

1. Using Information and Communication Technologies (ICT) Rural to Smart Cities

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Abstract:

It is possible to lessen the city's environmental impact while simultaneously improving the quality of life for its residents by creating a "smart city" that employs cutting-edge technologies. ICT is used by smart cities to put their smart strategies into action and to collect and send data to a variety of consumers.

Smart cities thus connect several urban features and concepts such as wired cities, virtual cities, intelligent cities, information cities, digital cities, knowledge cities, and so forth. For rural development to be successful, it is imperative that the rural population's living standards be raised by providing them with appropriate and high-quality social services and other needs.

Poverty alleviation, increased livelihood prospects, and the provision of basic utilities and infrastructure facilities are the primary goals of rural development in the current plan. Rural development has a new ally in information and communication technology (ICT). If used appropriately, ICT can have a significant impact on the development of grassroots organisations. As a smart city, ICT helps the city collect data, information, and knowledge that affects daily life and improves quality of life through e services, a stronger involvement of citizens in the city governance and a proactive role thanks to e democracy and the e participation platform.

Keywords:

ICT, Smart city, urbanization, IoT, Broadband, rural, urban, Technology

1.1 Introduction:

To put it another way: The telecommunications industry is a fast-growing sector of our economy. The consumer experience, spectrum utilization, the development of new services, etc., are all improving as a result of new technologies and technological breakthroughs.

In the past two decades, the telecom industry has evolved tremendously, bringing with it a slew of new ideas and technologies to the rest of the economy. [1]

India is witnessing a wave of migration from the rural to urban areas. Therefore, complete development of physical, institutional, social, and economic infrastructure is the need of the hour. All these changes are vital in increasing the quality of life and drawing people and investments to the city, setting in motion a sustainable cycle of growth and development. [2]

With the growth and evolution of information technology (IT) in the last century, the term of information communication technology (ICT) has been dominating over the 21st century in all aspect of our lives worldwide.

In the smart city project area, a range of pilot projects and agendas have already been implemented in both developed and developing countries, paving the way for a digital and smart society. [3]

A smart city is an entity that uses ICT effectively, to integrate the needs of its urban community, in terms of energy and other utilities (production, distribution and use), environmental protection, mobility and transportation, services for citizens (healthcare, education, emergency services, etc.), and with proper regard for security, both of individuals and their personal data, and use it as a driver for economic and social improvements.

More smart technologies and solutions would be deployed in rural areas, which would help local businesses grow and create conditions that would make smart communities more appealing to residents. [4]

A number of industrialized nations have already begun their own smart city approaches and efforts, as well as related policy and strategy at the national and regional level, which is gradually forming a national standard for each nation's smart city development. Several beneficial consequences and reciprocal advantages, as well as different changes in societal development, can be observed as ICT rapidly evolves around the world, including the effective adoption of E-government in several countries and ICT-based services. [5]

About 37 crore people, or 31 % of India's total population, live in cities, accounting for 63 % of the nation's economic activity, according to the 2011 census in India³. Nearly half of India's population will be living in cities by 2050, according to government projections. We need to discover innovative ways to manage complexity, increase efficiency, cut costs, and improve quality of life in order to deal with this large-scale urbanization. As a result, cities will be managed more effectively.

Smart cities are becoming a reality because to new technology including ultra-low power sensors, wireless networks, and online and mobile applications. They can deliver real-time information on everything from traffic patterns to pollution levels to parking places to power and light. [6]

A city's economic and environmental well-being can be improved using this kind of information. Improved working conditions and productivity for city workers will also result from this. Smart Cities concentrate on the most pressing issues and the most promising prospects for bettering the lives of their citizens now and in the future.

Rural areas, despite their abundance of natural and cultural resources, are typically viewed as lacking in knowledge capacity that hampers the efficient exploitation of these resources. Growing power in information gathering, processing, archiving, retrieval and transmission over long distances is creating new potential vistas for rural areas' future development. This is known as the "Information and Knowledge Society" (IKS). [7]

International Telecommunication Union (ITU, 2014) has clarified the massive benefits of ICT as follow:

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- "improve our ability to track progress toward all of the Sustainable Development Goals, to assess the techniques employed to do so, and to discover what is working"
- Working and not working, as well as how quickly and effectively decisions may be made.
- The landscape of development can be improved by streamlining and improving the efficiency and efficacy of our efforts.
- increasing the number of digitally enabled goods and services that benefit local economies, spurring creativity and building stronger local communities

1.2 Role of ICT in Employment:

Employment Technology has the potential to create rural jobs, especially for young people with some formal education but not enough to compete effectively in the urban job market. Additionally, they may be unable to move due to high search expenses or, in the case of women, social restraints.

Young women in particular might find rewarding careers in information and communication technologies. [8] In addition to the (perhaps minor) immediate monetary and employment benefits, field research indicates that young people's self-esteem is much increased, and they serve as positive role models for others in rural areas considering atypical, nonfarm rural work opportunities.

1.3 Role of ICT in Educations:

Because of the low marginal costs of digital media creation and consumption, enormous economies of scale are possible. Development of educational materials (which may require significant fixed costs) can also be achieved economically in countries such as India provided the market is identified and IT resources can be obtained by overcoming the relatively high fixed costs. Many of the efforts show that youngsters are able to quickly adapt and use a wide range of ICT tools for educational and recreational purposes, which is a good thing. [9] For a reasonable price, rural ICT providers can offer educational services to their customers.

The basic challenges that usage of ICT for rural development faces are:

- There is widespread illiteracy in the world's population.
- Every day, for 5 to 12 hours, the country-side suffers from widespread power outages and "brown-outs." Despite the fact that power supply systems are used, they are unable to handle power outages.
- Bandwidth and connectivity issues are major concerns. Technology exists to increase bandwidth, but not enough money has been allocated to change this situation. There is, however, a major improvement in connectivity once a few projects for bandwidth upgrades are completed.
- Financing issues faced by both state and local governments at the grassroots level. Funding for rural ICT development must be increased dramatically, and the private sector must play an increasingly important role. [10]
- Project managers and guides are in low supply, making it difficult to get ICTs implemented at the grassroots level. As a result, the majority of professionals prefer to work in urban locations, where there are numerous prospects for advancement and financial gain. ICT development in rural regions would always be slow if these 'techno-catalytic' resources are not available.

1.4 Review of Literature:

There are many reasons why ecological viewpoint studies are important, according to Wang [11]. First and foremost is that they are able to conceive various stakeholders as well as a variety of innovations practically as a single ecosystem, exactly like a biological one.

"Different entities, processes, goods, services, organisations, industries, communities, as they draw on resources, including technology, attention, and knowledge, to develop and realise the value of digital innovation" can be conceptually linked by adopting this particular approach. "

Over the years, ICT has been used to improve urban systems and quality of life, as demonstrated by Hosseini et al. [12], O'Grady and O'Hare [13], Batty et al. [14], Albino et al. [15], etc.

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As a result, the SC has become an example of an ICT framework in which cities are able to create and implement numerous strategies that can effectively solve the expanding urbanization concerns. In contrast to global initiatives, European initiatives work with communities where basic infrastructure is already in place, "addressing different challenges of smart and sustainable development through products and services with social, economic and environmental benefits," according to Zavrtnik et al. [16].

SVs' conceptual diversity and applicability are evidenced by the variations in how they are applied, proving that rural areas are everything but uniform. Zavrtnik et al. believe that a place-based strategy to digital transformation of the SVs is the best way forward.

As a result of the intelligent technology and ICT-intensive solutions, the public services of health, education, safety, and governance are being empowered by ICT, according to Hernández-Muoz et al. (2011) [17]. ICT-based infrastructure and spatial intelligence combine to create "smart urban settings," which serve as a platform for better delivery of services and applications within a given geographic area. In addition, designing or re-designing a web-based application increases the quality of e-services, which encourages the public sector and citizens to communicate.

1.5 Objectives:

- In smart city development, what is the role of ICT?
- The role of Information and Communication Technology (ICT) in creating smart cities

1.6 Research Methodology:

Research is a trip of discovery; a journey; an attitude; an experience; a method of critical thinking; an activity motivated by instinct of curiosity to get fresh insight/find answers to questions/acquire knowledge. To use analytical and descriptive approaches in the research, a careful reading and interpretation of secondary materials is required. In order to fully develop the textual analysis, it is necessary to do a close reading analysis of a small number of secondary sources.

1.7 Result and Discussion:

Growth in cities around the world is unstoppable. People have been migrating to cities from rural areas all across the world since since the nineteenth century.

Economic and Social Affairs estimates that the proportion of the world's population living in cities has increased from 30% in 1950 to 50 % at some point in 2008. It is predicted that by 2050, 64% of the developing world and 86% of the developed world will be urbanised. [18]

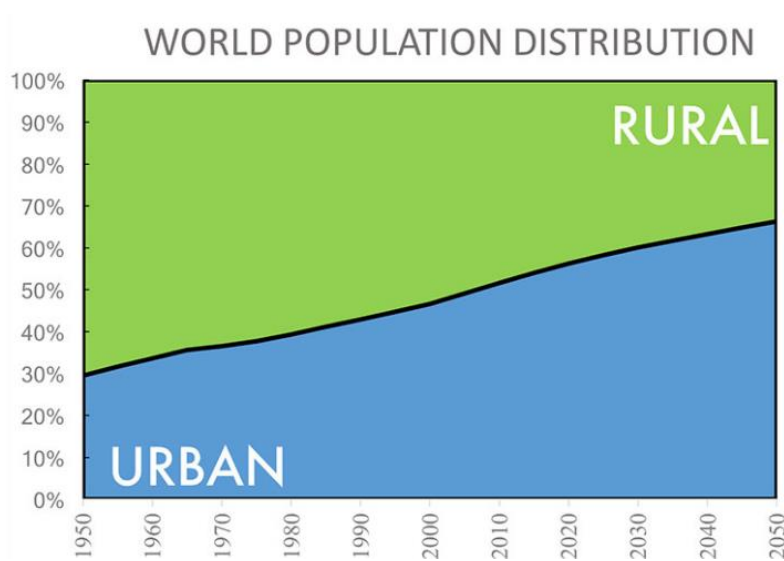


Figure 1.1: Historical and projected global urban and rural population distribution.

IoT can be considered as a global infrastructure for the information society, the technology that connects not just humans with things but also things with every other thing.

By 2020, 30 billion items will be inter-connected, with each item having a unique IP address. Future of ICT is as show below. [19]

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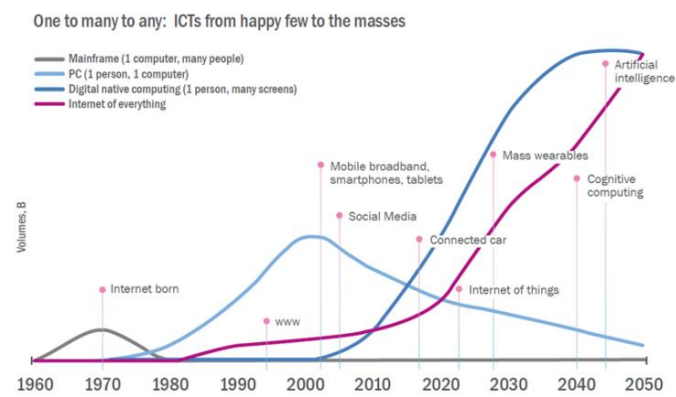


Figure 1.2: Development of ICT

Components of the IoT systems architecture, listing identification, sensing, communication, computing, services, and semantics



Figure 1.3: Internet of Things (IoT) Architecture Components.

Various countries' rural development attempts have taken into account some or all of the issues and critical aspects listed below. [20]

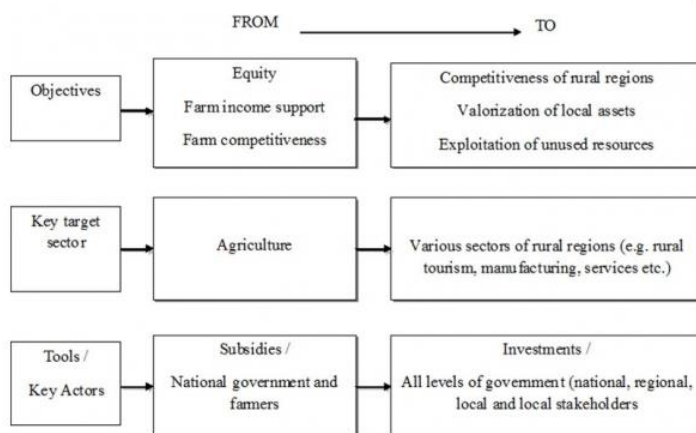


Figure 1.4: below is presented the shift from the traditional to the new rural development policy paradigm.

Digital inclusion and the creation of network value through the dissemination of knowledge and information are two of the most important functions of ICTs in the pursuit of long-term rural development goals. [21]

1.8 Conclusion:

Application-specific utilization of IoT architecture components, together with the acknowledgment that topographical differences between ecosystems play a role in connection, characterize the IoT technological domain. Examples of use-cases that demonstrate the structural aspects of each ecosystem's IoT application domain may be found in the use-cases (e.g., Smart Building, Smart Agriculture, E-health, Smart Grids, Smart Mobility, etc.). Social networks, empowerment and involvement, as well as local economic development can be bolstered through the use of ICT technologies, which can also provide employment and skills training and support services for micro-enterprise activities. Extreme natural hazards (drought, landslides, flooding), as well as their impact on local social systems (health, infrastructure, transportation, migration) in rural communities in developing countries are prompting an increasing interest in ICT tools (the potential of telecentres for disaster preparedness and response).

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