Urbanising Punjab – Sustainability and Investment Potential

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Abstract

Economies are transforming and have achieved different stages of economic development over a period of time. Based on different parameters we can evaluate the stages of development. Keeping in view the level of urbanisation (31 per cent), India can be classified into the category of low urbanised countries, however, different states are at different level of urbanisation as per 2011 census. Punjab is one of the comparatively leading developed states but on lower ladder of urbanised states having more than average urban population of the country. There may be fair distribution of urban population in the state of Punjab but urban form and sustainability parameters do not support perceived model that can lead it to the category of developed states in the next two decades. On the pattern of Delhi-Mumbai industrial corridor, Amritsar-Delhi-Kolkata corridor is also announced, at least one new city in Punjab is likely to come up. This paper would spell out framework of modern city and investment potential for the country and the same would be superimposed in the context of proposed modern city of Punjab.

Keywords:
Urbanising Punjab, Sustainability, Investment Potential, Stages of Development, Urban Transformation, Human Settlement, Urban planning

Section I Introduction

Historically societies have been transforming into urban even during BC era, however, size, scale and typology has emerged more specifically during the recent centuries. For example, India was at very low level of urbanisation (10 per cent) at the beginning of twentieth century. At the time of independence, the level of urbanisation in India was below 18 per cent. Apart from the level, which is also important, absolute number has increased very fast and even low level of urbanisation of 31 per cent in 2011, the scale is posing a very serious challenge. At early stages of such transformation, it is easy to plan and allocate capital investment, however, at later stages of development, it is difficult to improve upon the existing structure and moreover community participation is quite difficult. Unless innovative approaches are adopted, mobilisation of capital expenditure remains a difficult challenge and its further distribution among the stakeholders is very critical. Even if all conditions are qualified, the structure of large settlements cannot be fully transformed into comfortable operational model. It is therefore important to plan human settlements from the very beginning, decide its form, planning principles, and execute layout plan by utilising modern and well established
technologies and provide distributive gains to all sections of society by adopting an approach of equity and inclusiveness. The basic principle of urban settlements planning must fully support socio-economic dynamics of the society and affordability should be the prime moving factor to have composite living culture.

The first section of the paper introduces overall context and emphasises on basic principles of planning for sustainable urbanisation. Section two gives brief overview of development literature of urban settlements on planning approach, city form and usefulness of technologies and recent focus of sustainable approach. Section three presents an overview of urbanisation in India and very specifically of Punjab, problematic issues and identify gaps. The last section device strategy and concludes discussion by proposing sustainable planning and investment model.

**Section II Urban Planning Approach**

Greek philosopher Hippodamus is regarded as the first town planner and inventor of orthogonal urban layout. Up to 20th century, for about 25 centuries, he was regarded as father of town planning. The basic principle of orthogonal planning leading to square street block has been widely implemented in most parts of the world. The major focus of planning was to minimise the travel distance and improve circulation by the then modes of transport. The details of urban planning have been worked out and implemented over centuries to improve the health of residents, orientation of buildings was NW-SE to maximise sunlight and achieve social integration.

Sir Ebenezer Howard, urban planning theorist, introduced the concept of garden city in 1898, decentralised working environment and provided healthy living space to factory workers. Garden city planning was influenced by the writings of Alfred Marshall who argued that companies need labour that could be supplied anywhere. Factories have been provided incentives to improve living standard of workers and improve productivity as companies have been bearing the cost of inefficiency due to unhealthy urban conditions in big cities. Garden cities intended to plan self-contained communities surrounded by parks, having separate areas for residence, industry and agriculture. Howard envisaged cluster of several garden cities as satellites of central city, linked by rail and road. The concept of garden city was extended to regional planning and city suburbs. In the early 1900s, cars were introduced to city streets and the concept of safety of residents and especially children for safe walk to school was very important concern.

In the early 1900s, urban planning was supported by professionalism, town planning act, professional courses in the university, operational level, local government board, town planning institute and committees at the highest level to have more organised approach. The twentieth century can be termed as a period of modernism of urbanisation in terms of size, scale, form, use of technologies, better access to modern facilities and social infrastructure. With spread and growth of cities, connectivity to places with city road, rail, and airport was provided. Planning approach of contemporary city was replaced with radiant city that abandoned the class based stratification and housing was assigned by considering family size and not only economic condition.

After World War II, as morale boosting exercise, also to promote better Britain, the concept of decentralisation and Greater London Plan of 1944 was initiated to displace over one million people and settle them in satellite suburbs, existing rural settlements and new towns. The New Town Act 1946 culminated the idea of developing several new towns in Britain. The similar pattern was followed in France, Germany,
Italy, Sweden, etc. There are many examples of new towns in the United States of America including Reston, Virginia, Columbia, Maryland, Jonathan, Minnesota, Riverside Plaza, etc. The urban planning helped in founding several industrial towns in communist countries. Over a period of time, overall emphasis of urban planning was to overcome the problem of crime and social issues. Couple of countries, in place of uniform tower block housing, shifted to individual housing to represent diversity and income disparity. Even cities like Houston, with over 5.5 million people, rejected to follow comprehensive zoning plan, as consensus could not be arrived at.

On the one hand, there has been lot of emphasis on orderly urban planning, on the other, development of cities and towns have happened along with the presence of high percentage of slums and that is posing a very serious challenge to city governments. In view of such developments, emphasis of urban planning is shifting and focused onto reduce use of resources. Urban planning approach has incorporated the concept of transport management. There are numerous examples of successful implementation of public transport at many locations, however, few would be referred to in this section. McKinsey Global Institute reported that on an average, share of public transport in Indian cities has dropped from 40 to 30 per cent between 1994 and 2010, perhaps lowest among most of the countries. Hong Kong leads the world with public transport representing 90 per cent of total modal split in that city. With just 50 cars per 1000 population, Hong Kong’s car ownership rate is among the lowest in the world. It is important to note that Hong Kong is one of the most densely populated cities in the world with 35000 persons per square kilometre while it is still one of world’s top economies having highest per capita GDP. Singapore is another example having modal share of public transport of 59 per cent, likely to increase to 70 per cent by 2020. The ownership of cars is 100 per 1000 persons, lower rate despite city state Singapore is among world’s leading economies. The characteristics of urban transport of both Hong Kong and Singapore can be attributed to sustained policy of integrating land-use planning with transport planning, sound policy and successful implementation of several traffic management strategies. In Amsterdam traffic demand management strategies have been implemented and that resulted in reduction in personal motorised transport. The combined modal share of non-motorised modes including pedestrians and bicyclists stands at 54 per cent and share of public transport has also increased. The city of Copenhagen has reduced car traffic from 22 to 16 per cent while the share of commuters by train has risen from 24 to 33 per cent. Diversified approach to transport solutions and innovative policies can make tangible difference to any city and make it more liveable and sustainable. Adelaide city has used the concept of cross-subsidy very effectively and that in turn helped in increasing the share of public transport. Curitiba city, in Southern Brazil, has used land-use controls that helped to manage city of 1.6 million population, with half million private vehicles, without much traffic congestion. Central Road Research Institute, India, study concluded that of 8760 hours in a year, an average steering time of a car is just 400 hours. Cars are generally parked for about 90-95 per cent of time. Multi-space parking is needed at residence, work place, non-work place trips and road user time and space. Literature survey suggests that management and urban transport planning has emerged as one of the biggest challenges for city planners as well as for ultimate users. During the last two decades, emphasis of urban planning is on sustainable development that can improve long-term social and ecological health of cities and towns. The focus now is on compact, efficient land use, less automobiles yet better access, efficient resource use, low
pollution and waste, good housing and living environment, sustainable economy and community participation and preservation of local culture. Development of new towns emphasised incorporation of nature within a city, pedestrian zones or totally car free areas. For large urban areas, redevelopment process initiated with focus on distress areas. Logical framework as tool of urban planning approach was initially experimented, however, it was contained as experts did not encourage community participation. In US and European cities, public participation was replaced with meaningful participation to have creative outcome to persistent problems.

The process of urban planning emerged as truly inclusive, affected groups were invited from time to time and community had final say in decision making, full government commitment for pooling financial and intellectual resources. Also visual environment got emphasis including signposts, signs, hoardings, locality identity, respect heritage, pedestrians, traffic, utilities and natural hazards. Issues like coastal and flood plain and floods and storm surges, green belt, emergencies and evacuation plan and operational aspects. Further for security of citizens and property, an approach of natural surveillance was adopted to make areas occupied throughout the time. For effectiveness of this approach, citizens are advised to keep lawns of their houses clean and regular repair of windows in order to avoid impression of neglected city areas. In Britain and most countries since 18th century, transformed societies from rural to industry caused a difficult adaptation to urban living.

Developing countries have added higher proportion of slums as the urban policies could not keep pace with growth and fail to address socio-economic reality. Slum clearance, displacement, illegal squatting and lack of services are dominant trend in Africa, Asia and South America.

Few areas of cities are decaying and require special attention. Poor are pushed out to outer areas. Reconstruction and renewal has been focus in developed and developing countries. Preservation of historical monuments, religious and cultural places are preserved and integrated into the new city plan. Masdar city in UAE and GIFT city in India are examples of utilisation of advanced technologies. Saudi Arabia is building 5 new cities and 7 new cities in India to provide facilities like cycling paths, parks and public transport within a 10 minute walk to every office and home. Keeping focus on success on public transport, urban planning attempts to place higher densities of jobs or residents near high-volume transportation routes. Floor Area Ratio (FAR) generally used to measure density and FAR below 1.5 is termed as low density and ratio above 5 constitute high density. Walk-up apartments can achieve a density of three and skyscrapers can easily achieve densities of thirty or more. Environmental planners are focusing more on least use of resources, energy production, waste disposal, etc.

City life has assumed different level of importance with public transport system by incorporating transport policy having innovative technologies, operational and economic solutions. Urban public transport also requires regulatory, organisational, socio-economic and ecological dimension to be addressed. Public transport success requires network planning with high frequency integrated network for all modes and services supported by high quality infrastructure. Public transport should form basis of urban land use planning. Adjustment in frequency should be balancing factor for travel demand and services. Besides, public transport and improved accessibility and integration of foot, bicycle and cars should secure geographic and social coverage.

Another addition to the recent literature is the Venus city project and its focus is to identify inequalities and put
emphasis to overcome scarcity and provide for needs of entire world population. There would be no need for patents or proprietary information since the end goal is not to make money in order to continue working, but to achieve results that are freely and quickly available to the planet’s entire population. It is further stated that it is less expensive to build newer cities from the ground up than to restore and maintain old ones. The new circular cities would provide a total environment with clean air and water, health care, good nutrition, and entertainment, access to information and education to all. Waste recycling, renewable and clean power generating systems, and all services would be managed with integrated cyber dominated methods.

Section III Urban Issues in India and Punjab

Urbanisation in India has experienced rapid growth over the last couple of decades. The land use planning has not been able to recognise the role of transport planning and integration has emerged as one of the serious challenges. Of the total 7935 towns and cities reported by 2011 census, nearly one-fifth have master plan. The large majority of towns and cities have grown and followed the settlement pattern rather than plans are prepared and settlement follows the approved pattern. The master plan approved cities and towns have not been able to resolve as to how to deal with transport issues, what should be form of urban settlements which can suit to use well established technologies, how to maximise benefits by reducing operational costs, as to how to minimise capital cost, etc. Apart from form of settlements, density of population is another important issue which has also not been fully recognised, low density approach has been followed. Land is very precious resource and that has not been recognised except in the state of Maharashtra. All cities and towns that are recognised as planned settlements having approved master plan, are not fully developed as per approvals. Population residing in unauthorised areas is reported to range from 30-60 per cent. There are two cities within one city, that is, planned and unauthorised areas. Planned areas are developed as per the development norms while unauthorised areas have no system and having gross deficiency of infrastructure, people live in shanty conditions, vulnerable to any level of epidemic. On an average, level of infrastructure in general is very poor in most of planned cities and towns. It is all the more difficult to discuss the state of affairs of towns which are not having even physical plans approved by the authorities. The norms and standards of space are not generally followed. The development is happening in a sporadic manner and integrating scattered clusters of so-called planned areas is very difficult. The circulation space is not as per required norms. The congestion is taking place in all towns and cities after automobile revolution of 1990s in India. Laying of infrastructure is also not designed which can take care of requirements of existing population and new addition likely to happen in days to come, may pose more difficulties. The city of Delhi is recognised as one of the planned cities in India, supporting significant percentage of population residing in unauthorised areas.

In case of road development, moment the road is laid or re-carpeted, parties from other department start digging up road in order to identify and repair underground services passing through below it. Piping and perceived requirement of laying of new infrastructure to meet out the requirements of human settlements are not planned, designed and executed. On the one hand, there is expenditure on infrastructure development, on other hand, there is a huge cost of digging, repairing and leaving pot holes unattended for inviting accidents and even deaths. The roads and service lanes
are not smooth to carry out required traffic and deficiencies do cause bottlenecks for meeting out infrastructure requirements of cities and finally services up to mark for citizens. Even after making lot of complaints, municipal governments are not able to address such issues due to budgetary constraints. Slowing down and picking up speed of road traffic cause a lot of wastage of fuel. The roads and lanes built by contractors are not supported by proper drainage system and in this scenario, life of black top road gets reduced to low life span.

Over a period of time, cities have been choked by adding over volume of different typology vehicles. Traffic on Indian roads and streets is mix in nature and speed on road has come down very substantially over the last two decades despite roads are widened and central median has been developed in most of places. The traffic density is very high and city roads are generally choked during peak hours. Due to slow movement of traffic and high density of vehicles, emission level is very high and city of Delhi has achieved special distinction of one of the most polluted cities of the world. Growing city pollution in city is also generating heat islands, metropolitan area significantly warmer than its surroundings\(^{16}\). Queen’s London home, Buckingham Palace is one of the most polluted areas in the country. It is estimated that London compliance with air quality of European standards will only be achieved by 2025\(^{17}\). Mix of slow movement and high speed vehicles are also causing traffic management problems and even causing number of deaths. The pedestrians, cyclist, rickshaw pullers and two wheeler riders are generally victim of such accidents. The absence of adequate facilities of public transport, provision of destination to destination connecting services, separate path way for pedestrian and cyclist are the major bottlenecks of traffic management of Indian roads.

Apart from deficiency of city drainage system, cleaning of drains from time to time, slope of roads is also not generally satisfactory. This component alone causing damage to roads, is draining out major portion of limited budget available with local governments. It is further to add that contracts awarded to executing agencies for road works are generally not supported by maintenance contracts, normal expected life of five years. Therefore, there are perceived gaps at the time of laying of infrastructure as well as of quality as contractors do expect to get contracts on yearly basis to earn livelihood. It clearly indicates that there may be deficiency on the part of government machinery as well as greed of contractors to get work on regular basis in order to maintain high margins and business cashflows. But such kind of pattern and trends are causing lot of inconvenience and loss to citizens. This is one typology of losses but when fatal accidents take place, due to bad road that leads to loss of life, cannot be supported and measured as well. This is one of the reasons of rising level of smoke and gases coming out of vehicles due to bad quality of infrastructure. As adequate spaces are not earmarked during the time of planning, traffic congestion is causing lot of loss of fuel and energy. The form of settlements designed to suit and encourage destination to destination personalized mode of traffic is inducing manifold capital expenditure, maintenance and operation cost. If city form is designed in such a manner that it can help to promote uses of public transport supported by walking, cycling or other such modes and citizens are assured to have public transport within walking distance, capital expenditure on road can be minimised and operating cost can further be reduced to minimal. Cities can be built by reducing or minimizing harmful gases being emitted from vehicles.

The other infrastructure like water supply is often not found satisfactory. Water in manner in which it is supplied in...
most of cities and towns is of intermittent in nature rather than regular supply throughout the time. It has two disadvantages – one, design capacity is meant to supply 24 hour requirements, the same is pumped in 2 to 4 hours, higher capital and maintenance costs and two, it has negative impact on the quality of water as back pressure due to leakages attracts a lot of impurities to supply lines. The consumers at end destination do not get safe drinking water and that leads to medically reported cases to hospitals to the extent of 70 per cent. The end users are losers on account of absence from work places, physical fitness and overall wellbeing, etc. The waste water which is either pushed by sewerage system or channelized through open drainage is also not adequately treated to support good hygiene of citizens. There is small percentage of cities and towns having sewerage system and wherever the system is in place, operational aspects of system are further subject to many doubts. Most of the places, sewerage is directly pumped into water bodies without any treatment. There are many examples of towns near to sea are pumping untreated waste water into the sea, lakes and rivers. The national green tribunal has given notice to government of Madhya Pradesh that there are 56 towns and cities which are pumping raw sewerage and open drainage untreated water into the holy river of Narmada. Further to add that Bhopal city-lake is receiving untreated sewerage water regularly, also one of the sources of water supply. Ganga, Yamuna and other rivers are no exception to such kind of impurities being added to pure water on regular basis. On the one hand, cities are extracting water from ground and depleting water table by non-adoption of water harvesting practices. On the other hand, untreated waste water entering into the ground is causing serious problem by adding impurities to underground water in and around human settlements.

It is generally said that if one household does not have sanitation in city, entire settlement is at a risk of having diarrhea. However, most of towns and cities are generally experiencing the practice of open defecation and are at risk of having health problems. Cities are having a composite culture of rich and poor, urban and rural population mix and that is causing a problem of transformation and adjustment to city living environment. The health and hygiene standards maintained by one section are no more part of life of other section but there is a regular unavoidable interaction of domestic servants, eatable ventures predominantly supported by low paid unskilled jobs. It has very serious implications in terms of maintaining health and hygiene of citizens all over the country. Such examples are not new to India alone but there a good references in literature among the citizens of England who were urbanised after world war-II. Such rich mix of population is having its advantages as well as disadvantages. Advantages of economy and productivity is due to low wages and that is creating space for better talent to perform higher productivity jobs both by rendering household help as well as other ancillary services. Disadvantages pertain to cooking practices, hygiene, disposal of waste of streets and roads, burning of city waste, etc. The cooking of food by lower segment of society is still preferably done by using dead wood as fuel or cutting fresh wood to convert into fuel as well as coal and that practice emits a lot of smoke and gases into air. The poor people who are available for odd services during odd hours primarily security or industrial processes are not fully protected from conditions of heat or cold. Especially during winter season, poor people who work as security guards are generally exposed to cold weather for longer period, particularly in morning hours, they tend to burn wood, paper and plastic material and tyres. Municipal workers who are also from similar socio-economic strata also
tend to broom streets, collect leaves, papers, plastic and other waste material and generally put fire to it to minimize city waste meant for collection and disposal. Since such activities are generally done during early hours in morning, municipal health officers are not much aware to such practices and if informed, pretend about their ignorance and generally do not take any corrective measures. This is normally done as municipal governments do not have adequate capacity to collect city waste on daily basis for disposal to designated destination. City waste is generally not processed due to limitation of facilities and adoption of required technologies. City wastes dumped at certain locations generate methane gas and that is one of very important contributors to bad city environment.

As already indicated in the above discussion, circulation as well as open space is quite limited for performing different essentially required activities, city roads are choked by traffic and city governments have auctioned city road spaces for parking to mobilize revenue through innovative methods. On the one hand, there is limitation of circulation spaces, on other the hand, city governments in so called legal manner do encourage encroachments of circulation spaces in the name of approved parking. If one is able to take an over-view of city roads in early morning, especially markets and work places, road width visibly seems to be more than sufficient while during peak hours it appears that there is hardly any space for smooth movement and flow of traffic. Perhaps this is one of bottlenecks of city form and operational dimensions of emerging urbanisation in India.

City roads and streets are generally having deficiency of city lights. There are couple of problems in this regard including space standards between poles, height of poles, lumens per watt for lighting instruments installed, high consumption low lumen lights and paucity of finances to support electricity bills. City governments generally avoid repair of street lights in order to minimize electricity bills or sometimes do not put on certain lights in order to manage electricity bills in bad financial health scenario. The recent study of city lights indicate that bills for maintenance spares are in range of 50 to 70 per cent of electricity bill for the period of study. The other revealing fact is that in Madhya Pradesh, HT connection electricity charges of urban governments were to the tune of Rs. 2250 million per annum and the same has been reduced by 25 per cent by timely payments and correcting load requirements. If the LED lights are installed in place of old fashioned lights which are available with 5 year replacement warranty, recovery of capital cost can be done within a period of one year. At the same time, city roads can remain well lighted, smooth flow of traffic as well as safety of citizens can be enhanced apart from its by-product of availability of surplus funds at the disposal of municipal governments. It is just a matter of decision making and good governance. The issue of finances as well as application of technology does not seem to be limitation as such. If something is missing in this area that seems to be willingness to do and perception to manage better cities.

City managers hesitate to use technologies for management of traffic and building proof based crime record. CCTV cameras are latest entry in this area. City traffic can be better improved and managed by using such devices, vehicles emitting smoke can be identified, and served challan for over speeding can also be identified as proof for any kind of crime occurs especially during odd hours. Traffic management can help in reducing fatal accidents, reduction in death rates due to accidents and safety of citizens can be improved. Nearly 50 per cent section of population is represented by females, subject to increasingly growing crime and discomfort. Use of such devices and
technology can help in reduction and finally contain crime against women. It is well known fact that major component of activities are generally performed by women and if they are discouraged by any odd attitudes portrayed by the society, their participation would be contained and would cause lot of losses to nations. Therefore, such critical aspects need attention on priority and gender need to be incorporated as part of city management practices.

Apart from infrastructure shortage in cities and towns, housing is another important component that is making lot of dent on better performance and higher productivity. The 12th Five Year Plan has identified housing shortage of 18.78 million dwelling units. There is not even a single administrative unit among 35 states and union territories in the country that has not reported housing shortage. Of total housing shortage, 95 per cent belongs to EWS and LIG while very small percentage belongs to Middle Income Group. In new millennium, government facilitates in provision of law, land and finances and housing construction is largely carried out by private sector. There is hardly any focus of private sector to address housing requirements of the urban poor, that too at affordable prices. As per Deepak Parekh Committee report a house having carpet area from 400 to 600 sqft is identified for EWS and LIG dwelling units while houses below 1200 sqft are identified for Middle Income Group, also termed as affordable housing. Central Govt. budget 2013-14, has provided housing benefit upto loan amount of Rs. 25.00 lakh. There are tax benefits on interest income and that helps in reduction in effective rate of interest on housing loan to nearly 2/3rd of prevailing rates. Such benefits are generally availed by majority of section of a population which is affected by housing shortage of nearly 5 per cent, due to design of such package. Keeping in view this background, government of India launched very major housing programme under the banner of JNNURM in the year 2005 with life span of 7 years by making provision of 1.5 million houses. The target of housing under JNNURM

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<th>STATE/UT</th>
<th>% of Urban Population 2011</th>
<th>% of Slum Population 2001</th>
<th>Housing Shortage million 2012</th>
<th>% JNNURM fund sanction/allocation August 2012</th>
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could not be fully achieved, therefore, time period of this programme was extended for another two years. It is interesting to note that states with higher level of urbanisation (Lakshadweep, Daman & Diu, Dadra Nagar & Haveli and A&N Islands, no funds and Goa and Punjab, low access to funds) have given least preference to access funds under JNNURM as evident from the table above. Recently, government has launched Rajiv Awas Yojana and Rajiv Rinn Yojana to address housing needs of the urban poor. To support this programme, government also announced National Urban Housing and Habitat Policy 2007 which made provision of earmarking 15 per cent of land for housing the urban poor in all housing projects or 20 per cent of FAR whichever is higher. Land being a state subject, state governments have formulated their housing policies with broad perspective of national policy and different housing programmes have been launched by states as well as national government. Currently on-going housing programmes for urban poor are facing limitations of absence of identified land, slow construction, poor quality, price escalation, etc. There have not been many efforts to standardise construction material and there is a wide variation in use of material. Housing technologies used are very primitive in nature and does not address to issue of quality and dwelling units are also vulnerable to natural disasters. Government agencies which decide schedule of rates have not incorporated housing construction material which helps in construction of green buildings, provision of sound and thermal
insulation, earthquake resistance and low use of energy for maintenance of the housing stock. The houses built with prevalent technologies are not suitable to reside without putting much expenditure for heating and cooling of buildings.

The old city areas are also increasing affected due to its typology of narrow lanes and streets. Over the period of time, citizens have added lot of construction by violating norms identified by different master plans. This may include the city of Delhi, Bhopal, Raipur and many others. Except in case of Maharashtra particularly city of Thane, which has used FAR and TDR very efficiently and demolished old construction and created new space standards and better circulation, widened roads and improved other supporting infrastructure. Other cities are yet to follow such practices and especially make efficient use of land as a resource. These issues, by and large, are part of good governance which is generally not appreciated all over the country. The elected representatives do shy away from taking critical decisions to avoid risk of re-election or subsequent tenure while city government machinery to provide support to such initiatives are also not having adequate capacities to perform as per requirements. The institutions do not have adequate finances to hire-in services of private sector and consulting groups. Even if, services are hired-in from external resources, existing institutional framework does not have capacity to evaluate and put forward better planning approach for advancement of city management practices.

The housing services like maintenance, security, fire, regular supply of electricity and necessary back-up, absence of lift in low rise building particularly ground+3 structures are critical areas. The houses are normally allocated based on lottery system and in absence of provision of lift, senior citizens having general health problems relating to old age and other degenerative diseases are not able to have comfortable stay. The up-down movement of people is one aspect, other issues involved relates to access to sun for vitamin D, sunlight, slippery in staircase, etc. cause number of difficulties. There are frequent reports that senior citizens are often victim of violence in hands of servants and acquaintances and even there are cases of murder. There is general lack of security to senior citizens due to absence of adequate support of necessary technologies as well as problems of built city environment. Even children are also victim of different kind of violence and excesses. The buildings which are coming up in these days are mostly high-rise and adequate arrangement of lift, fire and other support infrastructure by municipal governments is posing serious challenge.

Cities are also experiencing the problem of dilapidation and obsolescence. There is a problem of amalgamation and re-organisation of old city areas, to improve stability of structure and give proper access to transport services and other essentially required infrastructure very critical. Old city areas are often encroached and cases of unauthorised construction is commonly reported when some accident occurs otherwise authorities do not keep eyes open to supervise and keep orderly development.

Urban development scenario discussed above in the context of country also broadly holds true in case of Punjab. All cities and towns have the similar typology of problems, scale and intensity varies depends upon population size and physical environment. Urban form as sustainable model is yet to be conceived and placed for discussion. Planning practices, laying mechanism, operational aspects, typology of problems, circulation, congestion, road, drainage, sewerage, solid waste, sparking, pollution, noise, housing, old city areas, etc. are common issues. The percentage of slum population in Punjab is significantly high, i.e. 26.20 per cent, housing shortage of 0.39 million while efforts to resolve do not seem to be reasonable. Projects sanctioned under JNNURM against allocation for housing
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the urban poor are just 51.80 per cent which is extremely low as compared to other states. Despite there is high component of subsidy available from central government, projects have not put up for approval to seek grants. Over a period of time, costs have gone up so high, number of houses to be built under the perceived projects cannot be completed by using limited fund. One can argue that this opportunity has been missed for the time being, however, at the cost of urban poor by urban rich. There are emerging innovative initiatives taken by other states while Punjab seems to be missing on this account also as per PPP status of projects. Maharashtra and Gujarat are leaders in such projects while no reference of PPP projects is found in literature in case of Punjab.

Section IV Framework for new city

Based on literature survey and emerging trend of sustainable cities predominantly using public transport to get rid of city pollution, it is proposed to plan circular or hollow city with 6km radius having circumference of 37.7km. By using 0.75km area on both sides of circumference for settlement having rail and road as lifeline and extended area of 0.25km wide green belt on both ends of outer area, we can have net usable area over 56sqkm, on both sides of central rail/road line. Hong Kong used FAR by accommodating 35,000 persons per square kilometre, while we plan our cities with 30,000 persons per square kilometre then we can accommodated 1.68 million persons, say 1.5 million persons in area of 56sqkm. We can have linear-circular cities by joining all such settlements, for example, from Delhi to Amritsar. The city form emerging from proposed plan would have completely jointed circles, would look like extended Audi car logo. All cities can have linear link by providing station at every 12km for fast access and complete integration with local city through circular route.

If we take average number of vehicles per household by Delhi standard, capital cost of metro rail and road of main artery would be lower than sum of costs of individual vehicles. Cost of operation and maintenance is least in public transport as comparison to individual vehicles ownership. If we plan 18 metro stations, supported by parallel road link, one needs to walk maximum of around 1.75km. For old, handicapped or those who cannot afford to walk, can travel by local electrical operated vehicles, say E-rickshaw or cycle. Entire city road traffic can be managed by using electricity as propelling force. The city of Bangalore has introduced first electrical operated bus that runs 250km on single charging, charging time is 5hrs, and initiative of this nature can help to get rid of smoke from cities.

Area within circular settlement can support day to day requirements of city population by cultivation of multi crops and also work as lung for city. Green belt as well as open areas of useable city space can
have grass and plantation for absorption of pollutants. Citizens, by and large, can depend on public transport except emergency services or inter-city requirements. Electrical operated road and rail public transport service would not generate any pollution in immediate local environment. City dust can largely be controlled by sprinkler by using treated city waste water. Water harvesting can also help in maintaining water table in and around city area. Solid waste from household sector and other sources can be used for generating methane or diesel whatever is most appropriate. While constructing road network, requirements of other networks can be taken care by laying additional underground pipes based on experience of other places. There would be no need for digging of road, time and again and in place of bitumen road, CC road can be constructed along with drainage by ensuring proper slope of road and drains. We need to build separate circulation space for cyclist and pedestrians. Due to climate change, droughts and flooding are expected all over places, therefore extra caution and capacity of system needs to be built. Electrical load of road/street light, pumping machinery, etc. can be reduced to at least half of current demand by using state of art lighting and other equipment. Dark patches in city can be removed by installing efficient LED lights, auto-switch micro-processor based almanac, scada based pumping for water, etc. Repair of street lights can also be done with the help of inverter rather than putting up all lights and wasting energy. Identification of defaulting poles can be done by auto-censor or through citizen reporting mechanism. City can partially generate its own electricity by solar concentrators and other non-conventional sources. Watch and ward can further be strengthened by use of CCTV cameras and other detectors. This can also help in providing security comfort to females, of course, education of counterpart population is very critical in this regard. Female participation on equal footing needs to be incentivised and hostile working environment requires improvements. City needs to be built on 100 per cent sanitation, comfortable number of convenient sanitation required places and education for its use to all required citizens is all the more needed seriously.

Water supply system to be designed for 24X7 for quality assurance and cost saving. Waste water to be treated by deploying small treatment systems, would save cost of long and very big size underground pipes. Yellow treated water can be used through sprinklers to control dust, watering for grass, plants and water harvesting. Solid waste of streets, cutting of plants, grass and other waste of household and other sectors can be collected and disposed of in scientific manner for generation of energy.

Housing including residential, commercial, industrial, institutional, etc. needs to be built on scientific principles by using better technology and construction material. For residential purpose, 15 per cent of land is to be earmarked on principle of cross-subsidy in line with National Urban Housing and Habitat Policy. Adopting this approach, we can construct 35 per cent houses for urban poor on 15 per cent land and have composite culture and get rid of unauthorised development. Service population could be accommodated within one square kilometre area. Houses built by using advanced technology and better construction material can help in saving lot of electricity for heating and cooling of buildings. Quality of city power grid could be improved by better design and material to have net metering system for two way power supply system reducing power storage cost of roof top solar system. All appliances at household and all other levels could be used by following specified norms in order to reduce electricity consumption.
Capacity building of institutions to develop and manage modern city needs to build by specialised training. City state is a dynamic framework and for forward looking approach there is need of training of each and every individual through education and skill up-gradation programmes. With this approach we can have good governance and provide comfort to each individual. Adoption of proposed city form and better development strategy we can have improved governance to support comfortably liveable city. There is further need to do detailing on several areas for micro details of design, implementation and operational plan. This concept of model city protects citizens from pollution and other day to day problems and saves foreign exchange on petroleum products, develop localised dependence on energy. Another area that drains country’s resources includes electronic chip for computer, mobile and other appliances and machinery, estimated to surpass its share in trade over petroleum products by 2025. Though announced plan for this area of concern of Rs.5, 50,000 million, however, proposed city needs to focus on concept of green industries.

**Conclusion**

Based on literature survey, data analysis and field level scenario, one can draw conclusions that we need to build around 100 new cities to accommodate growing pressure of population. There could be approach of right mix of re-development of existing cities, can be termed as brown field cities and new cities or green field cities. The focus of brown and green field cities can mainly centred around transport planning with focus on public transport to propel it on electricity, non-polluting environment friendly and cost effective mechanism. About 80-90 per cent population need to depend on public transport and the remaining should move on foot, bicycle, E-rickshaw, etc. There has to be composite living culture to address socio-economic dynamics of population with improved housing and urban infrastructure and use of advanced technologies for management of city services. All existing and future cities should focus on green practices to get rid of pollution and have improved quality of life. The focus of new investment particularly of industrial establishments should be on non-polluting units and invest to improve balance of trade to yield better results, contain inflation and create opportunities for smooth urban living environment.

**References**