

Issues of Development of *Smart-Cities* in India

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Introduction

The Government of India recently declared that it is going in for development of a 100 'smart-cities' distributed over all states. While it seems to have caught the imagination of the people, it is almost touted as a panacea for all urban problems, which will convert the cities of India into 21st century living utopias; the impression that the underlying, continuing problems and issues of most cities could be resolved by the development of such *smart-cities*, is a fallacy. Without considering or discussing the ground realities that the country as well as cities are in, such announcements and declarations seem to indicate a thinking where it is also imagined that investments in high technology will provide solutions to all problems, no matter how fundamental.

In much of the developed world, the idea of being technologically '*smart*' would imply the use of information and communication technologies (ICT) as an analogy, a substitute or as an extension of a basic sensorial functioning of the human being. The implication would pertain that just as going beyond the *natural intelligence* of the human, to the development of *artificial intelligence* (AI) for computer and software based solutions, so too from the sensorial abilities of the human to the ability and deployment of artificial sensors and effectors would enable to modify the environmental conditions of the space or situation.

In the recent past, in an effort to catch the imagination of the public, the interpretation of the *smart-city* has taken several definitions, even if reasonably tentative. The Government of India's (2014) definition, is:

"The Smart -City offers sustainability in terms of economic activities and employment opportunities to a wide section of its residents, regardless of their level of education, skills or income levels".

Smart Buildings

At a practical level, buildings in the 20th century have acquired and converted all the technologies of speculation, research and invention into necessities of everyday existence. Thus, gradually over the years, buildings have been electrically wired, preliminarily for lighting, and then for elevators, ventilation and air-conditioning, forms of communication – telexes/paging systems, alarms and similar. Later, fire and smoke alarms, television/cable, security systems, closed circuit television (CCTV), the internet and such have gradually been added over the years. In a home, by the use of sensors and actuators, the living conditions in a room such as the lighting levels, the qualities of temperature, humidity, or the sonic environment can controlled to suit the comfort of the resident(s). The sensors identify the existing condition, and modify it to an expected condition by the use of actuators attached to the lighting, air-conditioning or other mechanisms.

During in the 1980s/90s, the concept of *intelligent buildings* became popular, which include buildings wired with sensors and actuators, and which would feed back into a central console, usually located within the building or sometimes remotely; persons involved with building management or maintenance would be able to monitor and control some of these parameters, to know the location where malfunctions were occurring, or be able to remotely control parameters which were outside of acceptable measures, such as security, fire-alarms or similar; though not all would be responsive, issues or problems occurring

within the building could be monitored from the control locations and consoles. Some of the earliest *intelligence* was built into machines such as elevators, fire or smoke alarm systems, electrical and standby generators, or security systems. A central console with these sensors attached would alert the building management or maintenance crew to incidence of critical problems, malfunctioning, for scheduled or timely maintenance; these could also reflect emergency situations like fires, earthquakes, disproportionate loading, flooding or similar.

Similar to *smart* buildings now, some of the earliest *smart machines* were aircraft where it was necessary to prevent the aircraft from developing a malfunction, especially during flight – this is the field of aviation electronics, or *avionics*. Today, they say that flying in an aircraft is safer than travelling in an automobile, and the chances of dying in one is lesser. A typical Boeing 747 has actuators, sensors and about 300-400 km of wiring in it; newer aircraft would have more. This might sound astonishing, but when concerned with air-safety, these are not out of the ordinary.

In parts of the world, *smart-buildings* are becoming part of everyday life (often called *smart-homes*), and offer conveniences to residents like remote access, actuating the lighting, HVAC, temperature controls, TV/radio/music-system/computer and similar, besides monitoring for safety and security; routine controls also extend to daily life like heating up coffee or food, warming the bath, opening the garage door, turning up/down the blinds, turning off the lighting or air-conditioning responding to the presence or absence of a person in the room, and similar. These also have a secondary aspect that it also dynamically monitors the energy use so that only the appropriate amount of energy as necessary for an activity is used, and at the appropriate time, and can switch itself on or off as per the convenience, or to the liking of the residents.

On the supply side of things, the buildings can also generate its own electricity from the use of solar photovoltaic (SPV) panels or wind turbines, only absorbing necessary input from the mains supply when necessary; and even supplying, or selling to the local grid the excess generated. For this purpose, smart meters are attached to the main supply grid, and the usage (or supply) can be remotely monitored from the supplying station.

Electrical Power and Smart Grids

Electricity is a major issue of development in the country. In the earliest days, significant power was generated from hydroelectric power. While this was reasonably seasonal, and depended on the monsoon and similar factors to ensure a steady supply. When urban areas began to undergo power cuts during the hot summer months, the state electricity boards switched to the development of oil- and coal-fired thermal power plants. Subsequently a minimal number of nuclear power plants were made operational to meet the demand of the urban areas like Bombay/Mumbai and Madras/Chennai. Concurrently, part of the reason for lack of power supply was power theft, distribution losses and similar factors and inefficiencies which brought down the available supply; also to be factored in was the fact that there was cross-subsidisation between the various user-types, agricultural subsidies and similar factors which made the differences between demand supply quite complex for the common man. To be compounded with this would be factors like peak demand times, flat rates for all types of supply, variable generative capacities and similar.

Solar and wind-power has been installed in a large way in the states of Gujarat and Tamil Nadu, two states where the abundance of sunshine and wind potential is maximum. While these suffer from issues that it is dependent on diurnal and seasonal variations, in overall terms they have a decent rate of return, and are very clean and renewable sources of energy.

With the enhancement of allocations for power, the current situation is that overall there is sufficient power available in the grid, but the electricity boards are unwilling to purchase this from the Central Grid,

because of the rates that are being asked for. The distribution boards are unwilling to supply power at the rates asked for by the companies that are generating it.

What is envisaged for the future is the use of *smart-grids*, which can be used both by the common man, as well as by the whole range of users, to both supply power to the grid, and be much more flexible in adjusting to the range of users and suppliers. With the advent of the new century, the electrical infrastructure needs much better monitoring and control; part of this can be achieved by the use of smart-meters which can monitor usage in real-time as well as remotely be able to manage supply / demand, or to cut power in case of emergencies like fire, floods, earthquakes or similar (Tongia, 2005).

Development and Smart Urbanism

A question that comes up is whether developing countries should be investing in areas of high technology and cost such as *smart-cities*, as shown in developed countries. As a country progresses especially such as India, should it not be investing more in *sustainable cities* rather, or at least a combination of the two. Worldwide, several countries have gone in for the development of smart-cities, some of which are already almost complete, or up and running – examples are Songdo in South Korea, Masdar City in Abu Dhabi, Singapore, Barcelona in Spain, Portugal, etc. How successful they are has not yet come to be evaluated.

China has already embraced *high technology* as the answer to its problems, and has already declared the development of its smart-cities, and begun its program to develop 103 smart-cities, of which nine are already under development – Taiyuan, Guangzhou, Xuzhou, Wuxi, Linyi, Zibo, Zhengzhou, Chongqing, and Huhan. It can be argued that China's case is not just different, but be considered separately, on the fact that China's political system allows a much different form of decision-making, faster and without having to pass through a public vetting system; since the 1949 Revolution, China was and continues to be in a closed, nationalistic vacuum, cut off from the realities of the exterior world. This it can try to attain because of its ability to have tacit control over its citizenry, as well as to a certain extent over its economy. The reality that built-up space in many '*ghost-cities*' is lying vacant, are high-priced, and possibly out of the reach of the majority of the citizenry. However, such economic disparities are possibly common in the country, and are not economic problems which had been on a high growth trajectory, a major spurt beginning at the time of the 2008 Olympics preparations. The continued construction and expansion, however, did not happen.

As far as India is concerned, its urban population is expected to rise from 27.8% in 2001 to almost 36% in 2020, bringing the total number of people living in its cities and urban regions to 590 million. In this regard, it is important to note that though this is a worldwide phenomenon, and it is something that the country itself is going to face, some of the important questions that many people, including architects and planners are concerned about is whether India is prepared for such an eventuality, and what exactly one can do about it. While basic infrastructure in all cities is already problematic, So too, currently, whether smart-cities are the answer to such a condition. Of course, one of the first missions of the new government has been to project the development of sanitation, with the *Swachh Bharat* campaign.

The announcement of the initiative of smart-cities by the prime minister has been in the belief that it is a solution to the country's ills. The condition of most cities has been deteriorating over the decades due to neglect, partly because of the socialistic inclination of paying equal attention to the rural areas as much as to the cities; such a tendency have over the years tried to pay as much attention to the rural areas of the country; this is not to imply that rural areas and agriculture does not need to be given attention – on the other hand, considering that the bulk of the population of the country lives in its villages, much attention should be focussed in the rural areas. The general rule probably has to be that in a democracy, there needs to be equal attention paid to both the urban and the rural areas. A probable exception is of New Delhi, the capital city – the question really is whether it has been a wrong priority. Many cities have suffered the

neglect – a very typical city is Calcutta / Kolkata – ruled by a communist government for about three decades of the 20th century, the city has suffered significant neglect, both in terms of funds in cash or kind; though some amount of neglect could be attributed to the demands of a state which has not had significant income from industrialisation, even though it was a manufacturing hub at some point in history, has not continued into the modern era. Bombay/Mumbai on the other hand has been the centre of financial capital of the country as a whole, and hence the revenues have been consistently coming in for the city to be a centre for trade and similar. These kinds of disparities has brought about economic disparities in the population of the country as a whole.

A city, they say is an engine of growth, in matters of economy, society and similar. To a certain extent, in terms of an entity, cities as an organism has not been studied very extensively for its own sake, except during the latter half of the 20th century. Indeed, only in the 20th century has the discipline of city planning and design, and similar, become part of the formal areas of study. Till then, it was merely looked at as part of an administrative unit that really would not be of extensive concern to the citizenry.

While the process of urbanisation has been always going on since the beginning of civilisation, the idea that a city is a place of significant importance has taken humanity by much deliberation. It is have existed for millennia in some form, but beginning with the Industrial Revolution, and thence into the 20th century, cities seem to have come into their own. The Industrial Revolution and technology has brought out a distinction of independence from the rates of agricultural growth in a country. Mankind has discovered that with modern machines and technology, a handful of people are sufficient to feed the bulk of the population; nevertheless the dependence on food has not really diminished, but the fact that very few are actually required for its production has become a noteworthy achievement. Today, the USA with the advances in technology and, needs only three percent (3%) of its population to be involved in the practice. Such changes in the 20th century have also been a factor in a section of the population moving to the city, away from the rural areas in search of jobs.

Conclusion

In conclusion, it could be said that the Indian context for the development of *smart-cities*, is still waiting further elaboration and development, much depending on the government's priorities and budgeting. Open questions on such really are whether the new cities need to be built from scratch, or can the existing cities can be upgraded from the current conditions to be 'smartened' to future needs. An alternate concept which has not been fully explored is of *smart-villages* which can be built in rural areas, rather than the development of *smart-cities*; this was a suggestion from the India's recently deceased ex-President A.P.J. Abdul Kalam from almost a decade ago, but which has not yet found realisation.

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