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CHALLENGES BEFORE MUZAFFARPUR ON WAY TO SMART CITY IN BIHAR: A GEOGRAPHIC ANALYSIS

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▪ **Abstract :**

The idea of Smart Cities evolved out of the need to simplify life of the people, provide them with life's necessary service through technology, governance and coordination and it is these yardsticks that the concept and idea will be judged in : future, i.e., the power to transform the life of people and their ability to become more humane. The paradigm of smart cities appeared in the late 1980s as a means to visualize urban context, and since then they evolve fast in different contexts "smart cities are such cities where information technology is wielded to address problems ok and new." The old city of concrete, glass and steel now conceals a vast underworld of computer and software. The new city, on the other hand, is a digital remake to the constructed legacy giving rise to a new form of city, which may be called as smart city. One perspective tries to look at the smart city, not as a whole but as a part of it. For example, it is argued that whatever smart city may mean, not all spaces of the city will be equally smart. I mean that some places, people, and activities will have privileges over others. In the 21st century, cities compete globally to attract both citizens and businesses. A city's attractiveness is directly related to its ability to offer the basic services that support growth opportunities, build economic value and area competitive differentiation. Potential inhabitants, of both the commercial and residential variety, are a discriminating lot, and they are looking for cities that operate efficiently and purposefully. They are looking for smarter cities'.

Key Words : Master Plan, Development Plan, Metropolitan Planning, Smart city, morphological characteristics, 'KAVAL' towns

- **Introduction :**

Smart city is the transformation of urban centersinto a city having most of the modern facilities. The study area, Muzaffarpur city is known as "The Land of Litchi" and also known as "The Capital of North Bihar". The study area is the part of the muzaffarpur district. Muzaffarpur district is divided into 16 blocks. and the study area lies in musahari block. The table and figure given below show the locational setup of the study area.The study area is geographically situated on the southern bank of the BurhiGandakriver and located 26°07' North latitude and 85°27' East longitude. The study area occupies an area of 26.68 kilometer squire (2668.44 Hectare). It covers 0.84% of the total area of the Muzaffarpur district. It is fourth most populous city in Bihar.

- **The Study Area:**

The study area is Muzaffarpur Municipal Corporation (MMC) which located in Muzaffarpur district in the Tiruth division of the state of Bihar. It serves as the headquarters of the Tiruth division, Muzaffarpur district and Muzaffarpur railway district. The study area is geographically situated on the southern bank of burhiGandakriver and located at 26°07'N latitude and 85°27'E longitude. The mean sea level of the city is about 187 feet (53m to 57m). The total area under the jurisdiction of Muzaffarpur Municipal Corporation (MMC) is about 26.68 Km square (2668.44 Hactare) gives shelter to a population of 354462 persons (2011 census) in its 49 Municipal ward. The average density of population is 133 persons per hectare. Muzaffarpur was upgraded as Municipal Corporation in 1981 with its first elected body of the corporation constituted in 2002. As per the 2001 census, Muzaffarpur Municipal Corporation had 32 wards which have been revised to 49 wards in 2007.

- **Physical Personality:**

The outstanding features in urban site of Muzaffarpur are the natural dominance of the BurhiGandakriver and its abandoned courses that is known as mann area in muzaffarpur. The ancient location was on the southern bank of BurhiGandakriver while at present the river shifted in towards north. BurhiGandak has always acted as a natural burner for further northward expansion of the town. This has led the city to take a linear shape. The landscape concerned slopes from north to south and from west to east while within the city area, it appears towards BurhiGandakriver situating in the north of the town. However, the slope is so gentle that the whole land appears to be featureless and flat.

Some parts in the heart of the town are low lying areas and are often Waterlogged especially during the rainy season. They are locally called MotiJheel, Balughat northern part of Akharaghat,kalyani etc. immence pressure on land has forced the people to construct houses in these areas.In the preliminary stage of urban growth of the city, the river BurhiGandak flowed through the area now referred to as Sikandarpur area, hence, the northward shifting course of the BurhiGandakriver has provided newer land surface for thr future expansion of the city in the north. New Government quarters and several residential housing colonies are coming up in Jhapha area. The stability of the site of muzaffarpur through centuries suggested the presence of some kankar reef in the alluvium of the southern bank of the river. The convexity of the bank near Sarayaganj tower area is sufficient safeguard in the town that remains safe.

The stable southern bank has provided a permanent site for development and expansion of Muzaffarur. The whole area south of the river bears imprint of shifting courses of rivers. The river BurhiGandak is wide near Muzaffarpur town. It is characterized by meandering courses, sand bank and sand bars and abandoned channels. The highest flood level of the river is higher than the general level of the city hence protective wall has been built to protect the city from floods from the north. Flood in the south are similarly checked by the railway track near Ramdayalu and also by the newly constructed new bye-pass road further south of the bye-pass road.Sometimes the river bank acts as a promoting factor for the ideal location of towns. In the case of Muzaffarpur, this was true in its early stage of growth. Now it is an inhabiting factor because of the restrictions it imposes on the future expansion of the city.The drainage Structures Muzaffarpur originally constructed by PWD in 1895 to allow flood from river BurhiGandak. In due Course of time, these structures are being utilized as both sewage and storm water drains for which functions they were never designed. As a result even the limited drainage system of Muzaffarpur has never functioned properly. So the life of Muzaffarpur city becomes hell due to stagnation of drainage water on the road. The traffic movement is hacked and water enters into the shops and houses.

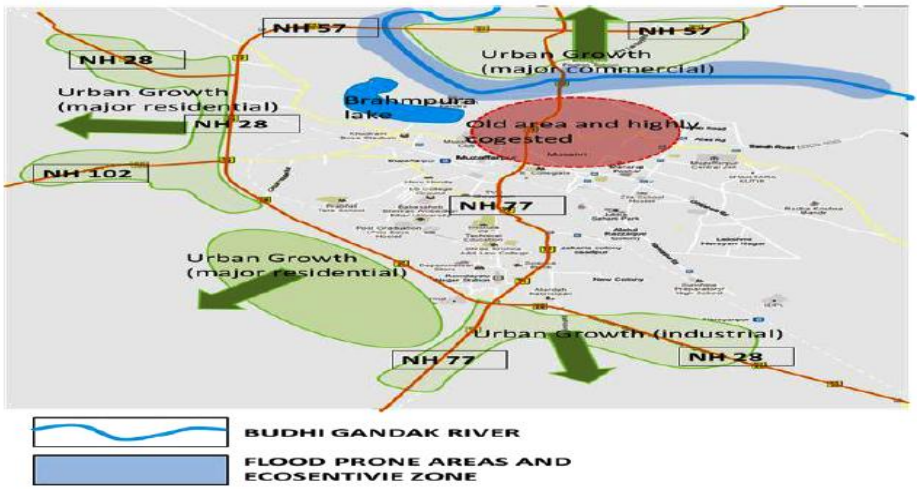
The contour map the city shows that the city has a very flat surface. Thus the topography of the city is such that stagnation of water is common feature in lack of proper drainage system. The filling on the road surface to raise the level of road as a measure to solve the problem of stagnation of water on the road is not a permanent solution. As the city has grown on a very flat surface where the natural slope is 3.5 feet to a mile which does not allow the smooth disposal of water.

The existing drainage system consists of 3 main drains, 2 of which start at one point at the north of city. One of these drains flows directly to Kalyani and the other takes a circuitous route near KachchiSarai and finally meeting the first one at Kalyani. The third drain flows on south-west direction along NathuChoudhary road to join the outfall of other two. The outfall crosses the Samastipur railway line near KalambaghRaod on north of L.S. College, taking southerly direction crossing the Hajipur Railway line, thereafter finally falling into FardoNallah

- **Physical constraints to urban development:**

The following are the physical constraints to the development of Muzaffarpur city.

1. The development of the city is restricted towards north particularly due to BurhiGandak river valley but Akharaghat Bridge over the river providing space for the development of the city areas across the river.
2. The natural slope of the city is towards the south-east but urban drainage is oriented towards the north. This result in reverse flow of the drains when the river BurhiGandak is in space.
3. Western, central and southern parts of the city are low lying which has resulted in later development of the city in these directions.
4. Climate has an adverse effect on the development in two ways. Rainfall is heavy and more than 60 per cent of the rain falls in three monsoon months. As the level of the BurhiGandakis generally higher than that of the drains in these months, almost central part of the city are waterlogged.



Condition of Muzaffarpur city during monsoon season and Heavy Rain


Under Motijheel Over Bridge


Near Dharmshala Chowk


Near Kalyani Chowk


Tilak Maidan Road


Station Road


Way to Islampur & Bank Road

Objective of The Study: The broad objectives of the present study are as follows:

1. to examine the morphological characteristics of Muzaffarpur town as a whole along with its municipal wards.
2. to examine the demographic and settlement characteristics of the town.
3. to study the socio-economic characteristics of the townscape.
4. to assess the adequacy or otherwise of housing in different localities of the town.
5. to examine the internal transport structure of the town in relation to various settled parts.
6. to plan for essential community services as per need of the people and
7. to prepare a comprehensive perspective plan for the town to make it an ideal place to live in.

- **Formulation of the Hypothesis:**

Hypothesis is defined as a tentative theory of supposition provisionally adopted to explain certain facts and to guide in the investigation of others. It determines the relationship between two or more variables and is accepted or rejected on or after experimental or empirical verifications. Thus, hypothesis are propositions which have not been verified or tested. The present research study will try to test the following hypothesis:

1. Civic amenities available to the town people are not sufficient.
2. The housing condition is vitally congested.
3. The supply of drinking water is below satisfactory level.
4. slums are increasing by leaps and bounds.
5. The transport and communication system of the town invites the problems of roads like jamming, accident etc in Muzaffarpur town.

- **Sources of data and related information:**

The data for the study have been mainly compiled from various documentary (published or unpublished) and internet sources. For the study of the population, data were collected from the Muzaffarpur district census handbooks of 1951, 1961, and 1971 and for 1981, it was collected from the census office in unpublished form. As regards the data for age - sex structure, sample data was collected from the M.R.D.A. Office which had conducted a field survey in 1983. On the basis of this data a map has been prepared.

For the preparation of maps, the help of following maps has also been taken from topographical sheets having various concerned sheet nos.

1. Topographical Sheets
2. Muzaffarpur Municipal Corporation Map 4" = 1 mile.
3. Muzaffarpur Regional Development Authority Map 2" = I mile.
4. Maps in the Master Plan for Muzaffarpur

These have been largely helpful in analyzing population growth, population changes, distribution, density, age and occupational structure. The unpublished data were collectedalso from different sources namely the census office and various government department, Muzaffarpur Municipal Corporation, Muzaffarpur water board, General post office and Muzaffarpur electric supply undertaking have been largely helpful in chapter V to understand problem and need of urban areas.

- **Methodology:**

Calculations concerning growth and density of population, growth of population (ward level), age-sex structure, literacy, occupational structure, accommodation and density of households have been attempted in the present research work. Choropleth maps have been prepared to show ward level density of various indices. Population for the city as well as the zones for 2011 has been projected through geometric progression. Functional zones of the city have been demarcated on the basis of Land Use Map.The map regarding urban development of Muzaffarpur was prepared on the basis of the four density maps and the map showing successive growth of the town during the last century. The Metropolitan Region of Muzaffarpur has been demarcated on the basis of the distance travelled in one hour irrespective of the distance. Time factor and accessibility have been taken as important indicators of demarcation. The map of Muzaffarpur Metropolitan Region has been prepared accordingly.The techniques used

for cartographic representation comprise isopleth and choropleth maps, bar and line graphs, and symbolic representation. All maps are based on data processed by appropriate statistical techniques.

- **Challenges beforeMuzaffarpur As a smart city:**

A lot of challenges are existing at present in Muzaffarpur and without shorting these out, its development as smart city will remain only a dream. These challenges are :

- **Housing shortage:**

The tremendous volume of population in-migrating from the rural areas has led to severe congestion and acute shortage of houses leading to unhealthy living conditions in the city. The shortage of houses is well reflected through a table given below.

Table -- 01

MuzaffarpurCity (MMC)

Housing Shortage, 2001-2030

S.N.	Years	T. Pop	NHR	NOH	NHF	PDH
1	2001	305525	49982	38799	11183	22.37
2	2011	354462	65870	50227	15643	23.74
3	2021	430954	81556	54983	26573	32.58
4	2030	507876	95492	60771	34721	36.36

Source: Calculated by the research scholar, 2018.

T. Pop--Total Population, NHR--No. of Houses required, NOH--No. of Occupied Houses, NHF--No. of Houses failing short, PDH ---%age deficit of houses

The trend has been projected up to 2030. This growth has been prepared on the assumption that the average family in the city will consist of five persons. The gap between the number of occupied residential houses and the number of required houses represents the housing shortage. This gap has been increasing with time. This shows that in future the housing problem will be more intense and severe and hence calls for immediate and proper planning and action. The shortage thus represents only the effect of immigration and natural increase in population.

- **Supply of drinking water:**

Drinking water is a majorchallenging issue in slums. The main source of water is public stand posts, tube wells, hand pumps andwells which account for 134, 134 and 25 in number respectively. The stand posts are located at the distance interval of 100

yards. There is no regular interval of supply of drinking water and sometimes no supply for 10-15 days. Few families in slums have their own hand pump to escape from this irregularity. Quality of water is not potable and causing various water borne diseases. Billing is done haphazardly with some households paying for water supply while others do not.

- **Slum Increases:**

Most of the slum development is observed along the bank of BudhiGandak River and its embankment.The figure concerned shows that there are 137 slums in the city. Ward no. 39 has the highest number of slums. The slum population of Muzaffarpur is 14,319 which accounts for 5% of total population of the city. Ward no. 49 with 2623 has the highest BPL families.

The slums present a scene of dingy streets and unkempt zones of delapidated and obsolete houses, of over-crowding in tiny rooms and of totally inadequate civic services. In addition to pucca built slums comprising mostly of over congested single room tenements, ill ventialated and in poor state of habitation without proper services, every city has the horizontal slums of hutment colonies which pock mark the surface all over.

Most of the slums have no basic civic amenities like sewerage, drainage, and water supply and sanitation facilities. Poverty forces people to exploit natural resources and cause various forms of air, water and land pollution. The poor do not have access to safe drinking water and sanitation. In Muzaffarpur, the slum population resort to pit latrines which are unhygienic and a breeding ground for several diseases. Solid waste generated by the families is disposed off in open dumps polluting land and water.

The slums of Muzaffarpur as per Master plan for Muzaffarpur can be divided into four types. First type comprises rural-cum-urban pockets in the city where the pattern of life and physical conditions resemble rural conditions, e.g. Rahul Nagar (Along NH) in ward no. 2, Govindpuri Muslim Basti in ward no.7, IB Road JhuggiJhoprimohalla in ward no. 10, AkharghatPul&Sikandarpurbandh in ward no. 14, Karpurinagar in ward no. 15, Majhauliya Road near railway gumti no. 5, in ward no. 27, Damuchak Dalit basti in ward no. 28 etc. The second type comprises areas where there is no regard for planning standard and housing regulations. The residents do not belong to lower class. Only the houses are built haphazardly without proper street lay out and sanitary conditions. Slums of this type have developed in parts of Aghoriya Bazar,

Sikandarpur, Akharghat, LakdidhaiRamdayalu Nagar etc. The third type of slums has developed in the parts of Sariyaganj, Company bagh, Juranchhapra, Motijheel, J.L. Road etc. All these area together include the commercial core of the city and also contain the university and newly developed area. The fourth type of slums includes areas which have degenerated due to obsolence and negligence. This type has developed in the parts of SadarSadar Hospital Road, Station road, PuraniGudri Road and areas behind the main streets and lanes.There are innumerable pockets of temporary thatched huts of scavengers, milkman and washerman. Moreover animals and human beings share the same roof. The shift of centre of gravity from this area to the west of the city led to the degeneration of this area.

The worst slums of the city are the Bahalkhana road, Near Chapman School, Majhaulia near railway gumti, Akharghat, Sikandarpur etc. Basically, they are rural enclaves in the city which have been saddled with dense population without commensurate civic amenities. The problems of these slums should be tackled in totality with a view to determining their deficiencies in respect of physical environment and the socio-economic needs of the slum dwellers. Slum prevention is as important as slum clearance and improvement. As such steps have to be taken to eradicate and improve the existing slums and also to ensure that the planned areas do not degenerate into slums in due course. To the view of prevention, it is necessary that proper building code be enforced, planning regulations, proper provision and maintenance of sanitary lay out also be enforced effectively.

- **Road & Street Lighting:**

The internal roads of the slums are of PCC and most of them are dead end. The width of these roads is of an average of 3 m and ranges from 1 m to 4 m. Most of the roads are dilapidated and require immediate repair. The level of the road is higher than the plinth level of the house. In rainy season, water from road drain into houses and create a situation of flood.There is no electricity connection in the slum houses. People rely on third party (connection from generator service). Tariff paid to generator connection is Rs. 100 per month. There is high fluctuation in electric supply and mostly (i.e. avg. of 15 hrs.) remains low voltage. There is no provision of street lights in internal roads of the slum area.

The traffic congestion in the town emerges from the basic fact that vehicles have to pass through the town. Encroachments on road-sides by medium and small sized

shopping units have resulted in the over-crowding of streets and roads. They obstruct the free flow of vehicular traffic. Other factors affecting the traffic problems of Muzaffarpur town are the rapid increase in the population, lack of adequate number of bridges, poor surface condition of roads etc. Different modes of transportation in the town co-exist and naturally creat problems in the town. Lack of co-ordination among the state government agencies of road transport viz. PWD for construction and maintenance of roads and bridges etc. private and public operators for the running the vehicles, Regional Authority for issuing license, state police department for doing supervision regarding enforcement of the traffic rules et.c. have aggravated the problems in this regard.

- **Sanitation in Slums**

Sanitation is a very important aspect of slum development. It directly impacts cleanliness, health and hygiene of the inhabitants. Population in these pockets does not have private toilets. About 85 number of Open Lavatory were also found. Bathing is also done in open spaces.

- **Condition of Public Toilets in slums**

There are only 7 Community toilets for use of 7 slum pockets in the town. Most of the community toilets are not in usable condition due to poor maintenance.

- **Sewerage System in Slums**

Sewerage System is in very poor condition in the city area and mostly absent in slums. Household sewage is disposed directly into open drains. This is very much harmful to the city people.

- **Disposal :**

The collected waste is disposed off at various dumping sites at random with no proper supervision. Earlier wastes are disposed in Rautaniya dumping site and now switched to low lying area in Dadar, situated between Beria and zero mile.

- **Solid Waste Management in Slums:**

Solid wastes are dumped in the open area. There is no proper and sound provision for waste collection in slums. Dust bins are located somewhere in the city area but quite far away from the slum pockets.

- **Status of Social Infrastructure:**

Access to Social infrastructure is an important factor for human development especially in slum areas. This section highlights the availability of educational and medical facilities within the slum pockets.

- **Poor parking facilities :**

There is no organized on-street of off-street parking arrangement in any of the major commercial areas in the city. Most of the core market areas of the city are characterized by narrow roads with a high proportion of pedestrian and low moving traffic. Thecapicity of theroads is further reduced by vehicles parked on theroadsides. Multi-levelparking adjoining core city area is proposed.

- **Present Proposal For Development of Muzaffarpur As a smart city:**

Concept of Smart Cities :-

There is no universal and definite definition of a smart city. Smartness is dependent on our expectation of what we want a smart city to be. Smart cities are cities where residents demand good governance and the government through better administration or high technology is able to deliver high quality services in a transparent and accountable manner. (R.B. Bhagat, 2015). Thus, while cities transform people, people make cities. It has to be neatly conceptualized how we use the technology to shape our cities and its consequences for the poor and the people at the margins (Albino et al, 2015). Since, India has been rapidly urbanizing, the fortunes of people hugely depend upon how the cities have been built. At the same time intervention by the government could be helpful in envisioning and shaping our cities.

- **Smart Cities Mission:**

Smart Cities Mission was launched by the Prime Minister or 25th June 2015. A Smart City aims to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology that leads to smart outcomes. The objective of the Smart Cities Mission of the Ministry of Urban Development is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' solutions for inclusive development. (A.K.Jain.2015). Thestrategic components of the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development), plus a pan-city initiative

in which smart solutions are applied covering the city. The model of Smart City development thus comprises:-

1. **Retrofitting:**Retrofitting involves the transformation of an existing built-up area into a smart, more efficient and liveable city. For this, an area of more than 500 acres will be identified by the city in consultation with citizens.
2. **Redevelopment:**-Redevelopment involves the replacement of the dilapidated built-up environment and creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, which is to be identified by Urban Local Bodies (ULBs) in consultation with citizens.
3. **Greenfield development:**-Greenfield development will introduce the smart solutions in a vacant area (more than 250 acres) using innovative planning, financing and implementation tools (e.g., land pooling/ land reconstitution) with provisions for affordable housing, especially for the poor, and to meet the needs of the expanding population.
4. **Pan-city development:-** Pan-city development envisages application of smart solutions to the existing infrastructure by the use of technology, information and data to make the infrastructure services better. For example, applying smart solutions in the transport sector (intelligent traffic management system) and reducing average commuting time or cost to citizens will have positive effects on productivity and quality of life of citizens. Other examples can be waste water recycling, smart metering and better water management in the city. {A.K. Iain 2015)

- **Components of a Smart City :**

Smart Infrastructure:-

One of the key things that our cities lack is smart inclusive infrastructure. Providing smart infrastructure in terms of roads, cycle tracks, pedestrian pathways, public toilets, water and sewer networks, street lighting networks, signal systems, gas supply systems, solid waste "management systems, drainage networks, pollution control systems, safety and security devices, etc. are all very important for efficient, healthy, safe and sustainable urban living. In al! these, IT plays a role no doubt, but more importantly, good town planning, public health engineering, architecture and civic design are essential ingredients. Construction, project management and contract management is even more

important. The role of IT comes only as a support to the core activity, that too in a limited manner.

Smart Mobility:-

Urban mobility is integral to city living. For a variety of reasons, be it for work, education, recreation, etc. trips have to, be made by children, the able bodied, physically challenged and the elderly. One is willing to pay, provided there are fast, comfortable and adequate options available at all reasonable times of the day. Today, there are many technologies available and being tried out. What, we need is implementation and integration ofJthese so that the last mile connectivity is not left out and a seamless travel experience is available. However, technologies themselves have to be a combination of engineering, design and management solutions. Starting from walkways to cycles, three wheelers, battery operated vehicles, cars, taxis, low floor buses, metro trains, maglev, mono rail, etc. there are many engineering options that can be introduced to make mobility experience in cities smart.

- **Smart Resource Management:-**

Water, energy and waste are key resources in the city. The need to manage these in terms of ensuring equitable distribution, ensuring minimum levels of supply, minimising leakage, maintaining environmental quality and creating modern technology options. Technology here would mostly be in the realm of public health engineering for water and waste management and power systems. Use of alternative energy sources and renewable also needs to be propagated here.

- **Smart Housing:-**

For people to live in a smart city, smart housing is an essential ingredient. The city today is a congregation of a wide variety of human beings having different work and life styles and earning and spending capabilities. We need a whole range of options for all, both in the ownership as well as in the rental segment. Most cities today have reasonably good housing but which is exorbitantly priced and meeting the requirements of a select few. To develop affordable housing options for the large majority is a very big challenge and no software can solve that. What is needed here is a combination of innovative speedy development of high density suburbs, rapid connectivity, and creation of social infrastructure for families to live in affordable locations away from the parent city and still commute quickly back and forth. We need a high degree of commitment from the governments on various fronts to make this happen.

- **Smart Statutory Management Systems:-**

At the root of developing smart cities is the statutory and governance regime. We need urban development laws that facilitate development, not restrict or hamper. Time and again, we have been voicing the concern of reforming various urban laws. A lot of room is still there for reform of our statutes in the urban arena. Further, we have constitutionally mandated urban local governance participatory systems which cannot be ignored. There is a huge baggage of organizational structures which need to be infused with a new vision and new ways of smart working. Ultimately, a smart city has to be managed by smart and knowledgeable human resources. There is a great amount of work to be done here.

Smart Financing: The fund allocation for smart cities in this Budget is only a drop in the ocean. Central allocation can never match the overall requirement of funds our cities, even if it is for just MOO crore out of the '7060 crore. Therefore, we need to explore ways of involving private capital investments and build-operate models where there is a win-win for all parties concerned.

- **Case of India :**

The government's flagship programmes - 100 Smart Cities, 500 Cities under Atal Mission for Rejuvenation and Urban Trasformation (AMRUT), National Heritage City Development and Augmentation Yojna (HRIDAY), Swachh Bharat Abhiyan, and Housing, for All aim at making cities livable, inclusive, vibrant, technologically advanced and economically competitive, According to the Ministry of Urban Development (MoUD), Government of India, the core infrastructure elements in a smart city would include:-

- Adequate water supply:
- Assured electricity supply;
- Sanitation, including solid waste management;
- Efficient urban mobility and public transport;
- Affordable housing , especially for the poor;
- Robust IT connectivity and digitafisation;
- Good governance, especially e-Governance and citizen participation;
- Sustainable environment;
- Safety and security of citizens, particularly women, children and the elderly; and

- Health and education.

Smart cities in the Indian context must include the following aspects: technology, financing; data access, energy, environment, climate change resilience, disaster risk management, reforms, governance, and citizens. (Usha. P. Raghupati, 2015)

- **Technology:-** Digital technologies can provide innovative and efficient solutions for managing cities - be it for mobility (traffic and transportation), urban planning or provision of infrastructure and services such as water supply, sewerage system, solid waste management, etc. Smart cities need to manage themselves to reduce congestion on roads and consequently air pollution, with co-benefits of better health and improved quality of life. Providing digital meters for water and electricity inside houses, where citizens can monitor the use, wastage, know its tariff, and themselves audit it. This will help in conservation and intelligent use of essential services. Information and communication technology should also be able to cater to the social sector and be inclusive, i.e., make innovative solutions and services accessible to the aged, disabled, poor, and illiterate.
- **Financing:-** There are numerous technology providers, who can provide solutions for different sectors but they will require funding. Municipal governments in many cities today are in financial distress, unable to even maintain basic services and pay regular salaries, Therefore, the smart city initiatives will need funding from higher levels of government, financial institutions, private sector, or funding by international agencies. (Usha P. Raghupati 2015). The capital investment will need to come from government and private sector, and the long term maintenance expenditure will need to be paid for by users through user charges.
- **Data Availability and Access:-** Smart cities should offer open access to information on infrastructure and services - especially those that are connected to citizens. This requires generation and maintenance of standardized information on services for each city. Technology will also enable crowd sourcing of information that under normal circumstances will be difficult to obtain. These can also be real time data. Access to information will empower service providers and users alike, which will help in improving the quality of life of citizens.
- **Energy:-** Renewable energy, green and clean energy, use of smart grids, intelligent green buildings that optimize the use of energy and natural resources should become the

norm for smart cities. This will also contribute to some climate mitigation efforts and CHC emission reduction targets that India has agreed to in global negotiations.

- **Environment:-** Forest cover that promote bio-diversity, green areas such as parks, and forests that act as carbon sinks, open spaces' for citizens to interact with each other, clean air, creation and preservation of water bodies that collect rain water, recharge ground water and also act as sponges during heavy rains. All should become the hallmark of smart cities.
- **Climate Change Resilience:**

  Smart cities should have built-in climate resilience. This means that right at the time of planning for smart cities, resilience to the impacts of climate change should be built in. In the water sector, for instance, this would include rainwater harvesting, recycling of wastewater, identifying multiple sources of water supply, recharge of aquifers, promoting water conservation, and so on. This would enable the city to cope with water shortages that are likely to result from climate change. Dependence on a single source of power to be reduced by decentralized power generation, e.g., solar rooftops.
- **Disaster Risk Management:-**

Cities have become the sites of multiple types of disasters and that too with regularity. This is likely to increase given the aberrations climate change. Smart cities need to be prepared for disaster management at all times. The disasters could be urban floods, earthquakes, fires, landslides etc. The smartness of the city will be put to test during the time of disasters and therefore, this aspect needs to be incorporated in planning for smart cities.

- **Governance:-**

is an extremely important part of managing cities well. The main difference between the developed and developing world is not just, technology, but governance. Rules, regulations and their enforcement play a major role in how cities function. India has very good laws, rules and regulations in every sphere, but has had a very poor enforcement record. (Usha P. Raghupati, 2015) Smart cities will require strong governance, aided by technology. The different institutions of governance at local level must coordinate and cooperate with each other in unison and not work in silos, as they do today in most cases. There must be information sharing between agencies and departments to improve governance. Political will is as important in governance as

putting systems in place. Elected leaders ultimately determine governance in a democratic country like India. Smart cities should have transparent and accountable governance. Vertical and horizontal integration in governance is the key to managing cities well. (Usha P. Raghupati, 2015). One of the major problems in bringing about any change in Indian cities is the capacity of institutions and individuals are to adapt to and manage change. New technologies and new ways of functioning will require new knowledge and skills. Governance can be improved only when providing such knowledge and skills to the city functionaries becomes a regular and an on-going activity.

City governance and management is not possible without citizens who are central to the managing any city. The administration can and must create avenues for citizens' participation in every sector and every area. Smart cities must have a governance structure that encourages citizens' participation. The citizens' participation must be so as to make the citizens feel that they own the city and be a part of its decision making. However, citizens must also be made responsible for maintaining the infrastructure and services. Providing high-tech solutions in smart cities will require information, education and communication (IEC) to change citizen's behavior and response. The behavior can also be changed by enforcement of laws and regulations.

Technology must empower citizens with information that is useful and usable. Smart cities should make information accessible to all citizens via mobile phones, computers, information kiosks, etc.

- **Challenges and Implications:**

The regional inequality in Indian rural-urban divide and intra-city disparities are a strong barrier to India's urban transformation and economic progress. The concept and strategies of smart city and AMRUT (Atal Mission for Rejuvenation and Urban Transformation) of the present Central Government must be seen in this light. There are many smart cities being proposed for the less urbanized areas of central, eastern and north-eastern India. AMRUT also proposes to cover 500 urban centers out of the 4041 statutory cities and towns in the first instance.

1. However, there are a large number of Census Towns (3894) which are not covered by either of the two programmers.

2. Census Towns are mostly governed by Village Panchayats, which lack resources and institutional capacity but have the potential to act as a bridge between rural and urban areas.
3. The potential of Smart Cities Mission and its convergence with AMRUT and Housing for All may bring many benefits, but there is a need to safeguard the poor and also the slum dwellers that comprise 65 million as per 2011 census.
4. These programs should not be seen in isolation either at the level of governance or at the level of implementation; otherwise they might lose sight of inclusiveness.
5. Smart cities are not meant to widen the digital divide but to help bridge the intra-urban gap as wellas the rural-urban divide.
6. At a deeper Level, this debate over smart cities boils down to a philosophical argument between advocates, ambitious, all-encompassing planning and those who think that a city's solutions are best generated internally on smaller scales.

- **Smart City Proposal – Muzaffarpur :**

Executive Summary: The Muzaffarpur Smart City Proposal (SCP) is being resubmitted for Round III. The proposal has undergone extensive discussions with various stakeholders like government officials, sector experts, private vendors and citizens of Muzaffarpur; suggestions and comments received have been incorporated to finalize the proposal. Following is the summary of the improvised SCP:

City Profile - Muzaffarpur is known as the capital of North Bihar and its strengths include its regional connectivity and locational advantage, and it's functioning as a hub for distribution and processing of the regional agro horticulture produce. There was a clear expectation from the citizens that these advantages should be leveraged to facilitate new businesses and innovative ancillary industries that provided local employment opportunities. However, Muzaffarpur is plagued by water logging, congestion, haphazard growth, neglected natural assets like the river and lake, lack of public spaces and rising crime. In the last 3 years, some of the noteworthy initiatives at city level under implementation include increase in energy availability and reduction in outages; improvements in transport through widening of roads, anti- encroachment drives, preparation of traffic management plan for CBD; augmenting security through installation of centrally monitored CCTV cameras at major junctions. Improvements have been noted in basic infrastructure especially solid waste management that resulted in the city being ranked 1st in Bihar in SBM rankings and sanctioning of a water supply

project. Muzaffarpur has achieved the distinction of being the second highest collector of property tax in the state after Muzaffarpur.

Vision -"Citizens of Muzaffarpur collectively envision a sustainable city, dedicated towards providing efficient and accountable services and good quality of life to its residents and at the same time positioning itself as driver of regional economy." Vision statements has been re-structured, retaining the USP of dual purpose i.e. a concerted focus on sustainable growth of the city and strengthening Muzaffarpur's position as a regional economic driver. Muzaffarpur Municipal Corporation (MCC) submits proposed plan for implementation of this vision. The proposal comprises of interventions at an area level and pan city level selected by the city through various and extensive consultative processes to ensure consensus.

Emerging from the Vision and the strategic directions, the goals that have been re-aligned are as follows:

- REGIONAL - Model of balanced regional development of Muzaffarpur city :

  GOAL 1 : SUGAM - A well- connected city with seamless mobility

  GOAL 2 : SAMRIDH - An economically vibrant and prosperous city

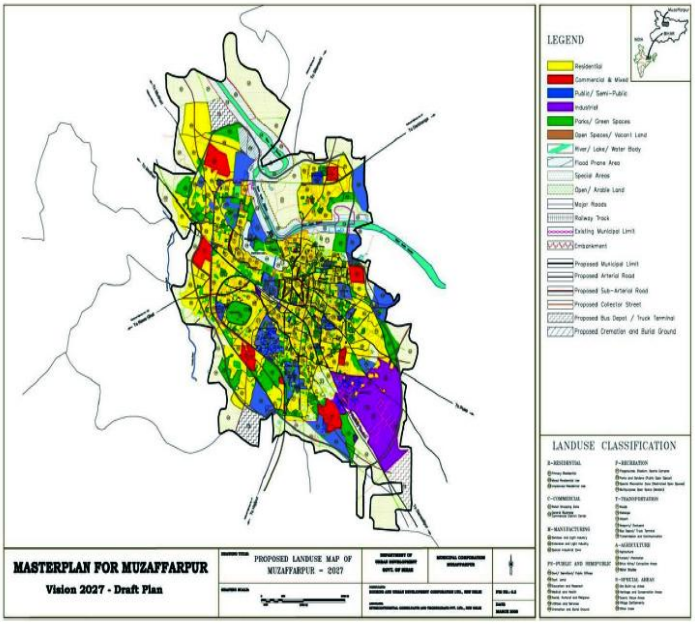
- CITY – Sustainable city with well looked after residents

  GOAL 3 : SUDRID - A well-functioning smart city

  GOAL 4 : SATVIK - An ecologically aware and sensitive city

  GOAL 5 : SATAT - A city steering towards sustainability

  GOAL 6 : SUSHASIT - A city with commitment to excellence



Area Based Development (ABD) : The selected Area Based Development (ABD) site covers about 990 acres located in the northern part of the city and in between the BurhiGandak River and the Sikandarpur Mann lake including the existing residential and commercial areas - the CBD andSuttapatti market and a number of slums. The specific interventions designed around retrofitting in line with the identified goals are as follows:

1. SUGAM : A well- connected city with seamless mobility

a. **Multi-modal public transport system** – geo enabled electric buses and e-rickshaws; renovation of railway station, bus stand, auto/taxi stand into E-Rickshaw stand with charging station, ITMS

b. **Transport network improvement** – roads and junction improvement, place making for on street parking, smart parking/MLCPs , development of new road links, widening of bandh road and road signages

2. SAMRIDH : An economically vibrant and prosperous city

a. Commercial area development – redevelopment of municipal markets, redevelopment of bus stand with commercial space, development of new commercial areas, improvement of 'lahti' (lac bangles), bazaar and Sutapatti market, tourist information centre

b. Skill training – development of sports academy, renovation of stadium with state of art facilities, upgradation of existing training centres, facilitation centre for embroidery and lac product designing

c. Infrastructure for agro-based products – re-development of freight terminal of railway station as logistic hub, cold storage facility, litchi market, zones for urban orchards and urban farming

3. SUDRID : A well-functioning smart city

a. 24x7 water supply with 100% coverage,

b. Underground sewerage system with 100% coverage

c. Underground storm water drains with 100% coverage

d. Zero waste SWM system

e. 24x7 power supply

f. Robust IT infrastructure

4. SATVIK : An ecologically aware and sensitive city

a. River and lake edge development – cleaning, developing an eco-park, urban farms, multi-purpose development, ghat development, rehabilitation of dhobi ghat, boat club, and Open air theatre

b. Optimum utilization of open spaces – plantation, development of new parks, rejuvenation of ponds

5. SATAT : A city steering towards sustainability

a. Alleviation of urban poverty and slums – in-situ up-gradation and development of new housing, primary health centres, slum dwellers information system

b. Upgrading informal sector – improved infrastructure for existing start-ups, solar powered smart kiosks, development of new vending zones, street vendors' information system

c. Affordable Housing – development of LIG and MIG housing

d. Encourage NMT & pedestrian safety – development of pedestrian walkways, zones, public bike sharing

e. Energy efficiency & Green Buildings – Roof top solar panels, GRIHA rated govt. buildings.

f. Policy support – Preparation of regional development plan, mobility plan, street design guidelines

6. SUSHASIT : A city with commitment to excellence

Pan City Initiative - The proposed pan-city initiatives have incorporated IT solutions and present a 'smart' solution to enable city government to address the identified concerns and achieve city vision. The solutions envisaged are:

1. ***Intelligent Transport System (ITS)***– the key components of this are as follows:

a. Command and Control Centre (CCC) – a central command zone equipped with adequate ICT infrastructure mainly for integration of other ICT interventions in urban utilities including traffic and CCTV surveillance in the city.

b. Intelligent Transport Management system (ITMS) – real-time traffic information system, traffic mapping on web and mobile app, dynamic traffic signaling system, incident management system, E-Challan

2. ***Intelligent Street Lighting***– solar powered LED street lights, WiFi, digital signages, pollution sensors

3. ***Unified City Governance***– redevelopment of MRDA building into e-governance center, single window citizen facilitation centres, mobile apps for government services,

creating database and infrastructure for e-learning in government schools, creating database and infrastructure in dispensaries

Finalcial Plan **-** All projects have been detailed with sub activities, related cost, convergence of funds from various sources, date of completion, O&M cost and revenue generation. Attention has been given to detailing the convergence with ongoing central government, state government and externally aided programmes namely AMRUT, SBM, HFA, NULM, SPUR, MukhyaMantriPakkiNaliGaliNischayYojna, MukhyaMantriShahriPayjalNischayYojna, CSR and ULB level initiatives. The total cost of the SCP is INR 1580 crores comprising INR 1268 crores for the Area Based Development proposal and INR 312 crores for the Pan City proposal inclusive of contingency provision and technical / admin support cost of INR 88 crores. Break up of this based on the funding sources for capital expenditure (CAPEX) are:

(i) Smart City Component – INR 980 crores (62%)

(ii) Convergence through GoI schemes and GoB schemes – INR 151 crores (10%)

(iii) PPP – INR 277 crores (17%)

(iv) ULB own funding – INR 172 crores (11%)

The total operational expenditure (OPEX) for the Area Based Development proposal is INR 616 crore and Pan City proposal is INR 412 crore which amounts to total of INR 1028 crores for a 15 year period. Lifetime cost of this SCP has been estimated at INR 2608 crore as compared to ~INR 1632 crore of SCP submitted in Round II. In Round III, proposal has been completely revised through extensive fresh citizen's engagement and review of SCP-Round II by various stakeholders. The City of Muzaffarpur and its residents are united in their ownership of the proposal and look forward to its approval by the MoUD to initiate ground work for a transformed future.

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