International Journal of Research
Available at https://edupediapublications.org/journals
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 04 Issue 10
September 2017

Efficient Smart Cities

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ABSTRACT

This conceptual paper discusses how we can consider a particular city as a smart one, drawing on recent practices to make cities smart. Paper deal with working model of smart city a set of the common multidimensional components underlying the smart city concept and the core factors for a successful smart city initiative is identified by exploring current working definitions of smart city and a diversity of various conceptual relatives similar to smart city. It also conceptualise major challenges face by cites of today and what are the strategies to be adopted to make the city more efficient .The paper offers strategic principles aligning to the three main dimensions (technology, people, and institutions) of smart city: integration of infrastructures and technology-mediated services, social learning for strengthening human infrastructure, and governance for institutional improvement and citizen engagement. It deals with various dimension of smart city and its impact as well detail out integrative framework to prepare a smart city.

***Keywords*:-** Smart city, Smart technology, Service integration, Infrastructure integration, Governance

Introduction

More than half of the World's population now lives in urban areas[1-3]. This shift from a primarily rural to a primarily urban population is projected to continue for the next couple of decades (see http://www.unfpa.org). Such enormous and complex congregations of people inevitably tend to become messy and disordered places. Cities, megacities, generate new kinds of problems. Difficulty in waste management, scarcity of resources, air pollution, human health concerns, traffic congestions, and inadequate, deteriorating and aging infrastructures are technical, physical or material. Problems of these types are associated with multiple and diverse stakeholders, high levels of interdependence, competing objectives and values, and social and political complexity. In this sense, city problems become wicked and tangled. Ensuring livable conditions within the context of such rapid urban population growth worldwide requires a deeper understanding of the smart city concept. The urgency around these challenges is triggering many cities around the world to find smarter ways to manage them. These cities are increasingly described with the label *smart city*. One way to conceptualize a smart city is as an icon of a sustainable and livable city [1].

Although there is an increase in frequency of use of the phrase "smart city", there is still not a clear and consistent understanding of the concept among practitioners and academia. Only a limited number of studies investigated and began to systematically consider questions related to this new urban phenomenon of smart cities. This paper attempts to start filling this gap by identifying important trends and suggesting research agendas about cities as they invest in new ways to become "smart." By exploring an extensive array of literature from various fields such as e-government, information science, urban studies, and public administration, we identify and discuss challenges, success factors, and impacts of government-driven initiatives to that make a city smart. We identify eight core components of smart city initiatives, and propose an integrated conceptual framework to guide future "smart city" studies.

Some cities are identified to successfully operate in a smarter way to solve concerns. Recent practices to make cities better for living have become successful cases for new city development strategies. We need to learn from the successfully progressive practices of the cities listed below or more. Intelligent Community Forum (ICF)

annually announces cities awarded as Smart Communities, which earns high score in terms of five successful factors to be an intelligent community[2] (i.e., broadband connectivity, knowledge workforce, digital inclusion, innovation, and marketing and advocacy). Table 1 describes the cumulative list of cities (in an alphabetical order) awarded by ICF from 2007 to 2011.Practices in the cities listed up deserve attention. Quebec City in Canada was a city highly dependent upon its provincial government because of its weak industrial base until early 1990s. The city government kicked off a public-private partnership to support the growing multimedia sector and high-tech entrepreneurship. For sustainable urban growth, the City of Riverside in California is improving traffic flow and replacing aging water, sewer and electric infrastructure by tech-based transformation. Estonia overcame post-Soviet economic ruin, and its capital city Tallinn played as a center to economic development, harnessing information and communication technologies (ICTs).

Table 1- List of Smart Cities

REGION	CITIES
Asia	Bangalore (India); Chongqing (China); Doha (Qatar); Gangnam District; Seoul (Korea); Hong Kong: HwaSeong- DongTan (Korea); Hyderabad (India); Ichikawa (Japan); Jaipur. Rajasthan (India); Jia Ding (China); Kabul (Afghanistan); Mitaka (Japan); Shanghai (China); Seoul (Korea); Singapore; Suwon (Korea); Taipei (Taiwan): Taoyuan County (Taiwan); Tel Aviv (Israel); Tianjin (China) Yokosuka (Japan)
Africa	Cape Town (South Africa); Nelson Mandela Bay (South Africa)
Europe	Besancon (France); Birmingham (UK); Dundee, Scotland (UK); Eindhoven (Netherlands); Glasgow. Scotland (UK); Hammarby Sjostad (Sweden); Issy-les-Moulineaux (France); Karlskrona (Sweden); Malta (Malta); Manchester (UK); Reykjavik (Iceland); Sopron (Hungary); Stockholm (Sweden) Tallinn (Estonia): Sunderland (UK): Trikala (Greece)
North America	US: Albany (New York); Ashland (Oregon); Arlington County (Virginia); Bettendort (Iowa); Bristol (Virginia); Chattanooga (Tennessee); Cleveland (Ohio); Corpus Christi (Texas); Dakota County (Minnesota); Danville (Virginia); Dublin (Ohio); Florida High Tech Corridor: LaGrange (Georgia); Northeast Ohio; Loma Linda (California); Riverside (California); San Francisco; Spokane (Washington); Westchester County (New York); Winston-Salem (Carolina) Canada: Burlington (Ontario); Calgary (Alberta); Edmonton (Alberta); Fredericton (New Brunswick); Kenora (Ontario); Moncton (New Brunswick); Ottawa (Ontario); Quebec City (Quebec); Strafford (Ontario); Toronto (Ontario); Vancouver (British Columbia); Waterloo (Ontario); Western Valley (Nova Scotia): Windsor-Essex (Ontario): Winnipeg (Manitoba)
MiddlelSouth America	Barceloneta (Puerto Rico); Curitiba. Parana (Brazil); Pirai (Brazil): Porto Alegre (Brazil)
Oceania	Ballarat (Australia); Gold Coast City (Australia); Ipswich, Queensland (Australia); State of Victoria (Australia); WhitIlesea, Victoria (Australia)

Source.
https://www.inte ligentcommunity.org/index.php?submenurAwards&srcroend

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The city developed a large- scale digital skills training program, extensive e-government, and an award-winning smart ID card. By fostering high-tech parks, Tallinn gains about 80 percent of Estonia's foreign direct investment. Taoyuan County in Taiwan is home to the international airport. It faced powerful competition from other cities. The Aerotropolis initiative makes its economy more robust and improve the quality of living through ICTs. A series of the county government's projects has evolved from *E*-Taoyuan to *M*-Taoyuan to *U*-Taoyuan. A common fact underlies the practices: that is, those cities are meeting a growing demand for more livable cities.

The cities are being labeled with a common phrase: *smart city*. The concept of smart city is not novel, but in the recent years it has taken on a new dimension of using ICTs to build and integrate critical infrastructures and services of a city. The initiatives of making a city smart have recently emerged as a model to mitigate and remedy current urban problems and make cities better as places to live. Hence some view smart city as an icon of a sustainably livable city. Yet, so far we see academics have seldom tackled the practical concept. Considering that, we take an analytic look at the conceptual identity of smart city.

We see commentators confused between visions and basic components of smart city. While a majority of discussions present rosy visions and ideal images of smart city (e.g., smart transportation, smart mobility, smart environment, smart energy, smart safety, and so on)[4], little research has tackled enabling factors of a smart city initiative (what really makes cities smart). Concepts and success factors of smart city have not been discussed with a comprehensive understanding. The discussion of smart city has been made without solid conceptualization.

Figure 1 Diagrammatic representation of smart city

Source- IBM Smarter Cities
<http://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/>

In this sense, we recognize a research gap in the current literature of smart city. Considering the gap, we raise various conceptual questions. What are main characteristics of smart city? In what aspects do people label some particular cities as smart city? Why is smart city being recognized as a novel concept, making distinction from other similar ones? What leads to the success of a smart city initiative? This paper seeks to answer these inquiries, fill the research gap, and conceptualize smart city for both academics' and practitioners' use of that concept.

Defining Smart City

The definitions of smart city are various. As the concept is being known popularly but used all over the world with different names and in different circumstances, there are a range of conceptual variants generated by replacing smart with other alternative adjectives. Hollands [5] recognized smart city as an "urban labeling" phenomenon, particularly in terms of what the label ideologically reveals as well as hides [5]. The label smart city is a fuzzy concept and is used in ways that are not always consistent. There is neither a single template of framing smart city nor a one-size-fits-all definition of smart city. This section seeks to dismantle "the diversifying terrain of smart cities".

Conceptualizing a Smart City

As discussed above, the concept of a smart city itself is still emerging, and the work of defining and conceptualizing it is in progress. The concept is used all over the world with different nomenclatures, context and meanings. A range of conceptual variants generated by replacing the word smart with adjectives

Such as digital or *intelligent* are readily used and reused. Some are recognizing the use of *smart city* as an urban labeling phenomenon, noting that the label smart city is a concept and is used in ways that are not always consistent. Several working definitions (see Table 2) have been put forward and adopted in both practical and academic use. This cacophony of definitions is resulting in calls for conceptual research in this regard [6].

Table 2. Working Definitions of a Smart City
A city well performing in a forward-looking way in economy, people. Governance, mobility, Environment and living, built on the smart combination of endowments and activities of self-decisive. Independent and aware citizens.
A city that monitors and integrates conditions of all of its critical infrastructures, including roads, Bridges, tunnels. Rails, Subways, airports, seaports communications, water power, even major buildings can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens.
A city "connecting the physical infrastructure. The IT infrastmcture. the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city[7]
A city striving to make itself -smarter- (more efficient. sustainable, equitable. and livable)
A city "combining ICT and Web 2.0 technology with other organizational. Design and planning efforts to de-materialize and speed up bureaucratic processes and help to identify new. Innovative solutions to city management complexity in order to improve sustainability and livability.

Managerial and organizational challenges and Strategies

Challenges	Strategies
▪ Project size	• Team skills for successful completion
▪ Manager's expertise attitudes and Behavior	• Well-skilled and respected IT leader (technical and social skills)
▪ Users or organizational diversity	• Clear and realistic goals
▪ Lack of alignment of organizational goals and project	• Identification of relevant stakeholders
▪ Multiple or conflicting goals	• End-user involvement
▪ Resistance to change	• Planning and adaptation
▪ Turf and conflicts	• Clear milestones and measurable deliverables
▪ Adequate training	• Good communication
▪ Adequate and innovative finding	• Previous business process improvement
▪ Current or best practices review	• learning from the experience of others

Source. Gil-Garcia and Pardo [8]

Success factors of smart city initiatives

Drawing on the rich, but quite different, conceptual definitions of a smart city presented above, this paper proposes a comprehensive set of factors that are essential to understanding smart city initiatives and projects. These factors, brought together into a smart cities framework, can be used to study and determine success factors of smart city initiatives or projects. In addition to sustainability and livability, our framework addresses several internal and external factors that affect design, implementation, and use of smart cities initiatives. Our goal is not to produce a set of components to rank smart cities, but to create a framework that can be used to characterize how to envision a smart city and design initiatives, which advance this vision by implementing shared services, and navigating their emerging challenges.

The Meanings of "Smart" in the Smart City Context

Tracing the genealogy of the word *smart* in the label smart city can contribute to an understanding of how the term *smart* is being loaded. In marketing language, smartness is centered on a *user perspective*. Because of the need for appeal to a broader base of community members, smart serves better than the more elitist term intelligent. Smart is more *user-friendly* than intelligent, which is limited to having a quick mind and being responsive to feedback. Smart city is required to adapt itself to the user needs and to provide customized interfaces [9] .

In the urban planning field, the smartness in smart growth is treated as a *normative* claim and *ideological* dimension. Being smarter entails *strategic* directions. Governments and public agencies at all levels are embracing the notion of smartness to distinguish their new policies, strategies, and programs for targeting sustainable development, sound economic growth, and better quality of life for their citizens . They associate smart with achieving policy success in their jurisdictions [24]. The smartness in smart technologies also merits attention. The technologies had permeated into the commercial application of intelligent-acting products and services, artificial intelligence, and thinking machines. Smartness in the technology context implies the automatic computing principle like self-configuration, self-healing, self-protection, and self-optimization. Smart homes, smart buildings, and larger smart ensembles like airports, hospitals or university campuses are equipped with a multitude of mobile terminals and embedded devices as well as connected sensors and actuators[10] *Smart ecosystem* is a conceptual extension of smart space from the personal context to the larger community and the entire city.

Integrative framework

Drawing on the conceptual literature on smart cities and the factors outlined above, we have developed an integrative framework to explain the relationships and influences between these factors and smart city initiatives. Each of these factors is important to be considered in assessing the extent of smart city and when examining smart city initiatives. The factors provide a basis for comparing how cities are envisioning their smart initiatives, implementing shared services, and the related challenges. This set of factors is also presented as a tool to support understanding of the relative success of different smart city initiatives implemented in different contexts and for different purposes. Similarly, this framework could help to disentangle the actual impact on types of variables (organizational, technical and contextual) on the success of smart city initiatives.

It is expected that while all factors have a two-way impact in smart city initiatives (each likely to be influenced by and is influencing other factors), at different times and in different contexts, some are more influential than others. In order to reflect the differentiated levels of impact, the factors in our proposed framework are represented in two different levels of influence. Outer factors (governance, people and communities, natural environment, infrastructure, and economy) are in some way filtered or influenced more than influential inner factors (technology, management, and policy) before affecting the success of smart city initiatives. This counts for both direct and indirect effects of the outer factors. Technology may be considered as a meta-factor in smart city initiatives, since it could heavily influence each of the other seven factors. Due to the fact that many smart city initiatives are intensively using technology, it could be seen as a factor that in some way influences all other success factors in this framework [11].

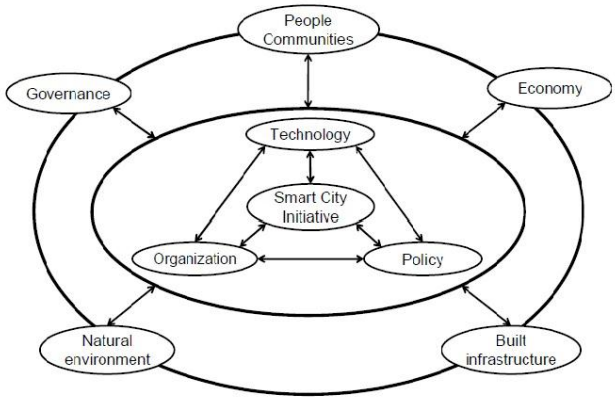

Figure 2 Smart City Initiative Framework

Conceptual Relatives

To build the set of common multidimensional components we need to take a close look at many conceptual cousins of smart city and trace the roots of the terms popularly used. A variety of the labels can be largely categorized into three dimensions: technology, people, and community. The conceptual variants are mutually connected with substantial confusion in definitions and complicated usages rather than independent on each other.

Technology Dimension

There are various cousins of the smart city concept that draws from a technology perspective. ***A digital city*** refers to "a connected community that combines broadband communications infrastructure; a flexible, service-oriented computing infrastructure based on open industry standards; and, innovative services to meet the needs of governments and their employees, citizens and businesses" [12]. Its goal is to create an environment for information sharing, collaboration, interoperability and seamless experiences for all inhabitants anywhere in the city. Williams views it as a sharing of networks. Through digital technologies and wide-area infrastructures/applications, those networks connect organizations, social groups and enterprises located in a city area. For example, Widmayer viewed Chicago as a digital metropolis consisting of large networks. The notion of an *intelligent city* emerges at the crossing of the knowledge society (a society in which knowledge and creativity have great emphasis and intangible, human and social capital are considered the most valuable asset) with the digital city. Malek defined an intelligent city as a city that has all the infrastructure and info structure of information technology, the latest technology in telecommunications, electronic and mechanical technology. According to Komninos and Sefertzi[19], initiatives for intelligent cities make conscious efforts to use information technology to transform life and work within its region in significant and fundamental rather than incremental ways.

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mechanical technology. According to Komninos and Sefertzi, initiatives for intelligent cities make conscious efforts to use information technology to transform life and work within its region in significant and fundamental rather than incremental ways.

In a ***virtual city***, city functions are implemented in a cyberspace concept of being clever, smart, skillful, creative, networked, connected, and competitive has become some of the key ingredients of knowledge-based urban development. The smart growth movement had prevailed during the 1990s, as a strong government- and community-driven reaction to worsening trends in traffic congestion, school overcrowding, air pollution, loss of open space, effacement of valued historic places, and skyrocketing public facilities cost. Smart city resembles some functions of smart growth initiatives as an urban problem solver within or beyond the physical jurisdiction of a community. However, the smart growth concept primarily covers urban growth as the alternative or antidote to spatial sprawl the general implication from smart growth is that the ill planned, ill-coordinated development provoked the smart growth movement. As urban planning based on governance with multiple stakeholders is pivotal to smart growth, smart city initiatives necessitate governance for their success. Given the experiential blurring between cyberspace and material space [21].

The category of the smart city concept comprises the notion of a ***hybrid city***, which consists of a reality with its physical entities and real inhabitants and a parallel virtual city of counterparts of real entities and people. Today some cities are experienced as and constituted within virtual and material spaces simultaneously. However, physical distance and location still have importance for consideration.

A ***ubiquitous city (U-city)*** is a further extension of digital city concept in terms of ubiquitous accessibility and infrastructure. It makes the ubiquitous computing available to the urban elements such as people, building, infrastructure and open space. Its aim is to create a built environment where any citizen can get any services anywhere and anytime through any devices. The ubiquitous city is quite different from the well-known virtual city. While the virtual city reproduces urban elements by visualizing them within the virtual space, ubiquitous city is created by the computer chips or sensors inserted to those urban elements [13].

An information *city* refers to digital environments collecting information from local communities and delivering it to the public via web portals. In that city, many info-habitants are able to live and work on the Internet. An information city is an urban center for commerce, social and civic services, and social interactions among people, businesses and government institutions.

Figure 3 Setup of Smart City

Source- <http://www.smartcities.info/smart-city-memoripng>

Human Dimension

Creativity is recognized as a key driver to smart city, and thus people, education, learning and knowledge have central importance to smart city. The expansive notion of smart city includes creating a climate suitable for an emerging creative class.

A ***creative city*** is one of smart city visions. Human infrastructure (i.e., creative occupations and workforce, knowledge networks, voluntary organizations, crime-free environments, after-dark entertainment economy) is a crucial axis for city development [31]. Social infrastructure (intellectual capital and social capital) is indispensable endowment to smart cities. That infrastructure is about people and their relationship. Smart people generate and benefit from social capital. Smart city is about a mix of education/training, culture/arts, and business/commerce and a hybrid mix of social enterprise, cultural enterprise, and economic enterprise.

A smart city is a ***humane city*** that has multiple opportunities to exploit its human potential and lead a creative life. Focusing on education, Winters analyzed why smart cities are growing, who moves, and who stays. In his view, a smart city is a center of higher education and better-educated individuals. Similarly, a smart city is full of skilled workforces. The knowledge worker and the high tech knowledge-sensitive industries migrate into highly livable communities

A smart city is also a ***learning city,*** which improves the competitiveness of urban contexts in the global knowledge economy. Learning cities are actively involved in building a skilled information economy workforce. Campbell established a typology of cities that are learning to be smart: individually proactive city, city cluster, one-to-one link between cities, and city network.

A ***knowledge city*** is analogous to a learning city. It refers to "a city that was purposefully designed to encourage the nurturing of knowledge". Technopolis and ideapolis, early articulations of a knowledge city, have evolved into digital, intelligent or smart city. The notion of knowledge city is interchangeable to a certain degree with similar evolving concepts such as intelligent city, educating city, or smart city[23].

Figure 4 IT Layout of Smart City

Institutional Dimension

The Smart Communities movement took shape over the 1990s as a strategy to broaden the base of users involved in IT. A smart community should be defined as a community broadly ranging from a small neighborhood to a nation-wide community of common or shared interest, whose members, organizations and governing institutions are working in partnership to use IT to transform their circumstances in significant ways. The concept highlights governance among stakeholders and institutional factors for governance. California Institute for Smart Communities elaborated the concept: "a community in which government, business, and residents understand the potential of information technology, and make a conscious decision to use that technology to transform life and work in their region in significant and positive ways [14]." With a holistic view, a smarter community is composed of not only a more integrated, collaborative, and inclusive "whole" but also of multiple neighborhoods and communities of interest and of kind.

Smart city resembles some functions of smart growth initiatives as an urban problem solver within or beyond the physical jurisdiction of a community. However, the smart growth concept primarily covers urban growth as the alternative or antidote to spatial sprawl. The general implication from smart growth is that the ill planned, ill-coordinated development provoked the smart growth movement. As urban planning based on governance with multiple stakeholders is pivotal to smart growth, smart city initiatives necessitate governance for their success.

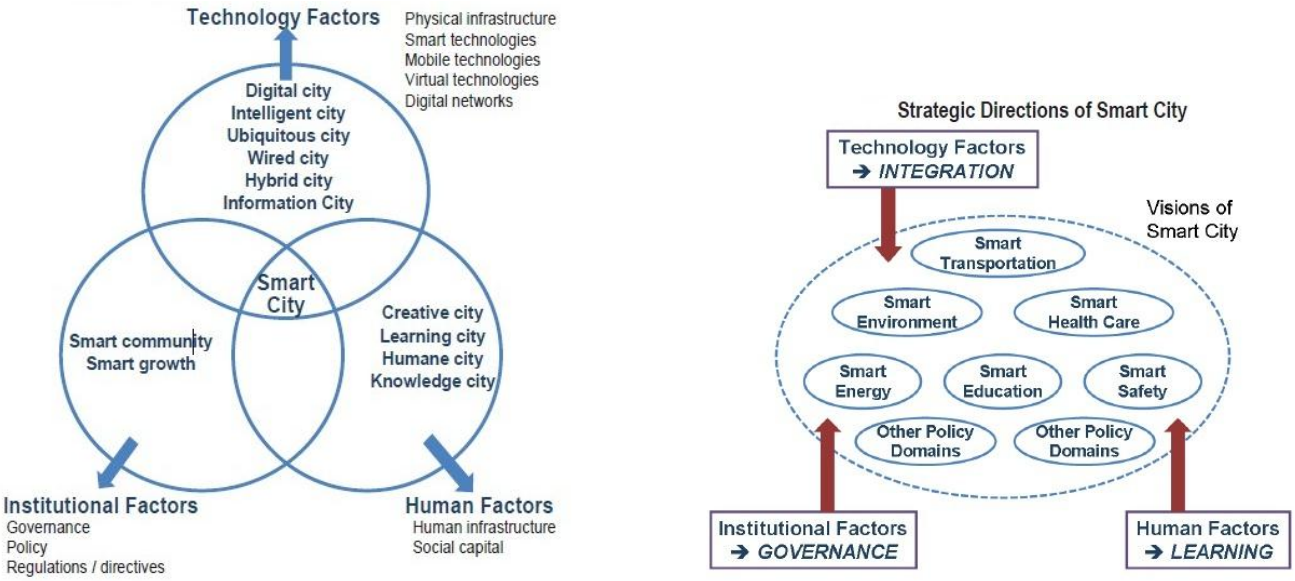

Figure 5 Fundamental Components of Smart City

Strategic Directions in Key Dimensions

This section offers strategic principles for making a city smart in order to realize the various visions specified for diverse policy domains, aligning to the three categories of core components identified in the preceding section.

Integration of Technology Factors

A solution to make a city smarter introduces a new level of complexity. The solution should extend beyond technology, but we should still value the indispensable role of technology. IT is just a facilitator for creating a new type of innovative environment, which requires the comprehensive and balanced development of creative skills, innovation-oriented institutions, broadband networks, and virtual collaborative spaces.

Learning for Human Factors

The emphasis on human infrastructure highlights social learning and education. Towards more progressive smart cities, cities should start with people from the human capital side, rather than blindly believing that IT itself can automatically transform and improve cities. To a substantial extent that is already recognized, the critical factor in any successful city is its people and how they interact. Stronger approaches to awareness, education and leadership offer services that are accessible to all of citizens, get rid of barriers related to language, culture, education, skills development, and disabilities..

Governance of Institutional Factors

Governance encapsulates collaboration, cooperation, partnership, citizen engagement, and participation. Successful cities possess a set of common features. One characteristic is collaboration among different functional sectors and parties (government, business, academics, non-profit and voluntary organizations, and others), and among different jurisdictions within a given geographical region[18].

Why India Need Smart Cities?

Concept of a smart city is a relatively new one. Cities in the developed world are formulating technology master plans and then using these plans to develop a citywide command and control network that monitors and optimizes the delivery of services like power, water, traffic and healthcare. The basic premise of a smart city is making infrastructure network and delivery of services more efficient – across

telecommunication, logistics, water and gas supply.

Indian cities, in a small way, are using advanced technology within departments to solve problems. These include traffic control, using sensors to monitor water leaks, tracking garbage trucks through global positioning systems to ensure they dump their waste at designated landfills, energy management in smart buildings and complexes. Also under development are smart townships that are controlled centrally, and entire cities along the Delhi-Mumbai Industrial Corridor. As these projects expand and mature individually, Indian cities will be ready for technology integration – which is in a nascent stage right now.

Seven new cities [15] coming up along the Delhi-Mumbai Industrial Corridor will also use smart technologies with a total investment of $90 billion over a decade. The government is looking at mass systems and digital technology that cuts across power, water, safety and transport needs. While technology firms are working on digital master plans, the models will be customizable to adapt to Indian realities.

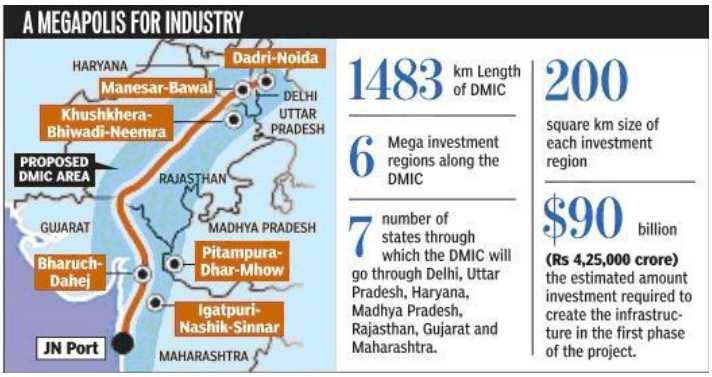

Figure 6 DMIC Corridor

Even in India, there are departments that are beginning to employ smart technologies. *Bangalore's traffic police* have 180 cameras around the city managed from a control room making it the most advanced traffic management system in India. In the power distribution sector, smart meters are gradually being used which have various advantages over the existing electricity meters like real time two communication, anti-tamper capability, remote disconnection and reconnection capability, remote load control, energy loss calculation, automatic energy loss calculation, automatic energy loss alert by text or email, pre-disconnection advice and remote configuration of multiple tariffs. Such meters can store information up to 100 days.

In the state of *Andhra Pradesh*, for example, distribution companies or discoms as they are called have been closely monitoring real time energy losses, voltage levels at consumer end, peak demand and tamper alerts with their own staff. By installing more smart meters, power distribution companies can monitor outage management effectively and time taken for restoration can be reduced. The consumers can also closely monitor their appliance-wise, consumption and plan for load management[22].

M2M Technology

Field trials are going on involving smart water meters that employ wireless modules for radio frequency communications over a metro area network to a concentrator/gateway that aggregates the traffic and then transmits the data over GSM. This is a combination of local and wide-area technologies, smart metering is coming to electricity, gas and water meters in that order. From a machine-to-machine perspective, there is little difference between electricity, gas and water meters. They measure the consumption of separate resources, but there is no reason- no technical reason, why they should not share the same communications network. Data from all three sources can go over the same local area network and be aggregated in the same concentrator and be sent over the same cellular network [16].

There is a massive amount of computing power inside such wireless modules and it can be employed to identify the relevant resource and send the data packets to the relevant utility[20]. In fact, telecommunications service providers can help make cities smarter by supporting machine-to-machine (M2M) and machine - to - machine - to – human (M2M2H) communications. Smart cities demand common open platforms and an information and communication technology infrastructure that can support high speed Internet access across wireline and wireless networks. This infrastructure requires two key components:

• An all-IP core network that can seamlessly integrate wireline and wireless technologies and create a converged infrastructure for buildings and ICT systems

• A broadband access network that can integrate systems through wireless, wireline, copper, fiber and other access technologies.

CONCLUSION

We expect that the elaborated conceptualization of smart city in this paper will contribute to future studies. As we explored multiple conceptual dimensions of smart city, the concept is an organic connection among technological, human, and institutional components. However, social factors other than smart technologies are central to smart cities. Not only technology but human factor also contributes lot for development of city and specifically in smart city human factor plays major role in success of city plan. In this sense, a socio-technical view on smart city is needed. This research will also explore the practical implications of the conceptual model suggested. To that end, we will continue studying smart city by focusing on exemplar practices of smart city initiatives, considering the dynamics of various stakeholders in those initiatives, and discussing policy innovation in city governments.

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