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Compact Cities as Sustainable Development Model

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ABSTRACT: Cities across the globe are experiencing the common phenomena of population concentration due to fast pace of urbanization. Cities are considered hub of resources where economic development takes place by using capital, workforce, and ever changing technologies and knowledge. Absorption of capital and labour induces growth which leads to better education, health and overall quality of life. This ever increasing population in cities and spatial areas of cities has resulted in mega cities and most common phenomena of emergence of primate cities across the globe, which is many a time responsible for inequitable distribution of resources, manpower and overall development of regions. The present rate of growth of cities are posing many challenges in urban ares; such as growth on city periphery termed as sprawl, unplanned growth and uncompatable landuses, city governance and management problems which is affecting human life. Many a time's traditional urban planning and development policies and techniques which are energy intensive growth model are attributed to unsustainable development and there is an urgent need to think about new concepts of urban development or city design which could be a shift from traditional urban planning paradigms. To overcome the problems of current growth trend, without jeopardizing opportunities for future generations, compact development planning policies for sustainable development is need of hour. Compact development policies focus on consolidation of different land use with idea of mix land use in close proximity targeting conservation of resources with ultimate goal of sustainable development. In this research paper author wants to develop theorictcal understanding of compact development policies as major attribute of sustainable cities.

Keywords: Compact City, Sustainable Development, Mix Land use, Urban Sprawl, High Density, Urbanization.

I. INTRODUCTION

"The 21st century is the century of the cities and of urbanization" [1]. Urbanisation of enormous scale happening wold over is also experienced in indian cities and concerned raised by researchers due to its multifasted results such as major shift from agriculture to urban area based industry and services. The Process of urbanization is set to continue well into the 21st century. Economic reform has given considerable impetus to the process of urbanization and cities are under constant pressure of population concentration. The change from 13% urban population world over at the beginning of twentieth century saw a major chage to 50.5% in 2010 and this chage is more rapid in developing countries. India's current 1.2 billion population is expeted to reach to a level of 300 million within next couple of decades [2, 3]. Many studies are suggesting that by 2030 India will be having approximately 68 cities having population of one million, and it is also expedted that Indian will add six new megacities of population of more than ten million each.The present rate of growth of cities are posing many challenges in urban areas; such as growth on city periphery termed as sprawl, unplanned growth and uncompatable landuses, city governance and management problems which is affecting human life. Many a time's traditional urban planning and development policies and techniques which are energy intensive growth model are attributed to unsustainable development and there is an urgent need to think about new concepts of urban development or city design which could be a shift from traditional urban planning paradigms.

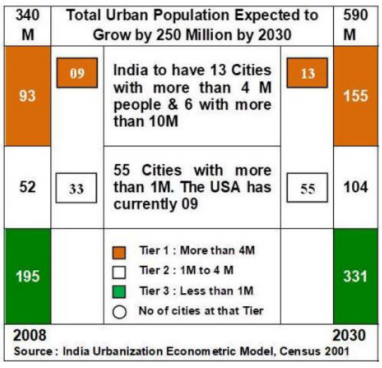
Global Concerns: If these development trends persist at the same pace then…,

— 21st century population growth needs 1.5 time's world
— Present consumption rate requires 2.0 time's world
— Ending poverty at present throughput 2.0 time's world

How do we make these transitions? We have only one world……[21].

Many researchers have raised question over current urban development happening in cities. Haphazard city growth have led to insufficient and underutilized serviced land, which can accommodate more functions and activites or residential stock to minimise housing shortgate. These unplanned of mono functional and low density areas completely lack character, identity and vibrant urban real. It is suggested that through urban renewal process, these areas of low dencity in close proximity to urban centres can be redeveloped to its full potential according to theisr context. Responding to above raised issues, a well coordinated transportation and landuse planning, alongwith natural and built environment can result in better solution and this itself argue for compct development policies for sustainable development

Table 1: Indian Cities and Future Challenges.



II. METHODOLOGY

The approach of this paper is through extensive review of existing literature and previous works done in the domain of compact city model. Authors have tried to develop conceptual understanding of compact city model as one of solution towards sustainable development with case study of different city across world

III. DYNAMIC URBAN LANDSCAPE

Due to rapid growth in urban population and human activities landscape of cities are changing significantly. A common phenomena of urban sprawl which consumes large land parcel, also contributes to other problems such as inefficient land use, mono functional low density fragmented development resulting more car dependency or personal vehicle for transport, diluting the urban area advantages. Cities in present day context need urban structure and space tackling present day challenges or common problem of urbanization so that urban life thrives. Studies across the globe suggests we need a approach which optimise the utilization of resource, land and nature, achiving high density develoed areas at the same time conserving the environmentally sensitive zones aiming at reducing ecological footprint of future development. This apparoach can be termed as compact, integrated, connected [4] or sustainable compact model which establishes a positive relation between urban dwellers and urban space.

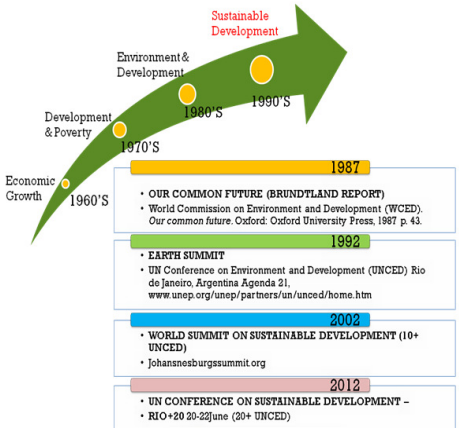


Fig. 1. Sustainability Ideologies from the 1960's to 1990.

IV. SUSTAINABLE CITY

A city following principals of reduced levels of consumption of natural resources, minimizing waste and pollution as reduced level of out puts, at the same time meeting needs of people i.e. good quality of life is known as sustainable city. The term sustainable development was, firt defined by Brundtland Commision (1987), according to this commision's report it deifnes the sustainable development as:

"Meeting the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable cities are critical to sustainable development, given their position as engines of economic growth, centers of population growth and resource consumption, and crucibles of culture and innovation [2, 4].

A sustainable community is one in which improvement in the nature of human life is accomplished in agreement with improving and keeping up the soundness of environmental frameworks; and where a solid economy's mechanical base backings the nature of both human and biological frameworks. Land is an important input for producing goods and services for urban development and it needs careful and equitable distribution of land among the competing land uses. The issue of equity in delivery of services is one important requirement of sustainable city development

V. THE UNSUSTAINABLE CITY

Urban development pattern in cities are focus of global concern in the search of sustainable world. Most of the world cities are vortices of unsustainability, ever-increasing and unpredictable environmental threats and economic and social distress. Many a time's traditional urban planning and development policies and techniques which are energy intensive growth model are attributed to unsustainable development. Some of the most common features and practices which are matter of concern which should be given attention can be summarized as;

– Urban planning usually stop at periphery, ignoring them to integrate with planning process. These city borders contribute to informality and related consequences.

– Urban production and consumption extracts resources from around the planet and deposits massive volume of waste, creating a bloated "urban footprints [5].

– Ever increasing personal vehicles dominate urban transportation systems producing gridlock, unjustified use of valuable land, greenhouse gases, and other environmental pollution.

– Cities act ac magnets of hope and attract rural population who in most developing countries live in hazard prone area such as urban slum, shanty towns, colonies and favelas.

– Their economy reflects the growing global inequality of wealth and income distribution. Concentration of Industrial units and their pollution in and around urban environment a common phenomena in developing countries.

VI. EMERGENCE OF COMPACT CITY IDEA

After world war during 1950's to 1980's many European cities started growing following urban sprawl characteristic at the cost of integrated city benefits. War time destruction and afterwards rapid growth in industries generated housing demand and other spaces with city structure. This need based development followed unreasonable land use, over use of resources, inefficient land distribution resulted many unforeseen ill effects of water and air pollution, traffic congestion and related environmental degradation. Utilization of urban space by current urban development practices have concerned many researchers worldwide [22] Literature review indicates emergence of compact city concept around mid 1980's. compact development policies focouses on arresting urban sprawl to conserve land resource, mix use high density development ensures equitable distribution of infrastructure srevices with justified per capita cost of infrasture. Some of the medieval cities exhibit this city planning model, where axctivities were restricted within walled city area [23].

In those cities most of the daily life activites were limited to walking. This kind of walkable cities were seen as "high density (100 to 200 people per hectare), mixed

land use, and narrow streets in an organic form that fit the landscape" [6].

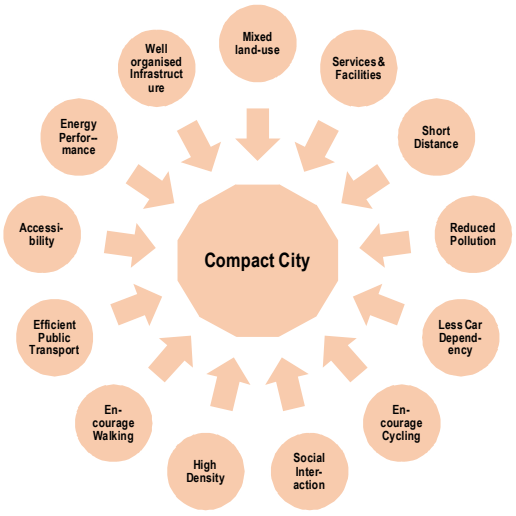


Fig. 2. Elements of Compact City [7].

The compact city is the result of a specific structure, scale, and blend of activities [8]. There is an across the board agreement that sustainable development progress is fundamental. In 1987, Brundtland Commission defined sustainable development. The connection between urban structure and sustainable development is viewed as solid, yet not straightforward and direct [8]. It has been observed by researchers that sustainable city "must be of a form and scale appropriate to walking, cycling and efficient public transport and with a compactness that encourages social interaction" [9].

Recently, much attention has focused on the relationship between urban form and sustainability, the suggestion being that the shape and density of cities can have implications for the future" [8]. By the 1980s planners across the world over advocated for three major uran policies i.e. densification, containment and intensification with a broader idea of "growth within" .

VII. DEFINING COMPACT CITY

The beginning of Compact City lies in the sustainability objectives of resources protection and waste-minimization as suggestedin the Brundtland Commission report and the UNCED Agenda 21 recommendations published in the late eighties and the mid nineties[10]. Compact urban structure is seen to be a practical urban form that can, contain never-ending suburbia also take care of natural environment also [11]. And provide required population numbers to support public transport particularly maas transit [12], Also compact city has many social and environmental benefits at the same time it promotes better social mix and quality of life [10, 12, 13].

The Compact City policies focus on mixed use high density development. In this compact development it envelops mix uses, for example, private, business, institutional and corporate, connected with judiciously planned transport network. Every corner of city is serviced by well connected public transport. Day to day life needs are placed at walking distance. A mixed use strategy works well rather mono functional areas.

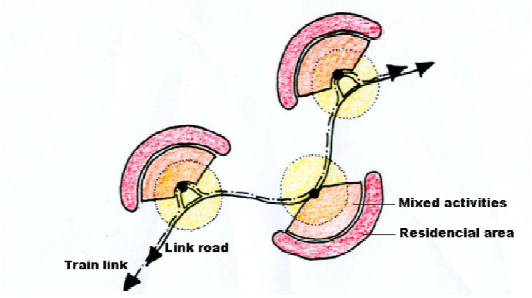


Fig. 3. Majorca Techno polis Primary Idea [14].

Compact City characteristics can be summarized as;
— Intesification
— Densification
— Containment

In recent years the focus of urban planners, city administrators and developers, was on achieving more compact urban form to make cities more vibrant and livable. Compact cities development practices have gained considerable popularity over current urban development models to takle issues like sprawl and other environmental issues [15].

Sustainable development majorly depends on equity between economic, environment and social pillars. Following are the key issues needs to be foused to achive compact development across three sustainability spheres.

VIII. CONNECTED CENTERS OF SOCIAL & COMMERCIAL ACTIVITY

Compact cities policies encourages multifunctional, energy conscious development. Common agreement among researchers calls for avoiding mono functional, energy intenvise urban development practices, and less dependency on cars. Some of the issues needs proper attention of city planners are :

— Cities needs to develop a mobility model in which community thrive without negative externalties.
— How to design urban spaces where human gets preferences over cars and other modes of transportation.
— How to design vibrant public realm such as street netwoks,pedestrian ways, where public is given prime importance.

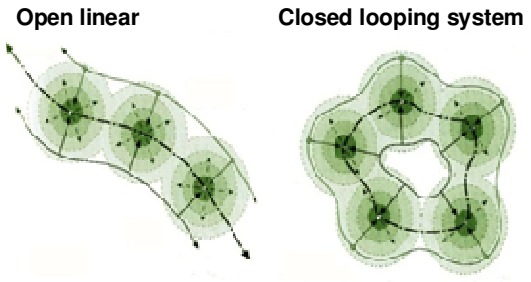


Fig. 4. Connection of Compact Nodes [14].

Theoritical understaning suggests compact development happens around social and commercial nodes. These are major referal point around which neighbourhood development happens. These contigious different neighbourhoods forming compact city have its own open spaces such as parks and play fields woven around diverse public and private spaces and activities.

These neighbourhoods and work places are at close proximity reducing travel time and distance from home to work place. In metropolitan or urban areas, mass transit system can give rapid intra urban areas travel by connecting one neighborhood with another, leaving local roads system to near by network. This diminishes the effect of through traffic, which can be over seen and controlled, especially around the heart of neighborhoods. Different method of public transport systems for example, mono rail, cable cars, light rail becomes more effective making walking and cycling more effective and pleasant ultimately resulting in reduction of congestion and pollution on the roads and increased level of wellbeing and security and gaiety of open space is increased.

IX. COMMUNITY BASED SOCIETY

Cities provide an opportunity for civilization to thrive and grow by various social and economic activities. Compact Cities can restore the city as wanted territory for a network based society. By virtue of close proximity and mix use placement of activities, provide intense chance of face to face interaction, more sense of belonging to the place, chances for reinforcing local culture and traditions, with the long term goal of sustainable development in creating a flexible structure for a cohesive and vigorous community within healthy environment

X. INCLUSIVE AND LIVABLE CITY ENVIRONMENT

Rapid urbanization has contributed regional inequalities due to resource concentration. Urban poors living with basic minimum facilities are common characteristics of fast growing cities. Contribution of city dwellers in economy and growth is possible only when a inlusive planning process is adopted. Urban areas needs to be engaging in character with enough chances to interact and contribute, that makes cities more vibrant and cohesive [16]. Cities with attractive and livable environment contribute to successful economy. It is the need of the hour to overcome the ill effects of hollow urbanization – Urbanzation without mixed use vibrant spaces, due to mono functional areas, high dense development, where fragmented development happens. Cities need to be careful in optimizing development and use of all kinds of capital be it human or natural capital.Succsee of compct city policy lies in creating places which pulls population close and stay together and this has been demonstrated by some countries like Phillippines by designibng commercial spaces such as music and food outlets.

XI. PROXIMITY AND OVERLAPPING

Meticuliously planned and intervowen natural landscape and vibrant public realm in close proximity and provisions and use of latest technological innovation can improve the quality of urban environment i.e. clean air, clear and vibrant sky, in dense city. Another benefit of land intensification or consolidation, with higher densities can reduce land demand, saving land on periphery or fertile agriculture land. Clubbing of different activities can guarantee increasingly effective use of energy.

A Compact City planned with overlapping activities is more congenial and it can bring down car trips, meaning dramatically reduction in energy used for transportation. Fewer vehicles on road implies less congestion and better air quality supprting more cycling and strolling instead of driving. Functional zoning make people rely more on transportation, while compact hubs can lessen vehicle numbers and individuals can walk or use bikes in the network. Availability to near by administrations and employments is concerned with the urban activities that are readily available at a local neighborhood scale.

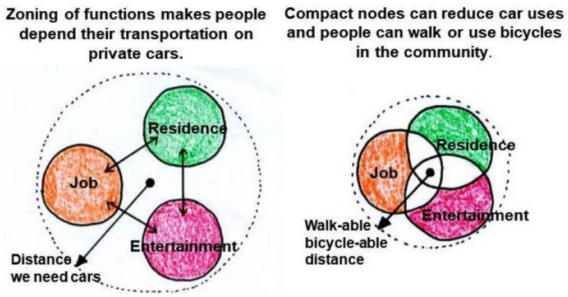


Fig. 5. Compact and Mixed Use City [14].

As suggested by Burton the proportion of residential to nonresidential urban land, the quantity of key establishments (eateries and food joints, banks, post office and building social orders, physicists, specialists' medical procedures) per 1000 inhabitants and the quantity of newsagents for each 10000 occupants [17, 18].

XII. USE OF REPRODUCIBLE ENERGY

Compact development policies support the idea of reducing fossil fuel energy consumption, depending on use of Reproducible Energy where energy source is natural and is recyclable and available in abundance. Locally produced renewable energy not only saves environment pollution but also minimizes energy loss during transmission. Sunlight and Wind power is having emmence potential to produce energy endless and wellwith close proximity to user areas, which can be reproduced indefinitely

XIII. COMPACT CITY PLANNING STRATEGIES GLOBAL EXPERIENCE

The OECD [19], compact city study demonstrates that wprldwide most governments right now have components of compact city policies. The overview and contextual analysis of five OECD metropolitan areas (Melbourne, Vancouver, Paris, Toyama, and Portland) proposes that no single far reaching compact city model is pertinent to all urban areas and regions, because each must take local context in to consideration. The comprehensive assessment reveals several connections between local circumstances and policy responses. For instance, in fast developing districts with strong development pressure, administrative instruments are imperative to forestall uncontrolled urban extension, and integral financial apparatus can orient market based decision about the location and volume of development. Interestingly, a district with Shirking populace may discover measures to contain urban improvement troublesome and complex measures to incite individuals to move to urban centers may along these lines be required.

XIV. URBAN INTEGRATION A CASE OF AHMEDABAD BRTS

Urbanization and rapid urban growth experienced by Ahmedabad metropolitan resulted many inevitable circumstances i.e. Rapid population increase (40% per decade), increased motorization, urban spreads and their resultant environment degradation. To promote

integrated development BRTS was imagined as spine of the city in year 2007, and operation began by Dec. 2009. Preliminary impact of BRTS projects were very positive, there was clear shift of transportation mode to BRTS. Approximately 18% two wheelers and 6% ridership change was noticed [20]. Following provisions perhaps impacted effective BRTS in promoting urban integration [20]

- Mobility Plan for long term incorporated in Ahmedabad Plan 2005. CMP and policies for BRT Implementation.
- To execute BRTS Nine PPP model for implementation of project.
- Inclusion of market forces for integration policies.
- Institutional support for planning and development.
- Culture of organized public transport operations.
- To support Identification of financial schemes.
- Fund for Urban Transpot was allocated.

XV. FUTURE PROSPECT

For a city to be sustainable the contention goes, for assigning functions and population must be at higher densities. However for a city to be more cohesive and liveable,different functions and population must be dispersed at lower densities. People aspire for good educational facilitie, safe and accessible places, vibrant public realm dotted by pleasing landscape, offered by low densily developd areas. Though thses equivalent characteristics exist in good numbers in many cities of densest urban neighborhood noticeably Prague, Barcelona, San Francisco, Amsterdam, and others.As a matter of fact, these qualities exist in various urban areas and are not particular to low-density rural territories. So we ought to be attentive in enduring cases that livability is significant in one type of human settlement over another. Planners and policy makers need to address following issues for a meaning Compact City model

– Possible results when city accomplish its highest possible conceivable density
– The impact of intensification or land consolidation on cross section of urban environment
– Compact City implications for individual lifestyles .
– Impct on service delivery such as electricity, water supply, and public transport.
– Compact City intanglement for individual way of life.
– After effects intensification on vibrancy and urban life
– Demographic and socio culture parameters such as household size, building and dwelling size, urban facilities, social infrastrutre and relocation cost etc.
– Carefull study of urban periphery, social exclusion and inclusion and security matters.

XVI. CONCLUSION

Urban areas are spreading in a haphazard way in the absence of much needed relevant urban development policies. The development is prompting one of the regular seen issues of sprawl. Irregular development and deficient utilization of space is prompting a large number of issues which are influencing human life. Compactness is one of the parts which are required so as to spare limited land, natural resources, time, nature and other significant things which are required to add to accomplishment of the perfect city. The methodology delineates how and why the compact city is the method of updating a urban situation in order to get rid of these negative aspects and to protect and improve the characteristics of urban life that we have come to acknowledge as desirable.

The new model of the Compact City will make neighborhoods more lively, vibrant, safe and significant for kids; thus the city itself turns into an all the more energizing community for individual connections in the present fast moving world. Adopting compact city policy to urban communities the whole way across the nations without cautious musings may aggravate urban issues; in any case, a few components of compact city strategy, particularly on urban integration, could be the key focal area. This integration should be possible through back-boning urban transport in urban development. Public interventions, market force, and financing schemes are the key territories that need cautious perception for promoting urban integration and and attaining the goals of compact city i.e. social, environmental, and economical benefits

XVII. FUTURE SCOPE

Compact city concept and theories widely theorized and implemented in many western and developed countries which is very much different as compared to developing world where high population and mix use alredy exists and needs rationalized reoraganisation of urban realm, this itself generates requirement of emphrical studies to understand existing urban form as aginst the compact city doctarine. Compact city model studies, can be linked to present ongoing urban development practices such as smart city mission and other government urban development policies to establish position of the compact city model in Indian context.

Conflict of Interest. There is no conflicts of interest between authors for this research regarding publication or authorship

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