Efficiency of Information and Communication Technology (ICT) in Sustainable Smart City Development

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Abstract - With the aim of making cities equitable, inclusive, smart and environmentally sustainable, the ICT has a key role to play in leveraging IT systems and innovations. Cities are complex systems which involve multiple stakeholders, agencies, departments and organizations. It is a necessity to innovate and respond to a new generation in terms of communication, health, education, recreation and urban services, while efficiently running daily operations. It must provide services that support the social, health and educational needs of citizens. A smart city provides infrastructure services such as water, sanitation, drainage, SWM, sewage, energy and transportation with intelligent networks, sustainable buildings and systems. A smart city focuses on intelligent computing infrastructure with cutting–edge advances in cyber–physical systems, and innovation support. Since a city is composed of numerous buildings, these also need to be smart and green. By innovation and renewal of existing operations it may be possible to reduce energy consumption. Integration of major systems on a common network helps optimize use assignment and space configurations, eliminating unused or underperforming space. There are so many components of ICT like internet, telecommunication and Geographical Information System (GIS) which make a city sustainable and efficient to provide online services and transparent Government system.

Key Words.:- Sustainable, Urban Health quality, Water Environment, . ICT

I. INTRODUCTION

A smart city (also smarter city) uses digital technologies to enhance performance and wellbeing, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens. Key 'smart' sectors include transport, energy, health care, water and waste. A city become smart which consists such characteristics like Information, Communication and Technology (ICT)-enabled governance, Efficient utilities - energy, water, solid waste and effluents, public-private partnerships (PPPs), Safety and security, Financial sustainability, Citizen-participative local government, Sufficient social capital, Transit-oriented habitats, Green features and Minimum population criteria.

ICT is a core to innovation in any Industry or organization.ICT Can Help Government Empower PWDs and Lead to their Inclusion- Says Minister for Social Justice and Empowerment

The breakthrough in technology has multiplied the space, energy and time. It has now been realized that ‘less is more’ with the application of microchips, micro-computers, microwaves, nano– technology, etc. The buildings and services are yet to capture this breakthrough. It is time that new forms of energy, services and construction are evolved. Renewal energy and recycling must be the key concepts in services and buildings. A new pattern of shrinking space and time is emerging. The network of society, cyber–space and e–topia is changing the familiar borders like inside–outside, private–public, here–there, city–country and yesterday–tomorrow. The world of space and place is characterized by online exchange of information, interactions, dynamic networks and floating nodes.The economy (Smart Economy) refersto cities with "smart" industries, especially in the areas of information and communication technology (ICT) as well as other industries that involve ICT in their production processes.

II. APPLICATION OF ICT IN SMART CITY DEVELOPMENT

ICT has the potential to play the role of a catalyst for the transformation of a city into a smart city with integrated and open interface of information management and governance platform. Urban development and transformation are intrinsically linked to the knowledge-based society where innovation and technology are main drivers of growth collective community intelligence and local capacity. This requires a planning paradigm pertinent for local-urban-regional development and innovation management. By developing sector–focused, cluster–based intelligent city strategies, territories can set in motion innovation mechanisms of global dimensions and enhance substantially their services and systems. The critical factors are those that affect use of resources and carbon emissions, such as energy use, transportation, waste prevention and recycling, air quality, water quality, affordable housing, green space and buildings. This implies the need to rethink and reshape the urban environment, comprising transportation infrastructure, zoning, building codes, waste management, open space and greens, etc., which make the city more efficient, sustainable, and smart. ICT can help in the integration of citizen participation, governance and online consultation over plans and programmes of local development.

Environmental sustainability is important in a world where resources are scarce and where cities increasingly base their development and wealth on natural resources. Their exploitation must guarantee a safe and renewable use of natural resources. The availability and quality of the ICT infrastructure is essential for a smart or intelligent city. However, it is also necessary to stress the role of human capital, education and learning in urban development. It has been shown that the most rapid urban growth rates have been achieved in cities where a high share of educated labor force is available. Innovation is driven by entrepreneurs who innovate in industries and products which require an increasingly more skilled labor force. Because not all cities are equally successful in investing in human capital, an educated labor force – 'the creative class' – is spatially clustering over time. This makes the cities diverse in terms of human capital, and the cities which are endowed with a skilled human resource, have managed to achieve spatial homogeneity by progressive clustering of human capital.

ICT Enabled Function	Use
Water Supply, Drainage and Sewerage	• Increase customer choice and control • Water quality and reliability • Lowering operational cost • Eliminating wasteful leaks • In addition to installing sensor • Increasing resilience. • Reducing damaging floods and overflows. • GIS Mapping • Smart metering and billing
Energy	• Energy networks • Smart Grid • Smart meters • Alternative energy • Reducing energy waste. • Electric Vehicle • Power quality monitoring • Optimize these energy systems • Enabling distributed generation. • Bionic control • Intelligent management • Online bill payment
Smart Mobility	• Traffic controls, smart signals, variable signage, mobile enabled real time maps/routes, way finding. • Smart card • Enable multi-channel access to an integrated customer transportation account. • Accident monitoring, forensic analysis • Stretch transportation budget. • Infrastructure integration • Achieve multi-model optimization • Reduce trip time • Implement optimal instrumentation for all modes. • Improving public safety • Empowering people with choice and control. • Improved mobility.
Health and Human services	• Public health is the macro, citywide view of health. • Broadening access to healthcare. • Preventing diseases and disorders before they emerge. • Telemedicine is cost effective. • Reduced long-term health costs. • Telemedicine and smart learning mean less travel. • Improved public health means fewer work hours missed.
Telecommunication Network Public Service and Transparent Governance	• Broad band connection, • Internet connection in public places • ICT support and training • Land information system, digitization, GIS based DBMS, Geoportal

List of application can be use in smart city development

The reality of the New Digital Society affects companies, just as it affects people, whatever their size. Companies must adaptto this reality, adapting their culture and they way they organise work to the digital economy. In that sense, although there are differences between regions in Europe and Asia compared with Latin America and Africa, regarding the degree of penetration of new technologies in businesses, the number of companies that have computers and Internet connections is on the increase.

Sensors very important aspect it can be used to manage the mobility needs of citizens with an appropriate Intelligent Transport System (ITS) that takes care of congestion, predicts the arrival of trains, buses or other public transportation options; managing parking space availability, expired meters, reserved lanes, and so on. ICT can be also used for environmental and energy monitoring such as using sensors to detect when waste disposal pick-ups are needed, or to measure energy consumption and emissions. As previously touched upon other services may include building management services like smart meters and monitoring devices to help monitor and manage water consumption, heating, air-conditioning, lighting and physical security. ICT can also be used in improving the health of citizens through telemedicine, electronic records, and health information exchanges and in remote assistance and medical surveillance for disabled or elderly people. When providing public Safety and Security, sensor-activated video surveillance systems can be employed along with location.

E- Learning is a new technologies are evolving at breakneck speed; therefore, it is important to design digital development plans in classroomsthat mainly focus on closing the digital divide, promoting the digital skills of teachers and incorporating the new generation of digital learning resources.

III. CONCLUSION

Finally it could be concluded that ICT work actively towards the development of our cities and regions, using Information and Communication Technologies as an instrument for sustainable development in all its dimensions, for each and every community, to bridge the North-South divide, and for all citizens, against marginalization and social division; to implement in our cities and regions an e-local agenda (Digital Local Agenda), designed to promote the Information Society, taking into account in particular the socio-economic and cultural environment, and based on the broad participation of citizens and social actors, with the ultimate objective of fostering sustainable development; to strengthen the enabling role of local and regional authorities in guaranteeing adequate and secure technological infrastructure and in promoting ICT-based applications for inclusive services; to promote, insofar as it is possible, the use of free software and other tools that facilitate inclusion and digital solidarity; to facilitate the mobilization of resources for digital inclusion, by engaging, if necessary, in new financing mechanisms; to prompt all local and regional organizations involved in the development of a more equitable Information Society to implement the commitments of this Declaration.

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