

“Smart City” Definition and ITS Practice in India



Vinay Prakash Shrivastava, Jagdish Singh

Abstract: Smart cities have fascinated the world as the application is emerging as a popular choice for city management in developed countries. And thus, the Indian administrators are lured to resolve their everlasting urban issues through the proposed Smart City Initiatives. The priorities are set as sustainable and inclusive development. But public in general wants resolutions on whatever their most basic immediate need is, which varies city to city, place to place. We have come a long way since inception of Smart Cities in India in 2015, but still the smart city tag creates a doubt as to what exactly it is. Different experts from different domain visualise it from their unique perspective of urgencies and priorities. And consequent models of smart cities world over are different from one another, not only in terms of extent of use of technology but also with the goals set in development. This brings us to the individual pursuit of development and the question, what is smart for us? And then this is a multidimensional question, as it brings numerous intellectual orientations, setting up entirely different perspectives. There are debates on priorities and context and consequently the different opinions tend to dilute the rational of smart cities.

This study covers evolution of smart cities world over for clarity on what is meant out of the Smart City as an Operating System for city or a Development tool and in what perspective. And as there are so many parallel technical aspects and so much of divergent details that a beginner fails to grasp the Smart City ‘pedagogical geography’, this paper attempts to cover most of the terms, classification and types of Smart City framework to bring clarity on what means what.

Keywords: Smart City, Theory, Definitions, Layers, Models, Class

I. INTRODUCTION

In simplest form, Smart City is use of information technology in infrastructure management. The technology use will result in management and control and can range from everyday objects to individual schedule. There is a surprising range of services, technology offers. Evolution of technology has established that it gains momentum slowly but logarithmically and that old gets redundant with innovation, leaving old as debris. So cost, usability, workability, supportability and viability concern the

stakeholders. But in Smart City Mission in India, with absence of a definition, Smart cities are creating confusion with the fears pertaining to purpose, relevance and outcomes. This paper attempts to study and define the Smart City as a Concept.

A. Evolution of Smart Cities

The course of events exhibited beneath demonstrates the presence of different elective ways to deal with the Smart City. From this examination of different ways to deal with Smart Cities, it is comprehended that mechanical elements are important parameters to suitability. Likewise, it raised the issue of reasonability lists in estimating the maintainability of Smart Cities. [1]

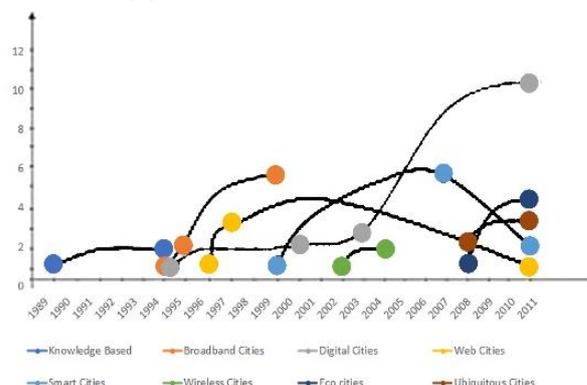


Figure 1: Evolution of Smart City Approaches (Source: Anthopoulos & Fitsilis 2013)

B. Concept of Smart City

The concept of Smart City varies from country to country. Some of the Smart City definitions are: "A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects." Emphasising the cities governance aspect, Ghani (2012) says the concept of "Smart Cities" is "really about good governance. It's about giving basic services to our citizens. It's about livability. It's about how we are using our resources. It is how a city functions on a day-to-day basis. I think smartness is about doing more with less." We can define Smart City as services and infrastructures that are supported by using information and communication technologies. Smartness or intelligence can be defined as the ability to use the information and turn them into knowledge by the help of information and communications technologies.

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Smart city approach can be divided into 6 core domains that carry smart services. These are smart economy, smart people, smart governance, smart mobility, smart environment and smart living.

Ashwin Mahesh says “A Smart City is one in which citizens are co-managers of the city along with public officials” thus highlighting the importance of citizen engagement (NIUA 2015).

Tim Campbell advocates that “Smart Cities need to go beyond technological innovations for improved service delivery” (NIUA 2015) and as part of his blog (Campbell 2014) defines the smartness of cities in three types: “1) cities are learning to learn, 2) cities are learning how to use ICT to make city systems more efficient, equitable and resilient, 3) cities are gaining new awareness about the important role they can play on global issues like climate change.”

C. Definitions

- “A Smart City is a city well performing city built on the ‘smart’ combination of endowments and activities of self-decisive, independent and aware citizens”. -Giffinger 2007
- “A city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”. -Caragliuet. al. 2009
- “Smart City is the product of Digital City combined with the Internet of Things”. Su 2011
- “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”. -Hall 2000
- “Smart City is a city in which it can combine technologies as diverse as water recycling, advanced energy grids and mobile communications in order to reduce environmental impact and to offer its citizens better lives”. -Setis-EU 2012
- “A smart city is a well-defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development”. -Dameri 2013
- “A ‘Smart City’ means ‘smart citizens’- where citizens have all the information, they need to make informed choices about their lifestyle, work and travel options.” -Manchester Digital Development Agency (MDDA n.d.),[2]

D. Smart Cities Definition Analysis

Exploratory research centres around multi-dimensional catchphrase investigation for meanings of Smart City (Caragliu et al. 2009; Kogan 2014; Cavada et al. 2014); a calculated structure (Mosannenzadeh and Vettorato 2014);

meaning of a practical Smart City (Sekhar N. Kondepudi 2014) featuring the significance of existing writing and experimental proof in reclassifying the setting explicit structure for Smart Cities. [3] One instance of a theoretical system by (Mosannenzadeh and Vettorato (2014) will set the setting for the ensuing areas of this examination. The key core value of this system is Kipling's technique for 5W1H (Why, What, Who, How, When and Where), which is viewed as the most fundamental methodology in data assembling and comprehension of writing (Zaidi et al. 2006) identifying with the Smart Cities development. [1]

E. Smart City Theories Studies

Governments world over, are concerned with challenges like quality of life, economics, environment, energy, sustainability, health and safety, mobility and are focused at enhancing city performance. Indian cities are struggling to find a system and Smart City offers exactly that. But Smart City goals and drivers are based on literature and other Smart Cities which vary with choices from a discrete array of objectives, topped up with universal goals like sustainable development. Objectives further vary in features, with stakeholder priorities, varying vernacular situations and available technology.

F. Key Stakeholders

1) Government

The government is the primary prospective client for Smart City Technologies and foremost catalysing stakeholder in the development of the smart cities. When IBM proposed the idea of “Smarter Cities” in 2008, since then, government and enterprises have seen the development opportunity through use of technology, and got involved in the construction of smart cities (Wang 2013). [4]

2) Market

Market as telecommunications operators, domestic and foreign information technology companies participate in smart city construction as smart city business is mounting. [4]

3) Society

Public sector enterprises like colleges, universities, hospital, police, get involved in the development of smart city, and construct smart city in indirect way, which means, they often cooperate with government and market, purchasing their products and services to provide smart city services. [4] (CUPUM 2015 Li, Lin &Geertman291-6)

II. METHODOLOGY

The approach is to successively survey and check the Smart City Concept in theory, International Smart Cities Development, and the Mission in India, through several case studies. The investigation of different view of idea of Smart Cities was done based on their primary objectives and drivers. The investigation is multi-layered and was done in following design, by writing hypothesis and site information of different smart cities.

The inquiries were talked about, in on-site overviews, person to person communication, from where questions were refined, verified and validated in a series of open public and expert sessions to distinguish what are the concepts and what is truly smart for India.

III. THEORY OF SMART CITY

A. Triple Helix Model

The theory of the Triple Helix began around 1995 with the desire to unite the scholarly world and industries for activity investigation on imaginative answers for networks by strategy creators. [1]

1) First Version of Triple Helix Model

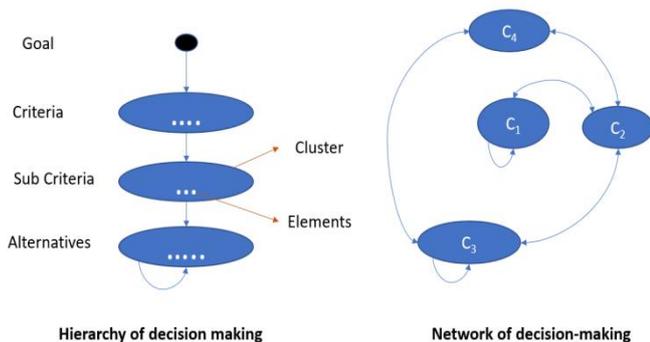
Etzkowitz and Leydesdorff (2000) organized the idea into a model for contemplating both information based and creating economies. The gainful intensity of enterprises and their lastingness as far as arrangement based basic leadership identifying with regions.[5] The Triple Helix model of smart urban communities was presented by (Leydesdorff and Deakin 2011). This model based on the theoretical structure that urban communities are considered as densities in systems inside three critical exercises - the scholarly world, businesses and government. [1]

2) Second Version of Triple Helix Model

A changed of the customary Triple Helix model was displayed by (Lombardi 2011). In Lombardi's words: "This advanced model presupposes that the four helices operate in a complex urban environment, where civic involvement, along with cultural and social capital endowments, shape the relationships between the traditional helices of university, industry and government. The interplay between these actors and forces determines the success of a city in moving on a smart development path." [1]

3) Theory of the Multi-Criteria Decision Framework

The Analytic Hierarchy Process (AHP) hypothesis created by Saaty in 1970 was about cooperative choice making. It structured a choice issue into a progression or a 'lot' of three incorporated levels: objective, criteria and options. [1]



IV. LAYERS AND CLASS OF SMART CITY

Table 3: Layers of Smart City

Layer	Useful in	Less useful in	Service	Lifecycle	Purpose	Platform
User requirements layer	Software, user interfaces and functional technology where users align to planning framework	Broadband and Mobile cities	E-services stakeholders	3–5 years	City specific requirements	ICT & Urban Planning

Figure 2: Hierarchy and Network Models of Decision Making (Source: Sadeghi et al. 2012)

4) Integrated Helix Model

Smart city execution appraisal for 'four EU arrangement dreams of the Smart Cities by 2050' was dependent on ANP (Lombardi 2011). The outcomes demonstrated four helices organizing the innovative city strategy vision. This expects expanding development and inventive potential and accessing developing markets outside its area. [1]

B. Theory of Hexagonal Dimensions

Smart City structures dependent on different measurements have been distributed. In this segment two examinations which have exhibited the instance of the six-dimensional model are dissected. [1]

Table 2: Hexagonal Dimensions of Smart City (Source: Giffinger et al. 2007)

Smart Economy	Smart People
(Competitive)	(Social and Human Capital)
Innovative spirit	Level of qualification
Entrepreneurship	Affinity to lifelong learning
Economic image & trademarks	Social and ethnic plurality
Productivity	Flexibility
Flexibility of labour market	Creativity
International embeddedness	Cosmopolitanism/Open-mindedness
Ability to transform	Participation in public life
Smart Governance	Smart Mobility
(Participation)	(Transport and ICT)
Participation in decision-making	Local accessibility
Public and social services	(Inter-)national accessibility
Transparent governance	Availability of ICT-infrastructure
Political strategies & perspectives	Sustainable, innovative and safe transport systems
Smart Environment	Smart Living
(Natural resources)	(Quality of life)
Attractivity of natural conditions	Cultural facilities
Pollution	Health conditions
Environmental protection	Individual safety
Sustainable resource management	Housing quality
	Education facilities
	Touristic attractivity
	Social cohesion



Figure 3: Six-Dimensional Model (Source: Giffinger et al. 2007)

Network layer	Data communication technologies through Ethernet transmissions, leased 'point to point' services and fibre to the premise (FTTP)	-	Network, information systems	5–10 years	Network applications	ICT
Transmission layer	Cabled or wireless Transmission infrastructure	-	Network, information systems	10–15 years	Application and transmission	ICT
Infrastructure layer	Above and below ground space and the infrastructure, but must attend environmental concerns	Virtual and Knowledge based cities	Network, information systems	15–30 years	Civil Engineering Works	ICT & Urban Planning
Service layer	Citizen's E-service like e-business, intelligent transportation, e- democracy services	Virtual cities	E-services stakeholders	10–15 years	Smart City E-Service	Urban Planning
Data layer	Information, maintenance and updating of information	Broadband and Mobile cities	Data	15–30 years	Smart City E-Service	Urban Planning

A. Grid Layers of Smart Cities

The layers of a Smart City are requested dependent on the idea of the advocate of the Smart City venture, explore study or arrangement program. Comprehensively these are structured around the city frameworks and go about as basic leadership stages. [1]

1) Layers Based on Information and Communication Technology

The Smart City execution model displayed by (Goff 2013) features data and correspondence innovation (ICT) as a key part and further subdivides it into four layers as per the lifecycle course of events. [1] Namely, User requirements Layer, Network Layer, Transmission Layer & Infrastructure Layer

2) Layers based on Urban Planning Framework

With the Campbell (1996) triangle of clashing objectives for arranging as the structure and elective Smart City approaches as the system Anthopoulos and Vakali (2012) introduced the accompanying four-layer conventional engineering. [1] Namely, User Layer, Service Layer, Infrastructure Layer & Data Layer

3) CISCO Smart City Framework Layers

The CISCO Smart City Framework is introduced as a choice procedure that encourages the usage procedure of Smart City activities in a successful way for both open and private partners. The round progression of data inside the four layers of the CISCO system (Falconer 2012) with city targets as base outcomes in an input circle for city partners.[1] The layers are: City Objectives Layer, City Indicators Layer, City Components Layer & City Content Layer.

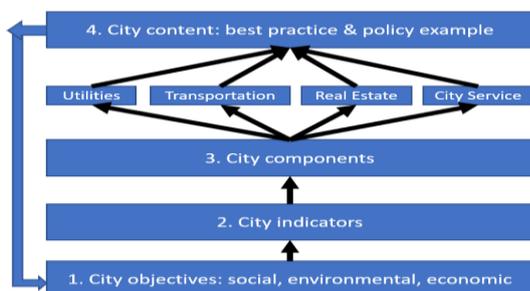


Figure 6: CISCO Smart City Framework Layers (Source: Falconer 2012)

4) Layers based on Future Internet Technologies

The advancement guide exhibited by Komninos et al. (2011) features a progression of topics at the crossing point of

future web advances and Smart Cities. It centres specifically around improvements and the effect of three principle Internet-based advances: distributed computing; certifiable UIs of sensors, labels and RFIDs; and the semantic web. [1] Two-dimensional Mapping incorporates layers and time spans. The vertical measurement thinks about the accompanying layers: mechanical change, business change, arrangement change and social change. The time measurement incorporates the present moment, mid-term and longer-term advancements.

5) Layers based on Intelligent Transport Systems (ITS)

This model is a result of the examination titled “ICT concepts for optimisation of mobility in Smart Cities ” directed for the European Commission by Böhm et al. (2012). A fundamental suspicion of this model is that Smart Cities are empowered by ICT for detecting, breaking down and incorporating data frameworks. [1] The normal specialized engineering proposed for ITS and Smart City incorporates the accompanying four layers:

- *Perception layer:* gets data of all segments of the foundation with sensors, actuators, labels and per users.
- *Network layer:* empowers information transmission among sensors and actuators and the application bolster layer by utilizing either wired or progressively frequently remote associations
- *Application bolster layer:* gives gigantic information handling capacities by utilizing distributed computing
- *Application layer:* examinations and procedures information identified with natural observing and smart transportation. [4]

6) Layers Based on Data

This model by Hawkins (2014) depends on essential components and presents the fundamental segments of the smart arrangement. This straightforward smart arrangement structure extensively comprises of the accompanying components: equipment and smart programming with supporting regular components like start to finish security, control arrangement, nearby correspondence ways, and information quality and veracity.[1]

Layers of simplified Smart Solution Framework:

Hardware: Working together with framework, a mix of gadgets, sensors, chip and correspondences innovation enable the components to end up mindful of their condition: [1]

- Infrastructure
- Devices and Sensors
- Embedded Processing
- Wide Area Connectivity

Smart Software: Smart Software supplements and use the information originating from physical equipment and goes about as the core of any smart arrangement. [1]

- Data Management
- Analytics
- Optimisation and Control

Supporting Elements:

- End-to-end Security
- Power Provision
- Local Communication Paths
- Data Quality and Veracity [1]

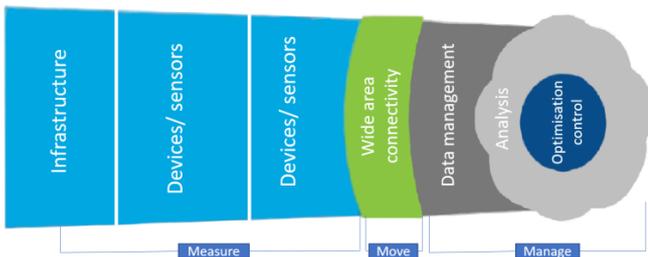


Figure 71: A Simple Smart Solution Network (Source: Hawkins 2014)

7) *Layers based on an Integrated Approach*

This model spotlights on the coordinated system and is proposed by Chourabi et al. (2011) in light of writing from different disciplinary regions. The accompanying eight basic variables of Smart City activities were recognized to build up this model: the board and association, innovation, administration, arrangement, setting, individuals and networks, economy, manufactured framework, and common habitat. The figure below clarifies the connections and impacts between the recorded elements and activities. [1]

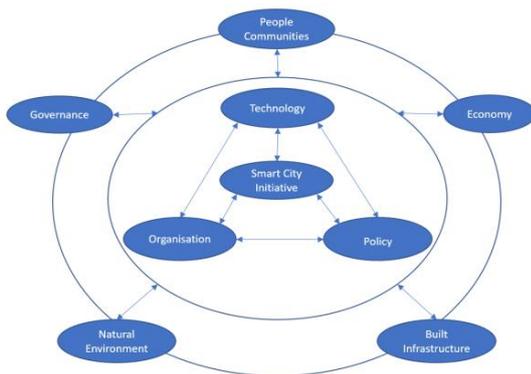


Figure 8: Smart City Initiatives Framework (Source: Chourabi et al. 2011)

8) *Layers based on Integrated Solutions Framework*

This model depends on the Kessides (2013) Future Cities Demonstrator Program call for tasks that incorporate city frameworks at an enormous scale. The point of the program was to finance one city to empower it to make its vision a reality. The recommendations included genuine difficulties that urban areas are confronting and the arrangements. [4]

The following are the four layers that were derived from the proposals for analysis:

- Organisation
- Infrastructure
- Platform
- Systems applications

Citizens	Local Authorities	Business & 3 rd Parties	Academia	Healthcare Institutions
Wi-Fi Network 16/30 Cities	4G Broadband Network 6/30 Cities	2G/3G Mobile Network 5/30 Cities	Sensors	Smart Meter/ Grid 16/30 Cities
Smart Card/ NFC 10/30 Cities	GPS/ Satellite 8/30 Cities	Heat Network 7/30 Cities	Space 6/30 Cities	
Web-based/ Virtual Platform 26/30 Cities	Open Data Platform/ Hub 23/30 Cities	Data Platform 9/30 Cities	In-home Device/ Interface 7/30 Cities	
Energy 20/30 Cities	Water 7/30 Cities	Transport 25/30 Cities	Community 2/30 Cities	Health & Social Care 21/30 Cities
Local Economy 26/30 Cities	Buildings 10/30 Cities	Education 12/30 Cities	Environment 21/30 Cities	Housing 2/30 Cities
				Safety & Security 7/30 Cities
				Waste 7/30 Cities

Figure 9: Integrated Solutions Framework Source: Kessides (2013)

9) *Layers Based on City Development Growth Model*

The execution methodology of this model as referenced in its short is an option in contrast to unbending arrangements upgraded to anticipated needs by giving adaptable framework arrangements because of the regularly changing needs of requirements.[1] City advancement is a persistent procedure with gradual development at each stage characterizes city development as a three-organize procedure comprising of development, development and reproduction. They additionally redevelop to fulfil the changing desires for occupants, who may some way or another move.

Layer	Growth Stage	Maturation Stage	Reconstruction Stage
Infrastructure	A base for industry and lifestyles	Additional investment and expansion	Renewal and maintenance
Transportation	Mass transit such as railroads	Private cars	Collaborative multi system transportation
Energy	Supply that needs growing demands	Stability to meet emergencies	Efficient supply of multiple sources
Lifestyle	Living essentials	Quality products and services that reach satisfaction	Services that born people and of a social benefit

Figure 10: Layers Based on City Development Needs (Source: NEC (n.d.))

B. Class and Types

The scope and type of smart cities vary greatly as well as their meanings and contexts. Smart cities could be cross classified by strategies, scales, motivations, financial models, ownership, or interior, Greenfield or Brownfield, business model or driving industrial sector, or driving technology as:

- **CLASS I:** Smart city of full sustainability, urban Greenfield project with global smart city plan, all functional areas and all aspects of urban life are covered by an all-encompassing and all-inclusive Master Development Plan.
- **CLASS II:** IT projects of various scales (u-cities, with all-IP citywide network with comprehensive smart city platforms intelligently connecting networked devices, machines and vehicles to create an urban Internet of Things infrastructure, no global smart city plan.
- **CLASS III:** Private or public fragmented urban projects, with no global smart city plan.
- **CLASS IV:** IT smart city refers on information and communications technologies, including mobile networks to improve the quality of life of its citizens in a sustainable way. It combines and shares disparate data sets captured by intelligently connected infrastructure, people and vehicles and provide ubiquitous services.

C. The Techniques commonly found in Smarts Cities around the World [8]

- E-Government services
- E-democracy services
- E-Business services
- E-health and Tele-care services
- E-Security services
- Environmental services
- Intelligent Transportation
- Communication services
- E-learning and e-education services

D. Eight different Smart City categories around the World

- Web or Virtual Cities
- Knowledge Bases
- Broadband City/Broadband Metropolis
- Mobile/Ambient Cities
- The smart city
- The Digital City
- The Ubiquitous City
- The Eco City [9]

V. INDIAN UNDERSTANDING

A. The Development of Smart Cities in India

In India, smart urban areas are progressively centered around the urban issues, and give less consideration on the utilization of innovation. With 20 affirmed undertakings of smart urban communities, this investigation is on how smart city idea has been comprehended in India. The goal is to comprehensively survey and to comprehend points of view of different partners. While a greater part of exchanges present definition, vision, and attributes of smart city, little research has handled entertainers in creating smart urban areas (what truly makes a city smart). Understanding entertainer's inspiration and job can help to investigations existing issues and potential dangers, and discover new answers for guide further smart city's development. This investigation will at long last rundowns encounters on the beginning and comprehension of smart urban communities and giving the genuinely necessary clearness to improvement.

The region-based methodology of the Ministry of Urban Development, which is coordinated towards rejuvenating existing urban areas through a methodical improvement of whole living situations, is probably going to be an interesting commitment to the historical backdrop of smart city advancement.

- Objectives of Developing A Smart City
 - Steps to be taken for converting city into smart city
 - Probable list of projects where smart city concepts has been used worldwide
- Define City Model with City Specific Needs
 - Structure of city
 - Priorities of city
 - City systems and gaps
 - City infrastructure & gaps
- City Economy
 - Development of city economy
 - Means to develop city economy
- Resilient City Concepts
 - Livable city – increasing space for people
 - Improvement driven systems
 - Work with other systems

VI. APPROACHES IN EVOLUTION OF SMART CITY

Every aspiring 'smart' city has chosen its priorities and built a system based approach through organised layers as model for city management, as discussed above. Based on the Smart City Concepts and Class, International Smart Cities have aligned themselves on one of the following design approaches, based on their need and suitability.

A. The Smart City Initiative Design (SCID) Framework

The SCID structure is an answer intended to address the absence of a solid plan system for Smart City Initiatives. It determines real parts of Smart City Initiatives and how the activities can affect explicit arrangement areas of City Governments. The applied model portrays the centre parts of "Smart City Initiatives" that are of intrigue and how these viewpoints relate.

1) Overview

In line with the conceptual model, there are six major elements of the SCID Framework –

- *Smart City Initiatives* – specific smart city related project or program to be implemented,
- *City Policy Domains* – related set of city aspects to be impacted by the initiatives,
- *Stakeholders' and City Transformation Outcome* - expected impacts on the city as a whole and desired results by wider Smart City stakeholder groups,
- *Enablers* – partnerships, institutional and governance mechanisms required to address critical factors and challenges,

- *Critical Success Factors* – set of conditions that significantly contribute to the success of Smart City initiatives,
- *Challenges* – difficulties that policymakers may face in implementing Smart City initiatives.

At a practical level, each element of the SCID Framework provides multiple choices to the following policymaker's questions about Smart City initiatives:

What kinds of outcomes could city stakeholder desire? What aspects of City life should be transformed for the desired outcomes? What types of Initiatives can be pursued for expected outcomes? Which objectives can be set for these initiatives? What factors contribute to successful Smart City initiatives? What are the common difficulties faced by managers of Smart City initiatives? What are the typical mechanisms deployed to address success factors and challenges in Smart City initiatives? [5]

2) *Objectives of Smart Cities Initiatives*

Across all cases studied, we observe that smart city initiatives in general aim at:

- Attaining high quality living condition for citizens; Ensuring peace, social congruity amongst all citizens; Developing inclusive social approach; keeping the development as citizen centric. Attending citizen comfort and concerns while enhancing economic activities for city development;
- Developing city as a Sustainable Model; and Listing, organising and resolving challenges and issues for optimisation and efficiency for achieving vitality, proficiency in the city, based on data on resources and priorities;
- Developing best in class data framework available to all; Leveraging ICT to create specialty enterprises, for example, those identifying with interactive media or information-based industry; evolving city as living research centre to upgrade by itself.

B. Theory of Organizing Knowledge

As referenced in Facloner (2012), scientific classification empowers urban areas to benchmark substance dependent on the progressive system of physical city segments, and encourages a Smart City Framework to see how urban areas work. The result of typology and geographic investigations uncovers two key viewpoints in understanding the methodology received and area of the cases thinks about, individually. [1]

1) *Typology Analysis*

This methodology alludes to the idea of the examinations, which is hypothetical and top-down or observational and base up.

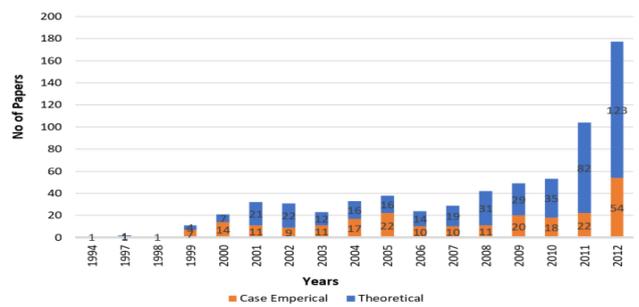


Figure 4: Typology analysis - Theoretical versus Empirical studies (Source: Cocchia 2014)

On account of Amsterdam Smart and Digital City the typology investigation demonstrates an instance of contention in the idea of methodology received inside the setting of a similar city. [1]

2) *Geographic Analysis*

A geographic investigation of the 162 exact contextual analyses by Cocchia (2014) exhibited the area of the smart or computerized venture over the globe. The Asia district is trailed by Europe in runner up for the most noteworthy number of exact cases with urban areas from China in the top position. [1]

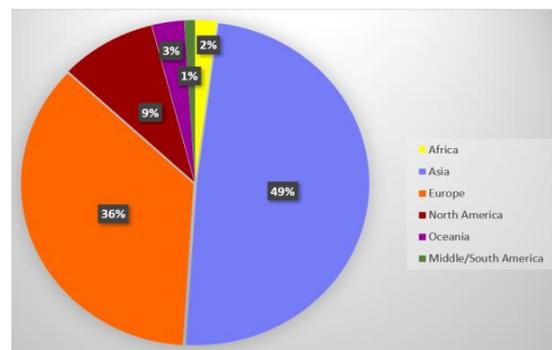


Figure 5: Smart and Digital Cities Geo-location (Source: Cocchia 2014)

C. Theory of Strategic Priority Areas

A Smart City structure depends on need zones which are explicit to the city's specific circumstance. Extensively, the need territories can be sorted into Political, Economic, Technology, and Environment dependent on a compressed rendition of PESTLE examination. The strategic priority areas are: Political, Economic, Social, Technology, Legal and Environment

VII. INTERNATIONAL UNDERSTANDING

With the rapid expansion of urban population, developed countries began use of innovative information technology. 'Smart cities' intend to resolve that urban issues, like shortage of vitality assets, human services, lodging, water, and streets, schools and transportation.[5] Different countries have aligned their models as per their goals. Having excelled in mass industrial production, China intends to graduate cities to nursery of knowledge. United Kingdom is steered towards organised knowledge approach in infrastructure.

The United States trusts technology to resolve complex problems, to the extent of use of Artificial Intelligence. South Korea has identified the unique purpose for it to become a city competitive in chosen sector. Technologically advanced Japan has old infrastructure and spatial challenges. So it best uses technology in redevelopment with adaptive planning arrangements with change in situation and requirement with great efficiency and optimization of resources. While there are cities which attempt technology and sustainability in different perspective, it is evident that smart city technology is a tool and falls in line with the city objectives.

VIII. RESULT AND DISCUSSION

The urban masses in India extended from around 27.8% (286 million) in 2001 to 31.2% (377 million) in 2011 [4] and is assessed to create to 40% by 2030 and over half by 2050. India’s Smart Cities Mission (SCM) is a national action by the Ministry of Urban Development (MoUD) to produce a foundation for 100 sharp urban regions in five years (FY 2015-16 to FY 2019-20) [11]. Regardless, the SCM does not demonstrate the specific characteristics that ought to be consolidated into a “Smart” city. The United Nations assesses that by 2030, over 60% of the overall people will live in urban networks or per urban systems that are continuously pressed in Asia, Africa, and Latin America [12].

A. What is a Smart City?

Cities need to take decisions on the basis of facts and figures, which are available as data through various sources including stakeholder’s smart phones. So, Smart city is a city that uses Information Technology for optimisation and efficiency for decisions in planning, operations and maintenance. A smart city goal setting is advanced in infrastructure, sustainable real estate, communications and market viability. Information technology is the principal infrastructure that gives essential services to residents and uses its resources to its full potential. Smart city in almost all the applications world over covers the six dimensions of cities which are people, governance, mobility, economy, environment and living. These exist with varied mix of attributes of following planning objectives, namely, Sustainability, Resilience and City Competitiveness. The definition of Smart City is in agenda setting rather than global settings. This calls for context setting of development of cities, graduating step by step from Class IV to Class I Smart City. To be really smart, the city needs to know itself well, which means it needs to be data ready, for analysis and decision making.

Table 1: Attributes of Smart City Planning Objectives

ASPECT	SOURCE	MEASURED BY	COVERAGE	REMARKS
Sustainability	Urban Planning Perspectives	Parameters of city performance	Complete	Too many aspects to take care. Limited in resources and limited in tax paying capacity of citizens.
Resilience	Urban Planning Perspectives	Parameters of city performance	Issues	Emergency Response system is retrospective as we have too many vulnerabilities and at too many places.
Adopt Urban Innovation with Technological solutions	Technological Interventions	Impact in city systems	Issues	Lack of Resource and Coherency
ICT establishment for accurate information for better decisions	Modern Electronic Technology	Internet-of-Things standards	Complete	ICT are interpreted as the extent to which an economy uses information and communications technology to improve efficiency, and productivity as well as to reduce transaction costs.

There is no confusion in above listed objectives, based on city agenda, situations and resources, if clear to administration, in purpose of the city planning, the decision remains only in extent of use of technology.

Table 5: Smart city Challenges and Approach

This section provides answers to the type of outcomes desired by stakeholders of Smart City initiatives. Recognition as good practice exemplars featured prominently	<ul style="list-style-type: none"> • Aesthetic value • Recycling take-up by residents and businesses • Green space per residential unit • Recognition - ranking and designation as best practice exemplar • Adoption of organic food 	Energy	<ul style="list-style-type: none"> • E-Vehicle adoption • Level of biogas production • Use of wind energy • Energy usage reduction • Petrol usage reduction
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B. If India is going for Smart City

- 1) *The Opportunities:* To realign with international standards in infrastructure, with evolution of a system and to be competitive, generating of employment with rationalised gap in infrastructure and affordability.
- 2) *Platform to achieve Business Growth:* A city in terms of its being smart in meeting its needs, through stakeholder consultation to suit their requirements and development. And the city will have system applied laws and thus people are obedient to the system.

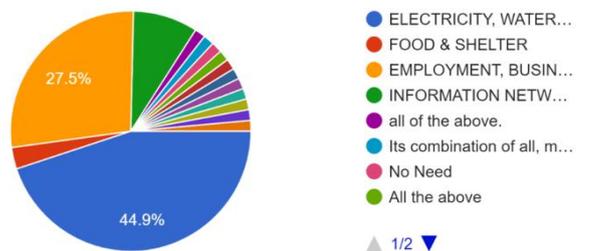


Fig:11- The priorities for design of smart cities (69 responses)

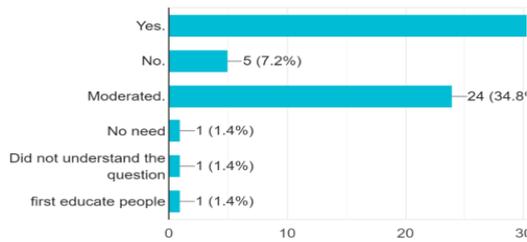


Fig:12- The inclusiveness of all willing incoming population (69 responses)

C. Issues in Smart City Proposal India

We had several talk sessions on Smart Cities and it deviated to gaps in infrastructure and poor administration. In city level discussions on requirements of a Smart City, the overall ecosystem, an array of identified issues in smart city proposal,

1) At City Level

- Do we really need smart cities? A determined segment of people wants to put it down.
- Engineering challenges in maintenance of public transport, spaces, buildings, are actually economic challenges and public reluctance.
- We want to retain our association with our land, in cities and villages, the landscape and our past associated. Every city has its own uniqueness in this aspect which is appreciated by its citizens, which makes them feel happy.
- We expect the Smart Cities to be inclusive and environmentally sustainable, maintaining their rich culture.
- Cities are personified as torch bearers of culture. Conservation of heritage is important aspect to retain the identity.
- Need to promote social inclusion

2) At National Level

- Smart City Pursuit (and not mission).
- Cities are failing in sustaining with ever increasing population.

3) At International Level

- We can correct our mistakes and we can aim at sustainability.
- Have to improve our skills for better productivity and be city competitive, because Cities are competing.
- There is a conflict at Implementation of Law. Variation from conventional master plan-based development.

D. Boundaries and Scope

Strictly related to the land component of the smart city concept, the boundaries define the area on which the smart city projects and initiatives are placed. The simplest point of view considers the boundaries of the smart city corresponding with the administrative boundaries of the city. However, several others solutions are possible [13], and we can dispose them on a scale from the smaller to the largest one,

considering: city, region, city networks, nation, and the global view. The choice generally depends on the role of public local government on the territory and on its capacity to drive and influence the creation of public infrastructure for smart city implementation. However, we should consider ICT to overcome the physical and geographical boundaries, creating virtual cities and communities, far from the traditional concept of city.[14]The Internet permits also to create relationships among smart cities and to build city networks, able to replicate best practices and to gain higher returns from investments in smart initiatives, thanks to scale, scope and learning economies. [15] But cities do not grow in a vacuum: it means that they belong to a nation and the local government policies should be accorded with national policies for a harmonized smart cities dissemination and growth [16].Current economies and social wellness increasingly depend on digital knowledge and information; smart cities are not only an opportunity for local development, but a national opportunity of economic growth. [16]

E. Steps to be taken for Converging City into Smart City

- Business Modules, Identify city strength and identify future opportunities for city
 - Understand IT requirement and knowledge services required for business enhancement, cost reduction, reduction of growth barrier
 - Understand skills required and how to attract such resources or how to develop such human resources in-house and the role IT based training which can promote such skill development
- Decision making for civic decision makers and administrators
 - Identify services which needs improvement to convert into a smart city and identify the role IT can play for such improvement of quality of civic services
 - Identify role of IT which can reduce cost of civic services and reduce corruption
- Identify areas for which accessibility of civic services shall be made available with the help of information technology
- Identify the projects which can be taken up along with likely cost
 - Likely cost of projects
 - Technical and financial Feasibility of such projects
 - Understand cost recovery mechanism
 - Define regulatory framework for implementation of the project
- Identify projects which can be taken up on PPP basis
 - Prioritize the projects based on
 - Stakeholder consultation
 - Priority for overall income development and cost reduction for city as a whole
 - Identify projects which need to be taken on pilot basis

F. Smart City Context

Table 6: Smart City Context, Context based approach proposed by Dr. Alka Bharat, MANIT, Bhopal

CONTEXT			
Concept	Design	Technology	Implementation
Aesthetics vs Functional	Game Theory	Hopes & Fears	Sensitizing citizens
Design driven vs Public Opinion driven	Decision –Making	Partners & Participants	Capacity building
	Institutional - set-up	Cost & Returns	Holistic Smart governance
	System’s Approach	Priorities	Co-ordination
	Co-ordination		Accountability
	Incremental		Transparency
	Segmental		Dichotomy between Urban & Rural- abolish. contrast between two that are represented as being entirely different.
	Evolutionary		Opportunities, conflicts and challenges
	Revolutionary		New dimensions - Social & Technology
	Integrated		
	Government Policies		
	Synthesis		
	Brownfield / Greenfield		

IX. CONCLUSION

Evolution of settlements has come a long way to city efficiency & city competitiveness. There used to be decorated garden cities whereas now there are competitive cities with responsibilities of sustainability and resilience. With these important concerns, city management is optimization management of resources for operations of city services, functions, amenities and facilities that are required to be provided to stakeholders for good quality of life. High concentration of population needs comprehensive coordinated city management of services and resources. And this can be performed with use of information technology in city operations which is commonly known as Smart City. The Indian Cities have a basic approach of functioning under pressures of demand. While there is little that aims at developing economic resources. City Development Plans need to highlight gaps in Economic and Environmental Infrastructure and propose City Vision. The provision of Special Purpose Vehicle as Smart City Company aims at developing the economic clarity and certainty of the project. What remains is the aspirations of citizens and for that there are many aspects to be covered in the smart cities and thus the development should be context based as one suggested by Dr. Alka Bharat of MANIT, Bhopal for a clarity on context in development of Smart City (Table 6). As every country has its own understanding and model of Smart Cities, India too need to have what is smart for its cities. People and system are important and need to understand each other. Government needs to choose priorities and go one by one, and citizens must understand this opportunity of data based decision in city management.

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