during the design life of the pavement. Equivalency factor in terms of damages to the pavement varies approximately with fourth power of standard axle load. This basically means that as the overloading increases, damages to road increase exponentially (Government of India, 2007). Though there is no official data to corroborate, it is not uncommon to see overloaded trucks and taxis[26] on the roads of Nagaland. And such overloaded vehicles contribute to increased damages of sub-standards roads. Thus, regulation of vehicle load is one problem, which further indicates the lack of resources-both human, financial and technical capacity-of the state, and also perhaps, the lack of awareness amongst the people of the rapid damages of roads caused by their 'over-loading acts.'

"Lack of financial resources has been a constraint in the maintenance of the road network, resulting in deterioration of the quality of this essential communication infrastructure" (State Human Development Report, 2004). Apart from the National Highways, the state has over 11000 km of various types of roads providing the much-required connectivity in the state, and the maintenance of which falls under the State's Public Works Department. As per the draft State Repair and Maintenance Policy 2016, Rs.300 crores per annum will be required for the next five years. The source of fund for the same is expected from NLCPR (Non Lapsable Pool of resources)[27] and NEC (North East council) schemes, in addition to the state's own resources. Besides, with regard to the High Level Commission on Transforming the Northeast's (1996) estimate of Rs. 11,000 crore investment to fill the infrastructure gap for Nagaland, the State Human Development Report (2004) stated, "such requirement of funds can be met from plan funding or assistance from Central Government alone". Here it is

[26]The drivers of passenger taxis plying between Kohima and Wokha that the author conversed with stated that their vehicles are often overloaded, especially by those carrying agricultural products from Wokha to sell in Kohima.

[27]NLCPR is utilized by the Ministry of Development of Northeastern Region to fund priority projects of Northeastern states and Central ministries for implementing projects of national and regional importance (Source: http://mdoner.gov.in/).

important to take cognizant of the state's high dependence on the Centre for its fiscal requirements, as the internal generation of revenue is miniscule. The major chunk of the government's receipts goes to revenue expenditure, leaving very little to spend on capital expenditure (Humtsoe and Walling, 2016), including road repairs. Thus, the fiscal position of the state also has bearing on the poor road conditions in the state.

4.3.5. Poor Rural Roads:

The coming of heavy earth moving machines such as bulldozers, excavators, etc. into the hills have caused a "frenzy for construction of roads resulting in network of roads in every nook and corner of the State" (Government of Nagaland, 2015). The same document observed that statistically the road connectivity in the rural areas seems adequate. Under the MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) programme, 18,431 numbers of rural roads such as agri-link, or approach roads to otherwise unconnected villages were constructed, and construction of 29915 roads are on going (Ibid). While the issue in urban areas is both adequacy and quality, in rural areas, quality is the real problem, as most of the roads are basically rough formation cutting and therefore are not all-weather ply-able. As on 31 March 2000, mere 29.24 percent of the villages had "pucca roads"(State Human Development Report, 2004). Besides, they are also prone to landslides due to the loose soil formation in many sections of the roads and heavy rainfall (thus requiring concrete retaining walls along certain sections, which are missing), and hence roadblocks due to such are not uncommon. On the whole, "as many villages are still not covered by all-weather roads, the villagers have been deprived of proper socio-economic development in education, primary health care, and ready access of farmers' products to the market" (Ibid).

4.3.6. Traffic Congestion:

Common measurement metrics through which congestion can be measured are "speed, travel time/delay and volume and level of service" (Rao and Rao, 2012). Of the three, congestion is mostly expressed in relation to speed profile of a particular stretch of road or intra-city roads as a whole. Coming to the state's two largest cities of Kohima and Dimapur, the cities' roads are witnessing *severe* traffic congestion. The Vision 2030 (2015) termed the prevailing traffic situation in Kohima as "clogged traffic," and this is taken up at length later in this Chapter.

There is no data on the congestion level of Dimapur, however, it is of *severe* level as well. It is worth noting that the other expanding towns, which are on their way to becoming cities (as per Census 2011, Nagaland recorded an urbanization rate of 69 percent as against National average of 21 percent), are also bound to face the same fate, i.e., traffic congestion, if adequate policy measures are not taken from now. This is because people's aspirations to own cars are increasing as their income levels are rising, as is evidenced from the growing number of cars observed on the roads of the towns across the state. The observed lackadaisical attitude from the state government is a cause of worry. For instance, Dimapur, the commercial hub and largest city of the state, is without any public bus service system, despite the fact that the city's population[28] is big enough for such service. Thus, what meet the eyes on the road is personnel cars, commercial trucks, stranded in traffic jam, with the ever mushrooming *autos* maneuvering to move pass those cars and trucks, often going sideways off the surfaced roads, endangering the pedestrians.

4.3.7. Vehicular Pollution:

Another challenge, especially from the health and ecological perspective, is the observed rising air pollution in the cities. Air pollution trend in Dimapur and Kohima[29] for four years[30] (for expository purpose) is given below (Table 4.5). It is clear from Table-4.4that the particulate matter in the cities (read as air pollution) in the recent years has been showing an increasing pattern. It is a cause of worry to note that the levels of RSPM (Respirable Suspended Particulate Matter) and SPM (Suspended Particulate Matter) have exceeded the prescribed NAAQS (National Ambient Air Quality Standard) values of 60 µg/m3 and 140 µg/m3 respectively.

The Nagaland Pollution Control Board (NPCB) attribute this increasing trend of the particulate matters to different factors such as bad road conditions, increasing vehicular movement, burning of waste, etc. The data for the whole year of 2014-that is available on NPCB website- suggests that the air pollution gets more severe during the cold winter months (Ibid). The winter months being dry, the roads become dustier and bursting of firecrackers (during festive Christmas season) accentuate the problem.

[28] The city has the highest density of population in the state.
[29] Where Nagaland Pollution Control Board (NPCB) is monitoring the air quality.
[30] Source: http://npcb.nagaland.gov.in/national-ambient-air-monitoring-programme-2/

Lack of street-sweeping and clogged drainage in cities' and towns' roads add to air pollution, as the roads remain dusty.

Table 4.5: Annual Average Concentration of Particulate Matter (RSPM and SPM) in Dimapur and Kohima

Years	Dimapur				Kohima			
	Bank Colony		Dhobinala		Opp. NST office		Opp. War Cemetery	
	RSPM	SPM	RSPM	SPM	RSPM	SPM	RSPM	SPM
2011	80	128	98	202	62	106	92	195
2012	76	130	95	199	63	107	100	217
2013	89	156	116	254	66	128	104	238
2014	111	186	158	295	71	142	113	251

Source: Nagaland Pollution Control Board (2016)

4.3.8. Issues Arising From Degradation of Ecosystems:

One issue arising out of anthropogenic disturbances to the fragile ecosystems of the state pertains to *road safety*. Slope cutting for roads and the consequent deforestation that follows after gaining access (say, logging, firewood collection, etc.) loosen the soils and denude the hill slopes of vegetation. It becomes dangerous for commuters in such section of roads from the risk of rock fall, especially in areas of overhanging rock cliffs. For instance, the Chumukedima cliff section of National Highway 29 was once a densely forested area. However, activities like logging, shifting cultivation, firewood collection, etc., led to disappearance of the entire canopy, then the binding roots, and consequently soil, the process aided by torrential rains. With no soil and roots to bind and hold the fractured rocks, the cliff now stands dangerously waiting to release rock fragments anytime. Lives have been lost, and property (cars) has been damaged (Mekro, 2014).

That there are also cases where *lack of development and not development per se* is detrimental to environment can be appreciated from an observation from the state. This has a bearing on transport as shall be seen. The Mount *Tiyi* in the state, on which downhill is situated Wokha Town, as it stands today, is denuded of vegetation. There is thus increased erosion consequent upon the deforestation, which leads to the filling up of the rivers and drains with sediments during monsoon season making the muddy water overflow to the roads. This contributes to faster deterioration of roads, and reduced mobility for denizens.

To return on the subject of environmental conservation and development, the prime reason for this deforestation is *collection of firewood* by the town denizens. There have been calls, from concerned individuals, for afforestation and to stop this, on a first look, reckless deforestation. Villagers from Wokha village and Niroyo Village, on whose ownership the slope area in question lies, have even deputed volunteers with authorization to impose fine on those caught collecting firewood. However, all these proved futile. Firewood collection still continues, and the mountain continues to stand denuded. Why? In the absence of alternative fuel to firewood and development in general, this is meant to persist. For these firewood collectors are economically backward who could not afford to bring purchased firewood or from 'own land,' like the few who could afford. Besides, getting LPG cylinders is not convenient, as they are available only on few days per month. Thus, availability of alternative fuel and increased in income to buy the same can alone save the mountain. And these two can be possible only with development. Along the same line, "recent studies report positive cross-sectional correlations between levels of state environmental protection and personal income (Hall 1994, cited by Ringquist and Feiock, 2001). If the mountain regains its vegetation, river siltation will reduce, and hence, adverse affects on roads and mobility will lessen.

4.4.State of Urban Transportation in Kohima City:

Myriad urban mobility issues, as shall be perceived, plague Kohima city. One stark issue that stands out is the "Jam speed" traffic flow on the city's main arterial road, which is keeping the city at standstill, giving rise to huge economic loss, environmental pollution, and adverse health bearings. Furthermore, the city's potential to become an important international agglomeration centre (highlighted in chapter 2) is constrained by this. The necessity to mitigate the same, thus, cannot be overemphasised. As such we take up this issue in depth, and while doing so, the overall poor picture of urban mobility in Kohima City becomes vivid. We begin by looking at the theoretical conceptualization of traffic congestion; basing on which a theoretic model of congestion mitigation is developed for Kohima city.

4.4.1. Traffic Congestion Metrics:

Traffic congestion is a condition on road networks marked by exceedingly slow vehicle speeds, and thus an increased vehicular queuing and longer trip times (for varied definitions of congestion, see Rao and Rao, 2012). Of the common measurement metrics, as already mentioned above, congestion is mostly expressed in relation to speed profile. In the theoretical frame of the current study, this speed metric of congestion is also employed.

From literature it emerges that congestion is measured differently across various cities and countries. Many countries or almost all define traffic congestion in terms of slower vehicular speed on a certain stretch of roads and accordingly devise policies. However, there is inter-county variation in the yardstick of low-level speed of vehicle. In the South Korea, traffic congestion is said to be occurring when traffic flow is below 30 km/h or congestion continues for more than 2 hours a day (Alam, Ahmed, 2013). In Japan, traffic congestion occurs if freeway travel speed falls below 40 km/h, or if there are repeated 'Stop-and-Go' flows for more than 1 km, or if these conditions stay more than 15 minutes (Rao and Rao, 2012). Notably, the benchmark of speed also varies significantly even within a country. For instance, in California, if the speed falls to the level of 35 km continuously for 15 minutes then it is referred to as congestion; whereas in Minnesota, congestion occurs when the average speed falls from the speed limit is 45 km per hour during 6 a.m. to 9 a.m. (Ibid).

4.4.2.Extended Speed Function and Extended Congestion Cost Function:

The textbook theoretical conceptualization of congestion is the so-called *Speed function.* Here, speed (S) is taken as a function of the number of vehicles per lane hour (T). Algebraically, Speed Function (S):

$$S=S(T)$$

$dS/dT \leq 0$, i.e., as T increases, S may or may not fall. If speed falls, it means the *marginal* or one additional car causes congestion. Otherwise, there's no congestion.

By introducing a new variable denoting congestion easing supply side interventions explicitly in the function and redefining the above independent variable T as number of commuters per hour (and not as number of vehicles per lane hour), *Extended Speed*

Function is proposed, keeping in mind the nature of traffic congestion in Kohima city. This is done on the motivation of the maxim, 'theory enriches practice and practice (Kohima's congestion characteristics, in the present context) enriches theory.' Through this tiny or perhaps insignificant tweaking in the standard model, congestion is made a function of not just lane and time, but also of other supply-side transport infrastructure and services (denoted by *capacity*, 'C') explicitly in the function itself. Algebraically, the extended speed function (S):

$$S=S\ (T,\ C).$$

S=T/C (i.e., With constant C, S falls if T rises; and with constant T, S rises if C increase, or S falls if C decreases).

Now, ceteris paribus, as C increases, *congestion threshold* after which speed decreases rises. When capacity is expanded, the same or more number of commuters-not necessarily more number of vehicles (which will be the case with road lane extension)-can travel at the same time without causing congestion externalities on an otherwise congested motorway. This case is graphically explained below:

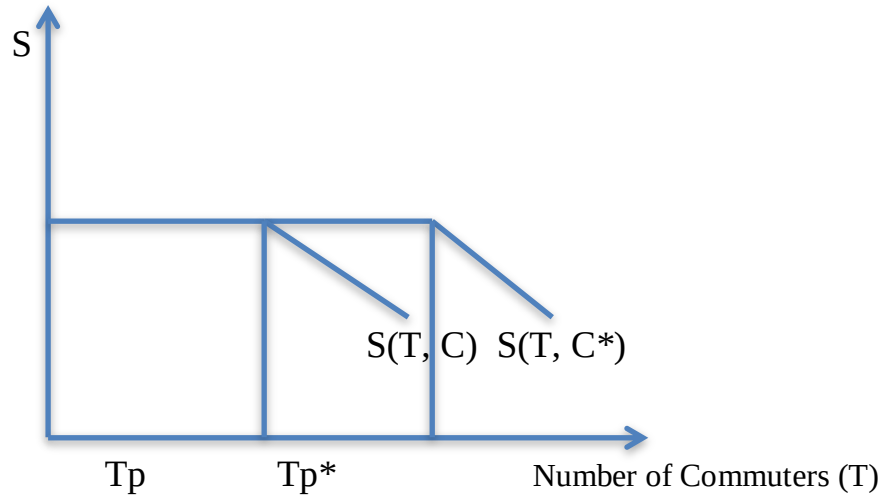

Fig. 4.1: Extended Speed Function

In Fig.4.1, at the initial capacity represented by 'C' in the extended speed function, S=S (T, C), congestion threshold is Tp number of commuters per hour. After the capacity is enhanced to 'C*,' the congestion threshold increases to Tp*. That is to say TpTp* number of commuters more can be accommodated without producing congestion externalities.

The mirror image of this extended speed function, S=S (T) is the *extended congestion cost function*, g=g (T, C) (see Fig. 4.2). This can be appreciated from the direct relationship between commuting cost and congestion; or an indirect relationship between commuting cost and congestion taken as traffic speed. Commuting costs (ignoring non-monetary or such other difficult to quantify costs like convenience level, etc.) include money cost and opportunity cost or time cost. The former refers to the money spent on per unit distance travel cost. The later can be thought of as the potential amount of wage lost by a worker owing to the time lost being jammed in congestion. Thus,

Commuting cost (g)= Money cost + w.d/S (Opportunity cost)

Where, w=wage rate; d=distance; S=speed; d/S=Time

It is quite clear from the above equation that there is an indirect relationship between commuting cost and speed (or congestion).

In fig. 4.2, y-axis measures travel cost, and x-axis measures the number of commuters per *capacity* per hour. As is clear from the figure, pre- and post- capacity expansion, the commuting cost owing to congestion rises after crossing the *congestion thresholds*, 'TP' and 'TP*'respectively. The g (T, C) curve after Tp need not necessarily be a linear straight line, or the shape can vary over time. But on average, it will be upward sloping. In an extreme possibility, in case of 'hyper-congestion' the curve may bend even backwards on itself (see Lindsey and Verhoef, 2000). Or in a case when *Capacity* as defined in the last sub-section falls, a backward bending curve may arise, for congestion can occur in a previously congestion free quantum of T.

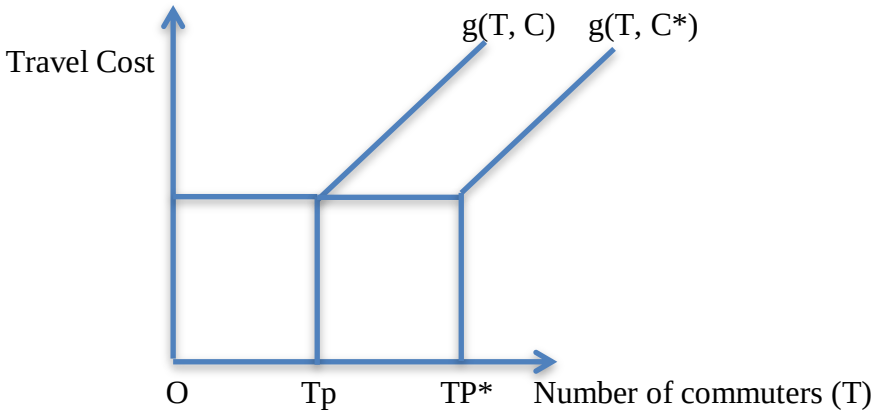

Fig. 4.2: Extended Congestion Cost Function

Using these theoretical concepts elucidated in this section, a simple theoretical model of congestion mitigation is developed for Kohima city's *paralyzed* urban mobility. Traffic congestion is essentially a condition of supply (capacity)-demand mismatch, requiring supply side and demand side interventions for its mitigation. The relative efficiency and practicality between the two approaches, or the question of precedence between the two, in the context of the city in question, will be assessed in terms of the model. We first look at the nature of traffic congestion in Kohima.

4.4.3. Clogged Traffic in Kohima City:

Traffic congestion of severe proportion is not restricted to metropolitan cities or other bigger cities. The speed profile of Kohima city shows that the speed varied from 14 km/h to 25km/h (CDP, 2006). This level is comparable to or in fact lower than the speed recorded in other Metropolitan Indian cities. In 2007, the average journey speed in Delhi was around 16 km/h and only slightly higher in Mumbai. Likewise, the average journey speed was recorded to be below 20 km/h in Hyderabad, Chennai, Bangalore, (Alam and Ahmed, 2013). During peak hour, traffic in Mumbai flows at a speed of 5 km/h (Kumar, 2013, ibid). This is a cause of worry, as it indicates that smaller cities like Kohima are prematurely facing the brunt of traffic congestion, and hence *congestion diseconomies*. The speeds in central parts are even lower and delays are higher (i.e., a speed of 5km/hour) (ibid). Thus, 'jam speed' is common reflecting that the traffic flow is abysmal in the city. Given the mushrooming private cars on the more or less static road capacity, it is reasonable to assume that the speed profile must have fallen. The Vision 2030 (2015) termed the prevailing traffic situation in Kohima, "clogged traffic."

Why has this situation arisen? For an answer, we have to look at the supply and demand sides of the city transport system. We first look at the demand side.

4.4.4.Factors Contributing To Demand for Transport in Kohima:

Transport is basically a derived demand created by a requisite for travel between a trip origin and a destination, which largely depends upon the size and structure of the demography and economy of any society. Other important factors that influence demand for transport are the relative costs and availability of alternative means of

transport; availability of parking space; social perception regarding car versus mass transport, etc. Such key factors contributing to the demand for transport in Kohima are discussed under the following heads:

4.4.4.1. Population Growth:

In 2001, the population of Kohima Municipal Council (KMC) was 77030, which increased to 99,039 in 2011[31]-a whopping increase of over 28 per cent. Notably, while for the state as a whole, the last decadal growth rate was negative (-0.48 percent), the district recorded a whopping 21.47 percent. This trend reflects the pull factor of the city.

While considering population data on Kohima Municipal Council (KMC), accounting for Kohima village (KV), which is located within Kohima city but does not come under KMC, is required for all practical reasons. This is more so while considering for transport policy because transport demand arising from the village means the same as arising from any of the wards under Kohima. The population of Kohima city (KMC+KV) area is 114773 (99039+ 15,734) persons. The total number of household is 25686 (22,312 + 3,374) (Census, 2011). Likewise, with lesser degree of importance, the same can be said of the population increase in other neighboring villages or even the increase in population of the whole state. People's travel to the city will be more because of its administrative, educational and commercial importance. Hence, there will be pressure on the city's mobility. The population of Kohima city is largely made up of Government employees, students, traders and workers. This nature of population composition increases the need for commuting. Notably, the population of the city and its share in the state's over all population is projected to increase (Table-4.6 below).

4.4.4.2. Nature of Urbanization:

As stated by Nagaland Vision 2030 document (2016), "the urbanization pattern is somewhat skewed as the urban growth is concentrated in few key towns such as Dimapur and Kohima." The difference in urbanization level between that of Kohima district and the state has doubled-8 percent in 2001 and 16.32 percent in 2011[32]. This trend of migration to the city has exerted and is exerting huge pressure on the intra city transport system.

[31]Source: http://www.census2011.co.in/

[32]Author's calculation from census (2011) data.

Table 7.6: Population Projection

Year	State		Greater Kohima Planning Area		
	Population	Compound Annual Growth Rate	Population	Compound Annual Growth Rate	% of State
2021	2531000	1.1	176,166	1.7	6.96
2031	2804000	1.0	208,512	1.7	7.42
2041	3106000	1.0	246,797	1.7	7.95

Source: CDP (2006)

Middle Income Groups (MIG) and High Income Groups (HIG) showed the maximum tendency of coming to the city from other parts of Nagaland to settle down (36.7 percent and 37.4 percent respectively) (CDP, 2006). Though recent data on these aspects is not available, however, it hints the fact that people who can afford the congestion augmenting personal cars are coming to settle down in the city.

An estimated 83.9 percent of the population in the city is Scheduled Tribes (2011 Census). Notably, since all the Naga population belonged to ST, 16.1 percent are migrants from outside the state. Like any other cities, the city thus attracts migrants from the rest of the country as well. What is pertinent from the point of view of transport policy is the income level of these migrants, who largely belonged to the marginally poor category. It calls for adequate provision of Public Transport Service (PTS) as these people are more likely to be at the receiving end in case of inadequacy of such services.

4.4.4.3. Occupational Structure of the Population:

The workforce participation rate in Kohima increased from 33 percent in 2001(CDP, 2006) to 37.09 percent in 2011 (excluding marginal workers) (District Census Handbook, 2011). With this rise, commuting for work increases and hence demands for transport too. There was a decline in the overall marginal workforce from 7 percent in 2001 (CDP, 2006) to 5.75 percent in 2011 (District Census Handbook, 2011). It

should be noted, however, that reduction in percentage does not mean reduction in absolute numbers. The marginalization of labour is attributed mainly to the lack of adequate economic opportunities and the absence of required skill sets for the prevailing employment opportunities (CDP, 2006). In the absence of regular jobs, it is reasonable to assume that these people travel longer distance in search of works, and also commute longer distance for work.

Occupational profile of the population shows that government sector is the largest employer with 54.5 percent of the population engaged in various government sector jobs. This is followed by 17.5 percent having own shops and business (CDP, 2006). In 2011, the numbers of persons in KMC under the following four heads: (i) Cultivators, (ii) Agricultural Labourers, (iii) Household Industry Workers, and (iv) Other Workers were 287, 72, 261, and 32150 respectively (District Census Handbook, 2011). What stands out from the above data is that the number under 'other workers' (most probably, the majority will be government employees) is huge, as compared to negligible numbers under the other three heads. Thus, it is reasonable to assume that the CDP's (2006) occupational ratio still applies.

And more government employees mean more travel for work given the fact that government offices were built without adequate or in most cases with no employee quarters nearby. Notably, Capital Complex Area where almost all the Government's departmental directorates and secretariats are located is sited at the outskirt to the North of the city without adequate staff quarters. Thus, staffs and other people commute for works from the main city and even from the extreme south of the city. This calls for land use-transportation policies integration. Besides, government employees commuting to work from neighboring villages to offices in the city (mainly by personal cars), and students commuting from city to colleges and schools located in the neighboring villages increases the volume of traffic, and exerts pressure on the road capacity.

4.4.4.4. Strategic Central Location:

Kohima district shares its boundaries with Assam State and Dimapur district in the West, Phek and Zunheboto districts in the East, Manipur State and Peren district in the Southwest and Wokha district in the North. And hence, Kohima city that comes under Kohima district is strategically located and acts as transit route for intra-state and inter-

state logistics. Three National Highways- NH 39, NH 61 and NH 150 traverse through, originate or terminate from the city. The Dimapur to Imphal National Highway 39 runs through the middle of Kohima Town, and is the main lifeline for the Manipur State (for which state the nearest railway station is also Dimapur Railway Station). The CDP (2006) reported that about 4700 vehicles enter and exit Kohima on an average day in 12-hour duration. Of the total vehicles, cars (over 70 percent) and goods Vehicles (about 15 percent) are the predominant modes and constituted 85 percent of total traffic.

All these locational factors contribute to the volume of traffic, wielding pressure on the existing mere two-lane road capacity. The need for control, regulation and segregation of regional traffic with intra urban traffic becomes an important aspect in planning design and investment decisions (CDP, 2006).

4.4.4.5. Administrative, Educational, and Tourist Hub:

Being the capital of the state, Kohima is the main administrative, commercial (could be slightly second to Dimapur, which is the commercial hub of the state due to its air and railway connectivity), educational and religious center of Nagaland. Thus, people agglomerate in this city for work, education, conferences, shopping, etc. All these contribute in augmenting the traffic volume of the city.

Notably, 45 percent of the area was under administrative uses, which accounts for the highest in this administration hub's land use break up (CDP, 2006). Kohima harbors the highest number of Government colleges in the state, including one of the campuses of Nagaland's University. Incase of private colleges, the city and its periphery areas come second after Dimapur (Statistical handbook of Nagaland, 2013). Also, there are number of civil service examination coaching centers, computer learning centers etc. Thus, students and civil service aspirants from all over the state agglomerate in this city for various educational pursuits.

Nagaland has many places of tourist interests that attract visitors through out the year. Being relatively more accessible and the hospitality sector more developed than the other districts, Kohima draws comparatively larger number of tourists. Notably, during the Hornbill Festival, local, domestic and international tourists come to the city. Traffic standstill is common during the time of the festival.

4.4.4.6. Health Care Hub:

As in 2012-13, Kohima has the highest number of doctors as well as medical specialists in the state (ibid). From all the districts, for all major medical complications patients are referred to Naga Hospital Authority-the largest Government Hospital in the state in terms of beds, doctors, specialists, and other staff members and advanced medical equipment. Besides, bigger private hospitals with specialized doctors and advanced medical equipment are concentrated in Kohima (and Dimapur) only. Thus, people often come to the city for medical reasons.

4.4.4.7. Market:

With more people, and more better off people residing in the city as compared to other districts, its market is wider in size and offers better remuneration. Reflecting the significance of the city in terms of market, the CDP (2006) noted that 15 percent of the total number of vehicles entering and exiting the city was goods vehicles. Local traders from across the state and neighboring states (like Manipur) come to the city to sell local produce. Likewise, merchandise traders agglomerate to the city from across the country and even from Tibet, Nepal, etc. (there even exists a designated Tibetan market).

Villagers from across the state come to the city to work as household chores 'helpers,' 'baby-sitters,' salesmen, teachers, etc. Also, people come to the city for 'shopping' during festive seasons. Thus, the market pull factor leads to agglomeration of traders, shoppers, job seekers, etc. and concomitantly leads to rise in demand for transport of goods and people.

Against this backdrop of increasing travel demand, we shall now look at the supply side of transport in the city.

4.4.5. Supply Side Inadequacies:

4.4.5.1.Road System in Kohima:

The topography of the city governs the form of road network that has evolved, which traverse along the elongated city. While NH-39 connects Dimapur and western parts of the city with southern parts of the city and extends towards Manipur in the South, NH-61 originates from the middle of the city and connects the northern areas of the city and extends towards Wokha and Mokukchung districts. The major road network of

Kohima increased from 15 Km in 2006 (CDP, 2006) to 87.1 km in 2015 (Kohima Smart City Proposal, 2017). This has certainly enhanced the road-reach of certain areas, however, since there has not been any lane widening, congestion is going from bad to worse.

About 55 percent of road length is near single lane configuration, i.e. carriageway width being less than 6 meters (CDP, 2006). The road expansion or widening has not taken place till today, which naturally contributes to congestion. Smart City Proposal (2017) reported that, "47 [Percent] of the citizens considered poor road condition as the major problem in transportation sector priority voting, followed by traffic congestion attaining 32 [percent] of citizen's priority."

Poor road geometry slows down traffic speed (as the drivers slows down to navigate) and increases the likelihood of vehicle accidents. Most of the intersections of the roads are T or X shaped, with poor geometric engineering (CDP, 2006).

Footpaths encourage commuters to walk, sometimes at the expense of using cars, and hence desirable from the viewpoints of environment, health and congestion mitigation. On all major road stretches, it is observed that footpaths are present. However, guardrail of footpath exists only in certain stretch of road (CDP, 2006). The drains along the pedestrian footpath networks are not regularly cleaned or maintained. During rains, there is an overflow of rainwater mixed with slush, sewage and other wastes, affecting the walkability quotient of the city (Smart City Proposal, 2017). Likewise, pedestrian overhead bridge exists only in two places. This also slows down traffic speed, as cars have to stop or slow down to make people cross over. All these lack of up-keep contribute to the deceleration of traffic speed.

Vehicles entering and exiting the city mainly from neighboring villages, towns, and states significantly contributes to the total traffic volume of the city. The city road network is "overburdened by the heavy goods vehicles moving through the national highways passing through the city. This leads to congestion in the city core" (CDP, 2006). Entry of vehicles can also be used as a measure to indicate congestion. This is actually in practice (see Rao and Rao, 2012). Table 4.7gives the details mode (type of vehicles) and location wise traffic (number of vehicles). Though a recent data on the

same is not available, the break ups will be more or less consistent, though for sure the total number of vehicles must have increased, considering the increased volumes of trade and number of vehicles in the state, region and across the country. This is also reflected in the snowballing level of congestion observed each passing year.

Table 4.7: Mode and Location wise Traffic (No. of vehicles)

Mode	Bypass Check Post	Merema Check Post (NH-61)	Phezema Check Post (NH-39)	BSF Camp Police Check Post	Secretariat Road	Overall
Two wheelers	50	33	70	21	168	342 (5%)
Cars	1529	459	853	522	1395	4758 (74%)
Buses	113	17	87	47	99	363 (6%)
Good Vehicles	472	78	254	85	81	970 (15%)
Total	2164 (34%)	587 (9%)	1264 (20%)	675 (10%)	1743 (27%)	6433 (100%)

Source: CDP (2006)

Given the strategic location of the city, and the consequent high level of pass-through vehicles, bypass roads are called for. Besides, adequate and timely maintenance of the created roads should be carried out, so that instances of the abovementioned case of neglect and disuse of the inter-urban road that bypasses Kohima city from its outskirt, is avoided.

4.4.5.2. Parking:

At the commercial centers in Kohima, as is expected the parking demand is observed to have been high. The location wise peak parking demand by mode type reveals that demand for parking varies from 80 ECS[33] (Equivalent Car Space) to 130 ECS. The maximum peak parking demand comes from cars (Ibid). There was an increase in parking lots capacity from 1 in 2012 to 9 in 2015 (Smart City Proposal, 2017). However, the parking demand far exceeds the supply levels due to the increasing number of vehicular traffic.

Allocated parking spaces exist in the middle of the city from TCP gate junction to Razhu junction. However, being a commercial and institutional area most of the

[33] ECS for other vehicles types (other than car) is calculated in relation to parking slot dimension of car (5 m x 2 m) taken as 1.

parking space is occupied by the local taxis leaving inadequate parking space for shoppers forcing them to park on the road. This encroaches upon the already narrow carriageways of the roads, accentuating congestion. Also, in the absence of any proper bus and truck terminal the entry of long distance regional passenger and freight traffic into Kohima city also adds to the congestion level on the city roads (CDP, 2006).

It is observed that, during peak time, the vehicles travel an extra distance (adding to congestion in doing so), spending extra time to find a suitable parking space. The values in minutes by mode are given below (Table 4.8), which must have gone up, given the rise in traffic volume against an almost fixed capacity:

Table 4.8: Extra Time and Extra Mile for Parking

Mode	Extra Travel Distance (m)	Extra Travel Time (Min.)
Cars	50	3
Taxi	50	3
Two-wheeler	40	3

Source: CBD (2006)

The authorized on street parking along the main roads of the city occupies 6m or even more of the carriageway. This, if relieved, it has been calculated that there would be an increase in the present speed of about 17 to 20 km per hour to as much as 25 to 35 km per hour (ibid).

4.4.5.3. Transport Service Providers in Kohima city:

Private cars, private bus service providers, Pubic bus service providers[34], local taxis[35], constitute the passenger carrier vehicles. In 2015, local taxis and registered buses were 713 and 109 respectively. And KMC operated 25 buses in the same year (Smart City Proposal, 2017). Thus, the provision of transportation services is largely from the private sector.

[34] Public in the sense that they are operated by Kohima Municipal Council.

[35] Local in the sense that the taxies are owned by different individuals, who are largely residents of the city, and are operated either by the owners themselves or by employed 'drivers'. Corporate taxi aggregators have not penetrated here.

Public transportation service is not only inadequate (CDP, 2006), but the only existing mass transportation provision, bus service "is [also] unstructured and inefficient, adding to the city congestion by their long stoppages to collect passengers. These buses further block the narrow roads at the bus stops" (Smart City Proposal, 2017). Moreover, bus service is available only along the city's main arterial road, leaving the other areas un-served. In the face of inadequate bus service, "taxis are an essential mode of movement in…Kohima… However these taxi stands are not properly planned…" (ibid). The disorganized parking by taxis encroaches upon the narrow roads and further accentuates congestion.

4.4.5.4. Traffic Safety:

Vehicle crashes, besides resulting in mortality, morbidity, and other economic and social costs, contribute to slowdown of traffic speed. Traffic safety is a concern in Kohima. "The major cause of accidents is lack of proper road geometry and ill-designed intersections with inadequate sight distance. Interactions also revealed that accidents have been taking place due to rash driving and negligence. Trucks, Taxis, and LCVs are reportedly involved in 75 percent of the accidents" (CDP, 2006).

4.4.6.Demand-Supply Mismatch

The foregoing discussion suggests that the severe congestion in Kohima road is primarily due to supply side bottlenecks. Demand for transport is rapidly increasing and is bound to continue in this expanding urban agglomeration (for the reasons stated above). However, as briefed above public transport system has remained inadequate, inefficient, with no quality improvements. Concomitantly, the rapid mushrooming of private cars on the static city road with lacking parking space is accentuating the already severely congested road (particularly along the main spine). Added to this is the lack of integrated spatial and transport planning. For instance, "the possibility of widening does not exist due to the continuous ribbon development[36]" (CDP, 2006), which also accentuates congestion as shoppers congregated along the main spine. Such traffic congestion, results in disruption of movement between the two halves of the linear city (Ibid) leading to economic and environmental costs.

[36] Ribbon development here refers to the construction of mainly commercial buildings along the main route of the city.

In the light of an increasing demand against more or less static supply, we shall now discuss mitigation of the 'clogged' traffic congestion in the city, by means of a simple theoretical model, foregrounded on the theoretical concepts elucidated above. We begin with the precincts of the model.

4.4.7. Theoretical Model:

4.4.7.1. Limitations of the Model:

The model is developed keeping in mind the distinctive features characterizing traffic congestion in Kohima City. There are empirical studies estimating elasticities (income and price) using time series data, panel data, and cross sectional data (e.g., Pirotte et al., 2011). Such studies provide critical evidence for effective policy making, specifically for demand side management. This model is a theoretical exercise, constructed without deriving the micro-foundations like price elasticity, income elasticity, the road users' behaviors (giving attention to their consideration of convenience), etc. Also, the model does not consider cases like conspicuous and other such consumption. It is not however denied here the fact that such consumption does exist, and that such factor and other aspirational factors explain increasing ownership of personnel cars to some extend. Having said so, it is assumed that the demand curve for travel is downward sloping curve (i.e., if the cost of travel increases, people will demand less and vice versa). The intent is to show that non-pricing supply side mitigation should precede congestion pricing or regulation for reasons mentioned below.

4.4.7.2. Conditions of Congestion-free and Congestion:

At the initial capacity, there will be no congestion unless the number of commuters exceeds the congestion threshold (point Tp* in Figure 4.3) at a given point in time (taken as hour in this discussion). The equilibrium is attained at the intersection point between the demand curve for travel (taken as downward sloping) and congestion cost function. Since the optimum (Point b in Figure 4.3) is taken at the point of inflection beyond which congestion externality sets in, the congestion cost function can be construed as MC curve, i.e., costs from societal point of view.

To begin with, we assumed a hypothetical initial condition where the city's traffic-flow is at optimum. Now, as is the case in Kohima, there occurred a shift in the demand for travel (from DD to DD' in Figure 4.3), for multiple factors. In a situation

where this shift in travel demand curve is not accompanied by an expansion in capacity, it will create congestion (equivalent to the area Tp*Tp in Figure 4.3).

4.4.7.3. The Model-Congestion Mitigation:

In fig. 4.4above, the pre-capacity expansion congestion cost curve, C (T, C) intersects the downward sloping demand curve at 'a', at which the corresponding number of commuters is Tp. However, this is beyond the congestion free commuter threshold, Tp*, and hence there is congestion. It is worth to pause here to note that this illustration also underscores the need for anticipatory planning and provision of urban infrastructure and services. For instance, in the line of French transportation policy, which involves drawing up of master plans by updating long-run traffic forecasts every five years to develop road and motorway improvements and construction (Pirotte and Madre, 2011). In the case of Indian cities, Kohima in particular, there is a failure in this area, especially at the local government level for want of fund or other reasons. Rao and Rao (2012) noted that the non-availability of funds for additional roadway infrastructure has seriously constrained the growth of the supply side.

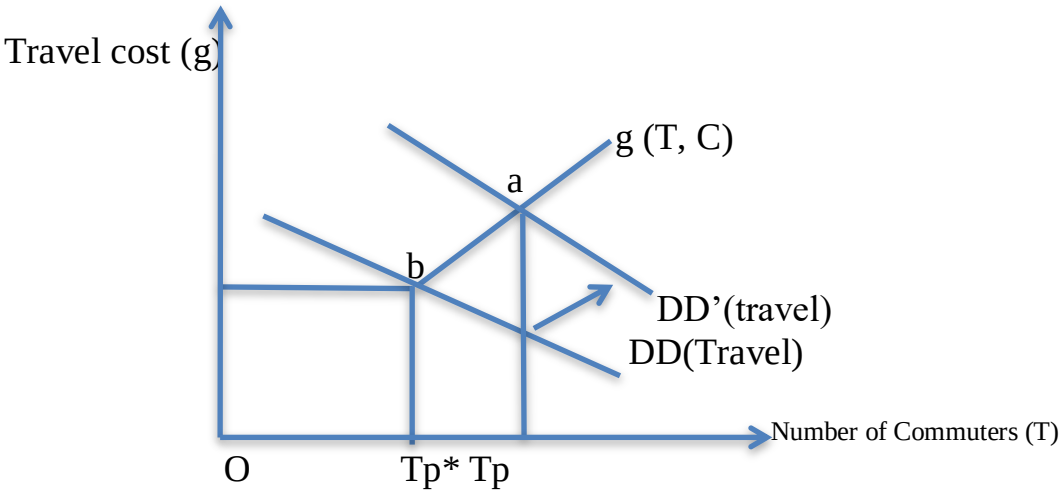

Figure 4.3: Shift in Demand Curve Leading to Congestion

Coming back to the figure, what the market based congestion pricing instruments will do to ease congestion (as is illustrated in all textbook elucidation) is to impose *charges* equivalent to P or less on those commuters using *prima-facie* congestion-causing private cars (so that the demand curve shifts towards the congestion free level, Tp*). Assuming the *charge* to be P, there is a dead weight loss equivalent to Q. The intention of such *pricing approach* is to reduce commuters using personnel cars through substitution effects. However, in the absence of *substitute*, i.e., adequate,

efficient and quality mass transit services, this approach may only lead to loss of welfare. In terms of the figure, there is a loss of commuters' welfare equivalent to P. The same effect will be observed if the government through *command and control* forces T to Tp* level. To put this into perspective, say, the commuters using private cars for want of adequate, efficient and quality PTS are charged, they are either *priced off the road* or bear extra costs, which amounts to loss of welfare. This is over and above the opportunity cost they incur for the congestion (in the context of Kohima largely due to more or less stagnant capacity). There is the classic counter argument that it is actually not loss of welfare as the government gains in revenue from the *charges* (which can be employed to finance infrastructure and services); however, given the acute deficiency of the *substitute*s, and "transportation [being] an input to all urban activities" (Mohanty, 2014), the potential adverse impact on the wider economy and hence on government revenue may neutralize such revenue potential. Moreover, in the context of Kohima, the question of propriety related to charging commuters for *prima facie* government failure cannot be evaded. Thus, there may be heightened "political challenges" (Button, 2010) if the *substitutes* are not put in place in the first place. For instance, the 'odd-even' scheme[37] of the Delhi government wasn't received well, despite the *severe* ambient air pollution emergency, citing the lack of adequate public transport services as one major reason. Congestion-pricing limitations noted by Robin and Verhoef (2000) are more pronounced in cities of developing countries like India.

Having said so, in cases where congestion is a result largely of inadequate capacity, it is more efficient to go for capacity expansion in the first place. In the figure, post-capacity expansion indicated by the extension of the cost function to C (T, C*), the congestion free threshold level increases from Tp* to $Tp_{s.}$ If the congestion is mitigated entirely through capacity expansion, as is quite evident in the diagram, there is no loss of welfare or dead weight loss (at lest in theory, the loss is zero). However, for financial, environmental, institutional, and the other associated opportunity costs reasons, complete alleviation of congestion through capacity expansion is not possible, and hence the need to employ market-based instruments comes. Even then, if such price-instruments are preceded by supply side intervention to the extend possible, the

[37] The scheme allows automobiles with odd and even registration plates to ply on alternate days.

loss of welfare and deadweight loss can be lessened. In practice, 'zero loss' is unlikely to be realized, but the losses can be minimized and should be minimized to the extend possible by affecting capacity expansion in terms of supply side measures. For instance, if capacity expansion smaller than that necessitated by the existing demand is represented by a *congestion cost function* between initial cost function {C (T, C)} and that of post capacity expansion {C (T, C*)}-not shown in the figure- it can be gleaned that even if the demand is brought down to equilibrium level corresponding to this congestion function through congestion pricing or command and control, the loss in commuters' welfare and dead weight loss is minimized. One may argue here that commuters' welfare and dead weight loss can be minimized to the same level by partially shifting down the demand curve to the equivalent level through pricing and command and control approaches. However, in that case, the lack of *substitute* and the associated problems will not be addressed. And therefore, such approach resulting in increased mobility costs may prove disastrous to economic growth.

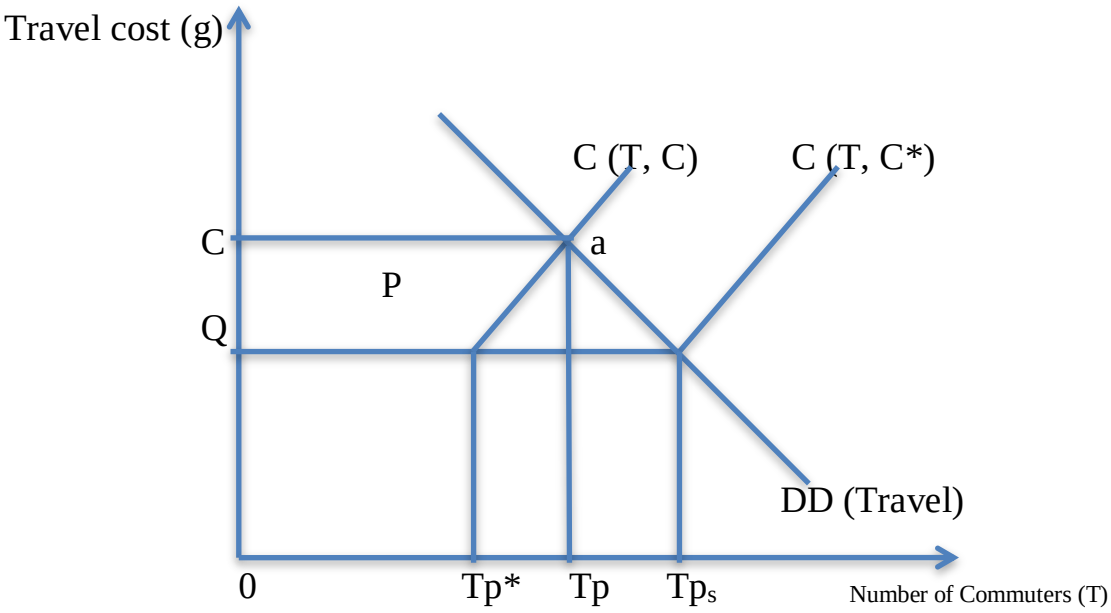

Figure 4.4: Congestion Mitigation

The traditional approach of new road construction or upgrading existing road is subjected to the popular three paradoxes in transport economics (Piguo-Knight-Downs paradox[38], Downs-Thomson paradox[39], and Braess Paradox[40]), which basically say

[38] Regarded as the fundamental law of traffic congestion, it says that expanding road capacity elicits new demand with no improvement in congestion.

that road expansion can be ineffective or counter-productive. Besides, there are evidences in the literature showing how expanding road capacity may be ineffective or counter effective (Kenneth and Richard, 1994). However, it is to be noted that these paradoxes should not be cited as an excuses by concerned authorities so as to abdicate in providing adequate and quality road infrastructure. These paradoxes are more to reinforce the argument that other market-based instruments of regulating traffic are also necessary, but in line with my argument, after putting in place the *substitutes*, if the government is genuinely for the welfare of the citizens. Besides, it is not solely argued in the paper to *build roads out of congestion*, but risking repetition, supply side measures to precede *pricing*.

Supply side measures like parking facilities and efficient parking policy, proper design of roads so as to lessen road accidents, intelligent transport system, and other passing recommendations made in the last section, in the context of Kohima, should be taken. Congestion being worsened by absence of bus and truck terminal, and lack of parking has been reported in Kohima (CDP, 2006). Thus, measures to mitigate these will push Tp* further to the right (meaning, the setting in of congestion is delayed or congestion is lessened).

Mention can be made of the increased likelihood that, in the event of "provision of bus services of a quality that would be acceptable to those currently using private transport" (Montek and Mathur, 2014), the number of commuters per lane hour will decrease. If accompanied by other efforts to alter people's preferences away from congestion causing cars towards mass transit, the likelihood will be further boosted. Thus, it will be equivalent to road expansion and concomitantly congestion is eased as well as additional pollution from traffic congestion. Towards that end, a citizens' initiative like the 'Cars free Thursdays' being organized in Delhi, Hyderabad etc. are positive signs and should be encouraged and institutionalized by the government as citizens initiatives tends to be sporadic. Given the hilly terrain, and hence the less likelihood of green alternative modes like cycle, PTS assumes greater salience. After putting in place the *substitutes*, congestion pricing can then be resorted to boost this 'shift.' PTS will "provide better service to the lower-income groups that tend to

[39] It says that road capacity expansion diverts people to the expanded congested road.
[40] It says that adding a new link causes total travel time to increase.

patronize it. Also, the wealthy are likely to benefit from being able to 'buy' uncongested road space, a situation they value because of the importance they attach to time savings" (Button, 2010).

4.5.8. Conclusion:

From the discussion so far, the picture that emerges of the state of transport in the state is grossly inadequate and abysmal. There are so many supply side bottlenecks that need to be addressed. It is thus imperative to invest in transport, for both capacity expansion and quality enhancements of the existing capacity (road infrastructure as well as mass mobility services).

Given the nature of traffic congestion in Kohima, and noting the fact that no single measure can be sufficient in addressing this complex issue, directly jumping to congestion pricing or command and control may not be the right approach for mitigating the same, for the rationales explored in this Chapter. Supply side measures should precede market based and command and control demand side measures. The provision of adequate, efficient and quality PTS is crucial from the viewpoints of sustainable and inclusive urban mobility. Moreover, "a good network of roads, coupled with an efficient mass transportation system, contributes to the "working efficiency" of cities" (Mohanty, 2014). Green urban mobility, or sustainable urban transport will make Kohima city a green engine of growth.

Chapter 5

Travel Mode Choice in Kohima City: Lessons from Empirical Study

5.1. Introduction:

The critical salience of urban mobility in the form and shape an urban space takes, and hence the quality of life in such a space, has been the focal point of discussion in the preceding chapters. The need for managing the same cannot be overstated, especially to leverage the expanding cities as a 'resource'. The supply side issues and the required policy intervention and management imperatives thereof of urban mobility in Kohima city have been chiefly dealt with in the last chapter. Equally important in urban mobility management is DSM or Demand side management, for continual supply side provision is fiscally and environmentally unsustainable, and after a certain point, counter productive.

To contribute towards an informed and evidence-based effective sustainable transport development and management strategy in Kohima city, an urban transport household survey was carried out in the subject city. The sampling technique employed for the same has been already briefed in Chapter 1. In this chapter, the findings of the survey are presented. An econometric model of travel mode choice for Kohima city residents is also built and presented, based on the same primary data.

5.2. Basic Particulars of the Household Members:

That the socio-economic profile of an economic agent (and of his household) has a strong influence on the individual's economic decisions needs no elaboration. From the household level survey conducted (totaling about 260 household visitations), a sample size of 243 households emerges, after dropping those with inadequate data (largely due to reluctance from the respondents to divulge certain information). The average household size is 3; the single member households, largely migrant students and job seekers (Kohima being an educational hub) staying in 'rented houses' (also reflected in the relatively higher percentage of 'head' vis-à-vis 'wife', with single resident household recorded as 'head'), contributing to this tellingly low figure. Likewise, the congregation of students to the city (students comprises the highest

proportion of the city's population, with 32.77 percent) contributes to the low average age, at 31 years. Sex ratio is more or less balanced, with male constituting 48.9 per cent, and female comprising 50.1 percent. The city has a reasonably educated populace, with the majority having a graduate degree. Maximum of the workforce is engaged in governmental sector, accounting for the highest in terms of occupational-breakups. The average household income at 42104 INR should be considered keeping in mind the high standard deviation value of 49.65, with minimum and maximum values of 10000 INR and 90000 INR. In other words, the average income is not at all representative. This high standard deviation value can be explained from the high degree of disparity in the income levels corresponding to occupational composition of the population (See Table 5.2). Further details apropos age, income are presented in Table 5.1; and those of gender, relationship to head, marital status, education level, and occupations, are presented in Table 5.2.

Table 5.1. Age and Income: Descriptive Statistics-A

Variable	Mean	Std. Dev.	Min	Max
Age	31	14.47	0 (i.e., less than 1 year)	79
Income	42104	49.65	10000	90000

Source: Author's compilation (2018)

Table 5.2. Categorical Variables: Descriptive Statistics-B

Variable	Categories	%	Cumulative Frequency
Gender	Male	48.9	48.9
	Female	51.1	100
Relationship to Head	Head	22.5	22.5
	Wife	18.19	40.69
	Son	28.88	69.57
	Daughter	30.41	100
Marital Status	Married	37.91	37.91
	Unmarried	62.08	100
	No Schooling	1.8	1.8

Educational Status	Primary (till Class 5)	9.02	10.82
	High School (till Class 10)	21.25	32.07
	Higher Secondary (till Class 12)	22.36	54.43
	Graduate	34.02	88.45
	Masters	11.52	100
Occupation	Unemployed	11.94	11.94
	Government Employee	24.86	36.8
	Pensioner	2.63	39.43
	Working Professional in Private Sector (including teachers, Sales men, etc.)	13.05	52.48
	Own Business	6.66	59.14
	Daily Wage	0.27	59.41
	Student	32.77	92.18
	Housewife	7.77	100

Source: Author's compilation (2018)

5.3. Trip Information:

Although 'bus mode' accounts for the highest percentage share, there is a fair distribution in the modes of travel (See Table 5.3). In what is a stark contrast to many of the Indian cities, the share of 'two wheeler' is negligible. In line with the demographic profile of the city, 'work place/office' and 'school/colleges' are the highest trip generators (See Table 5.3). Per trip, on average, the commuter travels for around 3 km, in about 30 minutes, and incurs about 46 INR (See Table 5.4). The high standard deviation value of 'Trip Cost' at 56.52 may be due to the reported spike in taxi fare in the event of unavailability of buses (See Table 5.11). The higher than the current travel cost 'mean maximum willingness to pay' for one-way trip from source to destination at 66 INR (see Table 5.4) should be viewed with a grain of salt,

considering the high standard deviation value of 51.27, with minimum and maximum values of 10 and 200 respectively. This high standard deviation value arises from the varying degree of willingness to pay (WTP) from current different travel-mode users (viz., walk, bus, taxis, and cars). Regarding the maximum time willing to spend per one-way trip, an overwhelming majority (77.96 percent) reported that they want the trip to be completed in "less than 30 minutes".

Table 5.3: Categorical Variables: Descriptive Statistics-C

Variable	Categories	%	Cumulative Frequency
Mode of Travel	Car	23.02	23.02
	Bus	29.94	52.96
	Taxi	20.19	73.15
	Walk	26.12	99.27
	Two Wheeler	0.7	100
Trip Purpose	Office/Work	34.74	34.74
	School/Colleges	34.18	68.92
	Social Visits	20.33	89.25
	Marketing	10.73	100
Maximum Time willing to spend (in minutes)	Less than 30 min.	77.96	77.96
	Less than 60 min.	16.52	94.48
	More than 60 min.	5.50	100

Source: Author's compilation (2018)

5.4. Characteristics of Automobile Used:

Regarding automobile ownership, 55.54 per cent of the households own at least one vehicle, with comparable percentage (44.44 per cent) owning none. The percentage break-up of automobile ownership is given in Table 5.5. With respect to the respondents (243 in total), while 45.26 percent own vehicles, 54.73 don't. The automobiles are mostly 'privately owned' (95.49 per cent), with 'organization owned' (e.g., government vehicles) vehicles comprising merely 4.51 percent. The vehicles are mostly 'cars' comprising of 92.19 per cent, with the generally lower mileage 'Sports Utility Vehicles' (and hence more fossil fuel consumption and potentially greater

adverse environmental impact) consisting of merely 7.21 per cent. Henceforth, 'cars' will thus be used interchangeably with 'vehicles'. Almost all of those who own automobiles perceive cars as "necessity", and mainly used for "office/work" and "social visits" (see Table 5.6 for the main reasons given for car ownership and major use of cars). With regard to the 'oldness' of the cars, which has implications on air pollution, most of the cars are purchased "brand new" and are less than 10 years (see Table 5.6 below). The car owners spend on average 2881 INR, but with a high value of standard deviation (see Table 5.7)-the possible explanation for the same may be the varying amount spend by taxi handlers (high), those using mainly for infrequent social visits (low), etc. (see Table 5.6 for 'Major Use of cars').

Table 5.4: Distance Traveled, Trip Time, and Trip Cost, Maximum Willingness to Pay

Variable	Mean	Std. Dev.	Min	Max
Distance Travelled (in km)	2.82	2.82	0.1 (100m)	20
Trip Time (in minutes)	28.9	27.86	1	180
Trip Cost	46.40	56.52	0	250
Maximum Willingness to Pay	66	51.27	10	200

Source: Author's compilation (2018)

Incase of unavailability of 'cars,' the preferred alternative mode of travel for most of the car owners is 'taxi', followed by 'bus' (See Table 5.8). And the factor that is mostly cited while choosing a particular mode is 'convenience and comfort' (See Table 5.8). This hint to a policy implication of 'shifting' those opting for taxis to buses by improving the service quality of the later.

Table 5.5: Household Automobile Ownership

Number of Cars per Household	0	1	2	3	4	5
%	44.44	44.44	8.64	2.05	0	0.41
Cumulative Frequency	44.44	88.88	97.52	99.57	99.57	100

Source: Author's compilation (2018)

Table 5.6: Categorical Variables: Descriptive Statistics-D

Variables	Categories	%	Cumulative Frequency
Reasons for Car ownership	Necessity	87.5	87.5
	Cheaper than taxi/bus services	5.83	93.33
	Inadequate and poor quality of bus service	4.16	97.49
	Others	2.5	100
Major Use of Cars	Office/Work	58.33	58.33
	Education	3.78	62.11
	Social Visits	36.36	98.47
	Marketing	0.75	100
Oldness of Cars	<5 years	53.84	53.84
	5 to 10 Years	35.89	89.73
	10-15 years	2.56	92.29
	15-20 years	7.69	100
Whether Purchased New or "Used" cars	New	81.9	81.9
	"Used"	18.10	100

Source: Author's compilation (2018)

Table 5.7: Monthly Fuel Expenditure

Variable	Mean	Std. Dev.	Min	Max
Fuel Expenditure	2881	48.56	2000	5000

Source: Author's compilation (2018)

Table 5.8: Categorical Variables: Descriptive Statistics-E

Variable	Categories	%	Cumulative Frequency
Alternative Mode incase of unavailability of cars	Someone else Car	1.98	1.98
	Bus	33.11	35.09
	Taxi	47.01	82.1
	Walk	8.6	90.7
	Work from home	0.66	91.36
	Bike	8.6	100
Cited Factors for the alternative mode	Easy Accessibility	26.05	26.05
	Cheaper Cost	19.32	45.37
	Convenience and comfort	34.45	79.82
	Non availability of bus service	2.52	82.34
	Health	5.04	87.38
	Reliability of reaching on time	3.36	90.74
	Safety	5.88	96.62
	Traffic Jam	2.52	99.14
	Environmental Concerns (Energy, GHG and other pollutants)	0.84	100

Source: Author's compilation (2018)

5.5. Bus Transit Information and Quality of Bus Service:

There is a negligible percentage of respondents who do not take bus at all in a year's period; however, combined with those who take only few times in a year's time, the percentage is significant at 11.38. Majority takes 'several times a week' (See Table 5.9). The availability of 'bus stops' within walk-able distance, as perceived by the respondents, is far from ideal. Almost 29 per cent of the respondents reported that there is no bus stop within a walk-able reach from their homes (see Table 5.9). On average, a respondent spends about 10 minutes walking to a bus stand, where it takes about 5 minutes to board a bus (see table 5.10). Regarding 'bus service frequency,' 54.43 percent finds it 'sufficient'. Around 69 percent does not find bus fare 'too expensive'; and greater percentage (74 percent) finds fare structure as 'not complicated'. Majority (about 69 percent) regarded 'bus cleanliness' as 'bad'. Around 60 per cent thinks that 'commuting by bus takes too long'; however, greater percentage (67 percent) reported that there are 'not too many transfers'; all these suggesting the severe congestion in the city. Commuting by bus is mostly perceived to be 'safe,' with 87 percent of the respondents reporting so. Majority finds commuting by bus not 'comfortable' (53.36 percent). On the overall 'quality of bus service', majority sees it to be of 'average' quality. Over the last year, an overwhelming majority (66.38) reported that the 'bus service quality has remained about the same' (See Table 5.9).

Table 5.9: Descriptive Statistics-F

Variables	Categories	%	Cumulative Frequency
How often do you take bus?	Not at all	2.1	2.1
	Daily	21.09	23.19
	Several times a week	38.39	61.58
	Several times a month	29.11	90.69
	Few times in a year	9.28	100
Number of bus	0	28.95	28.95
	1	40.72	69.67

stops within 'walk-able distance'	2	27.6	97.27
	3	2.26	99.53
	4	0.45	100
Is Bus Service frequency Sufficient?	Yes	54.43	54.43
	No	45.56	100
Is Bus Fare too expensive?	Yes	30.83	30.83
	No	69.16	100
Is Bus Fare too complicated?	Yes	25.63	25.63
	No	74.36	100
Bus Cleanliness	Good	30.83	30.83
	Bad	69.16	100
Does Commuting by Bus take too long?	Yes	60.66	60.66
	No	39.33	100
Does Bus commuting have too many transfers?	Yes	32.35	32.35
	No	67.64	100
Is commuting by Bus safe?	Yes	87.02	87.02
	No	12.97	100
Is commuting by Bus comfortable?	Yes	53.36	53.36
	No	46.63	100
Bus Service Quality	Good	5.02	5.02
	Average	61.08	66.1
	Poor	33.89	100
Over the last year, Bus service quality has…	Improved	9.36	9.36
	Remained about the same	66.38	75.74
	Worsened	11.06	86.8
	Don't know	13.19	100

Source: Author's compilation (2018)

Table 5.10: Descriptive Statistics-G

Variable	Mean	Std. Dev.	Min	Max
Time spend walking to a bus stand (in minutes)	9.95	7.17	1	33
Time spend waiting for a bus in a bus stand (in minutes)	5.32	4.16	0 (less than 1 min)	20

Source: Author's compilation (2018)

5.5.1. Impacts from Reduced/No Bus Service:

Commuting by bus forms a basic part of the day-to-day socio-economic activities of many individuals, the quality of which has a bearing on the economic growth of an urban space and the quality of life of the urban dwellers. Regarding impacts from reduced/no bus service on diurnal activities, maximum number (59.23 per cent) reported 'time lost,' and that in such event, "they are often late to workplace or to schools and colleges". With the unavailability of the cheapest available mode of transit (bus), and the consequent supply-demand mismatch in taxi service (resulting in higher prices), they incur higher costs of travel (28.46 per cent reported so). Moreover, there is the inconvenience associated with walking to 'taxi stands', negotiating price, and likewise that increase the transaction costs (see Table 5.11). The significance of bus transit is also brought out by the fact that 82.70 percent of the respondents responded that if provided they would use bus on holidays and Sundays (see Table 5.11).

5.5.2. Bus Service Quality Enhancement Suggestions:

Studies have pointed out the salience of incorporating inputs from consumers in order to bring about consumer-relevant improvements in the quality of any product or service. Towards enhancing the quality of bus service, following are the recurring suggestions given by the respondents (listed in decreasing order of percentage):better quality service (bigger, spacious, cleaner buses, with specified shuttle schedule with strict punctuality (26.36 percent); bus service to un-served areas [41] (13.18 percent);increasing the number of buses (10.90 percent);replacing the old with new buses (9.09 percent); improving the road condition-to ease congestion (8.18 percent);restructuring fare according to distance travelled(5.90 percent); provisioning adequate parking spaces[42] (3.18 percent); proper regulation to ensure quality by KMC (Kohima Municipal Council) (3.18 per cent); increasing the number of 'bus stops' (2.27 percent); proper driving (say no drunk and driving) (2.27); mitigating congestion and provisioning Bus Rapid Transport (2.26 percent); reducing the number of private taxis-to ease congestion(1.81 percent); government should provide buses (1.81 percent); more number of buses on Sundays (1.36 percent); bus card facility (1.36 percent); direct buses without transfers (0.90 percent); better 'customer care' service (0.90 percent); provisioning night time services of buses (0.45 percent); reducing private cars-to ease congestion (0.45 percent); increasing bus frequency (0.45 percent); enforcing no smoking and chewing of tobacco inside buses (0.45 percent); spreading awareness on the benefits of using PTS (0.45 percent); switching to CNG (Compressed Natural Gas)-to ease air pollution (0.45 percent); mandating transparent windows on buses (0.45 percent); better conduct by conductors (0.45 percent); and finally, well trained traffic police (0.45).

[41]The reported un-served areas by bus include Merhulietsa Colony, Forest Colony, Lerie Colony, AG colony, Seikhazou Colony, Agri. Colony, Don Bosco/Kohima College area, New Secretariat, BSF camp, Aradura, New Reserve, Electrical Colony, Upper/lower Chandmari, Naga Hospital, Para Medical, Kohima Bible College, Jail Colony, Indira Gandhi Stadium, Little Flower School, Billy Graham Road, New/Old Minister Hill, Poterlane Colony, Mission Compound/Bayavu, Naga Bazaar, Chotu Basti, Upper/Lower PWD colony, Officer Hill Colony, Midlane Colony.

[42]100 percent of the respondents opined that parking is a problem in the city.

5.6. Congestion and Air pollution:

In line with what has been said about the severe congestion in Kohima city in the last Chapter, about 50 per cent of the respondents reported that the congestion level on the city's roads is either 'very bad' or 'severe'. Analogously, 81 per cent find traffic speed 'problematic'. Given the proliferation of cars on the more or less stagnant city's roads, almost all the respondents (95 percent) are of the opinion that traffic volume has exceeded the road carrying capacity (Table 5.11). In such a scenario, it is only natural to observe severe congestion.

Table 5.11: Descriptive Statistics-H

Variable	Category	Percentage	Cumulative Frequency
Impacts from reduced/no bus service on daily activities.	Inconvenience	4.61	4.61
	Increased Cost	28.46	33.07
	Time Lost	59.23	92.3
	No effect	7.69	100
Would you use bus on holidays and Sundays?	Yes	82.70	82.70
	No	17.29	100

Source: Author's compilation (2018)

5.6.1. Congestion Mitigation Suggestions:

Towards mitigating congestion, following were the recurring suggestions by the respondents (listed in decreasing order of percentage): Road extension, including circular roads and improvements of existing roads (65 per cent); Public Transport System (PTS) enhancements (20.35 percent); construction of parking lots in commercial areas (3.21 per cent); reducing private cars and taxis, and shifting to PTS (2.14 percent); better traffic management (2.5 percent); constructing fly-overs (1.07 percent)[43]; encouraging walking (1.07 percent); exploring the possibility of cable cars (0.71 percent); introducing 'Odd and Even' scheme (0.71 per cent); Shifting few offices out of Kohima (0.35 per cent); establishing educational institutions outside Kohima (0.35 percent); using two wheelers (0.35 percent); car pooling/ shared taxi (0.35 percent); town planning (0.35 percent); spreading awareness about

[43] May not be feasible, given the steep slope and geologically unstable terrain.

environmental pollution from automobiles (0.35 percent); footpaths, over bridges and zebra crossings (0.35 percent); intelligent transport system (ITS) (0.35 percent); Regulation of cars own per family (0.35 percent).

5.6.2. Shift From Car to Bus:

In an earlier chapter, we have already established theoretically the salience of information in the form of 'awareness' in generating demand for larger environmental goods, and hence higher level of environmental improvement. In the light of this, notably, majority (58 per cent) reported that they were not aware that SPM is above the safe norm in the city. This calls for better dissemination of information on the same, to affect a change in the behavior of the agents. Encouragingly, an overwhelming majority (76 per cent) agrees that parking charges are acceptable on environmental grounds, provided quality public transport is available. However, majority of 'car users' (56 percent) reported that parking charges per se would not discourage them to *shift from cars to bus*. Besides, majority of them (61 percent) find parking charges expensive. Parking charges, thus, to be effective, should be accompanied with 'nudging,' say in the form of awareness drives.

While 45 percent of the 'car users' responded that they would shift to bus on environmental consideration, 23 percent reported that they would do so only if the quality of bus service improves. Thus, bus quality service enhancement is also imperative to affect change to more environmental friendly travel mode. Almost all of the 'car users' (92 percent) reported that they would be more likely to use bus if quality of bus service improves. An overwhelming majority of 'car users' (80 percent) responded that they would be more likely to use bus if concessionary fares are provided. This hints that Price/cost incentives approach if employed may work (Table 5.12).

Table 5.12: Descriptive Statistics-I

Variable	Categories	%	Cumulative Frequency
Congestion Level	No problem	21.84	21.84
	Bad	27.73	49.57
	Very Bad	23.52	73.09

	Severe	26.89	100
Aware that Air pollutants (SPM) are above the safe norm in Kohima?	Yes	41.59	41.59
	No	58.40	100
Parking charges acceptable on environmental grounds if quality public transport is available?	Yes	76.05	76.05
	No	23.94	100
Traffic Volume has exceeded the Limit?	Yes	95.39	95.39
	No	4.61	100
Traffic Speed is a problem?	Yes	81	81
	No	19	19
Parking Charges would discourage you from using private car and take a bus?	Yes	44	44
	No	56	100
Shift from Cars to Bus on Environmental Ground?	Yes	45.45	45.45
	No	22.72	68.17
	If only bus service quality improves	31.81	100
Is parking cost expensive?	Yes	61.29	61.29
	No	38.71	100
Will you be more likely to use bus if concessionary fares were available?	Yes	80.55	80.55
	No	19.45	100
Will you be more likely to use bus if	Yes	92	92
	No	8	100

quality of bus service improves?			

Source: Author's compilation (2018)

5.7. Travel Mode Choice Model:

What factors may be associated with an individual travel mode choice on a given day? From literature, these factors are grouped into three: the first category is "trip attributes" such as cost of a transport mode, etc.; the second grouping relates to the individual's "socio-demographic characteristics" such as age, per capita income, etc.; and the third kind includes "trip-related locational factors", comprising existence of bus stops within walk able distance from trip origin, etc. (Qin, Zheng, and Wang, 2013). Table 5.13 provides a list of the variables used in the current model. The descriptive statistics of the same have been detailed in the preceding sections, and hence not repeated here.

Table 5.13: Variables

Sl. No.	Variable
1	Distance Travelled (in km)
2	Trip Time (in min.)
3	Trip Cost (in Rs.)
4	Age (in Years)
5	Monthly Income
6	Trip Purpose
7	Gender
8	Relationship to Head
9	Marital Status
10	Educational Status
11	Occupation
12	Number of Cars in a Household[44]

Source: Author's calculation (2018)

[44]It should be noted here that there were cars users who reported choosing non-car alternative mode of travel, mostly citing, "to avoid being stuck in traffic jam" as the reason.

Given the binary nature of the regressand and the regressors taking on dummy and categorical variables, we use Logit Model to analyze individual travel mode choice. The model is conceived given the severe congestion level in the city, as has been extensively discussed. The dependent variable (alternative transport mode choices) thus takes either *congestion accentuating mode* or *congestion easing mode*. While the former includes private cars and 'unshared' taxis[45], the later includes walking, buses, and shared taxis[46]. The codes used are given in Annexure 2. The Logit function takes the following form:

$$\ln (p)- \ln (p-1)= \beta_1+ \beta_1 X_1 \ldots \beta_n X_n \qquad \ldots(1)$$

Where, $X_1 \ldots X_n$ represent the regressors described in Table 5.12 and Table 5.13.

5.7.1. Result and Discussion:

While Table 5.14 reports the estimation results of all the variables, Table 5.15 shows the results of only the significant variables. The discussion is limited to the statistically significant variables shown in Table 5.15[47]. Regarding socio-demographic factors, while the coefficients on 'age' is positive; that of 'occupation' is negative. The coefficient on 'number of cars' is expectedly positive, indicating that the probability of choosing a congestion-accentuating mode will increase with an increase in this variable.

Apropos trip attributes, while the coefficient of trip time is negative, suggesting that the probability will decrease with an increase in trip time by that mode; that of trip cost is positive. These results are warranted for 'time' and "cost' are generally factored in by any economic agent in his/her decision making. To put it in another way that distinctly brings outa policy implication, the results suggest that 'cost and time' considerations are important for commuters in Kohima city[48]; thus, congestion-easing alternative mode that is cheaper and takes lesser time should be provided. This is reinforced from the aforementioned survey result wherein an overwhelming majority of 'car users' responded that they would be more likely to use bus if

[45] Taxis hired by a single individual, and hence equivalent to personal cars in terms of per capita road space consumption.
[46] Two wheelers are excluded given the negligible number of such observations.
[47]The regression is run on Eviews.
[48]Few respondents opined that they choose to walk instead of commuting by bus or car, citing the time lost being stuck in traffic congestion.

concessionary fares are provided and if quality of bus service improves. The coefficient on 'trip purpose' is also negative.

Regarding trip-related locational factors, though the result is statically insignificant, it is negative. This suggests that with an increase in the number of bus stops within a walk-able distance, the probability of going by car mode decreases. In other words, the probability of taking buses increases with an increase in the availability of bus stops within reach. Thus, as suggested by the respondents in the survey, bus service should be extended to un-served areas, and accordingly bus stops should be made available.

Table 5.14: 'Overall' Logit Estimation Results

Dependent Variable: MODE_OF_TRAVEL Method: ML - Binary Logit (Newton-Raphson / Marquardt steps) Sample: 1 703 Included observations: 703 Convergence achieved after 6 iterations Coefficient covariance computed using observed Hessian				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE__IN_YEARS_	0.042619	0.016017	2.660820	0.0078
DISTANCE_TRAVELLED__IN_K	-0.035976	0.046780	-0.769048	0.4419
EDUCATIONAL_STATUS	0.111028	0.137922	0.805004	0.4208
GENDER	-0.445433	0.278987	-1.596605	0.1104
MARITAL_STATUS	-0.525520	0.431909	-1.216739	0.2237
MONTHLY_INCOME	2.10E-06	4.70E-06	0.447473	0.6545
NUMBER_OF_BUS_STOPS_WITH	-0.082606	0.166313	-0.496689	0.6194
NUMBER_OF_CARS_IN_A_HOUS	0.465960	0.154626	3.013473	0.0026
TRIP_COST__IN_RS__	0.049436	0.004317	11.45149	0.0000
TRIP_TIME__IN_MIN__	-0.010412	0.006184	-1.683819	0.0922
C	-2.870575	1.292700	-2.220605	0.0264
McFadden R-squared	0.596415	Mean dependent var		0.335704
S.D. dependent var	0.472572	S.E. of regression		0.242826
Akaike info criterion	0.552075	Sum squared resid		40.68549
Schwarz criterion	0.636314	Log likelihood		-181.0545
Hannan-Quinn criter.	0.584632	Deviance		362.1090
Restr. deviance	897.2317	Restr. log likelihood		-448.6158
LR statistic	535.1227	Avg. log likelihood		-0.257545
Prob(LR statistic)	0.000000	Total obs		
Obs with Dep=0	467			703
Obs with Dep=1	236			

Source: Author's calculation (2018)

Before we conclude this chapter, a passing note on the limitations of this model is deemed necessary, and the corollary need to improve on the same. It is clear that the sample size need to be scaled up so as to be more representative (and hence lower standard deviation value). Also, the exactitude of the data collected can be further improved by employing technology, say GIS, to calculate the distance between the two locations (home and workplace). This is mentioned keeping in mind the fact that commuters usually, at the best, approximate their replies on questions pertaining to 'trip distance'. Instead of a bivariate model as done in the present study (the context of severe traffic congestion as the justification), the same can be developed as a multivariate logit model of travel mode choice to bring out more clearly the probabilities of the alterative travel modes. All these are planned to be taken up in further research. These should be considered by anyone interested in a similar study.

Table 5.15: 'Significant' Logit Estimation Results

Dependent Variable: MODE_OF_TRAVEL Method: ML - Binary Logit (Newton-Raphson / Marquardt steps) Sample: 1 703 Included observations: 703 Convergence achieved after 7 iterations Coefficient covariance computed using observed Hessian				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
AGE__IN_YEARS_	0.057687	0.010504	5.491925	0.0000
NUMBER_OF_CARS_IN_A_HOUS	0.465149	0.147945	3.144072	0.0017
OCCUPATION	-0.109328	0.062418	-1.751532	0.0799
TRIP_COST__IN_RS__	0.049264	0.004162	11.83742	0.0000
TRIP_TIME__IN_MIN__	-0.012059	0.005847	-2.062531	0.0392
C	-4.445907	0.606191	-7.334173	0.0000
McFadden R-squared	0.590401	Mean dependent var		0.335704
S.D. dependent var	0.472572	S.E. of regression		0.245432
Akaike info criterion	0.542682	Sum squared resid		41.92484
Schwarz criterion	0.588041	Log likelihood		-183.7527
Hannan-Quinn criter.	0.560213	Deviance		367.5055
Restr. deviance	897.2317	Restr. log likelihood		-448.6158
LR statistic	529.7262	Avg. log likelihood		-0.261384
Prob(LR statistic)	0.000000	Total obs		
Obs with Dep=0	467			703
Obs with Dep=1	236			

Source: Author's calculation (2018)

5.8. Conclusion:

A policy implication that strongly emerges from the discussion in this chapter is the urgent requisite of enhancing the quality of public transportation services, or precisely, bus services in the city. This is borne out from the survey responses and also from the model. The feasible suggestions from the respondents towards mitigating congestion and improving bus services should be caused to materialize. All these, combined with the policy implications from the earlier theoretical discussions will contribute towards making urban mobility in Kohima city green, inclusive, and congestion free. Success in this will make Kohima urban agglomeration a truly green engine of regional growth.

Chapter 6
Conclusion and Directions for Future Research

6.1. Urbanization as a 'Resource':

Cities since ancient times have been prosperous centers of cultural and commercial exchange, helping generate the wealth of nations. Cities in India, similarly, have been the drivers of growth due to their agglomeration, network and other positive externalities. The contribution of cities to India's GDP is expected to increase from about 62 percent in 2007-08 to 75 percent in 2021. The same is true for cities in the Northeast India including Nagaland. For reasons related to agglomeration and network economies, Kohima has the potential to significantly contribute to the wealth of the state. History, geography and economics of Kohima accord a unique place to the city in its structural and spatial transformation.

The myriad positive externalities that urbanization creates are just one side of the story; the same also creates negative externalities including congestion, pollution, overcrowding, and so on. Urban mobility development and management stands out in addressing these challenges of urbanization. Urban transport is a unique infrastructure for it simultaneously addresses two critical aspects of any city's development: agglomeration economies enhancement and congestion mitigation. In essence, transport development strategy can and should address the concerns of growth and environment. This is the primary motivation behind the current study: an optimization attempt towards maximizing economic gains from transport, while minimizing their contribution to environmental bads.

The study examines the economic scenario of Kohima urban agglomeration including its state of urban mobility. The nature of relationship amongst growth, transport, cities and environment are explored to draw lessons for urban mobility development strategy in Kohima. A field study was also conducted, basing on which an econometric model is constructed to analyze the travel mode choice patterns in Kohima to draw implications for such strategy.

6.2. Kohima Urban Agglomeration: Challenges and Opportunities:

SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of Kohima city divulges that it exhibits agglomeration economies, and is in terms of socio-economic indicators, relatively better off than almost, if not all the urban spaces of the state. For myriad reasons and potentials, the economic salience of Kohima as an agglomeration centre for the state and the region is immense, exhibiting network economies. It is the administrative nerve centre; an important transit route for intra-state and inter-state logistics; a hub of education and healthcare; a market for jobs and goods; and so on. Notably, it has the potential to become an important international agglomeration centre in the foreseeable future, with the fruition of Act East Policy.

The performance of this otherwise potential regional center of growth is sub-optimal. Many urban challenges plague the city. One stark factor that is keeping the city at halt is its mobility, characterized by supply side inadequacies in the face of burgeoning demand. The snail paced traffic speed on the city's road bears witness to the crippling effect of the poor state of urban mobility. The same is also borne out by a household survey, as outlined in the last chapter. Needless to say, the current severe congestion is causing adverse environmental effects. Air pollution is exacerbating in the city, which should give a jolt to the observed policy inertia and underinvestment in the city. To convert these urban challenges into opportunities, policy makers and planners need to understand the economics of cities, transport and environment and plan and act towards an agglomeration economies augmenting, congestion mitigating, and resource generating Kohima city.

6.3. Lessons from Theory:

There exists bidirectional nature of relationship between and amongst transport, cities, economic growth and environment. To put this into perspective, augmentation in transport contributes to economic growth by means of myriad positive externalities that can emanate from the same. It leads to cost savings in 4 T's – transport, trade, time and transaction. It creates direct, indirect and induced effects on growth and leads to wider economic benefits (WEB). But at the same time, the converse is also true in the sense that, economic growth gives the necessary resources to augment transport infrastructure and services. Analogously, cities are engines of growth, however,

without economic growth (say in the form of agricultural surplus), they would not have come about. Still, transport plays an important role in the genesis and growth of cities; however, cities by contributing to economic growth provide the required capital to invest in transport, augmenting agglomeration economies and mitigating congestion diseconomies.

This interrelated nature of the relationship of the variables of interest should be appreciated in the policy formulation and intervention. For instance, land use planning should be integrated with transportation, balancing job, housing and public amenities locations. The negative environmental impacts of transport do not constitute as 'costs' from an individual viewpoint, however, they are 'costs' of unmatched importance from societal point of view that need to be incorporated in the collective as well as individual decision-making.

A simple theoretical model of congestion mitigation based on 'extended speed and congestion cost functions' suggests that in scenarios like that of Kohima characterized by acute supply side bottlenecks, congestion easing supply side interventions should precede congestion pricing and regulation, for welfare, political challenges, and other reasons. The provision of adequate, efficient and quality public transport system is crucial from the viewpoints of sustainable and inclusive urban mobility. Moreover, a good network of roads, coupled with an efficient mass transportation system, contributes to the working efficiency of the city.

6.4. Lessons from Empirical Study:

The Logit model is conceived given the severe congestion level in the city. The dependent variable (alternative transport mode choices) takes either congestion accentuating mode or congestion easing mode. From literature, the factors associated with an individual travel mode choice on any given day are "trip attributes," individual's "socio-demographic characteristics," and "trip-related locational factors".

Regarding socio-demographic factors, while the coefficient on 'age' is positive. The coefficient on 'number of cars' is expectedly positive, indicating that the probability of choosing a congestion-accentuating mode will increase with an increase in this variable. Apropos trip attributes, while the coefficient of trip time is negative,

suggesting that the probability will decrease with an increase in trip time by that mode; that of trip cost is positive. The results suggest that 'cost and time' considerations are important for commuters in Kohima city; thus, congestion-easing alternative mode that is cheaper and takes lesser time should be provided. This is reinforced from the aforementioned survey result wherein an overwhelming majority of 'car users' responded that they would be more likely to use 'bus' if concessionary fares are provided and if quality of bus service improves. Regarding trip-related locational factors, though the result is statistically insignificant, it is negative. This suggests that the probability of taking buses increases with an increase in the availability of bus stops within reach. Thus, as suggested by the respondents in the survey, bus service should be extended to un-served areas, and accordingly bus stops should be made available.

In essence, towards shifting car users to congestion easing travel modes, i.e., buses in the present context of Kohima city, thereby reducing congestion causing modes of travel, the quality of bus services should be enhanced so as to be "satisfactory" for those currently using private transport. The feasible ones from the recurring suggestions of the denizens on bus quality enhancements (and also on congestion mitigation) should be incorporated. This will make the changes that are brought about more meaningful for the consumers. Besides, a kind of 'nudging' in the form of enhanced information dissemination on the subject should be instituted. Towards bringing about emission easing public transportation system, technology (of combustion engines and fuel) used in buses should be increasingly made environmental friendly, through a mix of policies (regulation, or through tweaking prices/costs, including subsidies, taxes, etc.). Likewise, pedestrian friendly and public transport link infrastructure should be provided.

All these will take the city mobility towards green and inclusive urban mobility, or sustainable urban mobility. This will in turn contribute towards making Kohima City an economically productive, environmentally sustainable, and socially inclusive urban agglomeration. And the fast urbanization that is occurring in the city can be leveraged as a *resource*. The theoretical expectations and empirical evidence on the same have been already discussed. Appropriate design and prompt implementation of policies is imperative, and should be accordingly bring to fruition. Needless to say, in the event

of failure to suitably intervene, the current issues (highlighted in Chapter 1 and 2) that plague the city will go from bad to worse, and take the potential engine of growth to a grinding halt.

6.5. Directions for Future Research:

There is a scant research that combines growth economics, urban economics, transport economics and environmental economics to draw lessons for public policy; more so in the context of frontier states like Nagaland. This study as aforementioned is intended to draw lessons from such domains of economics for constructing urban transport development and management strategy for Kohima. In the absence of ample theoretical and empirical research on the subject, this thesis has not been able to robustly derive policy recommendations from theory and practice. However, it suggests that both developmental and regulatory interventions are needed to combine the synergies of transport and urban development to address economic growth and environmental concerns simultaneously. It recommends that developmental efforts, including transport and land use integration need to precede regulatory approaches in the context of Kohima's current travel patterns. Future research may explore in depth transport system management (TSM) and transport demand management (TDM) strategies in the overall context of addressing the concerns of growth, city development and environmental management.

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Annexure i

Urban Transport Survey Household Schedule

A.

Name of the Interviewer:			
Serial number of Questionnaire:		Date of Interview	
House No:			
Colony Name:		City	Kohima

B. Basic Particular of the Household Members:

ID No.	Name *(Start with respondent)*	Age (Years)	Sex (M/F)	Relationship to head	Marital Status	Educational Status	Occupation		Monthly Income
							Primary	Secondary	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									

C. Characteristics of Automobile Used (Please check all that apply)**:**

C.1. Number of bicycles owned by the family_____

C.2. Number of motorcycles (Scooter and Bikes) owned by the family_____

C.4. Number of cars owned by the family_____

C.5. Do you own a Car? Yes_____ No _____

[NB: If **No**, please **skip** to **Section D**]

C.5.1. If YES, is your car Privately owned_____ or organization owned (e.g. govt. cars, etc.)_____

C.5.2. Why do you own a car? Necessity_____ Aspiration (status symbol)_____ Cheaper than bus/taxi services_____ Inadequate and poor quality of bus services_____

Others:_____

_____

_____

C.5.3. Type of automobile: Car_____ SUV_____ Others (Please specify)

_____

C.5.4. Major Use of Car

_____

C.5.5. Year of Purchase of the car_____

C.5.6. Whether Purchased Brand new_____ or Used vehicles _____

C.5.7 Average monthly fuel cost_____

C.5.8. If your car is not available, what mode do you use?

Bus_____ Taxi_____ Take someone else car_____ Walk_____

Bicycle _____ Bike_____ Work from home_____

Others_____

Why do you choose this mode of travel?

_____

_____

_____

_____

D. Trip Information (for the day of interview)**:**

D.1.

Family Members	Mode of Travel	Trip Route	Trip Purpose	Distance travelled	Trip time	Trip cost
1-Self						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

E. Bus Transit Information:

E.1. IF YOU TOOK A BUS today, how much time did you spend walking to the bus? _____ Minutes.

E.2. How many minutes did you spend waiting for the bus?

_____ Minutes.

E.3. On what day(s) of the week is it hardest for you to get to work/school/or any other destination? (Check all that apply)

_____Monday _____Tuesday _____Wednesday _____Thursday _____Friday _____Saturday _____Sunday

E.4. During what time(s) of the day is it hardest for you to get to and from work/ school/or any other destination? (Check all that apply)

Early Morning (5:00AM-8:30AM)_____ Late Morning (After 8:30AM-Noon)_____ Early Afternoon (Noon-3:00 PM)_____ Late Afternoon (3:00PM-

6:00PM)_____ Evening (6:00PM-9:00PM)_____ Late Night (9:00PM and later)_____

E.5. According to you, which areas of Kohima City region are hard to get to because of lack of transportation?

_____

_____

E.6. How does reduced/no public transportation affects your daily activities (Work, shopping, etc.)?

_____

_____

_____

E.7. How much amount you are willing to pay for a one-way ride to or from your place of employment/education/other destination? (State the maximum amount you would be willing to pay)_____ Rupees

E.8. How much time you are willing to spend on a one-way trip to your place of employment/education/other destination?

Less than 30 min._____ Less then 1 hour _____ 1 hour or more _____

E.9. Do you think parking space is a problem? Yes_____ No_____

E.10. Is Parking Cost too expensive? Yes_____ No_____ Not applicable_____

F. Quality of Bus Services:

F.1. Is Bus Fare too expensive? Yes_____ No_____

F.2. Is Bus Fare too complicated? Yes_____ No_____

F.3. Cleanliness of Bus? Good_____ Bad_____

F.4. Does Commuting by Bus take too long? Yes_____ No_____

F.5. Does Commuting by Bus has too many transfers (i.e., changing buses before reaching your destination)? Yes_____ No_____

F.6. Do you think bus travel is safe? Yes_____ No_____

F.7. Do you think bus travel is comfortable? Yes_____ No_____

F.8. Do you think bus frequency is sufficient? Yes_____ No_____

F.9. Over the last year, do you think that the reliability of travel by bus to work/shopping/etc. has…? Improved_____ Remained about the same_____ Worsened_____ Don't know_____

F.10. What do you think of the quality of bus services?

Good _____Average _____Poor _____

F.11. How often do you use Public Transport?

Not at all_____ Daily_____ Several times a week_____

Weekly_____ Several times a month_____ Others:_____

_____

F.12. Will you be more likely to use public transport if concessionary fares were available. Yes_____ No_____ I don't use a car_____

F.13. Will you be more likely to use public transport if quality of bus service improves. Yes_____ No_____

F.14. If available, would you use local bus service on holidays and Sundays?

Yes_____ No_____

F.15. Please list any suggestions to improve transportation services:

_____

_____

_____

G. Congestion and Air Pollution:

G.1. What do you think of the congestion level in Kohima?

Okay (no problem)_____ Bad_____ Very Bad_____ Severe_____

G.2. Do you know that Air pollutants (SPM) are above the safe norm in Kohima?

Yes_____ No_____

G.3. Parking charges are acceptable on environmental grounds if good public transport is available. Yes_____ No_____

G.4. Would parking charges discourage you from using private cars and take bus services? Yes_____ No_____ I don't use a car_____

G.5. Would you choose to shift from private cars to bus services on environmental grounds? Yes_____ No_____ If only bus service quality improves_____ I don't use a car_____

G.6. Do you think the traffic volume in Kohima has exceeded the limit? Yes_____ No_____

G.7. Is speed of traffic a problem? _____Yes _____No

G.8. What do you suggest for congestion mitigation?

Road extension_____ Improvements in Public Transport Services (Bus service)_____

Others:_____

_____

_____

Making Urban Agglomerations Green Engines of Growth: Theoretical Underpinnings

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Abstract: Urbanization is justifiably the buzzword, today, and it is here to stay for long, both as a phenomenon and in terms of policy discourse. The comprehension of economic rationale of spatial organization of economic activities in urban agglomeration (or more precisely cities) is critical to counter the theses of 'over urbanization', 'hyper-urbanization,' or 'Urban hypertrophy,' and to appreciate and leverage urbanization as a *resource*. Concurrently, to make cities as a *green and sustainable engine of growth*, environmental reckoning has to be incorporated in the planning and development of cities; and argued in the paper likewise.

Key Words: Cities, Over-urbanization, Growth, Environment.

1. Introduction:

Humankind has made a remarkable stride in material wellbeing. In this economic headway, urban spaces have been and continue to be a key driver and facilitator. In ancient times, port towns and cities, by means of sea haulage, were prosperous centers of cultural and commercial exchange, providing rich revenues to royal exchequers. Today, the economic reality is such that cities are the prime generators of the wealth of nations. Nonetheless, cities of today are not without challenges. And in grappling with these issues, the salience of grasping the theoretical underpinnings on the economics of cities is unparalleled. The current study is thus motivated and an attempt towards that direction.

Cities are sprouting and enlarging at a rapid pace the world over, more so in Third World countries. In India, for instance, the number of cities and towns increased by 3 times between 1901 and 2011. During the same time period, urban population swelled by 13 times (Mohanty and Mishra, 2017)-suggesting an enlargement of the existing urban spaces-which is further projected to more than double between 2011 and 2050 – from 377 million to 814 million (ibid). This undoubtedly presents a policy challenge, but also an opportunity to leverage the same as a *resource* for socio-economic development, trotting along a green growth path. The current study makes a case towards that, foregrounding on theoretical underpinnings.

Section 1 is an introduction to the study. In *Section 2*, a kind of *inverted pyramidal approach*, beginning with heterodox theory of the firm (and not uniquely neoclassical theory of the firm), of comprehending why it makes economic sense to organize production in urban spaces is elucidated. The theses of 'over urbanization', 'hyper-urbanization,' or 'Urban hypertrophy,' are critiqued in *Section 3*, and it is instead argued that urbanization should be perceived as a *resource* and leveraged likewise. Building up further on the argument, the thesis of urban agglomeration as engines of growth is expounded, substantiating the same with empirical evidences. *Section 4*

takes up the case for making cities *great*, as a green and sustainable engine of growth. And finally, *Section 5* concludes by arguing for planning and acting towards an agglomeration economies augmenting, congestion mitigating, and resource generating cities.

2. Economics of Cities:

> **"**Cities are perhaps one of humanity's most complex creations, never finished, never definitive, they are like a journey that never ends. Their evolution is determined by their ascent into greatness or their descent into decline. They are the past, the present and the future" (UN-Habitat, 2008).

Urban spaces are chiefly defined in terms of the size and occupational structure of population inhabiting an identifiable space. Put it another way, "the definition of urban area is based on population density because an essential feature of an urban economy is frequent contact between different economic activities, which is possible only if firms and households are concentrated in a relatively small area" (O'Sullivan, 2009). Census of India (2011) similarly defines and classifies urban area into Statutory Towns, Census Towns and Urban Agglomerations. Statutory Towns are notified under law and have a Municipality, Corporation, Cantonment Board, or other such authority. Census Towns are settlements with a minimum population of 5,000; a density of population of at least 400 persons per sq. km; and at least 75 per cent of the male main working population engaged in non-agricultural pursuits. Urban Agglomerations or cities are a continuous urban space comprising of a town or more contiguous towns, with or without their outgrowths[1]. Such an "Urban Agglomeration must consist of at least a statutory town and its total population (i.e. all the constituents put together) should not be less than 20,000 as per the 2001 Census" (ibid).

How do urban spaces in general come about? Sketchily, three conditions must precede for such a space to come about and flourish. Firstly, there should be agricultural surplus (more precisely food surplus) from rural areas to feed the urban dwellers. Secondly, urban dwellers must produce certain products to exchange for food from rural dwellers. Finally, a transportation system should be in place to make the exchange possible between the spatially segregated rural and urban spaces (O'Sullivan, 2009). The emergence of cities was thus made possible about 7000 years ago only after the increase in agricultural surplus (Bairoch, 1988, cited by Mohanty, 2014). Historically, factors like locational advantages (say, access to waterway, natural resources, suitable climate, etc., together called as "first nature geography"), defense rationale, and political patronage played central roles in the evolution of cities. However, only these exogenous forces related to geography and historical events cannot wholly explain the dynamics of cities. Apart from those, "spatial organization of economic activities [in cities] also made good economic sense" (Mohanty, 2014). The multifarious positive externalities can be appreciated through an *inverted pyramidal approach,* starting with the spatial organization of production under *one roof*, and then in an *industrial district*, and finally in cities. These agglomeration economies (also referred to as "second Nature geography") are categorized as: internal

[1] Outgrowths are clearly identifiable units like railway colony, university campus, military camps, etc., possessing urban features in terms of infrastructure and amenities, which have come up near but outside a statutory town limits, nonetheless, physically contiguous with the core town of the Urban Agglomeration.

economies of scale (firm level), localization economies (industry level), and urbanization economies (city level). We enunciate this point, starting with the theory of the firm.

At the outset, a firm is a particular form of group activity. Spatially, there can be two broad forms of organizing production, to wit, either spatially 'scattered' or 'integrated'. Outsourcing production to guilds, like in the 'putting out system,' is a case in point for the 'scattered' kind of production. There are costs involved in this nature of production, which can be avoided in an integrated organization. By integrating the group activity under one roof, the entrepreneur not only has greater controls over the product and the production process but eliminates the costs associated with collecting (from spatially scattered producers) and transporting the final products to a common market. According to Landes (1986), economies of scale and production in anticipation of demand necessitated the organization of various operations under one roof.

Smith (1776) approached the rationale for organizing production as a *group activity* through his acclaimed argument of 'division of labour,' which with its fruit of increased productivity, can be greatly facilitated and enhanced when workers are brought together and coordinated through an organization. Post division of labour, the worker now specializing in and repeatedly doing a particular operation, experiences an increase in dexterity, comes up with certain innovations and tools that are better suited to his work, and saves time previously lost in moving from one place to another.

We see in Marx's exposition on *group activity*, the possibility of enhancing productivity through cooperation. The hitherto independent and individual workers, when brought together in one place become social labours, bringing forth varied positive implications. With cooperation, differences in individual capabilities are compensated, thus, entailing fixed minimum efficiency to each social labour. The means of production are now consumed in common on a larger scale than before. The various parts of the work previously done step-wise, now progress simultaneously, thus, churning out more output. Cooperation also occasions emulation and raises animal spirits of the workers, thereby, ushering in increasing returns. What is most striking, above all, is the fact that the workers, in isolation cannot produce what they could produce together. In other words, their combined working day produces, relatively to an equal sum of isolated working days, a greater quantity of output, or, in certain special cases, an outcome that would simply be impossible, if carried out, single-handedly, in equal sum of working days (Marx, 1887).

Firm as a *group activity* reduces transaction costs by reducing the need to negotiate and conclude highly asset specificity[2] and recurrent nature of contracts (See Coase, 1937; Williamson, 1985); and also help solve the problem of uncertainty and the consequent need of forecasting (What, How and For whom to produce), with this role being taken up by a special class of entrepreneurs; and furthermore, firm occasions an 'imperatively coordinated group' (Weber, 1947);

Regarding the gains from co-location of firms, Marshall's (1920, cited by Mohanty, 2014) 'industrial district argument' remains a classic.

[2] Asset specificity here refers to the specific or unique characteristics of the product that is exchanged.

> "…So great are the advantages which people following the same skills trade get from near neighborhood to one another. The mysteries of the trade become no mysteries; but as it were in the air…Good work is rightly appreciated; inventions and improvements in machinery, in processes and the general organization of the business have their merits promptly discussed: if one man starts a new idea, it is taken up by others and combined with the suggestions of their own; and thus it becomes the source of further new ideas…subsidiary trades grow up in the neighborhood, supplying it with implements and materials, organizing its traffic, and in many ways…"

He further adds,

> "…[A] localized industry gains a great advantage from the fact that it offers a constant market for skill. Employers are apt to resort to any new place where they are likely to find a good choice of workers with special skill which they require; while men seeking employment naturally go to places where there are many employers who need such skills as theirs and where therefore it is likely to find good market."

On the consumption side, Marshall rightly observes,

> "…There is also the convenience of the customer to be considered. He will go to the nearest shop for a trifling purchase; but for an important purchase he will take the trouble of visiting any part of the town where he knows that there are specialty good shops for his purpose. Consequently shops which deal in expensive and choice tend to congregate together; and those which supply domestic needs do not."

Regarding Urbanization economies, Porter (1990, cited by ibid) observes, "successful firms concentrate in particular cities or states within a nation." Why? Jacob (1969, cited by ibid) opines that knowledge transfers occur between rather than within industries; and this transfer facilitates search and experimentation that lies at the heart of innovation. A greater diversity of economic activities in cities facilitates greater knowledge exchange across enterprises and individuals.

Any discussion on the economics of cities will be incomplete without citing New Economic Geography's (hereafter as NEG) perspective. Paul Krugman's "Geography and Trade" (Krugman, 2010) is generally considered the beginning of NEG. This new perspective brings insights from geography discipline into economics discipline, while also emphasizing that economic model can yield new and interesting insights when applied to geographical questions. In passing, mention can be made that this new development has been increasingly gaining appreciation among economists and international economic agencies; for instance, in World Bank's World Development Report (2009), geography was accorded primary concern (ibid). This very recent development in economics showed that economies are not dimensionless points in space; rather that spatial dimension of an economy has a lot to say about the nature of economic forces.

NEG's models implied that the geographical structure of an economy depends on a few key parameters like transportation costs, economies of scale, and factor mobility.

NEG's models consider location patterns to be the result of the interplay between agglomeration or centripetal and dispersion or centrifugal forces. Agglomeration forces or increasing internal and external returns may "push firms to locate their activities in regions with bigger markets to be able to serve more consumers or where, through concentration of suppliers, the firm's input costs are lower than otherwise" (New Zealand Government, 2014) and to reap Marshallian trinity. Likewise, agglomeration returns may push households to locate in regions of bigger agglomeration, say to reap the benefits of comparison-shopping, more and better job opportunities, etc.

Operating against the centripetal forces are centrifugal forces. Agglomeration also brings with it after some point diseconomies, say, increasing costs of land and labour, which are observed in cities across the world, and traffic congestion in increasingly many cities. Such increase in 'costs' and dispersed availability of natural resources act as dispersing forces. Certain sections of the people who cannot cope with the increasing 'costs' are push out to the *fringes* of the city (say slums and poor people colonies on the periphery of cities). The increasing 'costs' also restrict people from moving in.

Urban economics theory thus suggests that cities come about and expand due to external economies of agglomeration and knowledge. The gains from 'integrated' organization of economic activities led to denser habitations. Spatial proximity, contiguity, and density stimulated "efficiency in manufacturing, commerce and administration, which would have been impossible in a dispersed pattern of settlements… It is primarily economic forces that made cities grow, stagnate or decline" (Mohanty, 2014).

3. Urbanization as a Resource:

The world has witnessed Industrial Revolution (18th and 19th centuries), and many economies including India have also witnessed Green Revolution (20th century), and according to Mohanty (2014), "the twenty-first century will witness urban revolution sweeping across the developing countries." Exploiting this rapidly occurring urbanization as a resource through agglomeration economies augmenting, congestion-mitigating, resource generating cities will generate huge opportunities for economic growth, poverty reduction, and rural development. Justifiably, in recent times urbanization has been increasingly gaining prominence in the global policy discourse. Perhaps, urbanization will be the single most important policy concern for national, provincial, and local governments in developing countries (Ibid).

For long, urbanization studies in Third World countries forwarded the views of 'over urbanization', 'hyper-urbanization,' or 'Urban hypertrophy.' It was contended that, "urbanization in the Third World countries are outpacing industrialization" (Hoselitz, 1955, 1957; cited by Mohanty, 2014), and that the rate of urbanization in relation to GNP per capita growth rate is "excessive" when compared to the experience of developed countries (Bairoch, 1988; ibid). Hence, "Third World cities were cramped by too many migrants 'pushed off' from agriculture…. 'queuing' for industrial jobs while seeking shelter in slums" (Todaro; ibid). Together with this conception of "over urbanization" thesis, the "Urban Bias" theories (suggesting 'biased' government policies in favour of politically powerful large cities (Lipton, 1977; ibid) portrayed a somewhat negative view of urbanization in poor countries. However, this view is now

substituted by a new thinking led by urban economists who regard the current trend of urbanization in development countries as a welcome development, while emphasizing the need to mitigate the accompanying urban issues. They suggested that over urbanization thesis is a fallacy, as they ignored economic geography and agglomeration externalities in cities. Besides, "the precarious state of cities in developing countries…[indicate] an anti-urban bias" (ibid).

To further build up on the thesis being advanced, we shall take up the case for cities as the prime generators of wealth of nation. "… Among all the various types of economies, cities are unique in their abilities to shape and reshape the economies of other settlements, including those far removed from them geographically" (Jacobs, 1984). The recognition of the advantages of larger cities goes back to the time of the ancient Greek. In his work, "Cyropaedia", Xenophon (c. 440-c. 355 BC), a student of the great philosopher, Socrates, "tells of the advantage accruing to a large, as opposed to small, city in the opportunity for specialization by trade-for division of labour" (Galbraith, 1991).

It is now a familiar established fact that cities are the *engines of economic growth*. "Theoretical and empirical research suggests that agglomeration externalities, in interaction with knowledge externalities, act as powerful drivers of growth" (Mohanty, 2014). Urbanization is historically associated with economic and social transformations, and the United Nation's 'World Urbanization Prospects' (2015) captures this fact, "The process of urbanization…have brought greater geographic mobility, lower fertility, longer life expectancy and population aging. Cities are important drivers of development and poverty reduction in both rural and urban areas… urban living is often associated with higher rate of literacy and education, better health, greater access to social services, and enhanced opportunities for cultural and political participation."

Cities present four kinds of basic gains: Economies of "density, scale, association, and extension. Density results in a reduction in the cost of interacting, learning, organizing, producing, transporting, consuming, and providing services. Scale economies, emanating from the sheer volume of economic opportunities, spread fixed costs and risks over large number of agents… [Association economies] reflect collaborative efficiencies in devising joint strategies, undertaking innovation, and inventing solutions. Extension economies are associated with cost efficiencies of cities from extending their organized strategies to other cities and rural areas" (Mohanty, 2014).

Cities are subjected to the above agglomeration economies, which make them storehouses of skill and capital; hubs of knowledge and innovation; sources of informal and formal employment; hopes of millions of rural-urban migrants; and generators of public financial resources for socio-economic development including rural development. Nagaland Vision 2030 (2016) document recognizes that "in the present century the urban areas are emerging as the 'engines of economic growth' as agglomeration and densification of economic activities stimulates accelerated economic growth and better opportunities. They are not only strategic centres of economic activity and living, but they are also critical for achieving inclusive growth as they provide ample social and economic opportunities". In short, cities are evidence that increasing returns and positive external economies play an important economic role (Krugman, 2010).

Numbers too speak of the economic significance of cities. Urban-based economic activities account for up to 55 percent of GDP in low-income countries, 73 percent in middle-income countries, and 85 percent in high-income countries (Mohanty, 2014). According to Mckinsey Global Institute analysis (2010), cities accounted for 58 percent of India's GDP in 2008, and is projected to account nearly 70 percent by 2030 (Also See Table-1 on the same subject, and Table-2 on agglomeration economies).

Table 1: Urban India Contribution to National Income

Year	Share of Population (%)	Share of National Income (%)
1951	17.3	29.0
1981	23.3	47.0
1991	25.7	55.0
2001	27.8	60.0
2007	29.7	62-63
2021		75 (Projected)

Source: Government of India (2014).

Table 2: Empirical findings on agglomeration economies

Studies' Authors	**Findings**
Shefer (1973)	Doubling city size upturns productivity in a group of 20 industries by 14-27 percent across US metropolitan areas.
Sveikauskas (1975)	Doubling city size upturns labour productivity in an average manufacturing industry by 6-7 percent in the US.
Kawashima (1975)	Elasticity of output with respect to city size measured 0.20 in US metropolitan areas.
Segal (1976)	Labour productivity is 8 percent higher in US metro areas with population above 2 million than in remaining metros.

Source: Mohanty (2014).

While the economic significance of cities is unparalleled, on the other hand, most cities of today are not without issues. And in order not to negate the benefits of urban agglomerations, the urban challenges and issues have to be taken care of. It is often the case that there is a divergence between private costs/benefits and social costs/benefits, and this gap has to be bridged in order to minimize negative externalities like air pollution, that plague many cities. The New Urban Agenda (2017; intended to guide the policy approach of the UN member states towards sustainable urbanization for the next 20 years) represents a global consensus and recognition that "our future is urban". And to make our future (read as cities) sustainable, gender-equity, youth-empowerment, participatory planning, "right to the city" or inclusive public space, "leave no one behind" or reducing urban inequality, etc. are some of the emphasized goals.

Against the backdrop of the increasing significance of and call for cities to be *robust, green, inclusive and sustainable engines of growth*, we will briefly look at the relationship between cities and environment.

4. Cities and Environment:

Economic entity of any kind interacts with the natural systems of the environment, directly or indirectly. Cities as a distinct economic entity are no exceptions. In fact, the *ecological footprint* of cities has always been high, and with fast-paced urbanization, it is increasing at an exponential rate. Urban dwellers have a 'higher consumption pattern' than those in rural spaces, in the sense that they consume comparatively much more resources (food, energy, land, durable goods, etc.). "This increased consumption is a function of urban labor markets, wages [income], and household structure" (Torrey, 2004), and urban lifestyle.

The burgeoning urban population is adversely impacting the environment through the consumption of resources and the generation of waste in the process. Firstly, lands with varying degree of biodiversity in them are being cleared to make way for cities to spring up or spatially expand; or to grow food, and extract resources beneath the land to sustain the cities. Secondly, urban consumption of fossil fuels (energy) has polluted the air-both locally and globally, and also created *heat islands*. Thirdly, urbanization unfavorably affects the weather and hydrologic patterns of wider regional environments. For instance, "regions downwind from large industrial complexes…see increases in the amount of precipitation, air pollution, and the number of days with thunderstorms… Urban areas generally generate more rain, but they reduce the infiltration of water and lower the water tables. This means that runoff occurs more rapidly with greater peak flows. Flood volumes increase, as do floods and water pollution downstream" (ibid). Finally, there are the other *consequent* environmental problems like inadequate water and sanitation, lack of rubbish disposal, and industrial pollution.

All these environmental issues and the consequent health problems are a major drain on the economy by way of lost workdays, costs of treatment and other capital costs of cleanup activities. It may seem intuitively logical to assume that the environmental bads and the incidental economic costs increase with the upturn in the spatial extent of cities. However, what is to be remembered here is that, "many of the effects of urban areas on the environment are not necessarily linear. Bigger urban areas do not always create more environmental problems. And small urban areas can cause large problems. Much of what determines the extent of the environmental impacts is how the urban populations behave — their consumption and living patterns — not just how large they are" (ibid). Besides, cities improve their environmental health with growth (as resources available for *cleaning up* increases), the pace of enhancement being quickened if accompanied by good urban governance.

It is true that humankind's historic tendency has been to place the development of cities above environmental conservation. The need for economic growth and social justice (job creation, etc.) has often been cited as the rationale or justification. However, as opposed to the conventional notion that cities *normally* degrade the environment, there is a counter argument that 'cities can be good for environment,' qualified by the phrase, 'if managed aptly.' How cities can be good for the

environment? First, cities, as we have been discussing, contribute to higher productivity owing to agglomeration and scale economies. This implies that output can be produced using fewer resources with urban agglomeration than without, thereby, potentially reducing the ecological footprint. Likewise, for the same reasons, environment-friendly public infrastructure and services are much easier and more economical to construct, maintain, and operate in an urban setting. Second, density is a key determinant of energy use. Thus, high density of cities, if not negated by traffic congestion, reduces the length of trips, and makes public transport more viable, thereby reducing energy use. Third, cities, as already discussed, drive innovation, including green technologies, which is making *green economy* possible. Fifth, the higher standard of living associated with urbanization foster pro-environment stance, as mentioned earlier. Finally, cities generate revenues that fund research and development (including green technology) and green infrastructure projects, which reduce congestion and other environmental bads, thereby improving public health (Wan, 2012).

To make cities *great*, or to make a city as a *green and sustainable engine of growth*, environmental thinking has to be incorporated in the planning and development of cities. Towards this, Wan (2012) suggested the following recommendations. First, improving energy efficiency and conservation through appropriate pricing, regulations, and public sector investment. Getting prices right is required to encompass the full social costs and benefits (thereby affecting the behavior of economic agents), and ensure the efficient allocation of resources. This can be achieved by means of market-based instruments like congestion and emission charges, carbon taxes, removing inefficient subsidies, introducing/increasing block pricing for water, electricity, and other public utilities. Regulations and standards should be framed on time to correct market failures on air, water, vehicles, and appliances; to build green industrial zones; and to reduce or prevent urban sprawl. Adequate and quality public transport systems should be planned and provided timely to improve connectivity, reduce pollution, ease congestion in city central hubs, reduce environmental degradation and improve the over all quality of life. Second, promote renewable resources and clean technologies. For instances, constructing waste-to-energy plants to reduce pollution and generate energy; acquiring green technology either by importation or innovation through research and development; building new towns and satellite cities using renewable energy as primary energy sources; tackling urban sprawl by reviving city centers and developing compact, walk able satellite cities centered on efficient train, light rail, or subway systems, without heavy reliance on highways and major roads. Third, help the poor by reducing disaster risks and improving slum conditions. Building dwellings in safe areas, improving housing affordability for the poor, and investing in drainage infrastructure and climate forecast technology can achieve the former. While slum conditions can be improved by providing basic services and granting land titles or housing vouchers to slum dwellers. Fourth, strengthen public finance, transparency, and accountability. Public finance can be improved by broadening the tax and revenue base and by increasing the access of urban governments to capital markets in order to lower infrastructure and public service costs. Politicians should (incentivized by public opinion) disclose city government performance to the public and non-governmental organizations (NGOs), and have healthy national competitions and campaigns to encourage a “race to the top” (say by rewarding high achievement).

5. Conclusion:

The State of the World's Cities Report (2008) elegantly brings out the salience of cities, and the critical function of governance and planning in making and keeping "their ascent into greatness:"

> "Cities contain both order and chaos. In them reside beauty and ugliness, virtue and vice. They can bring out the best or the worst in humankind. They are the physical manifestation of history and culture and incubators of innovation, industry, technology, entrepreneurship and creativity. Cities are the materialization of humanity's noblest ideas, ambitions and aspirations but when not planned or governed properly, can be a repository of society's ills. Cities drive national economies by creating wealth, enhancing social development and providing employment but they can also be the breeding grounds for poverty, exclusion and environmental degradation."

What emerges from the above discussion is that cities exhibit agglomeration economies, and are in terms of socio-economic indicators, relatively better off than almost other spaces of human settlements. For varied reasons and potentials, the economic salience of cities as an agglomeration centres for any economy is immense. They are the administrative nerve centres; important transit routes for intra-country and inter-country logistics; hubs of education and healthcare; larger markets for jobs and goods offering better remuneration to the farmers, etc. Towards realizing all these potentials, SWOT (Strength, Weakness, Opportunities and Threats) analysis should be carried out; and the urban policy should leverage the strengths and opportunities of the city, and mitigate the weaknesses and threats of the cities.

It is quite apparent that the planning and development strategy of most cities has not considered and incorporated key elements from the theories and applications of urban economics, transport economics and environment economics. As a matter of fact there has not been any attempt of comprehensive and integrated transport, agglomeration and environment strategy, in most cities of the world, especially in developing countries. The upshot of this is the many urban challenges confronting the city. To convert these urban challenges into opportunities, policy makers and planners need to understand the economics of cities, transport and environment (Mohanty, 2014) and plan and act towards an agglomeration economies augmenting, congestion mitigating, and resource generating cities. And therein lies the importance of grasping the theoretical underpinnings on the said subjects.

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