Construct Urban Strategies to Restructure Mumbai’s Main Centralities and their Functional Relationships to Facilitate the Development of Metropolitan Hinterlands

Shifting Trajectories

P 5 Report
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In loving memory of my grandmother ..
Acknowledgment

The journey in pursuit of my interests towards built spaces began first when I started as an Architect and together was the search to understand Architecture, as a critical response to its own context. After an incredible set of experiences during practice was the desire to travel and understand Indian cities, places framed as parts of interesting environments, which dealt with a plethora of urban challenges. Years have passed in light of this educating experience, which has taught me much about myself into what I am today. A continuation of this mysterious life’s journey was the most memorable two years of master's program at TU Delft and this report reflects the culmination of my graduation studies.

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Chapter 1.0
Introduction

The main elements of thesis plan setting the background of this study will be presented in this chapter by introducing the context of Mumbai, problem field, problem statement, the main research question and a following set of sub-research questions. It then explains the methodology and techniques used in achieving coherence between the various stages and parts of this project.
Fig 1 - A panoramic view of the backbay reclamation project in Mumbai. 
Source: O’Beirne, 2007
1.1 Thesis Abstract

This thesis is a morphological research into Mumbai’s urban centres focused on the changing roles of the central business districts, their connectivity and the behavior of the city towards its hinterland region, situated in the age of rapid urbanization and metropolitan expansion. Mumbai is the financial capital of India and an alpha city (see figure 3) owing to its increased corporate presence in the global economic networks (Grant and Nijman, 2002). As a ‘Gateway City’ Mumbai is changing at a fairly rapid pace of urban restructuring necessitated by its present day urban structure as a large metropolitan center (Sita, 2008). The population of Mumbai Metropolitan Region is expected to increase from 19.0 million in 2007 to 26.4 million in 2025 (UN Secretariat, 2007)

The main background of this graduation project explores the various urban development processes of Mumbai in different-scales of the city, metropolis and region aimed at re-structuring the growth of city mainland (see figure 2) towards the hinterland region. It is a specific study on the effects of historical transformations on the city structure from an infrastructural point of view to explore the spatial consequences.

The problem deals with the notion of five main centralities in Mumbai, namely Fort-Nariman Point, Bandra-Kurla Complex, Thane, Vashi and Panvel, wherein each is a different reality in itself and the south CBD remains the dominant source of most employment activities. The problem statement is formulated based on the lack of metropolitan integration between the urban centres, which has an enormous impact on the infrastructure of the city, causing overstressed transportation, congestion of the inner city and further lacks new development opportunities for city growth. (described in detail in the next sections).

The research objectives and questions are framed based on these challenges which engage Mumbai as an emerging global city positioned in different scales. The space of present Mumbai needs new development strategies and tools, adequately supported by physical infrastructure to reconfigure city growth towards hinterlands and to make the urban centres work together. Therefore, the context of this thesis is twofold; the first researches the role of Mumbai as an emerging global city and the second researches its poly-centric structure. The project focuses on delivering a spatial proposal for a strategic development plan for the twin cities of Mumbai and Navi Mumbai by the addition of a new development axis, and a design test incorporating the idea of different-scales. The axis is a ring which circulates the twin cities and integrates the centralities by the addition of a new High-speed public transportation layer to balance urbanization across the peninsula-region.

“A trajectory is the path that a moving object follows through space. It can be a progression, or line of development following a physical trajectory” (merriam webster, 2012)

The project attempts to develop a strategic proposal through urban framed technique which structurally address the scalar increase of Mumbai megacity and its unequal opportunities. The result is to establish an integration of urban-business environments through Hi-speed infrastructures and therefore, reconfigure development towards hinterlands-region.
1.2 Problem Field

Urban India

According to McKinsey (2010) by the year 2025, nearly 2.5 billion Asians will live in cities accounting for almost 54% of the world’s urban population (see figure 5). India and China alone will account for more than 62% of Asia’s urban population. Around the world, the number of megacities (see figure 7) each with greater than 10 million inhabitants will double in the next 20 years and urban India by 2030 will have 70% all new jobs with the largest growing workforce (McKinsey & Company., 2010). As a consequence of continued economic growth, an increased amount of growing urban jobs will be the driver behind accelerating the urbanization of Indian cities (see figure 6) and the population will rise from 340 million in 2008 to 590 million by 2030.

Challenges

The economic restructuring of Indian cities reflects a national trend with a shift from a largely rural-based economy to a predominant service-based economy and rapid urbanization has increased the demand for urban services (Rode and Chandra, 2008). Mumbai through the lens of contemporary urbanization is facing enormous problems including rural-urban migration, housing demand, lack of urban infrastructure, unaffordable real-estate, growth of informal settlements and more with increasing growth of population (see figure 4). It is typical of cities in the region with an intense pressure on the mainland or precisely massive reconstruction and redevelopment of the inner city (Harvey, 2001).

The demands imposed on the city also explains how Mumbai’s expanding population absorbed the distant suburbs from the outskirts to form the Greater Mumbai region and further spawned off the growth of its twin city, Navi Mumbai across the Thane creek on the mainland region. Within this spectrum of chaotic development and increasing urbanism issues, this thesis confronts the major problems related to infrastructure and growth of Mumbai towards Navi Mumbai. It is in Mumbai that the rich and poor coexist in settlements next to each other, where millions of Mumbaikars traverse the island city, the major location of most jobs on a daily basis in suburban trains, the major lifeline of this city.

The main challenge of this project focuses on the spatial organization of the urban centralities, transportation and Navi Mumbai development by analyzing the city through different-scales, subsequently dealing with problems related to the future growth, such as the overburdened transport, severe north-south congestion and unbalanced urban development of Mumbai hinterlands.
The Mumbai Metropolitan Region comprises an area of 4355 sq.km around a bay containing deep water harbor, a confluence of interesting man-made and natural landscapes. In order to deal with the city it is important to deal with the city’s different-scales or frames of the region, metropolis, city and the center (see figure 8), wherein each frame posits a particular challenge with the frame above and so on.

Located on the foothills of the Western Ghats bordering the Deccan plateau, the metropolitan region of Mumbai has a wide range of hills, lakes, thick mangrove forests, wetlands, regional and national parks (see figure 9). The city is situated between 18° 96’ north latitude and 72° 81’ east longitude. The average elevation ranges between 10 m to 15 m and a major portion of the city is at the sea level while the maximum height of the city is at 450 m (MMRDA, 1999). The relatively linear city development and the distinct geography explain the logic behind the birth of Navi Mumbai as well as the paramount significance of the city’s rail network.

1.2.1 Locating Mumbai in Different Scales

"Hence Mumbai reveals effectively how questions of hinterland or more generally about geographic ‘context’ are a matter of scale. Mumbai has extremely important external economic linkages but at a wide range of scales from the regional to the national to the global. And it is embedded in each of these networks, in each of these ‘hinterlands’.”

(Nijman, 2011, pg.450)
At the region, Mumbai shares close relationships with the cities of Gujarat, namely Surat and Ahmedabad, and with the cities of Maharashtra, namely Pune and Nashik.

At the Metropolitan level, the twin cities of Mumbai and Navi Mumbai are welded together with the Thane district, the extended suburbs of Kalyan, Bhiwandi-Nizampur, Mira-Bhayandar, Vasai-Virar, Khopoli, Karjat, Pen, Alibag and Matheran planning divisions (MMRDA, 1999).

At the city level, Mumbai shares a structural relationship with residents from the distant suburbs, in addition to its own native population having millions of commuters passing the city space on an everyday basis. The suburban railways carry around 7 million passengers on an everyday basis.\(^1\)

At the level of the urban centers, the main CBD which is at the southernmost tip of the peninsula locates two-thirds of the city’s jobs (UrbanAge, 2007) and further in itself, constitutes the global CBD, national-historic CBD and local-native CBD, each differentially connected to the wider global network (Grant and Nijman, 2002).

\(^1\) Mumbai Suburban Railway Network - Today, of 14 million people travelling per day by the Indian Railways, around 7 million people travel per day on Mumbai Suburban section alone.
Mumbai is one of the most cosmopolitan cities of India with a demographic growth characterized by three main features, migration from other states, native increase of population and growth of the metropolitan area with the shift of population and industries to the suburbs (Pacione, 2006). According to the United Nations Secretariat (2007), the Mumbai metropolitan region would grow to 26.4 million in the year 2025 (see figure 4) superseding Tokyo, becoming the world’s most populated city.

Globalization and the changing service economy have resulted in a city structure largely influenced by the growth of urban population (Bhagat and Sita, 2008). Mumbai retains a character of its own; it remains as distinctive an entity at the beginning of the 21st century as it was earlier. Although the city envisaged a metropolitan expansion by creating new centralities, the old city center positioned at the southern-most tip of seven islands continued to retain its importance as a place for work and employment, while the suburbs were more a place for housing and residence (Masselos, 2005). Therefore, in order to deal with the existing realities of the city, it is important to deal with the different urban frames of the city (See figure). To confound an understanding of the problems, the different scales of the region, the metropolis, the twin cities and the centers are studied. Diagrammatically, by overlapping the scales (see figure 14) it can be noticed that when the island city interacts with the other far-flung parts of the metropolis, it faces several problems, amongst it the major issues related to congestion, overstressed infrastructure and the uneven urban development of new town, Navi Mumbai are dealt in this project.

The Spatial Context of the Different-Scales:
Mumbai is one of the most cosmopolitan cities of India with a demographic growth characterized by three main features, migration from other states, native increase of population and growth of the metropolitan area with the shift of population and industries to the suburbs (Pacione, 2006). According to the United Nations Secretariat (2007), the Mumbai metropolitan region would grow to 26.4 million in the year 2025 (see figure 4) superseding Tokyo, becoming the world’s most populated city.

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Given the context of rapid growth of population and the metropolitan expansion of the city, the concept of regional planning was introduced to create synergy between the old and the new growth centers of the city. It was primarily aimed at relieving the congestion of the island city and at the same time reduce the concentration of economic activity through the decentralization of administrative and industrial activities from the old city. However this framework envisioned that the city center remains the focus of financial and specialized commercial activities (Pacione, 2006). Thereon, a new polycentric structure of the metropolitan region emerged with a central theme of de-concentrating Mumbai by the creation of a new planned city, Navi (New) Mumbai in order to make use of the available land resources and achieve a balanced regional development. Understanding the role of Fort area located at the southern tip of the island city as the place of origin and the European commercial business district of the 17th century and its position today, reasons the emergence of Navi Mumbai and the importance of infrastructure to Mumbai.

According to Grant and Nijman (2002) in the corporate spread of globalization in Mumbai, the historical development has established a functional hierarchy between the global, national and local activities each differentially linked to the other economic networks. The island city continued as the major source of multinational corporations and as a financial center housing, very dense with a large number of medium and small-scale industries (see figure 18). Mumbai’s role as a major player in the global financial network, enhanced its position as the financial and business center of India (Nijman, 2012). The Central Business District (CBD) which looked both inside and outside of Mumbai for its functions continued to be positioned at the tail end of the peninsula and in its own vicinity were other prominent economic chains. The Nariman Point CBD was assigned the global role, Fort-Ballard estate became the prominent national CBD and the earlier native settlements of Kalbadevi, Girgaum, Masjid, Crawford Market, Colaba Market, Bhuleshwar, Zaveri Bazaar, Chor Bazaar, Dadar flower market and Dharavi leather market handling a significant amount of domestic businesses, together became the local CBD (see figure).

At the same time, the need to decongest island city gave rise to the development of other new centralities (see figure 17) including a new commercial heart and business district of Bandra Kurla Complex (BKC) by the planning authority, more centrally located between the CST International airport and the old historic center. The decline of port functions, mill functions, manufacturing and wholesale activities from the colonial core placed an additional stimulus to the growth of suburbs (Mukhopadhyay, 2005). Furthermore as parts of the decentralization process several major commodity markets were moved from the inner city to Navi Mumbai (see figure 19), which included the steel market at Kalamboli, the fruit and vegetable market at Vashi and new port of JNPT (Jawaharlal Nehru Port Trust) at Nhava Sheva (Pacione, 2006). Navi Mumbai was linked to old Mumbai by a new rail link in 1992 connecting the dormitory developments to the old city. Vashi became a dynamic commercial node with an increased middle-class housing market and was closest to the old city than the planned CBD at Belapur. In addition to the recognized CBDs, Thane city of Thane district and Panvel of Raigad district (see figure), closer to the proposed international Navi Mumbai airport are studied as they are important in connecting the twin cities to the metropolitan-region.

1.2.2 The Problem of Five Centralities

Fig 17- Existing and emerging centralities in the Mumbai Metropolitan Region
Source: author, 2012

Fig 18- Urban Fabric of Island Mumbai
Source: Sorabjee, 2007

Fig 19- Urban Fabric of Navi Mumbai near the Thane wetlands
Source: Chowdhury, date unknown
1.2.3 Problem Statement

Mumbai, although a linear city defined by transportation as lifeline, has shifted from being a confined island to absorbing parts of its hinterlands which were once geographically separate from the main city (see figure 20). Interestingly however, the existing realities suggest that the relations of Mumbai with its surroundings continue to remain spatially distinct owing to the identity of island city and the physical separation from other parts of its hinterlands (Masselos, 2005). Rapid urbanization and restructuring of the economic activities from manufacturing to services between the years 1990 and 2011 positioned the south historic CBD as the global financial center (Sita, 2008). In the meanwhile the other new centralities in the city including the new CBD of Bandra-Kurla Complex and Navi Mumbai developed unique identities in relation to its local economic opportunities and gained structural importance in terms of functions at other scales of the region (Mukhopadhyay, 2005).

The main driver behind the growth and development of Mumbai has been public transportation, at the moment well served by the suburban trains and the city bus system. The southern CBD is the major employment provider, which creates massive overcrowding owing to the north-south orientation of the city and has resulted in a commute pattern with a unidirectional travel ratio of 80:20 southbound during mornings and reverse (Balakrishnan, 2006). Understanding physical infrastructure can help develop and define the relationships between the city and its hinterland-region, with such large population using it on daily basis.

The main spatial challenges therefore deal with the problems imposed by the restrained growth of Mumbai causing severe congestion, burdened transportation (see figure 21) and unbalanced development of Navi Mumbai, which nonetheless remains at the forefront of new development but relatively disconnected from the Old city. Each of these centralities are formed by a certain kind-of urban restructuring process having an identity of their own whilst sharing relations with other parts of the metropolitan-region. Therefore, the thesis researches the different realities of each of the five main centralities (Fort-Nariman Point; Bandra-Kurla Complex; Vashi; Thane; Panvel) and identifies the critical importance of infrastructure and economic relationships which bind them together.

However the nature of these relationships significantly differ owing to the realities of each of the centralities which consequently changes as the distance between the centrality and the historic center increases (see figure 20). This means that the centralities farthest from the main CBD contribute more in the supply of manpower to the employment generators of the old city becoming the new middle-class dormitory settlements. In this sense, restructuring the city by equal distribution of jobs, densification and integration of the main centralities in the metropolis and thereby, connecting the disconnected parts of the twin cities into a single system of efficient transportation would help tackle congestion, stressed transportation and creates balanced development opportunities.

1.2.4 Main Research Question

How to restructure Mumbai’s main centralities to facilitate urban development by using its hinterland potentials within a framework of different scales?

Sub Research Questions

How can historical transformations help identify the spatial and infrastructural development of the city?

What are the different scales which situate the city of Mumbai and in turn, how does it affect the centralities in the city? How can dealing with scales solve the disconnect between the city and its hinterlands?

Where are the main centralities? What are the changing roles and relations of the centralities in meeting the future demands of the city?

What are the economic and functional relationships between the city and its hinterland region?

What are the problems and opportunities facing the position of the historic CBD, in this sense how can it be reoriented towards Mumbai-Pune corridor?

How can efficient transportation develop integration between the centralities to foster balanced growth opportunities and metropolitan development?
1.3 Thesis Structure

The project evolves on the framework of analytical and theoretical research in the field of spatial planning and strategies mainly dealing with the different scales of Mumbai in the region, metropolis, city and center. The research is central to the theme of economic growth and activities related to the specific case of Mumbai. The main interest is to understand the potentials of Mumbai’s hinterlands (Mehrotra, 2008; Masseles, 2005; Nijman, 2012; Vedula, 2007; Pacione, 2006; Mujumdar, 2011; Urban age, 2007; MMRDA, 1999) in order to reorient the future urban development of the city. On the basis of the problem statement and the research questions, the structure of the thesis primarily focuses on the impact of historical transformations on the changing roles of the city’s main centralities. The thesis identifies issues related to the city transformations through the colonial, post-colonial and global phases (Grant & Nijman, 2010; Sita, 2008; Mukhopadhyay, 2005; Banerjee-Guha, 2002) and attempts to tackle the main challenges caused by congestion, stressed transportation and imbalanced urban development of Navi Mumbai. The project further hypothesizes to shift the prime urban opportunities along a development ring which envelopes both the mainland and hinterland Mumbai. It investigates the proposal of reinforcing the polycentric structure and introducing an intermediate scale Hi-Speed regional transportation system. In this order, the strategies aim to establish a development corridor which connects the presently disconnected parts of Mumbai and Navi Mumbai, integrate and intensify the centralities into a single transportation system. The proposal reflects the strategic interventions spatially through the design tests. The thesis concludes with a summary of the research findings, highlights the significance of the spatial strategies, evaluates the design proposal and suggests further recommendations for development.

1.3.1 Project Objectives

The objective of this graduation project is to restructure the main centralities of Mumbai into a coherent system by harnessing the hinterland potentials in order to open-up development opportunities. The project assesses the impact of different scales on the centralities and the significance of infrastructure as the major lifeline in guiding and defining the spatial strategies. The scales are understood as overlapping systems, each with their own set of infrastructure and design challenges. The aims are supported by necessary analytical and theoretical research. The objective has therefore three main parts which aim to decongest the island city, create a coherent infrastructure system acting across different scales and generate potentials for the development of South Navi-Mumbai to implement strategies for balanced growth.

1.3.2 Project Keywords

City transformation, centralities, scales, urban development, congestion, transportation, polycentric structure, integration, reconfiguration, intensification, economic-functional relationships

1.3.3 Personal Motivation

Given the context of rapid urbanization and accelerated growth of economic activities in Mumbai, the project situates the position of Mumbai as a key player in the global financial network. The main enthusiasm arises from the fact that much has been said and done in the recent discussions about the city shifting from its current linear structure to a polycentric structure, but is often limited by what is more a political issue. Besides having a large amount of population moving through the inner city space, which is the source of much employment lacks an efficient infrastructure with relevance and impact across the different scales. In addition to this is a personal enthusiasm which comes from the familiarity of Mumbai and its spatial context that has constantly engaged in the urban discourses worldwide owing to its distinct man-made and natural geographies, where public transportation is most vital.

1.3.4 Overview of Thesis Chapters

This thesis is divided into seven main chapters starting with the Introduction and then proceeding with Research and analysis of City Scales, Theory, Proposal with vision, concept and spatial strategies, Design Tests, Conclusions and in the end, Recommendations and Bibliography.

1.3.5 Scope and Exclusions

The scope of this study researches and analyzes the urban conditions of the relevant scales which locate Mumbai. It covers the economic and functional relationships the city shares with its centralities, its twin city of Navi Mumbai, to a certain extent the metropolis and the other cities of Pune, Nashik and Surat in the region. A focus is placed on identifying Mumbai’s main centralities that involve massive structural relations through daily commutes to city center, although located outside the city limits. Moreover acknowledging the spatial transformations in the city structure exposes attention to increase urbanization in the south of Navi Mumbai as an alternative model to the current development activities which are centered on island city. As a whole the scope binds the elements of centralities, scale and development opportunities together by a proposed Hi-Speed transportation system, which creates a platform to bridge the elements.

However, owing to the limited time as a part of the master’s graduation project, the thesis is limited to the economic and infrastructural dimensions of the city. By recognizing its potentials at the spatial level, it formulates conditions for urban development and gives directions for recommendations. As a matter of scale, the exclusions comprise the design of local, neighborhood scale therefore dealing to a less extent with the social dimension.

1.3.6 Expected Products

Based on the readings from the city, several products are made wherein each is a part of the larger research and analytical framework reflecting the project objectives. In this order a vision is first made to apply the scales of the city. The proposed vision is then developed and detailed by further analysis built on the existing realities of the centralities. A strategic infrastructural project is delivered with special attention on the spatial consequences for the future development of Mumbai. In the end some key locations are indicated and design tested to carry out the spatial strategies. The main design principles would embrace both generic and specific site conditions to create network hierarchy, landscape, urban densification, physical and visual connectors, public places and mixed-use functions.
1.4 Methodology and Relevance

1.4.1 Methods and Approach

The main approach prioritizes the spatial and infrastructural development of the city through the findings based on historical transformations. The impact of transformations is applied to different scales by investigating the implications on current conditions as well as its potentials for the metropolitan-region. Principles of public transportation and economic relations are used to increase the city’s connectivity between the centralities and the overlapping scales. The coherence between the different parts and processes (see figure 22) of this project is aimed at connecting together the elements of initial interests, research, analysis, proposal and reflections across scales studied.

The theoretical research is supported by studying the phenomenon of globalization, polycentricism, urban restructuring and changing roles of CBDs to coherently underpin the effects of rapid urbanization. The analytical research proceeds by documenting and mapping the dynamic drivers of change in the city. Studies on topography, land-use, demographics, employment, land-values, infrastructure, global and urban activities are contextually made. In addition to this, design drawings, diagrams, sketches, visualizations, case reference projects, government reports and statistical data were used further to support the working framework.

1.4.2 Techniques and Time Planning

For literature studies, journal publications, conference proceedings, books, magazine articles were used in supporting the theoretical underpinning and motivation of thesis.

The formulation of thesis was strongly guided by enthusiasm and self-interests, ongoing urban discourses, observation and media messages which helped assess the present urban conditions and challenges.

For deriving logic and argumentation, mapping, drawing, research datasets and statistical datasets were used for mapping the context. Analytical interpretations of data was made from different sources to represent and communicate the urban character of the city.

Mapping analytical and research datasets, current urban trends, government vision, future development, infrastructure opportunities and city relationships helped structure the hypothesis, requirements for urban strategies.

Spatial concepts and design principals were employed based on similar urban practices and potentials explored for design tests through mapping, diagrams, schematic illustrations and 3D visualizations which descriptively explains the characteristics of the final proposal. Comparisons are made between the urban situation before and after interventions to reflect on the impact of results.

Fig 22- Methodology and work building process
Source: author, 2012
Post-Industrial age has made urban India evolve into playing a role of an emerging global power. In the recent years, megacities of the urban age have become important in the field of urbanism. Mumbai, the largest city in India has been a part of intensive academic debates parallel to other globalizing cities worldwide. The phenomenon of urban restructuring in the context of globalization has led to social, economic, environmental, infrastructural concerns. The academic data available on the relationship of the city to its hinterlands is scarce, more so is the research on the economic spread of centralities in the metropolis. The literature and information available on this subject is not specific and is outdated, with very few available western authors owing to the less importance given to analytical and regional planning of Mumbai in the global context. Specific research and documentation presented as a part analytical research can be extended further to understand the strengths of the centralities and future development potentials.

Mumbai is a city of extremes and plays home to the richest of the rich and yet the poorest of the poor. The everyday life for an average "Mumbaikar" has changed manifold over the years. The city has risen to the position of the biggest financial hub in south Asia and yet the connectivity between its metropolitan regions takes very long periods of time in the order of two hours. Through time, a number of projects in the new centralities have evolved spatially to serve additional functions of business parks, IT parks and economic nodes in the greater Mumbai region. Connectivity between the main centralities in greater Mumbai today is poor and over stressed. While distances are genuine issues, infrastructure links between the clusters (mostly as part of a business regimen) does not help and commute is a tedious activity. Public avenues are also limited to indoors activities and shopping malls. Public spaces and green areas are very few. This graduation project aims to bring changes to this condition through spatial strategies at the intermediate scale, operating between the city and the region. Infrastructural and economic relations are brought together into a productive relationship by new technology of Hi-Speed connectivity guiding the urban development of future to alleviate the effects of insufficient correspondence, imbalanced growth of hinterlands and connectivity between scales. Primary regional corridors, secondary metropolitan corridors and concentration of centralities could help change Mumbai’s current realities affected by restrained geography. Commute times between the centralities shall considerably decrease and efficient connections shall increase catchment areas of the centralities for intensification of mixed programs unaffected by distances and congestion.

1.4.3 Academic Relevance
Post-Industrial age has made urban India evolve into playing a role of an emerging global power. In the recent years, megacities of the urban age have become important in the field of urbanism. Mumbai, the largest city in India has been a part of intensive academic debates parallel to other globalizing cities worldwide. The phenomenon of urban restructuring in the context of globalization has led to social, economic, environmental, infrastructural concerns. The academic data available on the relationship of the city to its hinterlands is scarce, more so is the research on the economic spread of centralities in the metropolis. The literature and information available on this subject is not specific and is outdated, with very few available western authors owing to the less importance given to analytical and regional planning of Mumbai in the global context. Specific research and documentation presented as a part analytical research can be extended further to understand the strengths of the centralities and future development potentials.

1.4.4 Social Relevance
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1.4.5 Ethical Relevance
For a majority of the population in India Mumbai is more than just a cultural epitome of financial success and achievements. With an increasing population, however, comes in the challenge of accommodation and conveyance, residential demands and employment opportunities within the city. In a way, this project concerns giving away certain positive spin-offs like urban gentrification, transport oriented development, decentralization of economic activities within the different scales. By doing so, it is expected to maximize the spatial opportunities created between physical and urban conditions. Affordable housing and facilities have always moved away from the city limits into the suburban areas of Mumbai to use the available resources of land and manpower. It is in this situation of housing and job opportunities for low and medium income groups, that this project finds its ethical relevance. As an outcome of this project, areas of focus can be determined for providing alternative living conditions and urban qualities, as a part of the suburbanization independent of the island city. In light of this, the project takes a position between the overlapping scales of this expanding city to open up potentials for new growth activities towards its hinterlands by a well-connected physical infrastructure and its own spatial consequences.
Chapter 2.0
Analysis: City and the Hinterland Region

In this chapter specific attention is paid to the research of different processes in the spatial development of Mumbai. As a colonial port city, the evolution of Mumbai has played a predominant role in shaping what it is today and is both a boon and bane to its urban development. Therefore, a detailed historical study describes the urban development of the city. After this, analytical studies on the city structure, transportation, demographics, economy, urban activities are discussed. The results are focussed towards understanding the overall context and the case of Mumbai in particular at the different-scales of the region, metropolis, city and center.
Fig 23- Satellite image showing urban areas and landform of Mumbai and Navi Mumbai
Source: Google, 2012
2.1 Historical Growth and Transformations

2.1.1 Pre Colonial Age: Story of Seven Islands

It is known that the city belonged to different local kingdoms and switched hands to the Mughals until the beginning of the 14th century (Gazetteer of Mumbai, 2008). After 200 years of Mughal rule and its function as an important military and naval outpost on the western coast the islands came under the Portuguese in the year 1534 (Gazetteer of Mumbai, 2008; HPIP, Rossa). The various attempts of the English to obtain possession of Bombay, were the outcome of the general policy of the East India Company. The company foresaw that British trade interests in India could not flourish unless it secured fortified stations and maintained at such stations a naval and military force sufficient to render the Company wholly independent of the intrigues and quarrels carried on between the native powers of the continent (Gazetteer of Mumbai, 2008). In regard to Western India in particular the growing power of the Dutch and the disturbances consequent upon the death of Shah Jahan impressed upon the Company the imperative need of obtaining a fresh station auxiliary to their chief settlement in Surat. The signing of the marriage treaty between Charles II and the Infanta Catherine of Portugal at Whitehall in June 1661, whereby the post and island of Bombay with all the rights, profits, territories and appurtenances whatsoever thereunto belonging were handed over to the King of Great Britain, his heirs and successors forever.

2.1.2 Colonial Age: Trade and Expansion

The period of colonial history of Bombay rightly commences in 1534 with the cession of the island to the Portuguese by Sultan Bahadur of Gujarat. But for several years prior to this, date, the Portuguese had been consolidating their power in the north Konkan and on more than one occasion had visited Bombay (Gazetteer of Mumbai, 2008; HPIP, Rossa). The various attempts of the English to obtain possession of Bombay, were the outcome of the general policy of the East India Company. The company foresaw that British trade interests in India could not flourish unless it secured fortified stations and maintained at such stations a naval and military force sufficient to render the Company wholly independent of the intrigues and quarrels carried on between the native powers of the continent (Gazetteer of Mumbai, 2008). In regard to Western India in particular the growing power of the Dutch and the disturbances consequent upon the death of Shah Jahan impressed upon the Company the imperative need of obtaining a fresh station auxiliary to their chief settlement in Surat. The signing of the marriage treaty between Charles II and the Infanta Catherine of Portugal at Whitehall in June 1661, whereby the post and island of Bombay with all the rights, profits, territories and appurtenances whatsoever thereunto belonging were handed over to the King of Great Britain, his heirs and successors forever.
Despite disputes with the Portuguese in the initial years, the British were able to exercise control over Mahim, Sion, Dharavi, and Wadala (Malabari, 1910; Da Cunha, 1993) and subsequently over Mumbai by 1782. The British East India Company acquired the island of Mumbai from the British government under the royal charter by Charles II in 1668 (Da Cunha, 1993).

From this point, the development of Mumbai stepped to a rapid pace. Reclamation works were suggested and proposed by the EIC. The earliest reclamation works were intended for control of flooding between Worli and Parel during high tides. The construction was named Hornby Vellard and commenced in 1770 (Mehrotra, 1991). The actual process of consolidating the disconnected landmasses into a single island began in 1836 with the formation of the Elphinstone Land Company. By means of continued efforts and initiatives in 1844, 1860 and 1873 (Mehrotra, 1991), the seven islands (see Figure 29) were amalgamated into a single landmass. The complete development of the city in its present form was a result of reclamation until the year 1929.

**Bombay Presidency**

Bombay became the headquarters of British operations in the western parts of India in 1686 (Kochhar, 1994) (see Figure 24). During the period between 1715 and 1880, several important functions relating to the civil administration and control of the islands were continuously implemented by the British (Pacione, 2006; Mehrotra, 1991). The Mumbai Castle was completed in 1710. According to the Gazette of Mumbai, the central mint was established in 1670, the dockyard and shipbuilding facilities were implemented in 1735, and continued with the establishment of several government functions. The northern island of Salsette was however only along the route to the mainland and continued under the Maratha empire until 1817. This could, in addition to the physical separation and the interest of the British to control the access to the island, have well been the reason for the delayed development of the suburbs. The booming cotton industry (see Figure 35) gave a stimulus for greater development in the 1860’s, especially between 1861 and 1865, following which universities (University of Mumbai was set up in 1857) and libraries such as the Asiatic Library were set up. (Gazette of Mumbai) The Mumbai municipality authority was set up in 1900 (see Figure 33).

The city’s planning itself was in turn based on the typical model of the colonial port cities (see Figure 26) being developed by the European powers in this period. The structure of the city resembled the structure of other colonial port cities, such as Madras, Calcutta and Accra (Grant, Nijman, 2002; Kosambi, 1988). The city core in all the colonial cities consisted of a European fort, surrounded by European suburbs and a western type CBD, government buildings and a western type shopping district. This was in turn surrounded by a mixed residential-commercial area or an esplanade followed by the residential complexes for the local communities and industrial suburbs (see Figure 38). The growth of population and the increasing proximity to the northern parts of the island bought about the railways instigated growth in these areas along the infrastructure corridors (see Figure 37). The population of the suburbs grew by 30% between the years 1891 and 1872 (Pacione, 2006). The business districts in the southern core of the island changed hands in 1947 with the independence of India, however, the businesses continued from the same historical core as before (Grant, Nijman, 2002).
Portugese presented Bombay to the English

1661

1708 Headquarters of English east India Company

1850 Land reclamations completed

1851 First Cotton textile mill

1853 First Railway line

1870 Bombay Port Trust

1900 Municipal Corporation was formed

1930 Industrialization Boom; Cotton exports

1947 India Independence

1965 Third municipal city expansion

1972 Navi Mumbai

1977 Bandra Kurla Complex

1982 Textile mill strike

1990 Economic liberalization

2002 Retail and Real estate boom

Fig 30 - Municipal Corporation Building of Bombay
Source: bombay archives

Fig 31 - Tram system which began in 1870s
Source: UDRI, 2007

Fig 32 - Bora Bazaar, the native business markets
Source: UDRI, 2010

Fig 33 - Events which influenced the urban development of Mumbai
Source: author, 2012

Fig 34 - Municipal Corporation Building of Bombay
Source: bombay archives

Fig 35 - Tram system which began in 1870s
Source: UDRI, 2007

Fig 36 - Bora Bazaar, the native business markets
Source: UDRI, 2010

Fig 37 - Events which influenced the urban development of Mumbai
Source: author, 2012
Immigration and growth of the city

Population of Mumbai grew in leaps and bounds during different periods, however the largest increase in populations are attributed to immigration. The chief periods of immigration have been attributed to the British period in the 1670’s (Pacione, 2006) followed by the establishment of Mumbai port functions and the establishment of colonial city functions in the 1860’s (Gazetteer of Mumbai). A major boost in the immigration into the city was due to the cotton boom of the 1860’s, following a drop in the production of cotton due to the American Civil War. In this period the construction of the Suez canal was completed in 1859 (Pacione, 2006; Mehrotra, 1991), this construction was a major step towards the importance of Mumbai as an important global location in the British network of commerce now forming around the world (Nijman, 2012). The city started growing after the cotton growing areas of the hinterland were connected to Mumbai by rail established first in 1853, facilitating the supply of raw cotton from the immediate hinterlands of Mumbai to factories in Mumbai and eventually to England (Pacione, 2006). With the growth of manufacturing units for cotton textiles, by 1888 Mumbai had emerged as the second largest commercial centre in India after Calcutta. The city gradually became more and more industrialized and attracted a massive supply of skilled and unskilled labor from all over the country. The city was connected to the International Sea routes after the opening of the Suez Canal in 1869 (Pacione, 2006), which facilitated the import of machinery from Europe and a financial and administrative centre for a suitable market in Britain and the then newly opened Chinese market.
An important aspect of immigration into Mumbai throughout history is the immigration of skilled manpower and businessmen into it. During the cotton boom the majority of the capital was invested into the local businesses by the immigrants from Gujarat, while the clerical manpower came mostly from the immigration from the south. Among the migrants the businessmen were from Gujarat, Kutch and Rajasthan, millhands from the Deccan and Konkan and clerks from South India. The enterprising men of industry and trade included Parsis, Baniyas, Bhatias, Marwaris, Khojas, Memons and Jews. By 1921, an enormous 84 per cent population of the city had been born outside it. (Gazetter of Mumbai). The gazette further states that the communities were almost equally matched in the financial and investment capabilities. This pattern of a perceived “foreign ownership” of the mill industry and the lack of participation of the local hinterland population in the economy of the city has been an important feature of the history of the city with major consequences.

2.1.3 Post-Colonial Age: Formation of Mumbai Metropolitan Region

Samyukta Maharashtra movement

The Bombay presidency continued to expand and at the highest extent included parts of Baluchistan, Gujarat and Aden. After India’s independence in 1947, Bombay was made the capital of the Bombay presidency which included Gujarat but not the hinterlands of Maharashtra. This, along with a motivation to amalgamate other border regions with a strong Marathi speaking population on part of the Marathi political leadership, was the reason for the “Samyukta Maharashtra movement”. The movement lasted for 18 months and culminated in the infamous shootout at Flora Fountain, now Hutatma Chowk. This incident created a popular upheaval amongst the Marathi speaking community and as a result, the state of Maharashtra was created in May 1960 with Mumbai as its capital. The Gujarati community supported the side of Mumbai continuing as the capital of Gujarat, while the Marathi community opposed this move. The event marked a sharp decline in the tenuous Marathi-Gujarati community relationships in Mumbai.

Development of the city in the post colonial age

The rapid growth of the city prompted regulation in 1965, and the city limits were expanded further to accommodate parts of the city until Sion and Dharavi. The port functions continued in the southern tip of the island surrounded by the native business district and the milllands until the 1950’s at which point arterial roads and the strengthening of the railway network expanded to the northern parts of the island. In the post independence era the expansion continued further north with the establishment of new housing development in the northern suburban regions and the infrastructure facilities to connect them to the city [see figure 36]. The mill regions continued in the vicinity of the port areas until this point.

Fig 39- Textile Mill Strike
Source: Google, 2012

Fig 40- Dilapidated Mills as redevelopment sites
[Near left] Source: unknown

Fig 41- Hiranandani suburban townships
[Far left] Source: Google, 2012

Fig 42- Spatial development of global, national and local business districts
[Near left] Source: Grant & Nijman, 2002

Fig 43- Corporate distribution of economic activities
[Far Left] Source: Grant & Nijman, 2002
However, the necessity to decongest the historic city centre and create a space to accommodate the ever increasing population in the suburbs was clear to the planning authorities. This lead to a set up of a planning commission and the recommendation to create a new city “Navi Mumbai” across the creek (Vedula, 2007) (see figure 44). At the same time it was proposed to develop business centres at BandraKurla with a view to providing much needed office space to rapidly expanding businesses in the historical CBD (Vedula, 2007) (see figure 43). The Mumbai Metropolitan Region Development Authority (MMRDA) was set up in 1975 as an apex body for planning and co-ordination of development activities in the Region.

Textile mills strike

Perhaps one of the most important events which shaped the city and its future growth was the textile mill strike of 1982 (see figure 39). The textile mill industry expanded from 12 mills in 1860’s to 82 mills by 1900 in Mumbai (Pacione, 2006). The mill worker’s union made demands for wage hikes and the establishment of other union bodies besides the RMMS (National Mill worker’s association), which was the only legal body allowed to represent the workers until then. This lead to an 18 month strike by an estimated 240,000 mill workers in Mumbai and brought the textile industry in the city to a standstill (Pacione, 2006).

Within a year of the strike, a huge attrition had occurred in the textile industry in Mumbai. Manufacturers and owners, not being able to withstand the huge operating costs and reduced productivity, had started to re-establish the mills outside of Mumbai. The event resulted in a large exodus of the textile industry at large and the destruction of the textile industry in Mumbai (Pacione, 2006). The strike collapse ended with about 150,000 mill workers drifting into the ranks of unemployed workers.
2.1.4 City Today: Mumbai embedded in the Region

In the period during the economic liberalization the city benefited from investment into key sectors such as IT enabled services and engineering, petrochemicals, fertilizers and finance. This was in large part due to the liberalization of the Indian economy and the end of the “license raj” era. The period from 1991 to 2005 showed a sharp increase in the commercial growth and an associated expansion of the city infrastructure. The nature of the economy also underwent a core change from manufacturing to a service based industry. Foreign investments and corporations increased in Mumbai in this period following the emergence of a largely free market economy. ITES and related industries lead the accelerated growth patterns in this duration. This period also saw an increased immigration from other parts of the country into suburban Mumbai and Navi Mumbai. The increased revenue from the private sector resulted in substantial re-investments in the hospitality, recreational, retail and educational sectors. This period also saw the increased importance of the multiple centralities in suburban Mumbai (see figure 41) with centralities attracting specialized industries. However the bulk of the economic activities continued to be settled in at the historic CBD, with the continued presence of global, national and local businesses (see figure 42) followed by BKC. The period also saw an increased interest in revamping the cultural connections with the hinterlands.

On the regional scale, Mumbai established stronger links with the hinterlands in this period (see figure 43). The Mumbai Pune corridor emerged as a major hub for ITES, engineering, chemicals and agro based industries. Simultaneously the commercial connections with Gujarat improved over the decade with major links being made in the field of heavy industry, automobile sectors, diamond processing industry and logistics and freight industry. This aspect is further dealt in detail in the forthcoming chapters. The growth of the city in this period has been chiefly characterised by the establishment of stronger links within the Mumbai Metropolitan Region and a stronger integration of regions such as suburban Mumbai, Thane and Navi Mumbai. While the regions have their own unique identities and functions, they continue to be oriented toward the historical city centre for economic and functional roles. Thus while the period between 1800 to 1950 was focused on the development of the city and its immediate suburbs, the period after the 1950’s has seen establishment of strong links between the city and its hinterland regions and the development of the Mumbai Pune corridor.

Fig 46- Illustration summarizing the urban development process of Mumbai
Source: author, 2012

Fig 47- Urban structure of Mumbai between the three most influential periods
Source: author, 2012
The Mumbai Metropolitan Region includes the metropolis of Mumbai along with its satellite towns and has developed over a period of 35 years. The first and second municipal expansions of the city were made when the demand for space increased with the accelerated growth of population. This region nearly equal to the size of the Randstad metropolis in the Netherlands has four main districts namely, the Mumbai city, Mumbai suburban, Thane and Raigad districts (see figure 49). There were two regional plans sanctioned for this region, one in 1973 and the other in 1999, wherein the main features focused on developing potential growth centers, increasing the role of private sector in infrastructure and in production of services clusters (MMRDA, 1999). The Mumbai Metropolitan Region (MMR) consists of the following divisions, 1. Mumbai city, covering parts of the city limits of island city until Sion, Mahim and King’s circle; 2. Mumbai Suburban, covering parts of Greater Mumbai and Navi Mumbai which extends until Mulund in the central line, Vasai in the west and Mankhurd in the east; 3. Thane, originally the northeastern parts of Greater Mumbai extends from Thane creek upto Ulhas river; and 4. Raigad district, a major industrial and housing center.

Mumbai is divided into 21 wards distributed amongst 6 zones. The administration in the different constituents of the districts (called “Tehsils”) is handled by the municipality corporations (see figure 48). Based on this the urban governance and planning authorities are accordingly divided. Mumbai and the suburban regions are governed by the Brihanmumbai Municipal council, the district of Thane is governed by the Thane Municipality council, Navi Mumbai by the Navi Mumbai Municipality corporation.

2.2 Regional Conditions

2.2.1 Administrative Profile of the City

The Mumbai Metropolitan Region includes the metropolis of Mumbai along with its satellite towns and has developed over a period of 35 years. The first and second municipal expansions of the city were made when the demand for space increased with the accelerated growth of population. This region nearly equal to the size of the Randstad metropolis in the Netherlands has four main districts namely, the Mumbai city, Mumbai suburban, Thane and Raigad districts (see figure 49). There were two regional plans sanctioned for this region, one in 1973 and the other in 1999, wherein the main features focused on developing potential growth centers, increasing the role of private sector in infrastructure and in production of services clusters (MMRDA, 1999). The Mumbai Metropolitan Region (MMR) consists of the following divisions, 1. Mumbai city, covering parts of the city limits of island city until Sion, Mahim and King’s circle; 2. Mumbai Suburban, covering parts of Greater Mumbai and Navi Mumbai which extends until Mulund in the central line, Vasai in the west and Mankhurd in the east; 3. Thane, originally the northeastern parts of Greater Mumbai extends from Thane creek upto Ulhas river; and 4. Raigad district, a major industrial and housing center.

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2.2.2 The Relationship between the Cities: Mumbai, Pune, Surat, Nashik

The development of the region has been spurred on by the development of Mumbai and the region shares a strong relationship with the city and its metropolis. In light of this, Mumbai’s spatial and functional relations with Surat-Ahmedabad (North), Nashik (North-East) and Pune (South-East) depends on several factors. The cities are connected by a network national railways and national highway system (see figure 50). Mumbai, the capital of Maharashtra state shares strong economic relations with Surat due to the dense cultural, historical and business connections. In the recent years, since 1995, there has been tremendous development in the States of Maharashtra and Gujarat. The historical connections between Surat (and the rest of Gujarat) with Mumbai has been built over a period of time (the original immigration of businessmen community into Mumbai was from Gujarat) (gazetteer of Mumbai, 2012) and thus the cities share a dense commercial relationship.

On the other hand, Mumbai together with the cities of Pune and Nashik forms the golden triangle network (see figure 52), focussed on the Regional development of the State of Maharashtra. While the economic connections with Nashik is more related to Agricultural networks, that with Pune is more related to service industries (MIDC, 2012). From Mumbai, the services extend to the rest of the region, especially into the heavily industrialized state of Gujarat, agro-based corridor towards Nashik and knowledge-based corridor towards Pune.
In this section, the nature of economic relationships shared between Mumbai and the three cities of Surat, Nashik and Pune are discussed. Surat is a major city for Heavy engineering, Logistics, Petrochemicals, Construction, Diamond processing, Textile and Finance. The main CBD and native business districts from the colonial times share structural and strong economical connections with Gujarat based on the nature of industries present. It can be noted that south Mumbai is more economically related to Surat than other parts of the city (see green in figure 51).

The corridor between Nashik and Mumbai is a highly industrialised corridor catering to automobiles, engineering, aerospace, and most importantly the agro-based industries. Another feature of heavy industries in Maharashtra is that the central headquarters of many private industries and many government agencies, along with their financial network are located in Mumbai, making these relationships essential. The Nashik region is rich in agricultural produce and is a major hub in the process of collection and distribution of agro products to different parts of the country. This brings Vashi and parts of Navi Mumbai with wholesale agriculture industries closer in relation to Nashik (see yellow in figure 51).

Pune has been the historical seat of the Maratha empire and was the capital of that empire. The ITES industry has developed Pune into a major centre for a knowledge-based, high-skilled industrial hub in the region. The businesses catered to by this industry are located in Mumbai and on a global scale. Pune’s relationship comes functionally and economically closest to Mumbai, with the Mumbai-Pune Industrial corridor development (with daily commuter patterns) and further reinforced by the nature of business networks shared in-between (see red in figure 51 & 55).
Given the context of rapid urbanization and economic development, the 151 Km long industrial corridor (see figure 54) between the two important cities of Maharashtra namely, Mumbai and Pune has significant challenges and opportunities. A recent study by Center for Policy Research (CPR, 2010) identified the Mumbai-Pune Corridor with strong growth characteristics for economic activities, residential development and infrastructure (see figure 56). The area has noticeably grown faster than other urban corridors in the State of Maharashtra. The terrain between the cities is mountainous and cuts through the Western Ghats, passing through certain important industrial lands, small towns and tourist attractions of Khandala-Lonavala.

The corridor itself however has evolved to a major network route between the two important cities. Planning and implementation began for the development of the Mumbai Pune highway in 1997. The sector has seen a boost in industrialization following the pattern of exodus of mainstream industries from Greater Mumbai towards Navi Mumbai (Vedula, 2007). The growth of the Mumbai Pune corridor has favoured the development of metallurgical, chemical and various other industries. The automobile industry has also boomed in Pune in the recent years. Pimpri, Kirkee, Hadapsar, Kurla are some of the townships which have developed along the corridor in the recent years. The industrial belt provides sustenance to more than 1.5 million industrial workers. A detailed report on special economic zones and service industries by Mujumdur (2011) discusses the scale, volume and type of employment sectors spatially concentrated in Mumbai and Pune region (see figure 55).
The knowledge corridor can be compared to other similar parts of the world for an understanding of scale, compared here are the distances between Amsterdam-Antwerp (see figure 57). As a part of the regional development, the Mumbai-Pune corridor forms golden triangle with Nashik aimed at promoting mega investments and large urban projects for the region. In addition to this is the implementation of Special Economic Zones (SEZ) by the State which recognizes the Mumbai-Pune Expressway as prime location focused on industrial production (Mujumdar, 2011) (see figure 55).

The Maharashtra Industrial Development Corporation (MIDC), a special planning authority for the development of the corridor conducted a recent Geomatrics research to identify specific clusters and suitable sites (see figure 56) along the corridor for the development of knowledge based industries like, IT, Biotechnology, Leisure, Tourism, Meditation Centers. Terrain and Landuse mappings were made to assess suitable sites along certain parts of the expressway.

Mumbai-Pune, the two cities constitute a functional economic region despite the distance separating their centers. Connected by a fast suburban rail, Pune is inevitably drawn into Mumbai’s dominance and as a matter of scales, these two cities share distinct relations and are as much strong centralities themselves in the region.

2.2.4 Growth of Navi Mumbai

The Bombay Municipal Regional Planning planned the creation of a new town on the mainland across harbor, when the development acts of 1954 and 1964 emphasized the need to relocate industrial activities from the island owing to the unmanageable growth of Bombay in the 1960s. Navi (New) Mumbai is the largest planned new city in the world covering an area of 344 Km2. Navi Mumbai developed by City and Industrial Development Corporation (CIDCO) in 1970 was designed to handle the decongestion of Bombay (Ananthakrishnan, 1998). Correa, Patel and Mehta designed this regional plan based on three basic objectives: a planned new development, financing physical and social infrastructure through land sales, and improving Bombay by drawing off pressures for growth into the new area (Patel, 1997). It was planned to generate new industrial and commercial activity along with providing affordable housing (see figure 58) with middle-income residential markets. The implementation has been largely successful in the long run and today Navi Mumbai is a city. However, although the project began in 1970, its development process has been slow owing to the poor transportation connectivity with Greater Mumbai. This in turn created adverse effects on the growth of the city, which was then (1980s) affected by the absence of port and rail infrastructure. The formation of modern JNPT port and the 1992 rail link (see figure 59) led to the establishment of more industries and construction activities (Ananthakrishnan, 1998). Navi Mumbai soon with its increasing supply on housing for the middle income groups became the favourite dormitory for those who worked in the Island city. Besides, Navi mumbai offered solutions to the increasing infrastructure congestion of Mumbai and soon became the industrial backyard (see figure 59) with middle-income settlements than a preferred location for office and commercial functions (Vedula, 2007).
According to the development plan proposed by CIDCO, the new city was to comprise 20 nodal settlements built along major transport corridors and to have an ultimate population of 2 million. The idea of Navi Mumbai viewed as a self-sustained independent settlement was undermined by the decision to locate the new city in close proximity to the office employment nodes of the island city. Moreover, an increasing amount of market forces operated on the basis of private investments in Navi Mumbai and as a result of which, public facilities including infrastructure, health facilities lagged behind (Pacione, 2006).

In the face of planning, land use patterns (see figure 60) were instituted in 1973 after MMRDA’s extensive research which focussed on preserving the agricultural and environmental attributes of the city while creating opportunities for industrial belts, commercial zones and residential areas [MMRDA, 1999]. However, Navi Mumbai as a location in the advantage of offices and tertiary sector activities was denied by the planning authorities in relation to prime plots in Island city and Bandra-Kurla Complex [Vedula, 2007]. But this is not the case anymore, as the city of Mumbai now shares strong relations with its hinterlands in the wake of changing economic base which are IT and High-Tech based, looking more towards the Mumbai-Pune corridor. The new well-equipped JNPT port and the proposed international airport at Ulwe node (see figure 62) have been planned to generate more employment opportunities and further aimed at creating urban development potentials in the south of Navi Mumbai.
The urban structure of Mumbai has been defined and developed by its infrastructure, it has one of the most busiest passenger networks in the world with rails over 200 km (Mas selos, 2005). Public transportation in Mumbai majorly constitutes the city BEST buses and suburban train systems connecting the different scales of the city. The city’s four main arterial roads and three railway lines (see figure 65) run mostly along the length of the city covering an average between 15-20 Km by train and 5-6 Km by Bus, with an 88 % travel commute (Balakrishnan, 2006). The suburban railways form the main backbone of the city, connecting the city to its distant suburbs and satellite towns, as the western, central and the harbor lines. The trains with heavy passenger traffic and massive overcrowding (see figure 63 & 64) during peak hours starts from Victoria Terminus (VT, now called Chhatra pati Shivaji Terminus, CST) and Churchgate (western & central), going up north linking the suburban parts of the city. Navi Mumbai is connected by the harbor line amongst other port areas in between. Clearly, owing to Mumbai’s peculiar topography and rapid urbani zation processes the railways although extremely efficient with a new train once in every three minutes suffers serious congestion, infrastructure degradation, lacks safety and has poor connectivity with hinterlands. For instance, the trains designed for 1750 passengers carries 4300 passengers, making it three times more its capacity (MCGM, 2012). It can be observed that distant commutes (see figure 66) have become an inevitable part of everyday suburban life having to spend 1-2 hours per trip to reach the island city, full of em ployment activities. However, other alternative modes of public transportation are being implemented like metro and monorail to mitigate the problems of overstressed railways, which clearly is the lifeline of Mumbai.
According to Mumbai Metropolitan Development and Planning Authority (MMRDA, 1999), the Regional Plan 1996-2011 (see figure 69) proposed the development of Navi Mumbai on the main land across the harbour and aimed at creating new growth centres like the Bandra-Kurla Complex and Kalyan Complex to relieve growth pressures of Greater Mumbai. Since then, much effort and investment have gone into the development of these growth centres, relocation of economic activities from the Island City, and creation of new infrastructure, such as, Mankhurd - Belapur railway line and J.N. Port. These efforts, together with the large population growth in the extended suburbs (Thane, Kalyan, Bhivandi, Vasai - Virar) and massive industrial investments in metropolitan hinterlands, have been initiated to deconcentrate Greater Mumbai region (MMRDA, 1999). The planning guidelines reflect this process and are guided by the current development trends.

New growth centres and new transport linkages are likely to give rise to a new spatial structure of the Mumbai Metropolitan Region (MMR) and south Mumbai may continue to remain the most dominant centre of the Region. In addition to several planning decentralization activities, the metro-rail connections are being implemented in the city to activate east-west links, feeding commuters to railways (see figure 68). A new polycentric structure, which may form a ‘Open Pentagon’ (MMRDA, 1999), will emerge as MMR’s core of economic activity and expected population growth. The possibility of the Mumbai Trans-harbour Link, and second international airport, are likely to strengthen the Pentagon pattern further. The resultant spatial structure (see figure 67) would have rings linking a set of urban centres, to be further developed along the major transport corridors.
2.3 Dynamic Drivers of Change

2.3.1 Population Growth and Density

Natural increase and migration are important in population change and in the case of Mumbai it occurs due to both the reasons. Mumbai’s contribution to population growth has declined consistently while migration has played a significant role in changing the demographic profile of the city. As one of the most populous urban regions in the world, Mumbai joined the league of world alpha cities (GaWC, 2008). The city with 12 million and the city agglomeration with an 18 million population and high density compact urban blocks. Analyzing the migration trends in Mumbai indicate that in 1780 there were only 1.14 million people, but it multiplied invariably through years when Mumbai experienced uncontrolled growth. In 1961, suburbanization gained momentum (see figure 70 & 73) to accommodate the expanding crowd and at the same time the population of the island city began to drop. Consequently, the position of Mumbai as a major industrial center got strengthened, when there was diversification in the industrial base. The economic base of Mumbai shifted from manufacturing to service, which then emerged as a major economic activity in addition to others.

However, studying the current trends in population distribution throughout the MMR, it is observed that the island city is relatively stable than the growth in city suburbs. The island city is marked by very high urban densities in relation to other areas and the average density equals 27,000 people per km2 and Ward C (see figure 71) is the highest with a density of 114,001 people per sq.km. The spatial arrangement reveals an intense and compact arrangement of urban environments made of buildings and tightly packed open spaces, which essentially also constitutes the public realm of the city.

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Fig 70: Population Increase in Suburban Mumbai after 1960s
Source: author, 2012
Data: MMRDA, 2011

Fig 71- Population Density in the Greater Mumbai Region
[Top left]
Source: author, 2012

Fig 72- Images of high density neighbourhoods in the inner city areas
[Top right]
Source: Google, 2012

Fig 73- Relative growth comparison between the City and the Suburbs
Source: author, 2012
The economic development of the city (see figure 74) has continuously changed in the last 300 years. Mumbai, the financial and entertainment capital of India has evolved steadily after the industrial boom of 1900s to its present position, as a key gateway city in the world economic network (Nijman, 2012). The realty rates are divided between south Mumbai, central Mumbai and the suburban regions of the city. The commercial activities mostly prefer choosing locations in south Mumbai, where the rates are very high (see figure 75) due to the proximity to main CBD (see figure 75), Reserve Bank of India, Bombay Stock Exchange, Stock and Exchange Board of India. The land price for commercial real estate drops towards the suburbs. The residential reality is highest in down south (see figure 76) and often the newly developed properties cater to luxury segments owing to their location between the two CBDs of Mumbai.

Mumbai is home to several financial headquarters and institutions. It is the financial and cultural capital of the country and contributes to 6.16% of the total country’s GDP. The economic hub of India has steadily shifted from manufacturing based economy to service oriented economy (see figure 81) towards the 1980s with increasing skilled labour industries like banking, engineering, diamond polishing, health care, media services and information technology. Mumbai also forms a critical part of India’s retail and hoteling industries that are customer intensive. The city has the largest airport, Mumbai houses the biggest and most internationally connected stock exchange, it is home to the headquarters of the Nationalized banks and India’s Western and Central Railway Zones, it has the largest share of bank deposits, income tax revenues, telephone and telex connections (Nijman, 2012). Mumbai houses more transnational companies than any other city, it has the largest share of foreign collaborations (joint ventures), it has the largest share of foreign direct investment, as well as the largest share of international trade and customs duties, and it has more internet connections than any other city in India. It is also one of the world’s top 10 centres of commerce in terms of global financial flow (Times of India, 2011).

### 2.3.2 Economic Growth and Land Prices

![Figure 74](image1.png) Illustration showing the Economic Development of Mumbai
Source: author, 2012
Data: KRVIA, 2007

![Figure 75](image2.png) Land Prices in Greater Mumbai Region [Top left] and Photos of VT, Nariman Point CBD [Top right]
Source: Gupta, 2010

![Figure 76](image3.png) Illustration showing the Decrease Land Values from City towards Suburbs
Source: author, 2012
Data: Colliers Int, 2012

![Figure 81](image4.png) Generic economic development diagram

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Beginning in the 1980s and accelerating through the 1990s the city and surrounding region experienced a wave of closures in the manufacturing sector. Two main forms of activity dominate the emerging post-industrial landscape. On one hand there are capital intensive service sector industries such as finance and producer services, software development, mass media and entertainment, communications and information technologies, and residential and commercial real estate and property development. On the other hand is labour-intensive casualised production of electronics, garments, plastics and consumer goods in small-scale workshops in informal settlements scattered across the city. These two principle forms of production and employment often referred to as the formal and informal or upper and lower circuits of the urban economy. In contrast to the decline of manufacturing employment in the formal sector, finance insurance and real estate (FIRE) services expanded markedly during the 1970s and 1980s, and employment in this sector increased by 43%. Growth of the sector and the entry of international financial groups to Bombay’s stock exchange stimulated ancillary growth in related service industries including the film and music industries of Bollywood” (Pacione, 2006, pg.234)

It can be noted here that the wholesale trade activities were shifted from Mumbai to Navi Mumbai. The retail trade however shows growth in the number of employment during 1990-98 period. It is observed that 97% of employment was in the private sector and about 2% in the government sector as of 1998. Greater Mumbai establishments were largely confined to Banking/Financial activities, public administration and defence services (see figure 75). The total office sector in the CBD has decreased from 54% to 47% during 1980-98 while the employment in the rest of Greater Mumbai has substantially increased (see figure 76). The 180 offices in Greater Mumbai in 1998 employed more than 500 employees per office.

2.3.3 Employment Profile
Beginning in the 1980s and accelerating through the 1990s the city and surrounding region experienced a wave of closures in the manufacturing sector. Two main forms of activity dominate the emerging post-industrial landscape. On one hand there are capital intensive service sector industries such as finance and producer services, software development, mass media and entertainment, communications and information technologies, and residential and commercial real estate and property development. On the other hand is labour-intensive casualised production of electronics, garments, plastics and consumer goods in small-scale workshops in informal settlements scattered across the city. These two principle forms of production and employment often referred to as the formal and informal or upper and lower circuits of the urban economy. In contrast to the decline of manufacturing employment in the formal sector, finance insurance and real estate (FIRE) services expanded markedly during the 1970s and 1980s, and employment in this sector increased by 43%. Growth of the sector and the entry of international financial groups to Bombay’s stock exchange stimulated ancillary growth in related service industries including the film and music industries of Bollywood” (Pacione, 2006, pg.234)
2.3.4 Mapping Urban Functions

In the 1990s Mumbai suburbs witnessed an extension and growth in a multi-dimensional way. With the closing of the engineering, chemical and pharmaceutical manufacturing units after the 1980s, several multinational companies established production centers in the suburbs and simultaneously private organizations set up their offices. This brought changes in the urban landscape of the suburbs, marked by the construction boom along the rail corridors with several mixed-use functions (Mukhopadhyay, 2005). With the rapid rise of residential and retail enclaves from the city towards the suburbs more modern towers and commercial buildings were developed along the central and western rail corridors of Mumbai.

Based on the change in the nature of urban functions, a detailed mapping was done from Google to locate cultural, institutional, recreational and leisure facilities in the city (see figure 7B). It can be noticed that with the implementation of market oriented reforms and construction boom in the suburbs, more functions were built along the western corridors of Mumbai. There is a high concentration of cultural and leisure activities in the Island city while there is as much clustering of hotelling and retail industries in the western and eastern suburbs of the city. This clearly indicates the tendency to decentralize commercial functions from the inner city with the emergence of new business structures along the rail routes.
2.4 Identifying Centralities

2.4.1 Field Research on the Distribution of Services and Commerce

The spatial allocation of service sectors was compiled from a reference list comprising of the CMIE, NASSCOM and naukri.com online websites (2011). In addition an available list of companies was used from Wikipedia (sourced to Bombay Stock Exchange) for a complete list of companies in these locations.

It was found during the course of the research that the companies in the survey were of different scales and not all of them had a national and regional headquarters in Mumbai. These companies have been segregated on the basis of their national HQ’s being present in a particular CBD. The remainders of the companies have only local centers of administration inside Mumbai. Alternatively, the companies chosen are from a medium to low scale of investments as compared to Companies from a national sector or MNCs.

Another assumption was made to lump service companies from neighboring localities together. This was done to achieve a deeper understanding of the area as a whole as opposed to insights on the suburban region under consideration itself.

The regions are described as follows (see figure 79):

Northwest suburban area:
- Borivili east, Dahisar east, Goregaon west, Malad west, Kandivili east, Khar west

Chembur east region:
- Chembur east and Deonar

Nariman point business area:
- Churchgate, colaba, Cuffe Parade, Dalal street, Kalbadevi, Nariman Point

Lower parel darad area:
- Dadar, mahim, lower parel, parel

Northeast suburban area:
- Mulund west, ghaskopar west, bhandup west

Southwest business area:
- Backbay reclamation, marine drive, mahalaxmi, kemps corner, Prabhadevi, Wadala, Tardeo

The remainders were classified for businesses according to their existing boundaries within the Mumbai region.

2.4.2 Ownership Patterns in the City

It was found that the ITES companies dominated the sectors in most of the city regions. This can be explained on the basis of the fact that the company size and trading volume was not considered as a criteria in itself by the references, and it would be a daunting job indeed to further filter the companies on the basis of trading volume, order bookings or by number of employees in addition to consolidating a reasonably large database of companies. It is however noted that a large subsector of companies appear under the ITES category, and thus the number of companies increases manifolds.

From the plots it is noted that predominantly, businesses in Mumbai is owned by local investors and local players as opposed to Multinational corporations. The regions with the highest concentration of foreign businesses (greater than 40% of net companies in the area) occur mostly along Bandra west, BKC, Ballard estate, Worli, Nariman point business area, Southwest business areas and Powai (see figure 79). The percentage of businesses controlled locally by domestic corporations was pegged at 71%, and businesses controlled by MNCs was pegged at 29%. Individual areas were analysed for the sectors of business they cater to. It was found that while the ITES truly dominated the sectors across Mumbai, individual sectors of importance did highlight in the research. Businesses in Fort and Nariman point business area showed large percentages of companies belonging to the airline sector. This trend changes toward hotels and hospitality industry in the Lower parel-dadar areas.

In the Bandra east, Bandra west, SEEPZ and BKC areas it was found that ITES and banking services represented the bulk of the businesses. This trend changes towards areas like Chembur, Worli, Andheri west and the northern areas, where the other sectors such as engineering, shipping and logistics acquire larger percentages in the share of businesses.

Perhaps the most remarkable observation is the emergence of the Financial institutions centered in Mumbai, around Nariman point and BKC. Both Nariman Point and BKC exhibit strong tendencies towards financial activities, however, the nature of the banking and finance sector varies greatly between these two points (see figure 80). While Nariman point has been the traditional economic centre of the city until the 1990’s, the number of companies in BKC and associated areas (especially the financial IT services provided by the SEEPZ/Andheri east area firms) has had a profound effect on the way finance moves in Mumbai. Nariman point houses core banking institutes such as the RBI, Bank of India and the Union bank, to name a few and foreign consulting companies set up in the late 90’s in the region, however the BKC region houses banks from the private sector in addition to banking and finance institutes with heavy government stakeholderships, such as NABARD.

It was noticed that niche companies developed in particular areas, for instance shipping and logistics was largely dominant along the eastern regions of the city. Engineering companies generally tend to be located in the centre and along the eastern parts of the city, mostly to benefit from the close proximity to the new port area and so on. These observations in light of the patterns observed in the 90’s show a general growth pattern. The illustrations to the right plot the nature of Foreign, Indian and Government Ownership patterns related to services, spread across greater Mumbai region (see figure 81-84). It can also be noticed that the foreign activities are more concentrated in the south CBD than other parts (see figure 79 & 80).
2.4.2 Field Research on the Distribution of Services and Commerce

Fig 79: Spatial Distribution of Economic and Corporate Firms in the Greater Mumbai Region (previous page)
Source: author, 2012

Fig 80: Illustration summarizing the location of global and national firms in Mumbai (Top Left)
Source: author, 2012

Fig 81: Graph showing the change in employment base between 1980-2000 (Bottom left)
Source: Pacione, 2006
The earlier maps explain the significant change in the nature of the CBDs occurred in the past 15 years. The CBD in Nariman point has evolved to accommodate foreign consultation firms which hold a significant share in the worldwide banking and finance industry (see figure 87). This is a development from the situation before the 90’s in the Nariman Point CBD.

A similar observation can be made about the CBD at BKC. While the development of BKC commenced in 1972, the real take off was deferred by about 20 years. BKC has attracted a multitude of private banks (see figure 87) since its completion and continues to be a new centre of administration and control for the banking and finance sector in the city.

Nariman Point (see figure 85 & 87) has developed to be the most preferred location for the multinational companies and emerged as a prominent business district of the Global CBD. While the national CBD continued to remain in the Fort area, which was the earlier European business district housing the headquarters of big domestic companies. Further, the old commercial core which was the native business district in the colonial times identifies itself as the local CBD with a large number of small domestic companies (Grant & Nijman, 2002). Bandra Kurla Complex (see figure 86 & 87), the established business district by the Mumbai metropolitan regional development authority is aimed at catering to the future growth of office and commercial functions. With its proximity of having located next to the International airport and the industrial areas of suburban Mumbai (see figure 79), this CBD is expected to increase the employment opportunities by relieving the inner city pressure.

The following sections would describe in detail the nature of five centralities in Mumbai in addition to the two main CBDs as above. It would discuss the urban connectivity by public transportation and will thereon draw a comparison between them in the end by indicating the urban development potentials and problems.
2.4.4 Main Centralities

2.4.4A Fort-Nariman Point: Historic City and Global CBD

Connectivity by Railways

Connectivity by Bus

Economic Functions and Commerce

Urban Conditions

The Historic Center of Mumbai has continued to be the major source of all employment activities with the Global, National and Local business districts in vicinity. Well connected by N-S arterial roads and railways which has existed since 1853, the rail infrastructure is now put under tremendous pressure with unidirectional traffic and long distance commutes.

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2.4.4B Bandra-Kurla Complex: New National CBD

Urban Conditions
The development authority established BKC business district to absorb the future growth of offices and commercial activities from South CBD & in- cludes private-government offices, banks, NSE (National Stock Exchange) and other financial business centers. However, it has very poor railway accessibility as it was reclaimed on marshlands off the rail corridors.

Fig 90- Centrality 2. Bandra Kurla Complex, the planned CBD next to International Airport
Source: author, 2012

Fig 91- Relations between Connectivity and Commerce
Source: author, 2012

- Economic centralities (HQ service functions, shopping malls, retail, wholesale markets, commercial functions)
- Main roads
- Central Business District
- Primary roads
- Secondary roads
- Bus stops r=250 m
Urban Conditions
Located on the Northeast of Mumbai, Thane dates back to the colonial times. The first railway link connected Thane to Victoria Terminus covering a distance of 34 Kms. It is well connected to the neighbouring suburbs by both rail and road networks. It has also gained prominence in binding the cities of Mumbai and Navi Mumbai with new fast train-bus connections.

Economic Functions and Commerce
HQ service functions, shopping malls, retail, wholesale markets, commercial functions

Connectivity by Railways

Connectivity by Bus

Fig 92- Centrality 3. Thane, Headquarters of Thane district
Source: author, 2012

Fig 93- Relations between Connectivity and Commerce
Source: author, 2012
As one of the successful commercial nodes of Navi Mumbai, Vashi was connected to Greater Mumbai with the 1992 rail link. It houses the wholesale agricultural activities which were relocated here from the inner city areas of Mumbai. As a planned township, Vashi is one of the oldest and most populated nodes with an upscale residential commuter market.
2.4.4E Panvel: New Airport Node

Panvel, which has existed since 300 years, is the largest and most populated area of Raigad district. CIDCO, the planning authority which developed Navi Mumbai also developed New Panvel in the 1970s to meet the residential demands of the hinterland industries. It is strategically located along the Mumbai-Pune expressway and connected to Mumbai by harbor line.

Urban Conditions

Fig 96- Centrality 5. Panvel, next to Proposed International Airport
Source: author, 2012

Fig 97- Relations between Connectivity and Commerce
Source: author, 2012

Connectivity by Railways

Connectivity by Bus

Economic Functions and Commerce

Fig 97- Relations between Connectivity and Commerce
Source: author, 2012
2.4.5 Mapping Work and Live Distances (Commuter Patterns)

Today, most employees of the CBDs in Narmian point, VT, Fort area, churchgate and the south-western business area live in the northwestern and northeastern suburbs of the city. Navi Mumbai, Kalyan, Dombivili and Thane are another major sources of employees to Mumbai. The minimum commute time for these employees is 45 minutes and extends up to 2 hours for commuters from Kalyan, Parvati, Belapur, and so on. It should be noted here that the dearth of employment in the central regions which functioned as the local CBD during the pre and post independence stages (until as recently as the late 90’s) is not due to want of opportunities; it is due to the fact that the labor demand in these areas is mostly met from within these regions itself. It was the want of sufficient and fulfilling employment in the suburbs which lead to the rise of the commuter. With the emergence of multiple CBDs in island Mumbai and the decline of the manufacturing industry in Mumbai, the trends have changed drastically. The source locations of employees still remain the same as before, but the avenues for employment are abound in multiple locations today, much closer than the conventional south Mumbai CBD for many employees. Means of conveyance have also changed with increased private funding and increasing concern on behalf on companies to provide additional incentives to the employees by easing the commute between the main infrastructure nodes (Railway stations, major highway nodes, etc.) and the usually farther CBD.

Mumbai suburban railways which is the circulatory system of the city has deficient and immutable infrastructure, which does not allow the city to develop more than the narrow peninsula constrained by topography. A failure in developing the major railways has put in effect, people living in the distant suburbs and commuting to the island city for work. Besides, this is in addition to the already existing small-scale domestic industries in the island with people living close by, who walk to their workplaces (see figure 99). This further increases the density and severe congestion of the island city areas.

The two main issues that create problems on the traffic arteries are the severe northsouth congestion and the lack of east-west connectivity within the city and between the city and the hinterland. The problems are compounded as the major CBD’s are not connected directly to the major infrastructural systems such as railways or road systems traversing the city. The relatively underdeveloped Navi Mumbai can be attributed to this reason. The bulk of the workforce from the suburbs (see figure 99) in Northeast, Northwest Thane, Kalyan, Dombivili and Navi Mumbai thus has to be ferried across the city and back everyday via inefficient means of conveyance. Various solutions have been proposed to address these issues, the efficiency of which remains to be unseen.

Fig 98- Island city as the major employment provider for global and local economic networks. Photos: Google, 2012

Fig 99- Mapping the Working and Living Commuter Patterns between city and suburbs. Source: Author, 2012

Fig 100- Connectivity Index based on public transportation and accessibility. Source: Author, 2012

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<th>Panvel</th>
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### 2.4.6 Comparing Mumbai’s Main Centralities

#### Fort-Nariman Point
- **Island City** since 16th century
- **Identity**
  - Colonial Core, Historic nucleus, High-rental-office, Civic facilities, Tourism
  - Art district, Global business district
- **Accessibility**
  - Global, Commercial, Offices, Civic, Institutional, Retail, Recreational, HQ of legal and banking firms, heritage sites, high-density, luxury-high residential
- **Land Use**
  - National functions, Commercial, Offices, Institutional, High density, High-range residential
- **Land Price**
  - Residential rental: 300-400,000, Residential/Commercial Sale: 1000-4000,000

#### Bandra-Kurla Complex
- **Greater Mumbai** since 1977
- **Identity**
  - New Business district, Financial district, Planned growth center for inner-city decongestion
- **Accessibility**
  - Infrastructure-CST @ 2.7 km, Churchgate @ 1.8 km, 24 km to Santacruz international airport
  - Time: 20 to 30 mins from inner-city, 45 to 60 mins from suburb, low connectivity
- **Land Use**
  - Mid range Commercial, Medium-density, Medium-low range residential, Mixed-use, Medium-scale industries
- **Land Price**
  - Residential rental: 50-150,000, Residential/Commercial Sale: 12,00,000-40,00,000

#### Thane
- **Thane city** since 16th century
- **Identity**: Commercial town, Wholesale agriculture market, developed in sectors, upscale residential market
- **Accessibility**
  - Infrastructure-Thane @ 1 km, 7 km to Santacruz international airport
  - Time: 90 to 120 mins from inner-city, 60 to 90 mins from suburb, medium connectivity
- **Land Use**
  - Commercial, High-Medium range residential, Small-scale industries, Storage, Retail, Medium-scale industries
- **Land Price**
  - Residential rental: 15-58,000, Residential/Commercial Sale: 2100-6100

#### Vashi
- **Navi Mumbai**: since 1972
- **Identity**: Wholesale agriculture market, developed in sectors, upscale residential market
- **Accessibility**
  - Infrastructure-Vashi @ 1.8 km, 25 km to Santacruz international airport
  - Time: 60 to 90 mins from inner-city, 60 to 90 mins from suburb, high connectivity
- **Land Use**
  - Commercial, High-Medium range residential, Small-scale industries, Storage, Retail, Medium-scale industries
- **Land Price**
  - Residential rental: 12-40,000, Residential/Commercial Sale: 1000-4800

#### Panvel
- **Raigad district**: since 1852
- **Identity**: Gateway to ‘Konkan’ region, New Panvel developed in 1970s, strategically adjacent to NH4 and proposed Navi Mumbai international airport
- **Accessibility**
  - Infrastructure-Panvel @ 2 km, 44 km to Santacruz international airport, 4 km to new airport, Time: 60 to 90 mins from inner-city, 120 to 240 mins from suburb, medium connectivity
- **Land Use**
  - Planned in sectors, Mix used residential housing, Housing Enclaves
- **Land Price**
  - Residential rental: 15-20,000, Residential/Commercial Sale: 1750-3100

#### 2D Comparison of Mumbai’s Centralities

- **Good**, **Fair**, **Poor**
- **Source**: Author, 2012
- **Photos**: Google, 2012

#### 2D Comparison of Development Potentials of Centralities

- **Source**: Author, 2012

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**Fig 102**: Summarizing the Development Potentials of Centralities

**Fig 101**: Assessing the Urban Conditions of Centralities

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**Fig 101- Summarizing the Development Potentials of Centralities**

**Fig 102- Assessing the Urban Conditions of Centralities**
2.5 Conclusions

The conclusions below are descriptive of the analysis and research carried so far, written for every sub-section in this chapter. An overall conclusion of this project will be presented in the final chapter fully summarizing the learnings from the city and effects on the existing and future urban structure of Mumbai.

2.1 Historical growth and city transformations:
1) As mentioned in Nijman (2012), while Mumbai has developed and undergone transformations, the hinterlands have remained largely underdeveloped. This bias toward playing the part of the national CBD and a higher focus on the role of the international CBD has happened in Mumbai’s case.
2) With the boom in the ITEs sector, businesses related to this sector have mushroomed around BKC. This sector has a strong relation with Pune, which has become another important centre for the ITEs sector in India. Thus the Mumbai Pune knowledge corridor is linked with Mumbai at BKC. The centralities around BKC from the sector play a complementary role to the role of BKC in the sector. Similarly, the connections with Gujarat are centered around the historical city centre (diamond industry, textile, iron and steel trading, construction and real estate, headquarters of chemical, etc.) continue to be located at the city centre. This makes a large part of the local domestic industries, in addition to the strong presence of National and Global CBDs.
3) Industrial relocation from inner city areas to the hinterlands and planning of new growth centers like BKC, Navi Mumbai have been efforts to decentralize industries to reduce congestion. Some of these planning initiatives have been largely successful, yet the city remains spatially disconnected from the metropolis.
4) Transportation is the main circulatory system behind the growth of the city. The system is efficient and well managed but severely overburdened and congested at major nodes, 88% of the people use public transport system in Mumbai. In the recent years there has been a heavy degradation of the infrastructure system and this system is fragile within parts of the island city.
5) Topographical limitations and deficient infrastructure have constrained the growth of city and this city, as it is now needs a comprehensive regional structure which can handle the pressure of growth, congestion and transportation.

2.2 Regional conditions:
1) Present the connection to the mainland along the eastern seafront via is 2 road connections. The mainland is 20KM away from the city centre. Connecting the Nariman point CBD to the vast resources of Navi Mumbai would be a beneficial step. The current government plan seems to lack this vision toward organizing the regional structure. Also the recent development of residential sectors, railway infrastructure and a new airport in Navi Mumbai is expected to have further significant effects on the urban spatial structure of the region.
2) The highly dense areas of the city occur in Mumbai Island itself. However, the population of the island has increased significantly in the recent years. At the same time, the population of the suburbs and Navi Mumbai have been increasing owing to the immigration and growth since the 90’s. The population is still growing at a very fast rate due to the growth of call centers, film industry and financial sectors, making it the economic powerhouse of India.
3) Land prices are the highest in the south of the island city. A significant portion of the southern part of the island city is under the Navy, port authorities and mill lands. These can be opened up for urban redevelopment opportunities.

2.3 Dynamic drivers of change:
1) 81% of the manpower is employed in the tertiary sector. The growth in the financial sector has spurred growth in the telecommunication, construction and real estate sectors.
2) The economic potentials in the MMR are not being fully utilized across different scales in the current situation. This is owing to the inadequate connectivity between the island city and the parts of the MMR in the mainland. The CBD at Nariman point functions at global, national and regional levels, however the CBD at BKC, due to the make-up of the firms has only national and regional outlook towards Pune.
3) Major economic activities, urban facilities and entertainment industries (theatres, shopping malls and multiplexes) are located along the infrastructure corridors in Mumbai. While the Historical CBD on the southern part of the island is home to high commercial, cultural and art industries, retail and luxury shopping establishments have grown in the suburbs. This situation may change in the future and the commercial activities may emigrate from the historical CBD into the suburban areas or the BKC.
4) Most Banking and Finance institutions are located at the Nariman Point CBD or at the BKC CBD. The other centralities have their unique identities and play complementary roles to work in conjunction with these CBDs. The Nariman point CBD acts at all the scales of the economy (i.e., global, National and regional scales) however the BKC CBD acts only at the national and regional scales. In effect, the Nariman point CBD looks both into and outside the city for its business opportunities and scope of operations, whereas the BKC CBD looks mostly inwards into the country and the region for business scope.

2.4 Identifying centralities
1) Mumbai plays an important role in the ITEs sector at different levels. The spread of employment opportunities has bought the ITEs sector to the centralities in the MMR, and this has influenced the growth in the centralities. This phenomenon has not been addressed sufficiently by the academia, studying the corporate geography of Mumbai.
2) The centralities identified in the section work very well within their own circles, each with their own different infrastructure. However, there is no one single system of transportation which connects all of them. The lack of supporting infrastructure and connectivity between the centralities is the major deterrent and does not support the growth of disconnected centers of BKC and South Navi Mumbai. The BKC centrality suffered greatly in the years of its inception due to the poor connectivity to the arterial road network and the lack of quick access to railway networks. The South CBD is well connected to the rail network and the other centralities have good-medium access to railways and arterial roads.
3) The major nodes in the MMR were studied for their characteristics. The CBDs at Nariman Point and BKC function as the economic hubs in the region, with mostly offices, specialized businesses, commercial and luxury-high residential activities. While Nariman point has the strength of being an Historic Center, BKC has the advantage of being located close to the airport. As opposed to this, centrality at Thane has medium-low income group residential areas with industrial activities and urban relations to other parts of the region such as Kalyan, Dombivli, etc. Large shares of the residents at the Thane centrality commute to the Nariman point and BKC CBDs for employment. Vashi is one of the major commercial centralities in Navi Mumbai and locates middle class housing areas, with Thane-Ghansoli Industrial belt in its vicinity. The Agricultural Produce Market Committee (APMC) is located at Vashi and is an important point for distribution of perishable foodstuffs and grains into the city. Panvel is an important point in the Mumbai–Pune corridor and a upcoming medium to low end residential centrality with an industrial backyard. It has proximity and advantage of the new proposed Navi Mumbai international airport.
This chapter focuses on the theoretical underpinning of this project, primarily by understanding the changing roles and relations between the Central Business Districts (CBDs). It deals with the evolution of a centrality and thereafter, explains effects of urban restructuring in shaping the centralities, especially in the context of globalizing megacities. It draws references from urban practices of Paris La defense business district and Copenhagen Loop city.
Fig 103- The Historic City and Cultural Center of Mumbai showing Gateway of India and Taj Hotel. Source: Rhode & Chandra, 2008
3.1 Theoretical Essay

3.1.1 Theory Abstract
In the recent years, urban restructuring has emerged as a central phenomenon in the field of urban studies. Several authors (Harvey, 2001; Banerjee-Guha, 2002; Grant and Nijman, 2002; Sassen, 1991; Sita, 2008) have argued in their own ways that, restructuring happens when there exists a direct relationship between the role of power that controls urban space (commerce, economic and political activities) and its socio-spatial formations (urban structure, network systems, functional components etc.). In other words, large metropolises have constantly been transformed through time with respect to their position in the global city network (Banerjee-Guha, 2002). Correspondingly, the center with the chief concentration of economic and business activities popularly called the ‘Central Business District’ (CBD) is noted for its changing structure and significance in the global economic network (Murphy, 1971; Grant and Nijman, 2002). However, the idea of restructuring in large cities is often propelled by the growth of accelerated population and increasing volume of economic activities, which consequently gives rise to new forms of centralities (Sassen, 1991).

The key objective of this paper is to investigate the changing roles of central business districts (CBDs) due to urban restructuring, in an attempt to study the transforming CBD in emerging global cities. Urban restructuring refers to the changes in the city’s structure, which are a result of partly ‘local’ factors and partly ‘global’ factors (Sita, 2008; Banerjee-Guha, 2002). The theory reviews transformation of CBDs, in order to analyse its constituents. The context of reference is mainly to the globalizing post-colonial cities influenced by market forces, with a range of corporate presence like Financial, Administrative, Legal, IT, ITES etc. (Sassen, 1991).

The methodology is divided into seven main sections explaining the factors which necessitate urban restructuring and in the process, led to the rise of the global CBD. Section 1 introduces the context and motivation behind changing centralities, Section 2 describes structure of the CBD, Section 3 reasons urban restructuring process with a relevant case of Mumbai, Section 4 studies the global CBD of Paris La Défense business district, Section 5 outlines the associated relations of CBD in the contemporary age, Section 6 and 7 propose conclusions and recommendations for future.

The findings indicate that the CBDs are integrated differentially at the local, national and global scales (Grant and Nijman, 2002) and are remodelled by the global forces. The paper further develops a critique on the evolving role assigned by an array of functional changes, which reorganizes the CBD. It embraces the shift in the focus of development from the main center to other emerging centers in the suburbs (Mukhopadhyay, 2005). Some key indicators of this spatial trend are made by huge investments in large urban projects, command and producer services, extended infrastructure networks, intensified high value mixed-development and the similar.

Keywords
CBD, change; role; global; urban restructuring; development

3.1.2 Globalization as the Context
According to Harvey (2001), the contemporary form of globalization is another round of capitalist production and reconstruction of space, resulting in the production of new forms of uneven development. Along this line, the phenomenon of urban restructuring has become a pressing concern for the post-colonial cities subjected to the global situations.

According to Banerjee-Guha (2002), a new centrality emerges inside global and globalizing cities with the implementation of economic liberalization policies and reforms. Banerjee-Guha (2002) refers that several large cities all over the world are undergoing transformations in their urban form owing to rapid growth, making them diverse and complex. Besides, it is an outcome of the major changes in the nature of the activities associated with the development of the city. According to Mukhopadhyay (2005), a new spatial order arises when the city shifts from a megacity into a global city (Sassen, 1991), noted by the rising conurbation of activities in the metropolitan area. The focus of this paper is to investigate the changing roles of the central business districts, mainly driven by global competitive-ness. The current structure of the post-colonial cities and their CBDs has evolved over lengthy periods of time. It hence becomes vital to understand the historical growth of these centralities, in order to realize the particularities and effects of restructuring.

According to Sassen (1991), the CBD is an international business center, a strategic site for leading industries, and one continuously reconfigured by the economic and technological change. Sassen (1991) expounds that the CBD is extended into the metropolitan areas in the form of intense business activities and acts as a transnational center involving economic transactions in the network of global cities. Moreover, the range of functions includes the financial markets, trade services and high corporate activities attracting large investments. Sassen (1991) further points to the formation of the new core of banking and service activities which have replaced the older manufacturing core. Also, that the global era is the most recent phase of restructuring as compared to the earlier periods of modernization, wherein the concentration of globalized services in the urban areas develop vast multinational networks becoming dominant centers. The view is agreed upon by Grant and Nijman (2002), who argue that most cities have moved through four historical phases: pre-colonialism, colonialism, nationalism and globalization. Here, they describe that each of the phases have distinctively changed the urban structure of the city in relation to its role in the world economy.

In the same way, during the 1970s urban centers rapidly expanded, this added new dimensions to the city by the addition of secondary and tertiary functions (Mukhopadhyay, 2005) and widely acknowledged the changing forms of the city structure. At the forefront of this new philosophy was a new spatial model of polycentricism, having more than one main center. As such, polycentricism happens over time, driven by external forces like globalisation and population migration (Jenks et al., 2008). This trend shifted the focus of development from the old city towards the city suburbs, significantly altering the overall urban landscape of the city (Mukhopadhyay, 2005) and thereby creating more central business districts. (Jenks et al., 2008).
3.1.3 Structure of the Central Business District

Background
Globalization is often used as an umbrella term to study the geographical developments related to urban studies. Unfortunately this usage blurs complex processes involved in the initial structuring of an urban space. Hence, in principal it is imperative to study the well-grounded history of the geographical developments (Harvey, 2001) of CBD to understand globalization and its effects. Therefore, it becomes necessary to analyse the development of the CBD through different time lines (Murphy, 1971) to comprehend elements of change.

Introducing Central Business District
The term CBD or ‘Central Business District’ is often the central place or downtown of the city with a high concentration of economic activities, since it contains most of the city’s offices and large retail stores (Murphy, 1971). Also, it is the area where the vehicular and pedestrian activities are highly dense, with the highest land prices (Murphy, 1971).

The notion of a CBD from being a traditional economic core has been questioned in the recent years through an understanding of the elements which constitutes it. The formation of a central business district closely reflects the city’s history and in today’s context, at times owing to certain urban regulations such as height, density etc. the financial and administrative center are separated from the historic traditional center. To explain how commerce, industrial and residential areas are divided around the CBD, the classical Bid-rent theory is used to explain the spatial model.

According to the Bid-rent theory (Von Thunen, 1826), the price and demand for land changes as the distance increases away from the CBD (see figure 104). In principal this is the most accessible part of the city, with trade routes radiating towards the city center as it is filled with business activities. The concentric zones around the CBD are assigned for industrial and residential uses, while the land rent increases as the distance from the city center increases.

Colonial phase: Historic Center
According to Grant and Nijman (2002) the historical phases determine the extent of the global links the cities have. They further study the gateway cities, which are coastal cities with global trade routes and are at the crossing point of two international destinations exposed to global networks. Grant and Nijman (2002) make few critical observations on the growth of developing colonial cities.

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First, they were spatially organized around ports which functioned as central nodes in trade network. The strategic location was linked to the rail lines and shipping routes, visible in the arrangement of docks, warehouses, railway terminals etc. related to trade, storage and distribution functions. Second, the port adjacent to the commercial waterfront was the main center of commerce and a well-defined European business district was placed adjacent to the port area. Third was the arrangement of the traditional markets or bazaars in the native town separated from the European town by a green esplanade (Kosambi and Brush, 1988).

Post-Colonial phase: New Form
The commencement of the global phase for the cities under the colonial age began after independence, with the implementation of economic reforms. The major developments which drastically transformed the cities happened during this period. The phenomenal growth of population was redistributed by depopulating the city core and by suburbanization (Sita, 2008).

According to Grant and Nijman (2002), four changes were evident in the spatial configuration of post-colonial cities. First, the declining of foreign corporate and residential presence that led to the rapid growth of domestic companies. Second, the nationalization of the former European CBD both politically and economically (Grant and Nijman, 2002; Kosambi and Brush, 1988) which further led to the steady rise of corporate density. Third, the increasing small scale businesses were located in the former native CBD while the large companies chose their locations on the emerging national CBD (former European CBD). This resulted in massive growth of rural-urban migration, which added to the congestion of the inner city districts. Lastly, the escalated values of the upscale residential neighbourhoods, unaffordable to the natives became areas for nationalized functions (Grant and Nijman, 2002).

Global phase: Growth of Services
The liberalization policies and economic reforms during the global phase generated certain specific kinds of developmental changes. One such was the restructuring of the economy in the post-colonial cities which experienced industrial boom, wherein the economy shifted from the predominantly manufacturing based sector to the service based sector (Sassen, 1991).

As a result, the major influx of foreign companies that concentrated on finance and producer services like Banking, Investment companies, Insurance, IT, ITES, BPO’s etc. fuelled the growth of the service sector (Sita, 2008). It further steered the expansion of specialized production processes that was more capital intensive than labour intensive. With the emergence of free market, developments in ICT etc. (Rocco, 2007), the global age led to several major changes in the city’s original structure. However, according to Grant & Nijman (2002), the corporate economic network of the global CBD are connected to the national and local CBD, wherein each is a part of the other (see figure 105).

The Changing nature of Central Business District
According to Harvey (2001), the CBD can be interpreted as the core of the city with produces surplus capital. This capital, in his words has the tendency to reorganize itself in another location expanding geographically creating another center in order to absorb its own surplus production.

Interestingly, studying the urban land-use patterns around the central business district of a city gives a primary direction to interpret the substantial changes that occurred through time. The historic center which was the original nucleus accommodated most central businesses of the early colonial trade and money transactions.
Post-Colonial phase: New Form

After independence during the post-colonial phase, the main central business district continued to expand by adding more land to itself, in a way to strengthen the concentration of economic and market activities. It reflected the early historic and cultural forces, by retaining the character of the European business district. With industrialization boom and more employment which increased migration, the manufacturing functions located themselves in the initial native business district, accompanied by merchandising and storage related activities. Murphy (1971) asserts that the roles of the CBDs are repeatedly shaped by the somewhat permanent physical space and the ever changing nature of activities [Murphy, 1971]. In the global phase, with the implementation of economic reforms and free markets, the growth of the CBD shifted from manufacturing functions to service functions. Hence were the new demands for space depending on the nature of activities and their position in the wider global network.

3.1.4 Urban restructuring

Outlining the factors

Sita (2008) says that some fundamental changes in the original city structure were a result of the processes during the post-colonial and global phases which led to major modifications. Banerjee-Guha (2002) discusses how wider restructuring of the economy and society at national and global levels has reflected in the transformation in the built environment. She terms that contemporary urban restructuring is the dialogue between the global and the local factors, as such represented by the requirements for high profile built environment and corporate structures set against the true realities and sensitivities of local conditions. These factors express the dominant trends of new relationships and production of spaces. The significance of which on the urban environment is in the formation of modern business districts, expansion of space for command activities, increasing real estate market, construction of sophisticated urban services like mega structures, info parks and massive investments in upgrading public infrastructure (Banerjee-Guha, 2002). The phenomenon of urban restructuring has led to some major spatial trends which alters the urban form, for instance the tendency to develop in the city suburbs, the formation of new central business districts etc. (Mukhopadhyay, 2005) often confronted by increasingly dense flows of capital, goods, services, communication and people (Rocco, 2007).

A case of Mumbai

In order to describe the main driving forces which necessitated urban restructuring and hence the rise of multiple business districts, it becomes critical to study a case that transformed from a colonial city to a global city. Mumbai, the financial capital of India has evolved from being a flourishing port, to a dense industrial city and now a financial player in the global economic network. As per the report of Globalization and world cities network (GaWC, 2008), Mumbai is an alpha city and as per the report of PricewaterhouseCoopers, it ranks among top five real estate investment in the Asia-pacific region (PwC, 2010). According to Mukhopadhyay (2005), during the 1990s a structural change in the overall urban landscape of Mumbai was noticed with the decline of commercial, port and industrial functions in the old island city. With deindustrialization and increase in service functions, the rise of private finance from both domestic and foreign sources fuelled change. Mukhopadhyay (2005) explains the reason behind the shift in the focus of development from old island city to suburbs chiefly to identify alternate areas for new kinds of growth potentials.

It can be observed that, in the process of continuous urban restructuring with change in the nature of economic base and change in the type of functions, more growth centers were planned in Mumbai (see figure 106). While this began, restructuring the development of the city to attract private capital from high investors and at the same time act as counter magnet to absorb growth from the over-exploited Nariman point main CBD, led to the new CBDs in Bandra-Kurla Complex (outside island city in the suburbs) and Navi Mumbai (new region across the peninsula on the mainland) (see figure 106). The key changes can be attributed to part decentralization of administrative and commercial functions from the island city, the real-estate boom and the rapid growth of retail market in the extended suburbs [Mukhopadhyay, 2005]. The new centralities are designed for mixed-use functions with residential and intense commercial functions, catering to the industrial sectors nearby.

A case of Paris La Défense business district

The polycentric spatial organization of Greater Paris had its origin in the development of La Défense during the 1960s and 1970s, which ensured showcasing of an international business district to the entire nation. Paris La Défense business district connected to the most representative and symbolic spaces through the monumental historic axis continues to associate itself to the modern image of the city. According to Harvey (2001), this business district clearly illustrates the reconstruction of capital in another place, connected to the historic axis of the old city by the extension of urban technical networks (see figure 106). The CBD houses France’s most important national and foreign headquarters which emerged when the historic center of Paris did not allow for further development of large structures, in order to avoid congestion. According to Rocco (2007), Paris La Défense was an early example explaining the phenomenon of new centralities in relation to the historic density of old Paris, which did not encourage large urban structures.
La Défense was created to answer the demands of offices in Ile-de-France, thus became the second job provider after Paris. Since its inception, the development of La Défense was a planning operation as a westward extension of Paris. The business district contains 30 hectares of public spaces, powerful transport networks, with thousands of people including office workers, residents and visitors using on a daily basis (Les Ateliers, 2011). With the advent of restructuring at the regional level, the CBD was governed by a changing and a more complex axial structure, into a network of links (Les Ateliers, 2011). However, according to the many challenges highlighted by the team of authors in Les Ateliers (2011) workshop, there exist both predictable and unpredictable trends in the future for this CBD with reference to the social, economic and environmental factors.

3.1.5 A Relational Perspective

Rise of the New Centralities

According to Rocco (2007), the notion of centrality in the global age has been moulded by the new elements that represent the urban and business structures. He states the relation between the centers of any city clearly connected to the urban technical networks, the density of which reduces as the distance increases from the center. The relation is defined by the urban land-uses and land-price based on the concentric model of the urban core. Moreover, he explains that the new functions, headquarters of national and foreign enterprises add to the already existing historic identity. Rocco (2007), describes that these networks are interurban and sometimes international, organizing themselves as the new ‘Central Business Districts’, also called as the Global CBD (Grant and Nijman, 2002).

Rocco (2007) describes that the core has the quality to multiply by creating a network of nodes within the city. In this case, a more central node based on its importance in the urban structure of the city has a stronger influence over other nodes (see figure 107). He further outlines that the traditional central business district usually is well connected to the rest of the city but in the contemporary urban situation, the new nodes of production and consumption offer possibilities for new urban structures. In his words, “In today’s city of flows, different centralities compose a network of nodes that can accommodate mutually supportive activities, creating and reinforcing synergies. They constitute a new kind of urban structure, with a new arrangement of the parts.” (Rocco, 2007, p.99).

The notion of centrality in the global age is governed by the new elements of command and control functions. With this in place, the former central places acquire new roles because of certain spatially specialized functions (Rocco, 2007). In this view, new urban peripheries emerge at the very core of cities while new centralities emerge at the fringe of the metropolises. Activities related to the progression of trade and businesses are influenced by global forces, hence their spatial conditions rely on connectivity and image (Rocco, 2007).

Interestingly, the spatial structure that undergoes changes owing to the demands of large urban development projects through Foreign Direct Investment plays a major role in defining the new spatial context. Grant and Nijman (2002) argue that these changes have resulted on powerful imprints in the urban landscape. Further, the old central places have transformed to link themselves to the wider global economy and have acquired new roles.

The Emerging Spatial Context

The CBDs in the suburban areas are assigned with key functions, earlier located in the main CBD, in an attempt to decongest the same. In addition to this, they are strategically placed to identify and provide highest standards for potential investors in a most competitive way (Raiser and Volkman, 2005).

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The spatial structure of the contemporary CBD is shaped by the market forces, which in turn affects the formations of space in and around the node(s) which locates them. The rapid growth of foreign companies (Grant and Nijman, 2002) along with the emergence of new centralities, project the old centralities in a new perspective altogether. The new centralities accommodate new functions which are found to be problematic in the old centralities, while the old centralities retain many of their important old functions and are in fact complementary to the new centralities (Rocco, 2007).

Fig 107 - Polycentric Urban Region and the Network between the Urban Core-Nodes

Source: Rocco, 2007
3.1.6 Conclusions
The spatial structure of Central Business Districts is changing and reviewing the above literature suggests that they are constantly influenced by the elements of the new corporate geography, in today’s global age. With the free market economic reforms, these concentrations are adapting to the developments of ICT and infrastructure. Grant and Nijman (2002), conclude that there exists a clear demarcated foreign presence in the globalizing post-colonial cities. Also, the local, the national and the global CBDs are differentially connected to the larger financial network. The relatively rapid pace of change in the spatial structure of globalizing cities can be assigned to the modifications brought by urban restructuring (Sita, 2008).

The process has led to a situation which involves conflicting interests subjected to the benefits of the various stakeholders coming together at these centers of intense activity. Raiser and Volkmann (2005) emphasize that fundamental changes in the economic structure of the city have far reaching consequences on its spatial order. It can be concluded that the main actors in the contemporary period are the market forces, whose locational choices determine the necessary characteristics and components of change in the urban structure of the city.

Earlier, a historic center used for only trade and business has evolved to accommodate the changing demands and needs of the global players to include in the current context an array of new programs. It is clear by review of the arguments presented by many (Grant and Nijman, 2002; Sita, 2008; Mukhopadhyay, 2005; Banerjee-Guha, 2002; Rocco, 2007), the structure of the CBDs underwent a great deal of considerable changes with the added new functions. Besides, the concentration of the business activities, corporate structures, other commercial, retail, and residential functions has enriched the character of the central business district, as seen from the development of Paris La Défense. Furthermore, these transformations are in direct relations to infrastructural systems like highways, airports and other urban technical networks (Rocco, 2007). The CBDs of high land index value become power nodes attracting the city’s most influential players and establish striking relations with the past, present and future (Murphy, 1971).

3.1.7 Recommendations
The CBD is a dynamic entity of urban form, with chief concentration of economic activity and understanding its future needs a precise valuation of the global forces which outlines a probable outcome. The central business district has an inseparable and important role in the development of a city, hence gauging its changing roles through time helps assess its future. Murphy (2009) makes it clear that the CBD represents huge investment of wealth, the greatest concentration of offices, businesses and forms the center of transportation and communication networks of the city. These concentrations in addition to acquiring businesses of global presence offer wide avenues for new programs and find themselves in the context of large cities as international or regional centers. It is therefore absolutely indispensable to have a deeper understanding and knowledge of the functions, to decide on the unique advantages offered by a CBD. It is recommended to study the tendency and nature of development activities happening in and around the CBD, along with its implications and manifestations on the built environment.

Further, analysing the larger regional structure and the infrastructure physical networks, which link the CBDs, create potentials for the future development of a coherent urban system, wherein each is a part of the larger whole network of entities. Hence it is critical to evaluate the nature of changing aspects before and after to suggest the probable and expected solutions for the development of CBD and its effects at the metropolitan, regional, national and global scales.

3.1.8 Bibliography


3.2 Literature References

3.2.1 The Loop City

An Urban Vision for Copenhagen-Malmo called the Loop City was proposed by BIG Architects which acts as a development catalyst, with priority placed on public transportation. This cross border regional development has a set of parallel strategies wrapped around the Oresund strait (see figure 108) in a sustainable spine focussed on Public transport, energy exchange and electric car infrastructure. The Loop embraces the different programs which grow around the station areas and activates the inbetween space creating new public realm connected by the transportation system.

The main idea is to convert the industrial areas in the Copenhagen suburbs by a new light rail corridor (see figure 109) which will connect 20 development zones, covering an area of 11 Km2. The light rail system is expected to create a new 50 year development potential between Sweden and Denmark. The ring of the Loop is comparable in size to the San Francisco Bay area and provides sustainable, dense and recreational development for the region.

3.2.2 Paris La Defense Business District

The development of La Defense was long seen as an extraordinary urban planning operation located on the westward extension of Paris' historical axis (see figure 112). The modern business district of Paris La Defense was created protect the historical skyline of Paris and at the same time, face the needs of large business spaces. With 30 Hectares of public space well served by powerful transportation and remarkable landmarks with major national and international businesses, La Defense houses thousands of employees, inhabitants and visitors (see figure 110). La Defense has evolved over a period of 40 years with considerable efforts and investments in the building of the financial district. It is well connected by Metro, Regional Rail, Tram and Bus services. Of the 3500 companies located here in La defense, 1500 are the headquarters of several firms and has 15 of the 50 most important international companies. The territory of La Defense is a combination of the green-blue corridor, the industrial areas, the old city centers, the large housing projects and the infrastructure which connects them together. The business landscape embraces the historical axis of Paris, with a large view to it and urban spaces constantly vary between the large modern towers and human scale spaces (see figure 111 & 113) like plazas and squares.
Chapter 4.0
Hypothesis, Vision, Strategy, Concept

From the earlier chapters of analysis and theory, it is clear that the centralities in Mumbai seek restructuring so as to deal with the challenges of increasing congestion, overstressed transportation and development imbalance of Navi Mumbai. In other words, the city rather needs a new regional structure and framework of fast transportation network across the different-scales of the city. Therefore, in this chapter a vision is proposed to counter these problems by introducing a ring system which reinforces the polycentric structure of the city, connected by a proposed high-speed regional rail. A suitable concept explaining the vision will be discussed to relate to the different-scales of Mumbai. After this, urban strategies are defined for the development corridors in the regional network and for metropolitan integration of Mumbai, with the infrastructure proposal.
Fig 114 - Sea Link Connection between Bandra and Worli along the Western Express Way
Source: Google, 2012
4.1 Framing the Hypothesis, Vision, Concept

4.1.1 Reviewing the Main Research Question: Learning from Mumbai

In order to explain the Hypothesis of this project, it is important to review again the main research question, which is as follows:

“How to restructure Mumbai’s main centralities to facilitate urban development by using its hinterland potentials within a framework of different scales?”

Keeping this in perspective and the set of sub-research questions initially highlighted, this section attempts to answer each of them. The case of Mumbai, as a narrow peninsula which originally constituted the colonial port has an exceptional topography which reduces the amount of developable land. Also, the public transportation system which Mumbai deeply relies on, railways in particular is currently under tremendous pressure. With less or no land available, the physical extension of the city towards the hinterlands has remained a constant challenge with no good physical public transportation. With millions of everyday commuters travelling from the suburbs to the city center, the city does not have a rapid system that can avoid long distance commuting trips. Moreover, there are only 5 access points to the peninsula from the mainland (Navi Mumbai) with inadequate and stressed railways, which is not accessible from all parts of the city-metropolis.

With this rationale, to answer the severity of the problems discussed, the project hypothesizes on expanding urban development towards the metropolitan hinterlands served by a new form of public transportation system. To realize this, the five centralities are restructured by a ring system towards the Mumbai-Pune development corridor, connected equally by a Hi-Speed regional rail network. The development imbalance can be counteracted by linking the overlapping scales of the city and by improving the accessibility of centralities towards the reorganization of Metropolitan Mumbai.
On of the main arguments for the undeveloped Metropolitan areas of Mumbai, Navi Mumbai in particular is because the existing infrastructure is insufficient. With a peculiar geography, the city is made naturally of heavy rail transport corridor, which has largely influenced the metropolitan structure. Therefore, in order to restructure the existing problems of five centralities in Mumbai and Navi Mumbai towards a polycentric configuration requires a high level of public transportation. The new form of infrastructure should guide the urban development of the city, as oriented towards the Mumbai-Pune regional corridor. In doing so, the growth can expand from the island to the mainland, towards the region generating further development using the potentials of metropolis, including the sea-port and proposed airport of Navi Mumbai.

Public transportation has to be prioritized first, to shift the focus of urban planning and development with a comprehensive vision and long term growth strategy. A Hi-speed intermediate railways, in the form a ring system is proposed to give the city its new regional structure (see figure 119). The ring would circle the centralities of urban-economic interests, namely the historic CBD of Fort-Nariman point, BKC, Thane, Vashi and Panvel, towards Pune. The proposed direct connection across the sea between the historic CBD and south Navi Mumbai, would integrate the centralities of the metropolis into a single network, creating equal access from all parts of the metropolitan region. The new link would have an impact on South Mumbai, for an inbetween centrality (see figure 119), strategic in location between Pune and Historic center of Mumbai.

The Ring system further strengthens the connectivity of Mumbai in its regional network (see figure 121), by creating a northern axis towards Surat, north-eastern axis towards Nashik and a southern axis towards Pune. The emerging spatial structure realizes these development axis as potentials to balance metropolitan growth of Mumbai. A dominant monocentric island city can shift towards a distributed polycentric city, served by a new form of fast regional transportation aimed at relieving the congestion of Mumbai.
Mumbai, like any other global city on the interconnecting routes between two important seaports, has had a policy of “looking away” from the mainland. This means that the resources from the mainland are consumed toward the economic demands of the city itself and the surrounding regions have a slower pace of development (Nijman, 2011).

It is necessary to note here that the usual connectivity between Mumbai and Pune is along the Navi Mumbai region (via chembur, Vashi bridge, Vashi, belapur and thence the Mumbai Pune highway). The Highway in itself is a part of the national highway system but is subject to bottlenecks at various locations along the stretch. The Bottlenecks within the Mumbai city limits compound the issues and the travel time is typically 4 hours in case of peak hours and about 3.5 hours in case of non-peak hours.

In the recent years, however, due to the increased economic and industrial growth in Pune to the south and Gujarat to the north, Mumbai’s interactions with the cities in the golden triangle and Gujarat have increased manifold. Due to Mumbai’s functional and economic relations with Pune and Gujarat, the importance of an efficient high speed connectivity between the financial and IT based CBDs in Mumbai to the other industrial hubs in the region is of paramount importance.

The project envisions to establish a hi-speed interconnection between the CBDs at Nariman point, BKC, Thane, Panvel, Vashi and Uran (see figure 122). Bandra-Kurla Complex, is placed at the crossroads of regional transportation, with connections from Pune and connection to Surat-Ahmedabad. The Historic CBD is well-connected in itself and therefore, is linked to the proposed vision through secondary Hi-speed links. The hierarchy of the primary and secondary Hi-speed transportation systems (see figure 125) are explained more in detail in the sections ahead.

As a result of this, certain centralities gain importance as a part of the regional network connections between the north and south development axis. The planned CBD of BKC, becomes a regional transportation hub for connections and transfer, while the Uran in South Navi Mumbai becomes strategic as a location between Historic Mumbai and Pune.

It is envisaged to use high speed connections between these points so as to achieve the following objectives:

1. Direct, high speed, efficient connectivity between Thane, Panvel, Uran on the eastern board to the CBD’s at Nariman point and BKC. The estimated travel window between any two points in the loops would be limited to a maximum of 30 minutes.
2. Efficient connections to Pune and Surat. The commute times from Nariman Point and BKC to Pune or Surat would be limited to approximately one hour to 1.5 hours.
3. Drop off points between Nariman point and BKC at Dadar and Sewri, between Thane at Ghatkopar and Bhandup, between Thane and Panvel at Ghansoli, Vashi and Belapur, between Panvel and Uran at the JNPT Port (see figure 134).
4. Airports and Seaports are provided with Hi-speed stops, existing Santacruz airport after BKC CBD on the northern line and proposed airport after Panvel on the southern line.
5. Intermodal transfers between the CBDs and the existing suburban railways are serviced by the BEST buses and the METRO phase1 connections, currently being developed by the planning authority.
4.1.4 The Link: Connecting the Different-Scales

Transportation and infrastructure, is critical to the future development of Mumbai. As growth and demand for services, as fundamental as railway infrastructure in Mumbai increases, provision of good public transportation becomes inevitable for city’s future. Moreover, the future of metropolitan growth of Mumbai also deeply relies on new transportation lines, which can improved accessibility and intermodal connectivity between the centralities.

To realize the Strategy, a concept is illustrated to indicate the differences between the existing and the proposed situations. Existing situation of Mumbai in relation to its regional structure (see figure 124) involves long commuting trips with certain parts of the city being fully disconnected. Mumbai exists in parts of the different-scales, which makes it vital to connect the different parts into a coherent whole. The overlapping scales when linked by a new infrastructure which connects across scales of the region, metropolis, city and center creates spatial conditions (see figure 123) for,

1. A polycentric network of reinforced centralities [economic centers], connected by a single layer of Hi-speed transportation system.
2. A set of interconnected development corridors, inbetween the centralities which can become potentials for development and redevelopment sites for different urban activities.

Efficient transportation connecting the five centers to the region in fast dedicated lines, reduces travel-time (see figure 125) and brings the centralities into a productive relationship [places of work and living] (see figure 126).
<table>
<thead>
<tr>
<th>Place</th>
<th>Line</th>
<th>Operator</th>
<th>Start</th>
<th>End</th>
<th>Speed</th>
<th>Length</th>
<th>Number of Stations</th>
<th>Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Tokaido Shinkansen JR Central</td>
<td>JR Central Tokyo Shin-Osaka</td>
<td>Tokyo</td>
<td>Shin-Osaka</td>
<td>270 km/h</td>
<td>515.4 km</td>
<td>17</td>
<td>2.30 h</td>
</tr>
<tr>
<td>China</td>
<td>China Railways CRH380A</td>
<td>Chinese Ministry of Railways-Shanghai Railway Bureau</td>
<td>Beijing</td>
<td>Shanghai</td>
<td>250-300 km/h</td>
<td>1302 km</td>
<td>24</td>
<td>4.48 h</td>
</tr>
<tr>
<td>Europe</td>
<td>TGV Thalys PBKA</td>
<td>Thalys</td>
<td>Paris</td>
<td>Amsterdam</td>
<td>300 km/h</td>
<td>500 km</td>
<td>4</td>
<td>3.5 h</td>
</tr>
<tr>
<td>Brussels-Netherlands</td>
<td>Sprinter Lighttrains NS Reizigers</td>
<td>Brussels Amsterdam railway bureau</td>
<td>Amsterdam</td>
<td>Brussels</td>
<td>250 km/h</td>
<td>211 km</td>
<td>10* (expected)</td>
<td>1.46 h</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Bhopal Shatabdi Express</td>
<td>Northern Railway</td>
<td>New Delhi</td>
<td>Bhopal</td>
<td>160 km/h</td>
<td>701 km</td>
<td>5</td>
<td>7.50 h</td>
</tr>
<tr>
<td>India</td>
<td>Pune-Mumbai-Ahmedabad High-Speed Passenger Corridor</td>
<td>Indian Railways</td>
<td>Pune</td>
<td>Ahmedabad</td>
<td>300-350 km/h</td>
<td>643 km</td>
<td>9</td>
<td>Less than 3 h</td>
</tr>
</tbody>
</table>

The Proposed Hi-Speed Public transportation is introduced in two levels; first in the form of bullet trains with limited stops and second, in the form of regional light rail with more stops. Each, has a set of individual urban conditions which deals with nodes, speed, functions, accessibility and its own infrastructure (discussed more in further sections on spatial strategies).
### 4.2 Urban Strategies

#### 4.2.1 The Regional Development Axis: Mumbai-Pune Corridor

Mumbai shares a strong structural relationship with Pune, therefore the regional strategy uses the Ring system and the Hi-Speed transportation system as tools to realize further urban development potentials along this knowledge corridor. Also, the regional and urban influences of the two cities act on the choice and nature of developable land used for new production and consumption activities. As an industrial knowledge based corridor, several SEZ Business and Hi-Tech Parks exist along the NH-4 expressway.

New Centralities are located around the existing residential and industrial clusters (see figure 130) stretching anywhere between 3 Km- 10 Km. With the proposed ring, south Navi Mumbai with the seaport and proposed airport becomes largely important with its proximity to the Historic CBD of Mumbai and the industrial corridor of Pune. With regional and urban influences, parts of south Navi Mumbai (see figure 131) are allocated for development purposes with a new strategic node in Uran. Parts of this developable land are assigned for dedicated knowledge industries, such as:

1. Related to Service sector, Hi-Tech towards Pune,
2. Related to Port logistics, Service sector, Mixed-use towards South Navi Mumbai

The Hi-Speed public transportation which connects Pune to Mumbai is of two kinds; one is a direct link with no intermediate halt and stops at BKC and second, is the intermediate regional light rail which connects the main centralities of Mumbai to the newly sequenced centralities along the corridor. The efficient transportation can integrate the urban qualities which satisfy the social, ecological and landscape interests amongst identifying potential nodes for urban opportunities between the two major cities of Maharashtra.
At the Scale of Metropolitan Mumbai, the main centralities (economic and commercial centers) of the twin cities are restructured along the Ring system, wherein each has an advantage of being equally interconnected with the others. As the Ring embraces large distances covering parts of Greater Mumbai and Navi Mumbai (see figure 134 & 135), it creates a platform for urban potentials that derives its benefit from Hi-Speed Railways (see figure 133). The proposed Hi-speed infrastructure aims to,

1. **Equalize** development opportunities using public transport, railways stations, regional light rail corridors as drivers for urban intensification and for future growth
2. **Integrate** the main centralities of the city; by connecting the major economic centers of the metropolis, where nodes and corridors of are opened up for development. A wide range of programs for public, culture, leisure, business and landscape activities based on the movement networks (region, metropolis, city, local) can be introduced.
3. **Reshape** the existing urban conditions to relieve the island city off its pressure by investigating redevelopment along the old port and derelict mill sites.
4. **Strengthen** the transportation networks which feed into the reserved Hi-Speed corridors. It is to be noted, that a comprehensive system of elevated metros, buses and underground transfers will be efficiently connected to the ring system
5. **Organize** public networks by creating pedestrian-oriented environments, improving accessibility to station areas and activating street life, as a majority of commuters walk.
6. **Prioritize** on safe and efficient public transportation made accessible from all parts of city, which can catalyse on urban densification and economic performances of centers
7. **Shift** the focus of urban development towards making specialized centralities (specific activities with places of living and work), densified and restructured for mixed-use programs and well connected with the fast-medium-low speed urban areas.

### 4.2.2 Metropolitan Integration of Centralities

![Comparison between Amsterdam and New Sea link Connection](image)

![Comparison showing the Hi-Speed Network](image)

**Fig 132-** Comparison between Amsterdam and New Sea link Connection

**Source:** author, 2012

**Fig 133-** Illustration showing the Hi-Speed Network

**Source:** author, 2012

<table>
<thead>
<tr>
<th>Nariman Port/Port</th>
<th>BKC</th>
<th>Thane</th>
<th>Vashi</th>
<th>Panvel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nariman Port/Port</td>
<td>20 KM,30/90 min</td>
<td>0</td>
<td>22KM,30/68 min</td>
<td>0</td>
</tr>
<tr>
<td>BKC</td>
<td>36KM,55/104 min</td>
<td>22KM,40/90 min</td>
<td>11.4 min</td>
<td></td>
</tr>
<tr>
<td>Thane</td>
<td>184 min</td>
<td>21KM,29/41 min</td>
<td>12.6 min</td>
<td></td>
</tr>
<tr>
<td>Vashi</td>
<td>90 min</td>
<td>51KM,60/90 min</td>
<td>11.4 min</td>
<td></td>
</tr>
<tr>
<td>Panvel</td>
<td>187 min</td>
<td>41KM,45/140 min</td>
<td>15 min</td>
<td></td>
</tr>
</tbody>
</table>

![Comparison showing the Distances between the Centralities](image)

**Source:** author, 2012

**Fig 134-** Metropolitan Public Transport Network and Hi-Speed Railway

**Fig 135-** Distances between the Centralities
- The Hi-Speed network is a mass transportation system which is designed for fast speed and with few stops, at the major economic nodes of the region. It is a combination of an integrated underground, on-ground and elevated construction, well connected to the mass feeder systems like metro, sky buses, monorails which link the neighborhoods of the region to the Hi-Speed stations.

- The dedicated line will have both national bullet trains and regional intercity trains running through, with different speeds and specifications (see figure 137 & 138).

- The Station environments are optimized for high density specialized business and residential development. At the same time, create organized urban conditions to foster the movement networks, of buses, cars, two-wheelers and pedestrians connected to their own destinations.

- Combination of National Bullet Train Network and Mumbai Regional Rail Network

- Enabled spatial conditions which favor switching between scales of movement

- Provide economic opportunities for new urban programs and public spaces distributed equally to Navi Mumbai

Fig 136- Construction of the Hi-Speed Ring System
Source: author, 2012

Fig 137- Intermediate Regional Rail Network and Specifications
[Next Page below]
Source: author, 2012

MUMBAI INTERMEDIATE REGIONAL RAIL
Type: Light Train
Frequency: 15 minutes
Distance Covered: Min 7 Km to Max 160 Km
Speed: 100 Km/h - 150 Km/h
Travel time: Min 6 minutes to Max 70 minutes

TO SURAT/ AHMEDABAD

TO NASHIK

PUNE-MUMBAI-AHMEDABAD
Type: Bullet Train
Frequency: 40 minutes
Distance Covered: 643 Km
Speed: 270 Km/h - 300 Km/h
Travel time: 2.5-3 hours

TO SURAT/AHMEDABAD

TO NASHIK

TO PUNE

Fig 136- Bullet Train network and Specifications
(Next Page above)
Source: author, 2012

Fig 137- Intermediate Regional Rail Network and Specifications
(Next Page below)
Source: author, 2012

Sea Link Connections, Reference Practices for across-bay bridges

Cheesepeake Bay Bridge Tunnel

Golden Gate Bridge

Pearl Bridge

Oresund Bridge
- Create synergy between programs, with more options for living and work.
- Integrate Station development with the economic development of the node.
- Make Stakeholdership so as to bring together the planning authorities, public and the private investors.
- Generate new local urban strategies connected to the fast transportation network to guide future development of the city.

Source: Author, 2012
Disconnected-Region
Mono-Centric
Development Imbalance
Fragile Infrastructure
Congested Urban Flows
Poor East-West Connection
Uncontrolled Growth

Connected-Region
Poly-Centric
Using Hinterland Potentials
Hi-Speed Infrastructure
Distributed Networks
Mumbai Metro Phase 1
Planned Densification of Major Nodes

Legend
- Urban areas
- Industrial areas
- Settlements
- Marshlands
- Hill lands
- National Park
- Hinterlands
- Old Port Areas
- Derelict Factory Mill Areas
- Major Centralities
- Suburban Stations
- Intercity Stations
- Secondary Roads
- Primary/Arterial Roads
- Mumbai Suburban and National Railways
- New Centrality
- Infantilisation of Centralities
- Proposed Hi-Speed Stations
- Proposed Hi-Speed Intercity Stations
- Secondary Roads
- Primary/Arterial Roads
- Mumbai Suburban and National Railways
- Proposed Hi-Speed Regional Rail Network
- Proposed Mono-centrality

Fig 140 - Existing Structure of Twin Cities
Source: author, 2012

Fig 141 - Restructured Centralities with the Proposed Regional Light Rail Network and East-West Mumbai Metro Network
Source: author, 2012
Intensification of centralities

Hi-Speed Regional Ring Rail

Hi-Speed Bullet Trains

Major Centralities

Hi-Speed Regional Ring Rail

U Loop between twin cities

Development Axis

Mumbai Metro Rail

Design Tests

BKC - Bandra Kurla Complex CBD

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximity to existing airport</td>
<td>Proximity to airport. Possibility of having conference rooms and convention halls which cater to the international clientele.</td>
<td>Proximity to airport. Possibility of having conference rooms and convention halls which cater to the international clientele.</td>
<td>Access to sub offices in SEEPZ, Andheri and rest of Mumbai is good.</td>
</tr>
<tr>
<td>Well established intermodal connections to city suburbs and manpower supply nodes</td>
<td>Faces the back of the airport as opposed to the front. This leads to an additional travel time of 20 to 25 min. under low traffic conditions.</td>
<td>Faces the back of the airport as opposed to the front. This leads to an additional travel time of 20 to 25 min. under low traffic conditions.</td>
<td>Connections to Pune and Gujarat, if intensified, could mean a more efficient system of nodes functioning along the Mumbai- Pune corridor (of which BKC is the culminating node).</td>
</tr>
<tr>
<td>Well established business district with diversification of functions. Proximity to I T E S and heavy industries suggests a reasonably good connection network to Pune</td>
<td>Public transport system from central and western suburbs is highly stressed and worsens during monsoon season.</td>
<td>Public transport system from central and western suburbs is highly stressed and worsens during monsoon season.</td>
<td>Limited space available for development.</td>
</tr>
<tr>
<td>Future expansion is possible, but limited. However, change of roles with in the BKC itself is possible.</td>
<td>Development of U corridor to connect to existing airport.</td>
<td>Development of U corridor to connect to existing airport.</td>
<td>New projects have to be carried out in a highly congested, traffic sensitive part of the city.</td>
</tr>
<tr>
<td>Present split of industries includes I T E S, engineering, oil and gas, finance, diamond bourse and others. These sectors interact successfully with other nodes and are well connected to the regional network.</td>
<td>Sectors are connected well to the network but frequency of connections is poor.</td>
<td>Sectors are connected well to the network but frequency of connections is poor.</td>
<td>Relationship between I T E S and industry at BKC could be the new hub for I T E S and also for the engineering intensive industry from Gujarat. Better connections to Pune and Surat can ensure this. Also connectivity from subnodes to BKC, if improved, could benefit the subnodes connected to BKC.</td>
</tr>
</tbody>
</table>

BKC should focus on heavy industries from Gujarat. BKC could be the new hub for I T E S and also for the engineering intensive industry from Gujarat. Better connections to Pune and Surat can ensure this. Also connectivity from subnodes to BKC, if improved, could benefit the subnodes connected to BKC.

Proposed New Center

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>High proximity to new airport</td>
<td>High proximity to historical CBD</td>
<td>Proposed node can function as a decongestion measure for historical CBD.</td>
<td>Failure of new functions to move from historic city centre to New centre.</td>
</tr>
<tr>
<td>High proximity to CBD</td>
<td>High proximity to CBD</td>
<td>New node can have a property of “looking inward” toward the inland and functioning as an international CBD. BKC node can function as a new node for Mumbai subnodes and the connections to the north.</td>
<td>Connecting infrastructure to Nariman point/Island city and Pune being delayed could have negative impacts on development plans for the area.</td>
</tr>
<tr>
<td>Intensified CBD and SEZs can be proposed with fewer restrictions on physical growth and good connectivity by High speed network.</td>
<td>SEZ’s need to have attractive features for industries to be demobilized/shifted from the historical CBD</td>
<td>SEZ’s need to have attractive features for industries to be demobilized/shifted from the historical CBD</td>
<td>New projects have to be carried out in a highly congested, traffic sensitive part of the city.</td>
</tr>
<tr>
<td>Functions related with the highly congested historical CBD</td>
<td>Port area and Agricultural area demarkations next to the developable area</td>
<td>Port area and Agricultural area demarkations next to the developable area</td>
<td>New projects have to be carried out in a highly congested, traffic sensitive part of the city.</td>
</tr>
<tr>
<td>High proximity to CBD</td>
<td>Heavy investment required for infrastructure.</td>
<td>Heavy investment required for infrastructure.</td>
<td>New projects have to be carried out in a highly congested, traffic sensitive part of the city.</td>
</tr>
</tbody>
</table>

As an infrastructure proposal for Vision 2050 aimed at reorganizing the metropolitan structure of Mumbai, phasing for immediate potentials become necessary. The Ring system integrates Infrastructure and urban development.
- Construction of Sea-Link from Historic CBD to South Navi Mumbai
- Development of U corridor (Linking Mumbai and Navi Mumbai)
- Dedicated Hi-Speed Lines
- Reinforced East-West Connections with Metro lines
- Station Areas and Economic Centers Densification
- Strategic Large Urban Projects based on existing urban conditions and future growth

This project tests the proposal on two main centralities: BKC and URAN. A swot study was made to assess the development opportunities. The impact of Hi-Speed proposal at the scale of the twin cities was used to test the centers and their connectivity.

Fig 143 - SWOT table comparing BKC and URAN
Source: Author, 2012
Chapter 5.0
Proposal: Design
Test and Evaluation

With an understanding of the vision and spatial strategies, this chapter applies the strategy in principal to test the impact of ring system and hi-speed transportation system on two major nodes. The planned CBD of Bandra-Kurla Complex (BKC) and the potential CBD of Uran are tested to showcase the relevant effects of this proposal on the existing and proposed urban structure of Mumbai. Evaluations are presented after to review the process of this project work for further discussions.
Fig 144 - Urban Landscape of Navi Mumbai (Above) and South Mumbai (Below)
Source: Google, 2012
5.1 Strategic Development Plan: BKC

5.1.1 Design Principles and Drawings

Organizing Principles: Sensitive to the Existing Urban Fabric
Regional Strategy: Specialized Business Clusters directly connected to Regional Rail
Local Strategy: Organized Movement with Program infill along transport corridors
Character: Multifunctional Business and Commercial District
Relations: IT/ITES and Airport Offices; Corporate; Retail; Leisure; Luxury Housing
Quality: Public Green; Local Parks; Station Squares; Waterfront Connections
Typology: High Risers; High Density; Green Edge; New Public Realm
Transformation Sites: Vacant plots; Old Industries

The planned CBD of Bandra-Kurla Complex, 20 Kms from the South Historic Center is at the vital crossroads of regional transportation between Pune-Ahmedabad line and Fort-Nashik lines. As a transportation hub at the regional intersection, BKC is tested for the impact of infrastructure proposal and the metropolitan ring system. As a regional central city, the proposed scheme opens up new opportunities with increased FSI between 4-6 to:

1. Improve accessibility to the business district from the Station area
2. Create functional hierarchy between the networks of the region, city and local centers
3. Integrate existing street environment into transportation planning
4. Provide direct east-west links to the arterial expressways
5. Investigate potentials for urban infill, to introduce specialized retail, business clusters
6. Reinstate intersections and crossings in the network with public programs
7. Increase Airport-Related Intensification, with good access to new regional light rail

Fig 145- Diagramming the Development of Networks
Source: author, 2012

Fig 146- Organizing Infrastructure Principles to improve urban structure
(Next Page)
Source: author, 2012

New Hi-Speed Public Transportation Line and Station Intensification

Changing Business Landscape by improving connectivity and accessibility to Roadways and Railways

Restructuring Regional, City, Local and Pedestrian Networks

Hi-Speed Regional Rail
Regional Roads
City Roads
Sub Centralities
Landscape and Public Green
Landscape and Mithi River

Hi-Speed Regional Rail
Regional Roads
City Roads
Sub Centralities
Landscape and Public Green
Landscape and Mithi River

Euralille, France
Station and Office Spaces
Amsterdam Sloterdijk, Netherlands
Pedestrian Friendly Environments

Stage, Copenhagen
New Hi-Speed Public Transportation Line and Station Intensification
The existing scheme locates BKC as fully disconnected from the suburban rail corridor. It takes greater than 30 minutes to reach the CBD from Bandra or Kurla Stations on the Western and Central Line. Advantage of water and green (which is heavily polluted by the nearby local industries) is not explored for urban environments.

With the proposed regional connectivity and improved accessibility from the station, help realize potentials for new programs-high residential, business and mixed-use. Movement networks are coordinated with urban projects of the right scale and indicate separation of vehicular speeds. Existing urban structure is redefined by new Urban grids, resulting from the Hi-Speed and Metro Lines and are used for creating flexible spaces for mixed-business landscape.

Fig 147- Existing Structure in the context of International Airport and Historic Center
Source: author, 2012

Fig 148- Proposed Structure with improved connections and networks
Source: author, 2012
Fig 149 - Existing Structure of BKC and Images of the Business District
Source: author, 2012
Photos: Google, 2012

Fig 150 - Proposed Structure of CBD and references to urban environments
Source: author, 2012
Photos: Google, 2012
Fig 151 - Part Typology of the Business and Commercial District at BKC
Source: author, 2012

Fig 152 - Multifunctional Mixed Development
Source: author, 2012
The intervention scheme at the BKC centrality recognizes a modern mixed business development, close in relations to the IT/ITES/Airport Services. The specialized businesses are arranged along the route of Hi-speed transportation. The urban environments are developed to convert chaotic flows to organize people flows within and around the CBD. Commercial and retail establishments are proposed by redeveloping the existing urban areas to create a balanced social-mix, along the new development corridors. Also mixing of programs within the tower typology allows street spaces to be an integral part of planning process.
Fig 155- Front and Side Elevation of Part Typology
Source: author, 2012

Fig 156- Sectional Perspective of Zoom 1-1 and Zoom 2-2
Source: author, 2012
Fig 157 - An Impression of the Bandra-Kurla Complex CBD
Source: author, 2012
5.2 Strategic Development Plan: Uran

5.2.1 Design Principles and Drawings

The Uran CBD, highly strategic in terms of its location between the Historic city center and Pune Corridor has the advantage of also being located close to the seaport and the proposed international Navi Mumbai airport. The landform and the landscape conditions are different than the BKC CBD. The direct connection to Nariman Point, makes this CBD most preferable for the businesses already located there. With predominant green field sites, a transit-oriented development is proposed here. Open fields, Urban plots, Reclaimed lands are transformed for urbanization. The Ring system provides access to southern parts of Navi Mumbai, which were disconnected earlier. Suburban lines and bus services are extended along the new development until Panvel Corridor. InterCity and Intermodal connections are organized around the station environments, which also allow compact densification strategies. Uran centrality generates,

1. A compact mixed-use development with offices and specialized business catering to Port, Logistics and Service Industries
2. Balance between the natural landform and urban form
3. Flexible concentrated growth around the Station areas, with FSI between 4-6
4. Equal Social and Economic Opportunities with mass housing options; which includes housing for high, middle and low income groups.
5. Connect the disconnected Island Mumbai to the metropolis, using infrastructure as a tool.

Forming Flexible Urban Grids, a web for regional, metropolitan, city and local centralities

Creating Transitional Spaces between the Wetlands and Urban Development

New Transit-Oriented Development (TOD) at Uran, Reinforcing Station Development and Densification
5.2.2 Visualizations

Organizing Principles: Sensitive to Wetlands, Land Form and Rural Settlements

Regional Strategy: Metropolitan Centrality between Mumbai Historic Center and Pune
Local Strategy: Flexible Urban Grids and Transit Oriented Development

Character: Compact Mixed-Use Development with Sub-Centralities

- A Quality: Stilted on Wetlands; Eco-park; Preserved Landscape
- Typology: High Density Station Development; Medium-Low Density Developments towards Marshlands; Inner Courtyard Blocks; Traditional Villages
- Transformation Sites: Green Field Sites; Reclaimed lands
- Landscape: Figure-Ground green; Agricultural Fields; Marshlands; Nature Parks; Beach-Tourism

Housing Typologies

- 150x150x10 Floors
- Apartment Blocks
- Inner Courts
- Public, Semi-Public Areas

Fig 162- Master Development Plan with Proposed Urban Blocks
Source: author, 2012

Fig 163- Conceptual understanding of 500x500 M and 150x150 M Urban Grids and Flows
Source: author, 2012
Low Density Housing
Medium Density Housing
Pedestrian Spaces
Hi-Speed Regional Rail
Medium-Rise Medium-Density Apartments
Independent Bungalows and Single-Family Residences
Mixed-Use High Density Blocks

Urban Farming

SEZ Industries
Station Development
Local Centralities Medium Density Housing

Sea Link Bridge

Urban Agriculture

High-Rise
High-Density Housing Blocks

Rural Clusters
Rural Clusters

Uran Hills
Fishing Villages
Rice Fields

Urban Fishing
Urban Agriculture

Fig 164- Sectional Perspectives through Compact Mixed-Use Developments (Drawings)
Source: author, 2012

Fig 165- Existing Housing Typologies, integrated into new structures (Photos)
Source: CRIT, 2010
Fig 166 - A Bird's Eye View of Proposed Centrality at Uran, showing Compact City Development and the Sea link Connection to Mumbai Historic Center. Source: author, 2012
Fig 167 - A Bird's Eye View - Restructuring Mumbai Centralities
Source: Author, 2012
Chapter 6.0
Conclusions

This chapter will present the conclusions of the whole project, by summarizing the existing and future urban structure of Mumbai. The main issues from analytical and research findings will be highlighted. It draws attention to rethink the regional vision of the city, by critically reflecting on the project results. Also, the process reflects on the importance of strategic spatial planning and provides recommendations for future discussions.
**Urban Development**

- Topographic Structure
- Inadequate Infrastructure-Disconnect
- Inner city pressure
- City development
- Rapid Urbanization
- City center at the southernmost tip
- Reoriented along the ring
- New Hinterland Opportunities
- Surat-Pune Regional corridor
- Shifted development focus-Intensity ring
- Well connected intermediate transport

**Centralities**

- Mainlands connected to Hinterlands
- Faster and Improved Connections
- Opportunities along regional corridor
- BKC at the Regional Crossroads
- Main CBD restructured along a ring axis
- Hi-Speed Regional Rail
- Connectivity and Infrastructure
- Nariman Point
- BKC
- Relations to the Region
- Distance-Time Travel
- Island City

**Proposal**

- Restrained growth of the city
- Under developed Navi Mumbai-Hinterlands
- Uneven geographical development
- Decentralization-Relocation of Functions
- Along Rail corridors; Work-Living Bubbles
- Insufficient space on Island; Fragile system
- Massive overcrowding along N-S axis
- No single transportation system
- Major source of work and employment
- Important across the Different-scales
- Proximity to Airport; Strong link to Pune axis
- Commerce, Industrial and IT/ITES corridors
- Inefficient; Overburdened; Slow and Long
- Spatially and Physically distinct from others

**Fig 170- Illustration concluding the effects of Infrastructure proposal on the realities of Mumbai**

*Source: author, 2012*
6.1 Conclusion

1. The diagram on the previous page illustrates the two main aspects related to this project, the issue of urban development and the notion of centralities. The development of Mumbai can be clearly understood by tracing its origin as a port city, wherein the evolution of space was in the form of land rejections, along the rail corridors. With strong colonial heritage and influence, the island city has remained physically and spatially separate from its mainland and metropolitan hinterlands.

2. Major economic growth of the city happened during industrialization, with the booming cotton textile mills, which was accompanied by massive urban-rural migration. It status as the financial gateway to India was a result of economic liberalization, with the entry of Banking, IT and ITES Sectors. The historic CBD at Nariman point still continues to be the main economic powerhouse and employment generator despite decentralization. Nariman point CBD continues to be the dominant CBD not just due to its heritage and administrative functions but also due to the fact that it is the centre of political and economic activities. The development of the city along a polycentric model of development has been proposed by the government authorities and exists at a visible form today but the dominance of the historical CBD has hindered its speedy maturity.

3. Rapid suburbanization in the Northern parts of Greater Mumbai Region led to unavoidable long distance commuter trips to the inner city areas, which located two third’s of the city’s major jobs. From the historical transformations since the 1990’s, it is observed that the manufacturing industry has been largely replaced by the service industry in Mumbai. While this has made more employment opportunities available in the greater Mumbai region, Navi Mumbai and the suburbs, the suburbs and Navi Mumbai have seen increased immigration in the recent years as opposed to the city itself. Higher quality of life and more spacious housing are the motivations on part of the emerging richer middle classes who live in these areas and commute to work in the island city. The historical city centre is predominantly a place of work and tourism than a place of residence.

4. Increasing congestion caused by large-scale domestic industries and wholesale functions was tackled by relocating some of them to hinterlands, which led to the decline of port and commercial functions in the island city. Together came the large planned city of Navi Mumbai (New Mumbai), to absorb the growth pressure of island city and at the same time relieve it’s tremendous pressure. Exodus of industries from Mumbai occurred in the late 80s and 90s due to decentralization policies and with a view to decreasing the congestion in the island city. This has resulted in the relocation of these industrial premises in the suburbs and Navi Mumbai.

5. All through, railway transportation has remained vital to city’s growth and development. The lifetime of Mumbai, suburban railways carried 7 million people on a daily basis with more than 3 times its capacity. Also, not all parts of Navi Mumbai and Mumbai were connected or accessible to railway lines. A small damage/ delay in infrastructure can cause major disruption to the lives of commuters, where connectivity becomes a serious challenge.

Having concluded the spatial development of Mumbai, it can be summarized that,

1. Owing to the geographical differences between the man-made and natural landscapes of the city, the growth of the city has been linear and topographically constrained. It was not planned for its current unprecedented growth due to rapid urbanization.

2. The realities of Mumbai reveal that infrastructure is inevitable to city’s growth. Transportation has been the backbone to this linear city. The current suburban railway system is highly fragile due to severe congestion and unidirectional N-S movement, therefore it is not viable on the longer run.

3. The nature of trade connections between Mumbai and Gujarat still exist owing to the strong cultural and economic connections between them. The Mumbai Pune corridor has developed as an important axis of development, due to the boom in the ITES sector and the regional plans of the government oriented towards the hinterlands. The city has a better relation today with the hinterlands today owning to increased economic and financial relationships. Efforts are now underway to “strongly link” the city to its region. The city works at different scales. The different scales were used as an instrument to understand the challenges at different levels.

4. While suburbanization has been a characteristic of expanding Mumbai, there is a need for regionalisation of economic growth with a large moving part of the workforce between the suburbs and the CBDs in the island city. The South CBD remains as the dominant economic node and the major employment provider. The commute distances are long and there is no one single system of connectivity between the centralities.

5. Although the regional vision of government envisaged a polycentric structure, it has not been possible due to the lack of physical infrastructure and continue to remain as a linear-monocentric structure. Development of southern parts for Navi Mumbai with proximity to seaport and proposed international airport remain unexplored. It has resulted in unequal distribution of economic opportunities and development imbalance shared between the two cities.

6. The implementation of regional plans in the Mumbai Metropolitan Region has been difficult due to political and financial forces. Both Navi Mumbai and the Bandra-Kurla Complex were designed and planned in a coordinated manner but it was the lack of connecting infrastructure to the island city which contributed to the initial failure and delayed development of these projects.

7. The city is in need of a new regional structure, which helps restructure the growth of centralities towards using the potentials of metropolitan hinterlands. Dealing with Mumbai, deals with the different-scales, mainly the commercial corridor towards north and knowledge corridor towards south. Mumbai needs a comprehensive vision for balanced regional development, connecting the disconnected parts of the different-scales, focusing on Mumbai-Pune development corridor. Consequently, the southern parts of Navi Mumbai become important locations for urban development, as they fall along this path.
6.2 Evaluation and Reflections

In order to evaluate this work, it is important to reflect on the main research question, "How to restructure Mumbai's main centralities to facilitate urban development by using its hinterland potentials within a framework of different scales?"

Firstly, the learnings from Mumbai clearly suggest that the city is more than just the island, in terms of its urban form and spatial relationships. However, often the dominance of island city over other parts of the metropolitan region continues to diffuse the realities. As such, the intensity of problems due to infrastructure, inner city pressure, topographical constraints and more become subservient to the development activities in the Peninsula. Strategic Infrastructure proposals, recognizing the potentials of economic centralities, southern parts of Navi Mumbai, airports, seaports, proximity to regional centers can help develop Mumbai in the context of increasing urbanization. Infrastructure, as a tool can shift the nature of Mumbai's development towards achieving regionalisation and social equity.

In this project, a strategic development plan for infrastructure is realized by the further extension of Nariman Point-South CBD to the parts of Southern Navi Mumbai through a Ring system, which also connects the main centralities of the Metropolitan Region. A linear-monocentric structure is expected to shift to a ring-polycentric structure, focusing on balancing the growth of specialized regional activities. Parts of Navi Mumbai and Mumbai Metropolitan Region earlier underdeveloped and disconnected from Greater Mumbai region, are now expected to develop with effective interconnections between major centers using the Hi-Speed Public transportation. Distance and Time are highly valued aspects in every Mumbaikar's commute, therefore bringing the economic centers closer in relation to each other using modernized forms of transportation can be beneficial in reducing long distance commute. It also provides alternative urban conditions for work and living environments, which get redefined by means of this strategic proposal.

A comparison is made between Mumbai, Jakarta and Seoul (see figure 173) to evaluate the uniqueness of Mumbai’s topography. Inside a 25 Km radius circle from Mumbai’s city center, water bodies occupy 66% of the total area, as compared to 22% for Jakarta and 5% for Seoul. Accordingly the built up area for Mumbai is only 212 Km2, as compared against 360 Km2 for Seoul and 1438 km2 for Jakarta (Bertaud, 2011). The land for development is reduced in the peninsula by about 50% as available to Jakarta. The proposal tries to evaluate this peculiar nature of Mumbai's topography, by introducing transit-oriented expansion to southern areas of Navi Mumbai, thereby developing its infrastructure and accessibility to the hinterlands through a new sea-link connection.

The spatial structure thus obtained with the intervention of Hi-Speed ring system would contain compact specialized centralities, interconnected by a generic system of transportation. However, this generic tool is the backbone behind directing the city’s future development. At the same time, the economic performances of the centers will remain specialized, in terms of their differences towards each other. In this sense, the strategic tests conducted for Bandra-Kurla Complex makes is closer in relation to Airport and Pune corridor while that of Uran makes it closer to Nariman Point CBD and JNPT Seaport.
6.2 Evaluation and Reflections

Connecting the centralities by linking the different scales of Mumbai, allows the centers and the corridors to evolve into greater productive relations for new urban potentials. This means, redevelopment sites including port lands and industrial areas of the old city and prime development sites of southern Navi Mumbai become favourable for growth.

An understanding of Mumbai with reference to the different-scales attempts to reorganize its relationship with respect to the metropolitan region. The development corridors obtained by shifting growth towards Pune in the southern axis and towards Surat in the northern axis help relieve the island city from its development pressure. It also allows the metropolis to parallay develop in an integral way. It makes use of the enormous available land resources to meet the demands of urban growth. The regional connectivity of Mumbai is further strengthened, wherein connections switch efficiently at the confluence of regional, metropolitan and city scales. By opening dedicated services for Hi-Speed Bullet trains (which runs at 300 Km/h) at the national scale and Hi-Speed Regional Rails (which runs at 100-150 Km/h as loops within the ring) connecting the major centralities in regional scale, distances shrink and densification for compact urban developments can be made possible.

The Strategic design tests in the planned CBD of BKC and potential CBD of Urn illustrate the effect of ring system towards restructuring the road networks, improving accessibility, reinforcing sub−centers, defining functional hierarchy, organizing pedestrian environments and providing conditions for equal social and economic opportunities to either sides of the peninsula, on the mainland. Reshaping the existing urban structure to differentiate vehicular speeds, pedestrian traffic, densifying station environments, integrating transportation planning and improving accessibility to Rail corridors bears positive impact on the performance of the centers. The organizing principles however, are generic but still inevitable in achieving the metropolitan integration of Mumbai centralities.

The proposal is a critical alternative to the government regional plan, which suggests alternative approach for balancing regional development while meeting the growth demands of Mumbai. Identifying the importance of integrating the economic centralities in the metropolis by a single fast transportation system, enables alternate perspectives in merging the different-scales, reducing travel-time, efficiency, decentralization and distribution of specialized services and activates underdeveloped parts of Navi Mumbai. Therefore, the proposal can be seen as an alternative solution to shift,
- Focus of planning to the development corridors,
- From mono-centric to poly-centric,
- From social inequity to social equity, travel for all groups.
- From disconnected to connected, ease of access
- From distant-time to reduced-time and importantly,
- From scale of the center-driven planning to scale of the region-driven planning

6.3 Reflection on the Studio

The project pays special attention to the position of Mumbai, as a key player in the global financial network. While influences of globalization led to economic liberalization in India, it also led to the growth of service sectors in Mumbai. Increasing regionalisation and suburbanization have been the spatial consequences of this impact.

During the last one year, different processes were undertaken to study the specific case of Mumbai. It involved an enormous amount of data collection and data sorting, as no up to date or accessible information was found on the city related to different-scales or economic cores. Using the relevant data-sets, analytical mapping and research illustrations were made.

Further, dealing with the spatial evolution of Mumbai since the last 350 years, owing to historical transformations were researched and interpreted. It helped in the fine-tuning of the project, as the challenges of the present are results of the unplanned past during the colonial ages, which did not expect the city to grow into manifolds.

Theoretical research was made during the early stages of the project towards supporting the arguments for main interests and fascinations.

In addition to acquiring data-sets and exploring the city transformations, the project methodology was structured into different sections. Section 1 was defining the main elements of thesis plan, which mainly formulated the problem framework, objectives and the research question. Section 2 focussed on understanding Mumbai through different-scales of the region, metropolis, city and center, which served as filters to study the scales. Section 3 dealt with researching Mumbai through the lens of economic and infrastructure relations with respect to the above scales. Section 4 addressed the making of vision and final proposal which integrates parts of the analytical and theoretical studies, Section 5 was the making of spatial strategies to tackle the problems identified, Section 6 was building on the strategies to carry out design tests and Section 7, was critically evaluating and concluding the research findings of the project.

As a part of Complex Cities graduation studio, I was able to relate and learn the cross-disciplinary nature of Urban projects, including urban economics, corporate geography, public transportation and urban transformation which were extremely helpful in channelizing and framing logical argumentation for Mumbai. Having constantly explored the subject of this thesis from the initial days, there were difficulties for me in defining the scope of work. As a result of which, expansive research studies had been conducted. In my opinion, better approach to the studio aspirations and organization of work, in terms of deliverables and expectations have to be well-clarified during the developing stages of project work, which could help set goals straight. As a final remark, I am glad to have been a part of this studio, it has adequately helped me gain profound insights towards handling large-scales.
6.4 Recommendations

The project started off with an early motivation to understand the economic nature of central business districts in Mumbai. In my own words, ‘Where you begin, is not necessarily where you land’. The project has undergone a series of normative and empirical studies and travelled leaps and bounds from its initial take off point. In summary, the idea of reading between the lines of urban and economics was put into effect. The results and findings clearly show impact upon and strongly connected to two aspects- Spatial Structure and Transportation. The arguments behind the findings have been showcased in the early chapters, however certain limitations due to lack of time have led to work prioritization. Mentioned below are key aspects to be considered as suggestions or directions for future discussions, presented in the form of recommendations.

The centralities and the development corridors, connected the Hi-Speed Ring System, should be researched further for the following,

- Relationship between the Site and Situation (see figure 174) has to be carefully understood, as the economic centers have high land prices and public transportation is expected to introduce positive gentrification to these locations.

- Since infrastructure involves massive irreversible investments, Stakeholdership is necessary. Recommended measures have to be taken to involve right participation, both from public and private sectors to integrate transport with urban planning. Urban governance in Mumbai is complicated and often, manipulated by market-oriented developments. Therefore, it is necessary to make arrangements between public and different private stakeholders, towards achieving benefits in realizing the potentials of Hi-Speed ring. A detailed research into stakeholders and their respective roles is important for this aspect of the study.

- Station environment and Station area densification has also been considered vital to the project. Therefore, quality of urban spaces and program requirements have to be assessed in prior to planning. Pedestrian friendly environments and Compact High-Medium density developments are encouraged around the Station areas. Regulating roads for vehicular speeds and creating mixing strategies for new programs (see figure 175) are required to be aligned.

- As a Strategic development plan for the metropolitan scale, the project defines infrastructure as the backbone of new development. Therefore, detailed investigations have to be made to study the aspects of Transit-Oriented Development (TOD) in South Navi Mumbai. Furthermore, Hi-Speed rails have been proposed as a dynamic tool to deal with Mumbai’s complexities and contradictions. Although it presents an overall scheme which communicates the stops, the speed etc. a deeper research has to be made into the aspects of this connectivity for primary and secondary loop systems. Also, mass transportation feeder systems which handle the intermodal connectivity have to be thoroughly analyzed.

- Mumbai’s integration with its hinterlands has more dimensions than infrastructure and economic performances of the centralities, therefore aspects related to social, physical and environmental concerns (see figure 176) have to be well-coordinated beforehand to realize effective solutions.
The following references from the Existing body of Knowledge were used and referred to in the making of the graduation material.