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Smart Sustainable E-Solutions for Implementation and Enforcement of Smart Cities in India

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1 ABSTRACT

In the present knowledge and information age Indian towns and cities are expanding rapidly in spatial and demographic terms. Moreover, spatial information are not correlated with the complex urban integrated problems, as data generated at various level for urban planning and management remains uncoordinated and redundant to support decision-making and leading to poor urban governance and timely implementation of the master plan. Hence, there is an urgent need to create common platform so as to address problems and issues in the right perspective to assist cities in coping with economic realities and, thereby, produce high quality responsive environment and demonstrate successful urban solutions. Thus, in order to address these issues in a holistic manner, the Ministry of Urban Development has launched the Smart City Mission for 100 cities on 25th June, 2015. However, due to the absent of any basic "Smart E-Solutions Model" for implementation and enforcement of sustainable development plan in India, the present paper is an attempt to evolve the concept of "Smart E-Solutions Model".

At first the present paper discusses about the smart sustainable solutions at design level. Thereafter, the paper evolves a "Smart E-Solutions Model" to establish intelligent online system for implementation and enforcement of sustainable development plan design. Hence, to define the success of Smart City Scheme in India, the present paper pursing a vision of sustainable smart cities by exploring the possibilities of different innovative solutions through designing of Smart Comprehensive Development Plan (SCDP) through virtual world.

GIS based SCDP will facilitate the cities to compete in the global competitive world. In India designing SCDP will act as E-solution tool to ease out new challenges and opportunities for urban planners and managers to design the various dreams, ideas and hopes of urban community and translate the same into the spatial terms. In all this paper will thread common ground to address problems and issues in the right perspective to assist urban planner, manager in coping with economic realities and, thereby, produce high quality responsive environment and demonstrate successful sustainable urban solutions for implementation of Smart Comprehensive Developemnt Plan through "Smart E-Solutions Model".

2 INTRODUCTION

When the world is gearing up for transforming the urban community to a smart and sustainable community, India is also committed to transform cities for better responsive quality of life through the application of Information and Communication Technologies (ICTs). With the establishment of the Urban and Regional Information System Department in Town and Country Planning Organisation, New Delhi, during the 1980s, India has never look back on involving ICTs for Planning and designing of Indian cities and towns. The computation technologies became an integral part of the urban and regional planning and data management system. However, during the last ten years, dramatic changes have been manifested by Indian planners and urban managers with the development and launching of the National Urban information system scheme in India by the Town and Country Planning Organisation under the Ministry of Urban Development. Moreover, during the mid 1990s, the department of Space has set up by the National Natural Resources Management System with the basic objective to utilise natural resources in a sustainable manner and protect the environment. Hence, the fusion of ICT and sustainable development of cities and towns were already in the thinking process towards effective decision making for smart urban and regional planning in India.

In the present knowledge and information age Indian towns and cities are expanding rapidly in spatial and demographic terms. Moreover, spatial information is not correlated with complex urban integrated problems, as data generated at various levels for urban planning and management remains uncoordinated and redundant to support decision-making and leading to poor urban governance and untimely implementation of the master plan. Hence, there is an urgent need to create a common platform so as to address problems and

issues in the right perspective to assist cities in coping with economic realities and, thereby, producing high quality responsive environments and demonstrate successful urban solutions. Thus, in order to address these issues in a holistic manner, the Ministry of Urban Development has launched the Smart City Mission for 100 cities on 25th June, 2015. However, due to the absence of any basic "Smart E-Solutions Model" for the implementation and enforcement of sustainable development plans in India, the present paper is an attempt to evolve the concept of "Smart E-Solutions Model" for Rourkela City of Odisha State in India.

In the present cyber era, the development of Web 2.0 technologies; customised and entrepreneur GIS; computer animations; and 3D cadastral information, dramatically changing the prevalent syntax and semantics of the urban and regional planning process. At the same time, a whole gamut of rapid development in network technologies; establishment of GIS labs at 153 towns and cities through NUIS Scheme; development of space technologies; disseminating knowledge by some of the high-profile websites like YouTube, MySpace, Google, Flickr, Facebook, Twitter, created a conducive environment to harness the virtual world technologies to design and find solution for complex urban problems in a smart way. Thus, smart cities are not only about application of ICTs for E-governance but should be open to multiple perspectives on smartness of Urban and Regional Planning. Hence, the present scheme of the Government of India to develop hundred smart cities is associated with innovativeness, knowledge, creativity, openness and inclusiveness (Careyannis and Campbell, 2010). In this context Rourkela Smart E-Solution Model will support the building of a responsive, intelligent sustainable city.

3   BACKGROUND OF ROURKELA CITY

Rourkela is an important commercial centre of Odisha State. In fact, the Rourkela Steel Plant (RSP), a unit of SAIL makes Rourkela one of the largest steel manufacturing towns in India. There are many small scale industries in Rourkela catering for the needs of RSP and other large industrial units. The literary meaning of 'Rourkela' according to the language of 'Sadri' is "Your Home". Moreover, the tribal community called 'Raulia' has been living in the village since times immemorial. The erstwhile revenue village of Rourkela is now popularly known as old Rourkela. The Rourkela Development Planning Area comprises Rourkela Steel Plant, Steel Township, Civil Township and 52 villages. The total planning area stretches over an area of 259.18 sq. km. with a total population of 2.59 Lakh (Census, 2001).

The Rourkela Development Authority (RDA) is looking after the execution of town planning schemes and also after development control aspects of the Rourkela Planning Area. As such two functionaries i.e. RDA and Rourkela Municipality under the administrative control of the Government are responsible for the overall Development of Rourkela Planning Area. The total Rourkela Development Planning Area covers 104 Mouzas out of which 52 units/ Mouzas in Rourkela Steel and civil township and 52 Mouzas in the surrounding. The area extends over 259.18 Sq Km of which the Civil Township area is 22.73 Sq. Km. constituting 8.76 % of the Steel Township area of 20.98 Sq. Km, while the rural area of 183.49 Sq. Km. is constituting 71 % of the total Planning Area for Rourkela. Reserve forests lie on the north and south of the Planning area and comprise of 11.37 Sq. Km, constituting 4.39 % of the total Planning Area.

The Rourkela Planning area is located at 22o – 12' N Latitude and 84o – 54' East Longitude. Most of the northern boundary is formed by the Koel River flowing from the east and meeting with the west flowing Sankh River just at the north-west corner of Rourkela Steel Township, flowing down southward as Brahmani River and dividing the Planning Area into three parts. The Brahmani River takes its course southwards through the region which borders the South-West, the Saranda forest in the South and vast agricultural land in the East.

The industrial potential of Rourkela town led to a sudden spurt of population increase after the establishment of the Steel Plant. The population of the Civil Township was less than 4000 persons in 1951 but by the year 1961 the population had increased to 35,000 persons. Since then the population has increased to 2,59,553 persons in 2001. This registers an annual growth rate of 16.04 % which is more than the urban population increase in Odosha State. If compared with the growth rate of population during the last decade Rourkela registered 69.99% of growth rate where as growth rate of the urban population in the State is 30.28 % for the same period. The main factor responsible for growth of the town is the availability of employment opportunity which benefits the agglomeration economics and makes Rourkela an economically vibrant town and attracts people from the hinterland.

4   CONCEPT OF 'SMART E-SOLUTION MODEL' FOR ROURKELA CITY

Apart from sustainable design of Rourkela there is a need to establish Smart E-governance with the help of emerging Information and Communication Technologies (ICTs).   Smart E-Governance will not only improve service delivery but add efficacy to the function of the Rourkela Development Authority (RDA). However, successful implementation of 'Smart E- Governance Model' for RDA will put forth the new frontiers for multiple challenges on the role of leadership, process alignment, availability of right skills; designing, planning and enforcing sustainable land-uses; establishing a high end, state of art computer lab; and a participative responsive local community. Rourkela is facing ever more complex urban problems as regards competitiveness of the international business community and is well aware of the reactions of the tribal community which poses a challenge to making a success of the application of smart and sophisticated technologies in social terms.

As Rourkela is embedded in a tribal community, just to provide a simple and understandable "Smart E-governance Model" will not serve the purpose of socialising the Rourkela urban community, because, social boundaries go beyond the smart Physical Planning and Web 2.0 technologies E-Solutions. Hence, for RDA, as the planning and governance process is evolving around the social uncertain environment, a "Smart E-Solution Model" needs to be framed through collective intelligence, social intelligences and wisdom of local urban community.

Thus, with the help of crowd wisdom, a collective intelligence system will be evolved through Web2.0 technologies and RDA Planning participative E-Solutions Platforms. The interactive applications are also required to be framed for implementation and enforcement of RDA Planning services and government process to generate E-solutions. The adapted Smart E-Solutions Model will be presented to both Rourkela communities (Industrial and Tribal communities) by smart service delivering; smart traffic management system, smart planning process, smart approval by government authorities and smart peoples participation.

The Smart E-Solution Model (SEM) for Rourkela has been conceptualised by three elements, first, innovative technological solutions (both hard and soft), secondly, local community (leadership, responsive, intelligent and creative thoughts) and thirdly government (policy, rules, governance, political will). In a way SEM will transform the smart city approach from only application of ICT to urban planning (Anttiroiko 2012) to integrating s social system which enables society to create, solve, built, use, transform, need, secure, etc the smart city. Hence, the smart E-solution Model is framed by integrating physical planning design with the influence of the local community over a digital platform (Figure 1).
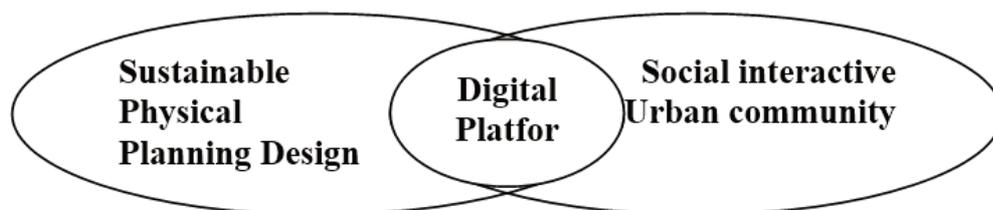

Fig. 1: Smart E-solution Model

Moreover, a Digital platform is required to be built at RDA to act as a Rourkela City System for the entire city, complemented by the sub-system which will be part of wider systemic whole. Rourkela City System will be based on the input-output model for measurement of sustainable development and quality of life. These sub-systems will consist of a smart transportation system, smart E-governance, smart ecological system, smart water management system, smart infrastructure system, smart community system, smart power management system, smart finance system, smart social development, smart economic development, smart environmental development system, smart creative community development system, smart housing system, etc. In the subsequent years after installation of the Smart E-solution system the success can be measured and will be able to transform itself, repair itself, and redesign the base of collective intelligence through the acting players.

The spatial planning designing concept of the Comprehensive Development Plan (CDP) of Rourkela is reflected in three interlinked layers. First, the Knowledge Core layer at the confluence of the Sankh and Koel Rivers and emergence of the Brahmani River where the Vaid Vayas Temple for spirituality is also located, Vedanta university for knowledge, Rourkela Airport for connecting with the outside world and dense forests

and ecological reserves. Second, the Resting Middle layer for providing social space and residential and recreational land-uses. This middle layer connects the third Working Periphery layer. The working periphery will be designated for the growth of the economy, industrial boost or working areas. Thus outward movement of traffic will lead to economic growth and inward movement of traffic will lead to enhancement of social connectivity and inner peace (Figure 2).
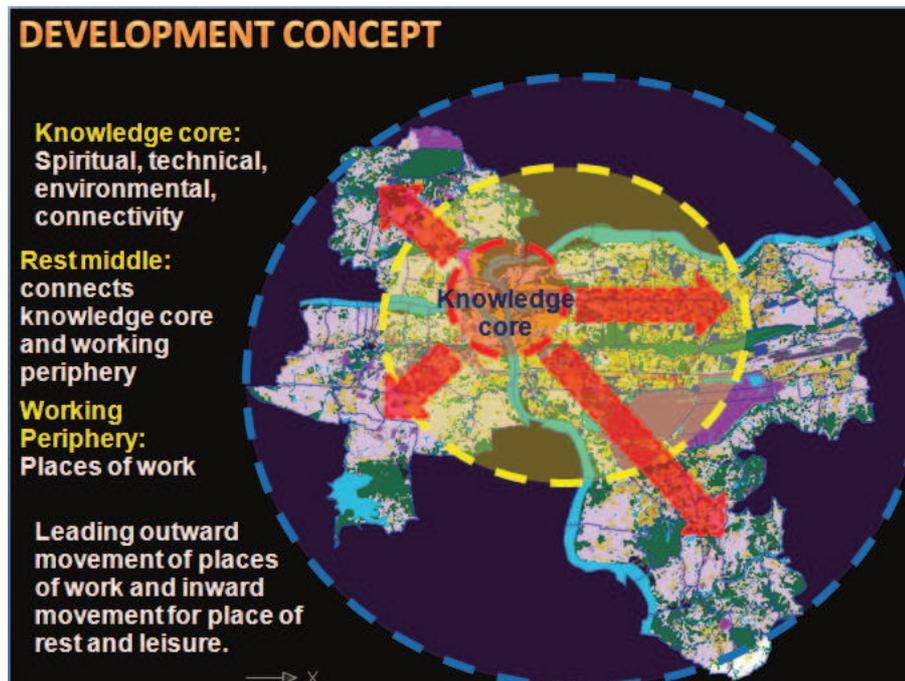

Fig. 2: Sustainable Development concept of Roukela City

Hence, during the physical planning design of CDP of Rourkela the centre of the townwill provide a social and knowledge sharing space for local community participation and inclusions and to react to the digitally created platforms. As in the Smart E-Solution Model, community participation takes the central role for governance and urban planning. Thus a crowd-sourcing model will take centre place in the Smart E-Solution Model and wisdom of crowds will create effective solutions do that the government can take a collective decision.

5   SUPPORTIVE TECHNOLOGIES FOR THE SMART E-SOLUTION MODEL

In order to disseminate information over the digital platforms Web 2.0 technologies provide limitless possibilities for social inclusion of the local community for making urban planning and design sustainable cites. Web 2.0 technologies are participatory web applications in which one can participate and where people can create their own content and communicate over map, sketch, picture with the local and worldwide governance system , irrespective of language difference. Infect Web 2.0 is a powerful tools for planners to communicate with the local community and vice-versa. Social networking sites, Google map Mashups, blogs, YouTube, are some of the effective example of Web 2.0 technologies.

Moreover, Web 2.0 technologies are also providing transparency to the governance system through interoperability of the urban planning. Transparent government system is the essential need for social inclusion and local community involvement in the planning process. In recent years, Central and State Governments are making extensive investments for E- governance and urban planning. One example is Haryana Urban Development Authorities E-governance project, eHUDA project. The main role of the project is to have automated functioning of various departments of HUDA. This will provide a quality services to the urban community of Haryana State and also make HUDA planning process transparent to local community. With the help of Web 2.0 technologies HUDA has created a Plot and Property Management (PPM) system. Another example is 'Automated Building Plan Approval System' by Indore Municipal Corporation. It was envisaged to facilitate quick processing and disposal of pending building plan permissions, automation of the drawing scrutiny, standardisation of building fee and other changes for

effective monitoring of the process. Local communities today are aware of their rights and expect efficiency, accountability and transparency in all areas which affect them.

Basic importance of the Web 2.0 technologies is that, all unconventional data, irrespective of its source, which have geo-located information, can be used for planning purposes. Thus, the use of this unconventional data to translate into planning solutions will define the Smart E-Solution Model for Rourkela or any other city. For example, data available on road side camera for traffic management will provide many important data if fixed with the Urban planning portal, banking transaction system, smart phone video recording and uploading on social networking sites, controlling social behaviour or traffic movement on roads through FM Radio, GPS installed on taxi and many innovative data mining techniques will measure the smartness for defining Smart Urban planning.

6 CROWDSOURCING WEB 2.0 TECHNOLOGIES FOR SMART E-SOLUTIONS MODEL

Smart E-Solutions Model will be using Crowdsourcing Web 2.0 platform at all stages of the planning process. Crowdsourcing will lead to the collective intelligence and, thereafter, creating web based solutions to complex urban problems. In the sequence to the Model,

(a) Identification of the problems: local community will communicate the problems over digital format and give the responsibility to disseminate the knowledge for different perspective of problems.

(b) Defining Goal: Creating a collective response over defining a goal and recording local community ideas to translate into the future design of the city by solving the problems and giving direction to the city development.

(c) Collection of Data: the process of collection of data first compounded through unconventional sources through identification of the Intelligent Crowdsourcing and creating crowdsoucing information platforms. Mobile and internet alert applications software should be put in place for reporting and collection of data.

(d) Analysis of data: Collective resources information generated by the Crowdsourcing information platforms should be connected with the different analysing computer models and translating the results for crowd computing. Local community should be mobilized to analyse the solutions of the problems and concluding the solutions over technical controlled but transparent platform.

(e) Designing solutions: Crowdsourcing should be encouraged to create designing solutions over online mapping and defining the content of the plan for creation of virtual plan.

(f) Implementation of the plan: Implementing virtual plan over real space will give pride and social satisfaction to the local community and even come forward with innovative idea for fund raising.

(g) Monitoring of the plan: Crowdsourcing Monitoring platform will provide easy access to the monitoring information and recording online efficiency of the concerned agencies.

(h) Evaluating of the plan: Evaluating Performa in relation with the plan should be displayed on the Authority web site for public reaction to the plan.

Overall designing a Smart E-Solution Model for Urban and Regional planning will reduce planners' dependency on time and space and over a period of time will transform the traditional planning process over virtual planning process for defining Smart Sustainable solutions for participatory, transparent Urban Planning.

7 CONCLUSION

Moreover, it is evident that Smart Rourkela City will not only use the application of ICT for the planning process but also reflect smartness for planning and design of Rourkela city. Thus, smart Rourkela Planning and designing approach is not only ICT oriented but also gives evidence to innovative ideas for the collection of data or information; people participation; knowledge base; creative economy; inclusiveness; and transparency. At first the present paper discusses smart sustainable solutions at design level. Thereafter, the paper evolves a "Smart E-Solutions Model" to conceptually frame an intelligent online system for the implementation and enforcement of sustainable development plan design. Hence, to define the success of Smart City Scheme in India, the present paper is pursing a vision of sustainable smart cities by exploring the possibilities of different innovative solutions through designing a Smart Comprehensive Development Plan (SCDP) through the virtual world.

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